# II B. Tech II Semester Regular Examinations, June/July - 2022 HYDRAULICS AND HYDRAULIC MACHINERY 

(Civil Engineering)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) Derive the condition for most economical trapezoidal channel section.
b) Find the critical depth and critical velocity of water flowing through a rectangular channel of width 5 m , when discharge is $15 \mathrm{~m}^{3} / \mathrm{s}$.

## Or

2 a) Find the velocity of flow and rate of flow of water through a rectangular channel of 6 m wide and 3 m deep, when it is running full. The channel having bed slope as 1 in 2000. Take Chezy's constant $\mathrm{C}=55$
b) Derive an expression for the discharge through an open channel by Chezy's formula.

## UNIT-II

3 a) Write the applications and types of hydraulic jumps.
b) A rectangular channel 10 m wide is laid with a break in its bottom slope from 0.01 to 0.0064 . If it carries $125 \mathrm{~m}^{3} / \mathrm{sec}$, determine the nature of the surface profile and compute its length. Take $\mathrm{n}=0.015$

## Or

4 a) A horizontal rectangular channel 4 m wide carries a discharge of $16 \mathrm{~m}^{3} / \mathrm{sec}$. Determine whether a jump ay occur at an depth of 0.5 m or not. If a jump occurs, determine the sequent depth to this initial depth. Also determine the energy loss in the jump.
b) State and discuss the assumptions made in the derivation of the dynamic equation for gradually varied flow.

## UNIT-III

5 a) What do you under stand by repeating variables? How are you repeating variables selected for dimensional analysis?
b) Explain the different types of similarities that must exist between a prototype and its model.

## Or

6 The pressure difference $\Delta \mathrm{P}$ in a pipe diameter of D and a length of L due to flow turbulent flow depends on the velocity V , viscosity ' $\mu$ ', density ' $\rho$ ', roughness K . Using Buckingham's $\pi$ theorem obtain an expression for $\Delta \mathrm{P}$.

1 of 2

## UNIT-IV

7 a) Obtain an expression for the force exerted by a jet of water on fixed vertical plate in the direction of the jet.
b) A nozzle outer diameter 55 mm diameter delivers a stream of water at $25 \mathrm{~m} / \mathrm{sec}$ perpendicular to plate that moves away from the jet at $8 \mathrm{~m} / \mathrm{sec}$. Find the force on the plate, the work done , the efficiency of jet.

## Or

8 a) Derive the equation for force exerted by a jet on stationary inclined flat plate and draw with its neat sketch?
b) A jet of water having a velocity of $35 \mathrm{~m} / \mathrm{s}$ strikes a series of radial curved vanes mounted on a wheel. The wheel has 200 rpm . The jet makes $20^{\circ}$ with the tangent to wheel at inlet and leaves the wheel with a velocity of $5 \mathrm{~m} / \mathrm{s}$ at $130^{\circ}$ to tangent to the wheel at outlet. The diameters of wheel are 1 m and 0.5 m . Find (i) Vane angles at inlet and outlet for radically outward flow turbine. (ii) Work done (iii) Efficiency of the system.

## UNIT-V

9 a) A Kaplan turbine develops 25000 KW power at an average head of 40 meters. Assuming a speed ratio of 0.63 , diameter of the boss equal to 0.4 times the diameter of the runner and an overall efficiency of $90 \%$, calculate the diameter, speed and specific speed of the turbine.
b) What are the characteristics curves of a hydraulic turbine? How are they useful to a practical engineer?

## Or

10 a) A centrifugal pump is to discharge $0.15 \mathrm{~m}^{3} / \mathrm{s}$ at a speed of $1500 \mathrm{r} . \mathrm{p} . \mathrm{m}$. against a head of 30 m . The impeller diameter is 275 mm , its width at outlet is 50 mm and manometric efficiency is $85 \%$. Determine the vane angle at the outlet periphery of the impeller.
b) Describe the working principle and working of a reciprocating pump.

SET - 2

## II B. Tech II Semester Regular Examinations, June/July - 2022 HYDRAULICS AND HYDRAULIC MACHINERY

(Civil Engineering)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

## UNIT-I

1 a) A most economical trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500 . The area of the section is $40 \mathrm{~m}^{2}$. Determine the dimensions of the section and the discharge. Take $\mathrm{C}=50$.
b) Explain the terms briefly:
(i) Rapidly varied flow and (ii) Gradually varied flow.

Or
2 a) Find the discharge of water through the channel shown in Fig. below. Take the value of Chezy's constant=62 and slope of the bed as 1 in 2200.

b) Prove that for the rectangular channel of most economical section Width of the Channel = Two times the depth of the channel; Hydraulic mean depth= Half the depth of flow.

## UNIT-Ii

3 a) A sluice gate discharges water into a horizontal rectangular channel of width 10 m with a velocity of $9 \mathrm{~m} / \mathrm{s}$. The depth of flow is 0.5 m . Determine whether a hydraulic jump will occur, or not and if so, find its height and loss of energy per kg of water.
b) What are the essential difference between gradually varied flow and rapidly varied flow? Illustrate with neatly drawn sketches. Or
4 a) Classify the various water surface profiles and discuss briefly.
b) Find the slope of the free water surface in a rectangular channel of width 20 m , having depth of flow 5 m . The discharge through the channel is $50 \mathrm{~m}^{3} / \mathrm{sec}$. The bed of the channel is having a slope of 1 in 4000 . Take the value of Chezy's constant $\mathrm{C}=60$

## UNIT-III

5 The drag force $\mathrm{F}_{\mathrm{D}}$ on a sphere in laminar flow is known to depend on its diameter D , velocity of flow V , density of fluid $\rho$, coefficient of viscosity $\mu$. Obtain an expression for $\mathrm{F}_{\mathrm{D}}$ using Raleigh's method.

Or

6 a) In 1:30 model of a spill way, the velocity and discharge are $1.5 \mathrm{~m} / \mathrm{s}$ and $2 \mathrm{~m} / \mathrm{s}$. Find the corresponding velocity and discharge in the prototype.
b) Explain in detail various types of dimensionless numbers.

## UNIT-IV

7 a) Show that force exerted by a jet of water on a inclined fixed plate in the direction of the jet given by: $F_{x}=\rho A V^{2} \operatorname{Sin} \alpha$ Where ' $V$ ' is the velocity of the jet; ' $A$ ' is the area of the jet; ' $\alpha$ ' is the inclination of plate to the direction of the jet.
b) A jet of water with diameter 0.1 m strikes on a series of symmetrical hemispherical curved vanes at the center attached to the circumference of a wheel with a velocity of $15 \mathrm{~m} / \mathrm{sec}$. The linear velocity of the vane is $5 \mathrm{~m} / \mathrm{sec}$ in the direction of the jet. Assuming that the vane is smooth, find the (i) the force exerted on the vane in the direction of the jet,(ii) worked one per second (iii) efficiency of the jet.

## Or

8 a) Show that the efficiency of a free jet striking normally as series of flat plates mounted on the periphery of a wheel never exceed $50 \%$
b) The diameter of the nozzle fitted at the end of pipe is 75 mm through which water is flowing and the head of water at the center of nozzle is 200 m . The jet strikes the plate perpendicular to it. Determine the force exerted by the jet of water on the plate if the plate is moving away from the jet with a velocity of $10 \mathrm{~m} / \mathrm{sec}$. Also find work done per second on the plate and the efficiency of the jet. The coefficient of velocity is given as 0.95

## UNIT-V

9 a) What is meant by cavitation? How can it be avoided in reaction turbine?
b) A Pelton wheel is to be designed for the following specifications; Shaft power $=11,775 \mathrm{KW}$; Head 400 m ; speed $750 \mathrm{r} . \mathrm{p} . \mathrm{m}$; Overall efficiency $=87 \%$; jet diameter is not to exceed one-sixth of wheel diameter. Determine the wheel diameter, the number of jets required and diameter of jet. Take $K v_{1}=0.985$, $\mathrm{Ku}_{1}=0.45$.

## Or

10 a) A double-acting reciprocating pump, running at $45 \mathrm{r} . \mathrm{p} . \mathrm{m}$., is discharging $1.5 \mathrm{~m}^{3}$ of water per minute. The pump has a stroke of 450 mm . the diameter of piston is 225 mm . The delivery and suction head are 22 m and 7 m respectively. Find the slip of the pump and power required to derive the pump.
b) List the main component parts of a centrifugal pump and explain them briefly.

SET - 3
II B. Tech II Semester Regular Examinations, June/July - 2022
HYDRAULICS AND HYDRAULIC MACHINERY
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

UNIT-I
1 a) Classify the different type of flow in channels?
b) Find the rate of flow of water through a triangular channel having the total angle between the sides as 60 . Take the value of Manning's constant $\mathrm{n}=0.015$ and the slope bed as 1 m in 1 km . The depth of flow is 1.6 m

Or
2 a) Derive an expression for maximum velocity of flow through a circular section
b) Find the discharge through a trapezoidal channel of width 8 m and side slope of 1 horizontal to 3 vertical. The depth of flow of water is 2.4 m and value of chezy's constant $\mathrm{c}=50$. The slope of the bed of the channel is given 1 in 3000

## UNIT-II

3 a) Define hydraulic jump. Explain various types of hydraulic jumps.
b) A rectangular channel 10 m wide carries a discharge of $40 \mathrm{~m} 3 / \mathrm{s}$. If at a section in this channel the depth is 1.5 m , how far (upstream and downstream) from this section will the depth be 2.0 m . Take $\mathrm{S}_{0}=0.00009$ and $\mathrm{n}=0.017$. Use direct step method for computation.

## Or

4 a) Deduce the dynamic equation for gradually varied flow.
b) A hydraulic jump forms at the downstream end of spillway carrying $20 \mathrm{~m}^{3} / \mathrm{sec}$ discharge. If the depth before jump is 1 m , determine the depth after the jump and energy loss.

## UNIT-III

5 a) In a 1 in 20 model of stilling basin, the height of the hydraulic jump in the model is observed to be 0.2 m . What is the height of the hydraulic jump in the prototype? If the energy dissipated in the model is $1 / 10 \mathrm{~kW}$, what is the corresponding value in prototype?
b) Explain the concept of similarities with suitable examples.

## Or

6 a) A 8 m height and 20 m long spill way discharges $100 \mathrm{~m}^{3} / \mathrm{s}$ discharge under a head of 2.5 m . If a $1: 10$ scale model of this spillway is to be constructed, determine model dimensions, head over spillway model and the model discharge. If the model experiences a force of 8 kN , determine force on the prototype.
b) State Buckingham $\pi$-theorem. Why this theorem is considered superior over Rayleigh's method for dimensional analysis.

## UNIT-IV

7 a) A jet of water of diameter 15 cm strikes a flat plate normally with a velocity of 18 $\mathrm{m} / \mathrm{s}$. The plate is moving with a velocity of $9 \mathrm{~m} / \mathrm{s}$ in the direction of the jet and away from the jet. Calculate
(i) The force exerted by the jet on the plate.
(ii) Work done by the jet on the plate per second.
(iii) Efficiency of the jet.
b) Define the term impact of jets and explain in detail stationary and movable jets with neat sketch

## Or

8 a) Derive an expression for the force exerted by a jet of water on a Stationary curved plate when jet strikes the curved plate at the center.
b) A jet of water 50 mm in diameter with a velocity of $25 \mathrm{~m} / \mathrm{sec}$ impinges on a series of plates. The plates are so arranged that each plate appears successfully before the jet in the same direction and always moves with a velocity of $8 \mathrm{~m} / \mathrm{sec}$. Find the force on the plate, work done per second, power and efficiency of the system.

UNIT-V
9 a) Explain the functions of following parts of reaction turbine:
(i) Guide blades (ii) Scroll casing (iii) Draft tube (iv) Runner
b) A power develops 10000 kW when running at $100 \mathrm{r} . \mathrm{p} . \mathrm{m}$. The head on the turbine is

30 m . If the head of the turbine s reduced to 10 m , determine the speed and the power developed by the turbine.

## Or

10 a) Draw and discuss the operating characteristics of a centrifugal pump.
b) A single-acting reciprocating pump, running at 50 r.p.m., delivers $0.015 \mathrm{~m}^{3} / \mathrm{s}$ of water. The diameter of the piston is 300 mm and stroke length 550 mm . Determine: (i) the theoretical discharge of the pump, (ii) Co-efficient of discharge and (iii) Slip and the percentage slip of the pump.

# II B. Tech II Semester Regular Examinations, June/July - 2022 HYDRAULICS AND HYDRAULIC MACHINERY 

(Civil Engineering)
Time: 3 hours
Max. Marks: 70

Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

## UNIT-I

1 a) Differentiate between:
(i) steady and unsteady flow (ii) laminar and turbulent flow (iii) critical, sub-critical and super-critical flow in an open channel.
b) A Rectangular channel carries water at the rate of $0.4 \mathrm{~m}^{3} / \mathrm{sec}$ when bed slope in 1 in 2000. Find the most economical dimensions of the channel if $\mathrm{C}=50$

## Or

2 a) Determine the expression for the most economical trapezoidal section in terms of side slope
b) The discharge of water through a rectangular channel of width 8 m , is $15 \mathrm{~m}^{3} / \mathrm{sec}$ when depth of flow is 1.2 m , calculate the following terms:
(i) Specific energy of the flowing water
(ii) Critical depth and critical velocity
(iii) Value of minimum specific energy

## UNIT-II

3 a) Derive the expression for loss of energy due hydraulic jump.
b) Define rapidly varied flow and discuss its assumptions.

## Or

4 a) Derive the equation for gradually varied flow and write the basic assumptions in analyzing the GVF
b) A rectangular channel 10 m wide carries a discharge of $40 \mathrm{~m}^{3} / \mathrm{s}$. If at a section in this channel the depth is 1.5 m , how far (upstream and downstream) from this section will the depth be 2.0 m . Take $\mathrm{S}_{0}=0.00009$ and $\mathrm{n}=0.017$. Use direct step method for computation

## UNIT-III

5 Prove that the discharge over a spillway is given by the relation:

$$
\mathrm{Q}=\mathrm{VD}^{2} \mathrm{f}\left[\frac{\sqrt{g D}}{V}, \frac{H}{D}\right]
$$

Where $V=$ Velocity of flow; $\mathrm{D}=$ depth at the throat; $\mathrm{H}=$ Head of water and $\mathrm{g}=$ acceleration due to gravity.

## Or

6 a) Explain in detail various types of dimensionless numbers.
b) In 1:30 model of a spill way, the velocity and discharge are $1.5 \mathrm{~m} / \mathrm{s}$ and $2 \mathrm{~m} / \mathrm{s}$. Find the corresponding velocity and discharge in the prototype.

## UNIT-IV

7 a) Water flows over series of curved vanes of a hydraulic turbine wheel, the diameter
of which between inlet tips of vanes is 2 m and that outlet tips is 1 m . The wheel rotates at 240 r . p. m. Jet of water enters at an angle of $30^{\circ}$ to the tangent to wheel at inlet with a velocity of $40 \mathrm{~m} / \mathrm{s}$ and leaves with a velocity of $10 \mathrm{~m} / \mathrm{s}$ at an angle of $30^{\circ}$ to the tangent to wheel at outlet tip. Find (a) Vane angles at entry and exit; (b) Work done on the wheel per newton of water; (c) Hydraulic efficiency of wheel; (d) power developed by the wheel when the discharge flowing through it is $0.3 \mathrm{~m}^{3} / \mathrm{s}$
b) Derive an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet.

## Or

8 a) Show that force exerted by a jet of water on a moving inclinedplate in the direction of the jet is given by: $F_{x}=\rho A(V-u)^{2} \operatorname{Sin}^{2} \theta$ Where ' $A$ ' is the area of the jet; ' $\theta$ ' is the inclination of plate with the jet; ' $V$ ' is the velocity of the jet.
b) A jet of water with diameter 55 mm moving with a velocity of $40 \mathrm{~m} / \mathrm{sec}$ strikes a curved fixed vane tangentially at one end at an angle of $30^{\circ}$ to the horizontal. The jet leaves the vane at angle of $20^{\circ}$ to the horizontal. Find the force exerted by the jet on the plate in horizontal and vertical directions.

UNIT-V
9 a) A Kaplan turbine runner is to be designed to develop 9100 kW . The net available head is 5.6 m . If the speed ratio $=2.09$, flow ratio $=0.68$, overall efficiency $=86 \%$ and the diameter of the boss is $1 / 3$ the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine.
b) Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water.

> Or

10 a) Define the terms 'unit power', 'unit speed' and 'unit discharge' with reference to a hydraulic turbine. Also derive expressions for these terms.
b) With help of neat sketch, explain the working principle of reciprocating pump.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> POWER SYSTEM-I <br> (Electrical and Electronics Engineering) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) Explain the principle of operation of hydro power plant with neat diagram?
b) Enumerate essential elements of hydro electric power plant.

Or
2 Briefly describe the main parts and the working of a steam power station with neat diagram.

## UNIT-II

3 a) What are the merits and demerits of nuclear power plants?
b) Enumerate and explain essential components of a nuclear reactor.

Or
4 a) What are the factors to be considered for the selection of site of a nuclear power stations?
b) Describe with the help of a neat sketch the working principle of a pressurized water reactor.

## UNIT-III

5 a) State the advantages of outdoor substations over indoor substations
b) Explain the constructional aspects of GIS.

Or
6 a What are the merits and demerits of a gas insulated substations?
b Draw and explain the sectionalized single bus bar system? List out its merits and demerits

UNIT-IV
7 a) Briefly discuss the types of insulating materials used in cables?
b) The capacitance of 3-core cable belted type has the following data
i. Between three cores bunched together and the earthed sheath $6.6 \mu \mathrm{~F}$
ii. Between the conductor and the other two connected together to the sheath $4 \mu \mathrm{~F}$.
Determine the capacitance to neutral and the total charging current drawn by the cable, when the cable is connected to a $66 \mathrm{kV}, 50 \mathrm{~Hz}$, 3-phase supply.

## Or

1 of 2

8 a) What do you understand by grading of cable? Explain why grading is more of theoretical interest than practical?
b) :Deterrmine the thickness of insulation and operating voltage of a single core cable if
the maximum and minimum stress in the dielectric is $38 \mathrm{kV} / \mathrm{cm}$ (r.m.s) and 12
$\mathrm{kV} / \mathrm{cm}$ (r.m.s) respectively and the diameter of core is 3 cm .

9 a) Explain the following:
(i) load curve and (ii) load duration curve
b) Calculate the annual load factor of 120 MW power station deliver 110MW for 4 hours, 60 MW for 10 hours and is shut down for the rest of each day. For general maintenance, it is shut down for 60 days per annum.

## Or

10 a) What are the objectives and requirements of tariff
b) A thermal power station fixed costs is Rs. 600 per kW of installed capacity per annum. The fuel and operating costs are 12 paise per kWh generated. Calculate cost of energy generated per kWh at the following station load factor
(i) $25 \%$, (ii) $50 \%$ and (iii) $100 \%$. Comment on the results.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> POWER SYSTEM-I <br> (Electrical and Electronics Engineering) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) Compare hydro and thermal power plants.
b) Explain the general arrangement and operation of hydroelectric power plant.

Or
2 a) What are the factors to be considered for selection of the site for a thermal power station.
b) Describe the function of ESP and condenser in thermal power plants?

## UNIT-II

3 a) What is nuclear fusion? How does it different from nuclear fission?
b) What is a moderator? Name commonly used moderators and discuss their merits and limitations

4 a) What is boiling water reactor? How does it different from a pressurized water reactor?
b) Explain the nuclear waste disposal in nuclear power plants?

## UNIT-III

5 a) Draw and explain the substations layouts of $33 / 11 \mathrm{kV}$ showing the location of all the substation equipment.
b) Give the comparison of outdoor and indoor substations.

## Or

6 a) Draw and explain the main and transfer bus bar system? List out its merits and demerits.
b) What are the advantages of gas insulated substations?

## UNIT-IV

7 a) What do you understand be the term grading of cable? Discuss briefly any one method of grading.
b) A 33 kV , 3 -phase, 2.5 km long feeder consists of single-core cables having a conductor radius of 12 mm and an insulation thickness of 8 mm . The dielectric has a relative permittivity of 3 and the power factor of the unloaded cable is 0.3 . Determine the following
(i) capacitance per phase,
(ii) charging current per phase,

Or

1 of 2

8 a) Show that the insulation resistance of a cable is inversely proportional to its length.
b) A single core 3000 m long cable has a core diameter of 1.6 cm , the sheath diameter of 5 cm and an insulation resistance $1800 \mathrm{M} \Omega$. Determine the resistivity of dielectric.

## UNIT-V

9 a) Define the following
(i) maximum demand, (ii) demand factor, (iii) load factor and (iv) diversity factor
b) A generating station supplies four feeders with the maximum demands (in MW) of 16 MW; $10 \mathrm{MW} ; 12 \mathrm{MW}$ and 7 MW . The overall maximum demand on the station is 20 MW and the annual load factor is $45 \%$. Find the diversity factor and the number of units generated annually.

## Or

10 a) What are the desirable characteristics of a tariff method?
b) The energy cost of a 120 MW steam station working at $50 \%$ load factor comes out to be 15 paise $/ \mathrm{kWh}$ of energy generated. If the load factor is improved to $75 \%$ find the cost of energy generated? The fuel cost of the power station due to increased generation increase the annual generation cost by $7.5 \%$.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> POWER SYSTEM-I <br> (Electrical and Electronics Engineering) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) Enumerate and explain briefly the factors which should be considered while selecting the site for hydro electric plant.
b) Explain the essential elements of hydro electric power plant.

## Or

2 a) Give the layout of a modern steam power plant and explain it briefly.
b) What is the need of cooling towers in thermal power station? Discuss its working principle?

## UNIT-II

3 a) Explain with a simple block diagram working of a nuclear power station.
b) Describe the nuclear chain reaction in nuclear power plants?

Or
4 a) Explain the working principle of fast breeder reactor with neat diagram.
b) Discuss the radiation hazards and shielding of nuclear power plants?

## UNIT-III

5 a) What is a substation? Name the factors that should be taken care of while designing and erecting a substation.
b) What are the different types of substations? Listout its major components?

Or
6 a) Draw and explain the double bus bar with one circuit breaker system? List out its merits and demerits.
b) Describe the installation and maintenance of GIS.

## UNIT-IV

7 a) Derive the expression for power factor of cable?
b) The insulation of a single core cable is $495 \mathrm{M} \Omega$ per km . If the core diameter is 2.5 cm and resistivity of insulation is $5 \times 10^{14} \Omega-\mathrm{cm}$, find the insulation thickness.

## Or

8 a) What are the desirable characteristics of insulating material used in cables?
b) A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6 cm . Calculate the maximum stress. It is desired to reduce the maximum stress by using two inter sheaths. Determine their best positions, the maximum stress and the voltage on each. System voltage is 66 kV , 3-phase.
UNIT-V
9 a) What do you understand by the load curve? What information's are conveyed by a load curve?
b) A 120 MW substation delivers 120 MW for 3 hours, 60 MW for 8 hours and shutdown for the rest of each day. It is also shutdown for the maintenance for 15 days each year. Calculate its annual load factor.

Or
10 a) What are the various tariff methods? Discuss the two-port tariff method?
b) A power station has a maximum demand of 15 MW . Find the cost per units generated from the following data:
Annual load factor $=45 \%$, capital cost $=$ Rs. $13,00,000 /-$, annual cost of fuel and oil $=$ Rs. 7,50,000, taxes, wages and salaries $=$ Rs. 6,00,000, Interest and depreciation $=12 \%$

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> POWER SYSTEM-I <br> (Electrical and Electronics Engineering) 

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Draw the general layout of hydro power plant? Discuss its working principle?
b) Draw general layout of a modern thermal power plant? Explain its working?

Or
2 a) How the coal is utilized in power generation? Describe how it is handled starting from delivery of coal to final combustion stage
b) What are the functions of economizer and super heater in a thermal power plant

## UNIT-II

3 a) What are the methods of producing nuclear reaction? What is chain reaction
b) Explain the radiation hazards and shielding in nuclear power plant?

Or
4 a) Describe the need of reflectors and coolents in nuclear power plant?
b) Explain the working of boiling water reactor with neat diagram? Listout its merits?

## UNIT-III

5 a) Discuss the different ways of classifying the substations
b) What are the various types of bus bar arrangements in substations? Discuss the single bus bar system with neat diagram?

## Or

6 a) Draw and explain the gas insulated substation?
b) compare air insulated substations and gas insulated substations

## UNIT-IV

7 a) Show that in a three core belted cable the neutral capacitance to each conductor $\mathrm{C}_{\mathrm{n}}$ is equal to $\mathrm{C}_{\mathrm{s}}+3 \mathrm{C}_{\mathrm{c}}$ where $\mathrm{C}_{\mathrm{s}}$ and $\mathrm{C}_{\mathrm{c}}$ are capacitance of each conductor to sheath and to each other respectively.
b) A single core cable for 132 kV , 3-phase system has conductor radius 0.9 cm and inside sheath radius of 6 cm . It has two inter-sheaths. The stress varies between the maximum and minimum limits in the three layers of dielectric. Find the radii of the intersheaths and their voltages.

## Or

8 a) What are the various types of cables used in underground system? Discuss construction of any one types of cable?
b) Cable has intersheath grading that satisfies the equation, $R / r_{1}=r_{1} / r=\alpha$. The core and cable radii are $\mathrm{r}=1.2 \mathrm{~cm}$ and $\mathrm{R}=3 \mathrm{~cm}$. Determine the location of the intersheath and also calculate the ratio of maximum electric field strengths with and without intersheath grading.

## UNIT-V

9 a) Explain the terms load factor and diversity factor? How do these factors influence the cost of generation?
b) A customer connected loads are 10 lamps of 60 W each and two heaters of $1,500 \mathrm{~W}$ each. His maximum demand is 2 kW . On the average he uses 10 lamps 7 hours a day and each heater for 5 hours a day. Determine his (i) average load, (ii) monthly energy consumption and (iii) load factor.

Or
10 a) What do you understand by tariff? Discuss the objectives of tariff.
b) A power station has the following data:

Plant capacity $=75 \mathrm{MW}$, annual load factor $=50 \%$, capital cost $=$ Rs. $14 \times 10^{6}$, annual cost of fuel etc. $=$ Rs. $1.4 \times 10^{6}$, interest and depreciation each $6 \%$ per annum of initial value. Determine the generation cost per kWh.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> DYNAMICS OF MACHINERY <br> (Mechanical Engineering) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) An effective diameter of the cone clutch is 75 mm . The semi-angle of the cone is $18^{\circ}$. Find the torque required to produce slipping of the clutch if an axial force applied is 200 N . This clutch is employed to connect an electric motor running uniformly at 100 r.p.m with a flywheel which is initially stationary. The flywheel has a mass of 13.5 kg and its radius of gyration is 150 mm . Calculate the time required for the flywheel to attain full speed, and also the energy lost in the slipping of the clutch. Take coefficient of friction as 0.3
b) Explain the working principle of rope brake dynamometer.

## Or

2 A band brake used for a winch is wound round a drum of 0.75 m diameter, keyed to the shaft. The two ends of the band are attached to the pins on the opposite sides of the fulcrum of the brake lever at distances of 25 mm and 100 mm from the fulcrum. The angle of lap on the drum is $240^{\circ}$. The coefficient of friction is 0.25 . Find the torque which can applied by the brake when a force of 500 N applied to the lever upwards at a distance of 1 m from the fulcrum. Consider clockwise and counterclockwise directions of rotation.

## UNIT-II

3 a) What is Turning Movement diagram? Mention its uses.
b) A certain machine requires a torque of $(1500+200 \sin \theta) \mathrm{N}$-m to drive it where $\theta$ is the angle of rotation of shaft. The machine is directly connected to an engine which produces a torque $(1500+250 \sin \theta) \mathrm{N}-\mathrm{m}$. The flywheel and other rotating parts have a mass 300 kg at radius of gyration 200mm. Mean speed is 200 rpm . Find: (i) Kinetic Energy of flywheel (ii) Percentage coefficient of fluctuation of speed (iii) Crank angle at Maximum Turning Moment.

Or
4 a) Explain the dynamic force analysis of slider crank mechanism.
b) A Punching press is driven by a constant torque electric motor. The press is provided with a flywheel that rotates at maximum speed of 225 rpm . The radius of gyration of the flywheel is 0.5 m . The press punches 720 holes per hour, each punching operation takes 2 seconds and requires $15 \mathrm{kN}-\mathrm{m}$ of energy. Find the power of the motor and minimum mass of the flywheel if speed of the same is not to fall below 200 rpm ?

## UNIT-III

5 The arms of a Hartnell governor are of equal length. When the sleeve is in the midposition, the masses rotate in a circle of diameter 200 mm (the arms are verticalin the mid-position). Neglecting friction, the equilibrium speed for this position is 300 rpm . Maximum variation of speed, taking friction into account, is to be $\pm 5 \%$ of the midposition speed for a maximum sleeve / movement of 25 mm . The sleeve mass is 5 kg and the friction at the sleeve is 30 N .Assuming that the power of the governor is sufficient to overcome the friction by $1 \%$ change of speed on each side of the midposition, find (neglecting obliquity effect of arms).
i) The mass of each rotating ball
ii) The spring stiffness
iii) The initial compression of the spring

Or
6 a) An aircraft consists of a propeller. It also consists of engine and propeller mass moment of inertia $150 \mathrm{~kg} \mathrm{~m}^{2}$. The engine rotates at 3600 rpm in a sense clockwise looking from rear. The aircraft completes half circle of radius 100 m towards left when flying at 360 km per hr. Determine the gyroscopic couple on the air-craft and state its effect.
b) Explain the effect of precession motion on the stability of motor cycle.

## UNIT-IV

7 Three cylinders of an air compressor have their axes $120^{\circ}$ to one another and their connecting rods are coupled to a single crank. The stroke is 12 cm and the length of each connecting rod 20 cm . The mass of the reciprocating parts per cylinders is 2 Kg . Determine the maximum primary and secondary forces acting on the frame of the compressor when running at 2500 rpm . Describe the method by which such forces may be balanced.

Or
8 a) Distinguish between balancing of inline engines and radial engines with appropriate examples.
b) Derive expression for Hammer blow as applied to a locomotive balancing.

## UNIT-V

9 a) Distinguish between longitudinal, transverse and torsional free vibrations.
b) A rotor of mass 10 kg is mounted min-way on a 2 cm diameter horizontal shaft supported at the ends by two bearings. The bearing span is 80 cm . Because of certain manufacturing defect, the centre of gravity of the disc is 0.1 mm away from the geometric centre of the rotor. If the system rotates at 3000 rpm , determine the amplitude of the steady state vibration and the dynamic load transmitted by the bearing. Take $£=200 \mathrm{GN} / \mathrm{m}^{2}$.

## Or

10 Two rotors A and B are attached to the ends of a shaft 600 mm long. The mass of the rotor A is 400 Kg and its radius of gyration is 400 mm . The corresponding values of rotor $B$ are 500 Kg and 500 mm respectively. The shaft is 80 mm diameter for the first $250 \mathrm{~mm}, 120 \mathrm{~mm}$ diameter for next 150 mm and 100 mm diameter for the remaining length. Modulus of rigidity of the shaft material is $0.8 \times 10^{5} \mathrm{MN} / \mathrm{m}^{2}$. Find the position of the node, the frequency of torsional vibrations?

# II B. Tech II Semester Regular Examinations, June/July - 2022 

 DYNAMICS OF MACHINERY(Mechanical Engineering)

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) A cone clutch is used for transmittals a torque of $3 \times 10^{6} \mathrm{~N} \mathrm{M}$. The mean diameter is 20 mm and the semi cone angle is $12^{0} 30$. The coefficient of friction if 0.25 and the normal pressure at the mean radius must not exceed $1.4 \times 10^{5} \mathrm{~N} / \mathrm{m}^{2}$. Calculate the necessary width of the contact surface. Also find the axial force needed to hold the clutch surface together.
b) Explain working of belt transmission dynamometer in detail.

## Or

2 A band and block brake having 12 blocks, each of which subtends $15^{\circ}$ at the centre, is applied to a rotating drum of 600 mm diameter. The blocks are 75 mm thick. The drum and the flywheel mounted on the same shaft have a mass of 1800 kg and have combined radius of gyration of 600 mm . The two ends of the band are attached to pins on the opposite sides of the brake fulcrum at distances of 40 mm and 150 mm from the fulcrum. Calculate (i) the maximum braking torque, (ii) the angular retardation of the drum, (iii) the time taken by the system to be stationary from the rated speed of 300 r.p.m. Take coefficient of friction is 0.3

UNIT-II
3 The torque delivered by two stroke engine represented by $\mathrm{T}=1000+300 \sin 2 \theta-500 \cos \theta \mathrm{~N}-\mathrm{m}$ where $\theta$ is the angle made by the crank from IDC. The engine speed is 250 rpm . The mass of flywheel is 400 kg and radius of gyration is 400 mm . Determine: i) Total percentage of fluctuation of speed.
ii) The angular acceleration of flywheel when the crank has rotated through an angle of $60^{\circ}$ from IDC.iii) The maximum angular retardation of flywheel.

## Or

4 A machine has to carry out punching operation at the rate of 10 holes per minute. It does $6 \mathrm{kN}-\mathrm{m}$ of work per mm of the sheared area on cutting 25 mm diameter holes in 20 mm thick plates. A flywheel is fitted to the machine shaft which is driven by a constant torque. The fluctuation of speed is between 180 and 200 rpm . The actual punching takes 1.5 seconds. The frictional losses are equivalent to $1 / 6$ of the work done during punching. Find: 1. power required to drive the punching machine, and 2. Mass of the flywheel, if the radius of gyration of the wheel is 0.5 m .

## UNIT-III

5 a) Derive an expression for the height of Proell governor.
b) Calculate the minimum speed of a Proell governor, which has equal arms each 200 mm and arepivoted on the axis of rotation. The mass of each ball is 4 kg and the central mass on the sleeve is 20 kg . The extension arms of the lower links are each 60 mm long and parallel to the axis when the minimum radius of the ball is 100 mm .

The rotor of a turbine installed in a boat with its axis along the longitudinal axis of the boat makes 1500 rpm clockwise when viewed from the stern. The rotor has a mass of 750 kg and a radius of gyration of 300 mm . If at an instant, the boat pitches in the longitudinal vertical plane so that bow rises from the horizontal plane with an angular velocity of $1 \mathrm{rad} / \mathrm{s}$, determine the torque acting in the boat and the direction in which it tends to turn the boat at the instant.

## UNIT-IV

7 a) Explain the role of reference plane in balancing masses of rotation in different planes.
b) $A, B, C$ and $D$ are from masses carried by a rotating shaft at radii $100 \mathrm{~mm}, 150 \mathrm{~mm}$, 150 mm and 200 mm respectively. The planes in which masses rotate are spaced at 500 mm apart and the magnitude of the masses, B, C, and D are $9 \mathrm{Kg}, 5 \mathrm{Kg}$ and 4 Kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance.

Or
8 A single cylinder reciprocating engine runs at 150 r.p.m. The stroke is 30 cm , mass of reciprocating parts 100 kg mass of revolving parts assumed concentrated at the crank pin is 120 kg . Find the magnitude of the balance mass required to be placed opposite at the crank at a radius of 16 cm , which is equivalent to all of the revolving and two thirds of the reciprocating masses. If the crank turns 450 from the inner dead centre, find the magnitude of unbalance force due to the balance mass.

## UNIT-V

9 a) A shaft of 10 cm diameter and 100 cm long is fixed at one end and other end carries a flywheel of mass 80 kg . Taking young's modulus for the shaft material as $2 \times 10^{6}$ $\mathrm{kg} / \mathrm{cm}^{2}$, find the natural frequency of longitudinal and transverse vibrations?
b) Explain the critical speeds and whirling of shafts in detail.

## Or

10 a) Derive an equation for the natural frequency of free transverse vibration of a shaft loaded with a number of concentrated loads, by energy method.
b) A steel shaft 6 cm diameter and 50 cm long fixed at one end carries a flywheel of mass 100 kg and radius of gyration 30 cm at its free end. Find the frequency of free longitudinal and transverse vibrations.

# II B. Tech II Semester Regular Examinations, June/July - 2022 DYNAMICS OF MACHINERY <br> (Mechanical Engineering) 

Time: 3 hours
Max. Marks: 70

Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks<br>$\qquad$

## UNIT-I

1 a) Illustrate the working of a band and block brake with the help of a neat sketch. Deduce the relation for ratio of tight and slack side tensions.
b) A plain collar type thrust bearing having inner and outer diameters of 200 mm and 450 mm is subjected to an axial thrust of 40 kN . Assuming coefficient of friction between the thrust surfaces as 0.025 , find the power absorbed in overcoming friction at a speed of 120 rpm . The rate of wear is considered to be proportional to the pressure and rubbing speed.

Or
2 a) Analyze the working of a single plate friction clutch with a neat sketch?
b) In a band and block brake, the band is lined with 14 blocks, each of which subtends an angle of 200 at the drums centre. One end of the band is attached to the fulcrum of the brake lever and the other to a pin 150 mm from the fulcrum. Find the force required at the end of the lever 1 m long from the fulcrum to give a torque of $4 \mathrm{kN}-\mathrm{m}$. The diameter of the brake drum is 1 m and the coefficient of friction between the blocks and the drum is 0.25 .

## UNIT-II

3 The equation of the turning moment diagram for a three-crank engine is given by $\mathrm{T}(\mathrm{N}-\mathrm{m})=25000-7500 \sin 3 \theta$, where $\theta$ radians is the crank angle from the inner dead centre. The moment of inertia of the flywheel is $400 \mathrm{~kg}-\mathrm{m}^{2}$, and the mean engine speed is 300 rpm . Calculate the power of the engine and the total percentage fluctuation of speed of the flywheel, if the resisting torque is constant.

## Or

4 a) Find the maximum and minimum speeds of a flywheel of mass 3250 kg and radius of gyration 1.8 m , when the fluctuation of energy is $112 \mathrm{kN}-\mathrm{m}$. The mean speed of the engine is 240 rpm .
b) Describe about angular velocity and acceleration of connecting rod?

## UNIT-III

5 A governor of the Hartnell type has equal balls of mass 3 Kg , set initially at a radius of 200 mm . The arms of the bell crank lever are 110 mm vertically and 150 mm horizontally Find i) The initial compressive force on the spring if the speed for an initial ball radius of 200 mm is 240 rpm and ii) the stiffness of the spring required to permit a sleeve movement of 4 mm on a fluctuation of $7.5 \%$ in the engine speed.

Or

6 a) Analyze the gyroscopic effect of precession motion on the stability of motor car in detail.
b) The lengths of the upper and lower arms of a Porter governor are 200 mm and 250 mm respectively. Both the arms are pivoted on the axis of the rotation. The central load is 150 N , the weight of each ball is 20 N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30 N at the sleeve. If the limiting inclinations of the upper arms to the vertical are $30^{\circ}$ and $40^{\circ}$, determine the range of speed of the governor.

## UNIT-IV

7 a) Explain terms i) Variations in tractive effort ii) Swaying couple iii) Hammer blow as applied to locomotive balancing.
b) Why balancing of rotating parts necessary for high speed engines?

## Or

8 A single cylinder horizontal engine runs at 120 r.p.m. The length of stroke is 400 mm . The mass of the revolving parts assumed concentrated at the crank pin is 100 kg and mass of reciprocating parts is 150 kg . Determine the magnitude of the balancing mass required to be placed opposite to the crank at a radius of 150 mm which is equivalent to all the revolving and $2 / 3$ rd of the reciprocating masses. If the crank turns 300 from the inner dead centre, find the magnitude of the unbalanced force due to the balancing mass.

## UNIT-V

9 a) Explain about free Vibration of spring mass system.
b) A shaft of 10 cm diameter and 100 cm long is fixed at one end and other end carries a flywheel of mass 80 Kg . Taking young's modules for the shaft material as $2 \times 10$ $\mathrm{Ks} / \mathrm{cm}$. Find the natural frequency of longitudinal and transverse vibrations?

## Or

10 a) Analyze the vibration isolation.
b) A shaft 50 mm diameter and 3 m long. It is simply supported at the ends and carries three masses $100 \mathrm{Kg}, 120 \mathrm{Kg}$ and 80 Kg at $1.0 \mathrm{~mm}, 1.75 \mathrm{~m}$ and 2.5 m respectively from the left support. Taking $\mathrm{E}=20 \mathrm{GN} / \mathrm{m}$. Find the frequency of transverse vibrations using Rayleigh's method.

SET - 4

## II B. Tech II Semester Regular Examinations, June/July - 2022 DYNAMICS OF MACHINERY <br> (Mechanical Engineering)

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> ~~~~~~~~~~~~~~~~~~~~~~~~ <br> UNIT-I

1 a) Name different types of dynamometers?Explain function of prony brake dynamometer.
b) Find the power lost in friction assuming i) uniform pressure and ii) uniform wear when a vertical shaft of 100 mm diameter rotating at 150 rpm rests on a flat end foot step bearing. The co-efficient of friction is equal to 0.05 and shaft carries a vertical load of 15 kN .

## Or

2 A simple band brake is operated by a lever of length 450 mm . The brake drum has a diameter of 600 mm , and the brake band embraces $5 / 8^{\text {th }}$ of the circumference. One end of the band is attached to the fulcrum of the lever while the other end is attached to a pin on the lever 120 mm from the fulcrum. The effort applied to the end of the lever is 2 kN , and the coefficient of friction is 0.30 . Find the maximum braking torque on the drum.

## UNIT-II

3 A Punching machine makes 20 working strokes per minute, and is capable of punching 20 mm diameter hole in a 15 mm thick steel plate having an ultimate shear strength of 240 MPa . The punching operation takes place during $1 / 10$ th of a revolution of the crankshaft. Estimate the power required for the driving motor, assuming a mechanical efficiency of $95 \%$. Also determine the size of the rim of the flywheel having width equal to twice the thickness. The flywheel is to revolve 10 times the speed of the crankshaft. The fluctuation of speed is $10 \%$. Assume the flywheel to be made of cast iron having working stress of 6 MPa and density 7300 $\mathrm{kg} / \mathrm{m}^{3}$. The diameter of the flywheel should not exceed 1.5 m . Neglect the effect of arms and hub.

## Or

4 a) An engine flywheel has mass of 6.5 tonnes, and the radius of gyration is 2 m . If the maximum and minimum speeds are 120 rpm and 118 rpm respectively, find the maximum fluctuation of energy.
b) Explain the dynamic force analysis of four bar mechanism.

## UNIT-III

5 a) Discuss the sensitiveness, isochronism and hunting of governers?
b) Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 Kg and the mass of the central load on the sleeve is 25 Kg . The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the maximum and minimum speeds and range of speed of the governor.

6 a) Explain the effect of precession motion on the stability of moving vehicles such as aero planes.
b) A rear engine automobile is travelling along a curved track if 120 m radius. Each of the four wheels has a moment of inertia of $2.2 \mathrm{~kg} / \mathrm{m}$ and an effective diameter of 600 mm . The rotating parts of the engine have a moment of inertia of $1.25 \mathrm{~kg} . \mathrm{m}^{2}$. The gear ratio of the engine to the back wheel is 3.2. The engine axis is parallel to the rear axle and the crank shaft rotates in the same sense as the road wheels. The mass of the vehicle is 2050 kg and the centre of the mass is 520 mm above the road level. The width of the track is 1.6 m . What will be the limiting speed of the vehicle if all the four wheels maintain contact with the road surface?

UNIT-IV
7 a) Define and explain the term 'Balancing of Rotating Masses'. What will be the harm if the rotating parts of high speed engine are not properly balanced?
b) Four masses A, B, C, D revolve at equal radii and are equally spaced along a shaft. The mass B is 7 kg and the radii of C and D make angles of 90 and 240 respectively with the radius of B. Find the magnitude of the masses A, C, and D and the angular position of A so that the system may be completely balanced.

## Or

8 a) Four weights A, B, C and D revolve at equal radius and are equally spaced along a shaft. The weight B Weighs 70 N and the radii of C and D makes angles of $90^{\circ}$ and $220^{\circ}$ respectively with the radius of B. Find the magnitude of weights A, C, and D.
b) Derive expressions for these for two cylinders uncoupled locomotive balancing?

## UNIT-V

9 a) A shaft 12 mm diameter rotates in spherical bearings with a span of 0.9 m and carries a disc of mass 10 kg midway between bearings Neglecting the mass of the shaft, determine its deflection in terms of the speed of rotation in radians per second if the mass centre of the disc is 0.2 mm out of the centre. The young modulus for the material of shaft is $200 \mathrm{kN} / \mathrm{mm}^{2}$.
b) Analyze the torsional vibrations of two and three rotor systems.

## Or

10 a) Explain vibrations of beams with concentrated and distributed loads.
b) A shaft of 100 mm diameter and 1 m long is fixed at one end, and the other end carries a flywheel of mass 1 tonne. The radius of gyration of the flywheel is 0.5 m . Find the frequency of torsional vibrations, if the modulus of rigidity of the shaft material is $80 \mathrm{GN} / \mathrm{m}^{2}$.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ANALOG COMMUNICATIONS 

(Common to ECE \&ECT)
Time: 3 hours
Max. Marks:
70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) With neat sketch explain Frequency Division Multiplexing.
b) Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of $100 \%$ and $50 \%$.

Or
2 a) Develop the equation of a single tone modulation of AM system and explain the power relations.
b) With the help of waveforms and spectrum, describe the concept of Amplitude modulation both in time domain and frequency domain.

UNIT-II
3 a) List out the methods for generation of SSB-SC signal and explain any one of the method in detail.
b) Find the various frequency components and their amplitudes in the voltage given by $v(t)=50(1+0.7 \operatorname{Cos} 5000 t-0.3 \operatorname{Cos} 1000 t) \sin 5 \times 10^{6} t$. Draw the single sided spectrum. Also evaluate the modulated and sideband power.

Or
4 a) Explain the generation of DSB-SC signal using balanced modulator. Derive the expression for DSB-SC signal.
b) A carrier signal c $(\mathrm{t})=10 \operatorname{Cos}\left(2 \pi .10^{6} \mathrm{t}\right)$ is modulated by a message signal $\mathrm{m}(\mathrm{t})=$
$2 \operatorname{Cos}\left(8 \pi .10^{3}\right.$ t) to generate a DSB-SC signal. Sketch the spectrum, calculate the B. W and power.

## UNIT-III

5 a) Explain Armstrong method of generation of FM signal.
b) Distinguish between FM and PM by giving its mathematical analysis.

## Or

6 a) Describe the frequency analysis of Angle modulated waves. Explain their Bandwidth requirements.
b) Compare AM and FM Systems noise performances.

## UNIT-IV

7 Explain the following (i) AGC (ii) RF sections.

## Or

8 a) Discuss about frequency stability in FM Transmitter.
b) List out the advantages and disadvantages of TRF receiver.

## UNIT-V

9 a) Explain, how a PPM signal can be generated from PWM signal.
b) Explain demodulation of PPM.

## Or

10 Write short notes on i) Single polarity and Double polarity PAM ii) Generation [14M] and Demodulation of PWM

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ANALOG COMMUNICATIONS <br> (Common to ECE \& ECT) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) How AM is generated using square law modulator? Derive relevant expressions.
b) Discuss (i) Single tone modulation (ii) Switching modulator

## Or

2 a) With neat sketch, explain communication system.
b) Comparison and contrast different AM Techniques.

UNIT-II
3 a) What is vestigial side band? Explain the process of generation and detection of VSB modulated wave using a carrier Ac $2 \pi \mathrm{fct}$
b) Give the applications of AM-FC and VSB modulation schemes.

Or
4 Describe the SSB in frequency domain and then explain how to generate SSB modulated wave using frequency discrimination method. Also, list the advantages of SSB

## UNIT-III

5 a) With neat diagram, explain the FM demodulator using PLL.
b) Discuss about the power and bandwidth requirements of FM?

Or
6 a) For an FM modulator with a modulating signal $m(t)=V_{m} \sin 300 \omega t$, the carrier
Signal $c(t)=8 \sin \left(6.5 \times 10^{6}\right) t$ and the modulation index $\beta=2$. Find out the significant side frequencies and their amplitudes.
b) Explain the difference between Narrow band FM and Wide band FM.

## UNIT-IV

7 a) Draw the block diagram of superhetrodyne receiver and the function of each block.
b) Discuss the factors influencing the choice of intermediate frequency (IF) for a radio receiver.

## Or

8 a) Explain the Foster Seeley Discriminator method for FM demodulation with the help of neat circuit diagram.
b) Explain working of FM transmitter using Armstrong method with a neat block diagram

## UNIT-V

9 a) Write short notes on Modeling of Noise Sources.
b) Explain about noise in AM systems.

Or
10 a) Explain the process of generation of PWM with neat diagrams.
b) Write short notes on transmission bandwidth of PAM, PWM, and PPM.

SET - 3

## II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ANALOG COMMUNICATIONS <br> (Common to ECE \& ECT)

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) With suitable diagram explain the square-law diode modulation method for AM generation.
b) An amplitude modulated voltage is given by $\mathrm{V}=50(1+0.2 \cos 100 \mathrm{t}+0.001 \cos$
$3500 \mathrm{t}) \cos 10^{6} \mathrm{t}$. State all frequency components present in the voltage, and find modulation index for each modulating voltage term. What is the effective modulation index of V ?

## Or

2 a) Describe an expression for AM wave and sketch its frequency spectrum.
b) Explain the square law detection of AM signals.

## UNIT-II

3 a) Explain the Frequency discrimination method for generating SSB signal.
b) With neat sketch explain COSTAS Loop?

Or
4 a) Explain the phase discrimination method for generating SSB.
b) Explain the principle of coherent detection of DSB-SC with neat block diagram.

## UNIT-III

5 a) With the help of waveforms and spectrum, describe the concept of FM.
b) With neat circuit diagram explain the working of a Balanced Frequency discriminator.

## Or

6 a) Draw the block diagram of FM transmitter using indirect method and explain its working.
b) Describe the working of a varactor diode modulator of FM

## UNIT-IV

7 a) Mention the advantages of superhetrodyne receiver over TRF receiver
b) Distinguish between simple AGC and delayed AGC
c) Draw the block Schematic for FM broad cast receiver and explain the function of each unit
Or

8 a) Explain the effect of feedback on performance of AM transmitter.
b) Write a short notes on amplitude limiting.

## UNIT-V

$9 \quad$ Write short notes on i) Single polarity PAM ii) Generation of PWM

## Or

10 a) What is Noise figure? Find the Average Noise Figure of cascaded networks
b) Discuss threshold effect in angle modulation systems

SET - 4

## II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ANALOG COMMUNICATIONS <br> (Common to ECE \& ECT)

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) Derive the equation for power relation of a single tone modulation of AM system.
b) The antenna current of an AM transmitter is 9 A when only carrier is transmitted but it increases to 10.6 A when the carrier is modulated by a single sine wave. Find the percentage of modulation. Determine the antenna current when the percentage of modulation changes to 0.8 ?
Or

2 a) Draw the Envelope detector and illustrate the process of detection of AM wave.
b) An amplitude modulated signal represented in time domain as $4 \operatorname{Cos}(1800 \pi \mathrm{t})+$ $10 \operatorname{Cos}(2000 \pi t)+4 \operatorname{Cos}(2200 \pi t)$. Sketch the spectrum and calculate the band width and total power.

## UNIT-II

3 a) What is DSB-SC modulator? Explain the ring modulator for generation of DSB-SC.
b) A DSB signal is to be generated with a carrier frequency of 1 MHz using a nonlinear device with input and output characteristics $\mathrm{v} 0=\mathrm{avi}+\mathrm{b} v i^{3}$. The output of the nonlinear device can be filtered by an appropriate $\operatorname{BPF}$ and $v i=m(t)+\operatorname{Cos}\left(2 \pi f_{1} \times t\right)$. Find the value of $f_{1}$.

## Or

4 a) Discuss about the power and bandwidth requirement of DSB-SC.
b) With neat sketch explain the Envelope detection of a VSB wave pulse carrier.

Or
5 a) With neat diagram explain generation of FM using reactance modulator.
b) With neat diagram explain the detection of FM using Zero crossing detector.

6 a) Explain the working of Varactor diode modulator in FM.
b) Make a comparison of AM with FM.

## UNIT-IV

7 a) Describe the operation of variable reactance type and phase modulated FM transmitter.
b) What is the significance of AGC circuit? Differentiate between simple, delayed and amplify AGC.

## Or

8 a) Draw the block diagram of a superheterodyne receiver and explain its operation What are the advantages of this receiver?
b) List out the advantages and disadvantages of TRF receiver.

## UNIT-V

9 a) Explain the effect of Noise in SSB system
b) With neat sketch explain the significance of Pre-emphasis and De-emphasis.

10 a) Mention and explain different methods for generation of PWM
b) Define the following (i) thermal noise (ii) shot noise (iii) noise figure

## II B. Tech II Semester Regular Examinations, June/July - 2022

FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, CS\& AIML)
Time: 3 hours
Max. Marks: 70

Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Outline formal language and Explain the Chomsky classification of grammars.
b) Draw a DFA which accepts strings ending with 11 where the input is $\{0,1\}$

Or
2 a) List the various operations on languages in detail and relate with transition diagrams?
b) Draw a DFA which accepts strings ending with 01 where the input is $\{0,1\}$

## UNIT-II

3
a) Compute the regular expression for the following machine.

b) List and explain the closure properties of Regular grammar.

Or
$4 \quad$ a)


Compute the regular expression for the above machine.
b)


Construct left and right linear grammar for the given NFA

## UNIT-III

5 a) Convert the grammar into GNF

$$
\begin{aligned}
& S \rightarrow A B 1 \mid 0 \\
& A \rightarrow 00 A \mid B \\
& B \rightarrow|A| .
\end{aligned}
$$

b) Discuss the applications of Context free grammar. Illustrate ambiguous grammar.

## Or

6 a) Convert the grammar into Greibach Normal Form.

$$
\begin{aligned}
& S \rightarrow A B \\
& A \rightarrow B S B \\
& A \rightarrow a \\
& B \rightarrow b
\end{aligned}
$$

b) Discuss the simplification of context free grammar. What is the importance of useless symbols and unit productions in it?

## UNIT-IV

7 a) Explain the elements of PDA. Construct PDA for $L=\left\{0^{n} 1^{m} 2^{k}\right\}$ Where $n, m, k>=1$
b) Show the procedure and explain to find the equivalence of PDA and context free grammer.

## Or

8 a) Outline the PDA with example. In what ways a PDA can show the acceptance of a string. Explain with example
b) Demonstrate the conversion of PDA to grammar with a case study.

9 a) Construct a TM that computes a function $\mathrm{f}(\mathrm{m}, \mathrm{n})=\mathrm{m}+$ ni.e, addition of two numbers.
b) Construct a TM for computing ones complement calculation.

## Or

10 a) Discuss the languages accepted by Turing machines.
b) Construct the Turing machine that computes subtraction, where the fist operand length is more than the second operand. X is a symbol that separates the two operands.
Example: 0000X00.

## II B. Tech II Semester Regular Examinations, June/July - 2022

FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, CS \& AIML)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

## UNIT-I

1 a) Demonstrate the mathematical definition of DFA. Design DFA which accepts even number of a's and even number of b's where the input is a,b.
b) Compare features of NFA and NFA- $€$ transitions with example.

## Or

2 a) Write and explain the steps for minimizing DFA with an example?
b) Design an NFA- $€$ to accept the string of a's and b's, such that, it can accept either the string consisting of one a followed by any number of a's or one $b$ followed by any number of b's.

## UNIT-II

3 a) Construct left and right linear grammar for the given NFA

b) Illustrate the Chomsky hierarchy with a neat sketch.

Or
4 a) Explain the step-by-step method to generate equivalent FA for the regular
b) Explain the Pumping lemma for the regular sets.

## UNIT-III

5
a) Simplify the following grammar.

$$
\begin{aligned}
& S \rightarrow A a \mid B \\
& B \rightarrow A \mid b b \\
& A \rightarrow a|b c| B
\end{aligned}
$$

b) List and explain the closure properties of regular grammar.

Or

6 a) Simplify the grammar with the following productions.
S $\rightarrow \mathrm{A} a / \mathrm{B} / \mathrm{cA}$
B $\rightarrow \mathrm{A} / \mathrm{bb} / \mathrm{E}$
A $->b c / B$
b) Demonstrate the importance of PDA using acase study.

## UNIT-IV

7 a) Develop a PDA to accept the strings of the form $\mathrm{a}^{\mathrm{n}} \mathrm{b}^{\mathrm{n}}$ where $\mathrm{n}>=1$.
b) Discuss the use of NPDA in solving real-world problems.

## Or

8 a) Develop a PDA to accept the language $\mathrm{WCW}^{\mathrm{R}}$ where W belongs to $(0+1)^{+}$and
$\mathrm{W}^{\mathrm{R}}$ is the reverse of the string
b) Discuss the equivalence of PDA and Context free grammar.

## UNIT-V

9 a) List the elements of TM's and give the block diagram of TM.
b) Design TM which accepts strings ending with 111 where the input is taken from $\{0,1\}$

## Or

10 a) Explain Church's Hypothesis and Halting problem?
b) List and explain various Turing Machines with suitable diagrams.

# II B. Tech II Semester Regular Examinations, June/July - 2022 

FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, CS \& AIML)
Time: $\mathbf{3}$ hours
Max. Marks: 70

Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

## UNIT-I

1 a) List and explain the classifications of Finite Automata. Discuss the applications of it.
b) Draw a DFA which accepts strings ending with 00 where the input is $\{0,1\}$

## Or

2 a) List the elements and components of DFA and NFA.
b) Draw a DFA which accepts strings ending with 10 where the input is $\{0,1\}$

## UNIT-II

3 a) Derive the regular expression for the following DFA

b) Explain the method of developing a FA from Regular expression using a case study.

Or
$4 \quad$ a)


Convert the regular expression for the above DFA
b) List and explain the Closure properties of Regular sets.

## UNIT-III

5 a) What types of productions are accepted in CFG?
Check whether the grammar is ambiguous or unambiguous or not over alphabets $\{\mathrm{a}$, b).
$S \rightarrow \mathrm{aSalbSb} \backslash a \backslash b \backslash €$.
b) Explain the step-by-step method to prove that certain languages were not Regular.

## Or

6 a) Simplify the following grammar
$\mathrm{S} \rightarrow \mathrm{ABa} / \mathrm{B} / \mathrm{c}$
$\mathrm{B} \rightarrow \mathrm{A} / \mathrm{bbA}$
$\mathrm{A} \rightarrow \mathrm{a} / \mathrm{bc} / \mathrm{BS}$
b) What is pumping lemma? Explain its closure properties?

## UNIT-IV

7 a) Develop a PDA to accept the strings of the form $\mathrm{a}^{\mathrm{n}} \mathrm{b}^{3 \mathrm{n}}$ where $\mathrm{n}>=1$.
b) Discuss the notation and applications of two stack push down automata.

## Or

8 a) Develop a PDA that accepts the strings of the form $a^{n} b^{2 n}$ where $n>1$.
b) Compare DPDA with NPDA using a suitable example.

UNIT-V
9 a) Design a Turing Machine to accept the language $\mathrm{L}=\left\{\mathrm{a}^{\mathrm{n}} \mathrm{b}^{\mathrm{n}} \mathrm{c}^{\mathrm{n}} \mathrm{d}^{\mathrm{n}} / \mathrm{n}>=1\right\}$
b) Discuss the decidable and undecidable problems with examples.

## Or

10 a) Develop a Turing Machine toaccept the language $\mathrm{WCW}^{\mathrm{R}}$ where W belongs to $(0+1)^{+}$and $\mathrm{W}^{\mathrm{R}}$ is the reverse of the string.
b) Define the TM with formal notations. Explain the concept of Universal Turing Machine.

SET - 4

## II B. Tech II Semester Regular Examinations, June/July - 2022

FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, CS \& AIML)
Time: 3 hours

Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) Explain the formal definition of a DFA with an example.
b) Construct a DFA string accepting neither $a a$ nor $b b$ as a substring.

## Or

2 a) Explain the formal definition of an NFA with a suitable example.
b) Compare and contrast the features of NFA with DFA. What is the importance of $-€$ transitions.

3 a) Draw the DFA for the following Regular Expressions

1. $(0+1)^{*} 101$
2. $a^{*} b^{*} a$
b) Demonstrate the Pumping lemma of a regular set with example.

## Or

4 a) Draw the DFA for the following Regular Expressions

1. $(01)^{*} 1(0+1)^{*}$
2. $(a b)^{*+}(a+b)^{*}$
b) How to find equivalence of regular grammar and finite automata? Explain with example.

## UNIT-III

5 a) Define Context Free Grammar.
Derive the left most and the rightmost derivations for the string aabbaa.
$G=(\{S, A\},\{a, b\}, S, P)$, where $P$ is,

$$
\begin{aligned}
& S \rightarrow a A S \mid a \\
& A \rightarrow S b A|S S| b a .
\end{aligned}
$$

b) Consider the following CFG into GNF
(1) $S \rightarrow a A l b B$
(2) $\mathrm{B} \rightarrow \mathrm{bBIE}$
(3) $\mathrm{A} \rightarrow \mathrm{aAIE}$

## Or

6 a) Design the CFG for the expressions

1. $a^{n} b^{n}$ where $n>=1$
2. $a^{n} b 2^{n}$ where $n>=1$
3. $W^{2} W^{R}$, where $W$ belongs to $(a+b)^{+}$and $W^{R}$ is the reverse of the string
b) Illustrate ambiguous grammar and check the grammar is ambiguous or not

## UNIT-IV

7 a) Define PDA(Push Down Automata) and Construct a PDA for the following grammar
S->aSa
$\mathrm{S}->\mathrm{bSb}$
S->c
b) Demonstrate two stack PDA with an example and explain the applications of it.

## Or

8 a) Define PDA and Construct a PDA for the following grammar S->AA/a A->SA/b
b) Compare the features of DPDA(Deterministic Push Down Automata) and NPDA (Non Deterministic Push Down Automata) with a suitable example.

## UNIT-V

9 a) Design a Turing Machine to accept the language $L=\left\{a^{n} b^{4 n} / n>=1\right\}$
b) Explain the concepts NP-Hard and NP-complete with examples.

## Or

10 a) Define Turing Machine and design it to recognize the language $\mathrm{L}=\left\{0^{\mathrm{n}} 1^{2 \mathrm{n}} /\right.$ $n>=1\}$.Illustrate the action of Turing machine in accepting/rejecting the word $0^{3} 1^{3}$.
b) List and explain the types of Turing machines.

# II B. Tech II Semester Regular Examinations, June/July - 2022 THEORY OF STRUCTURES 

## (Agricultural Engineering)

## Time: 3 hours

Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) Enumerate the five limit states commonly used in limit state design and state briefly how they are provided in the design.
b) A reinforced concrete beam of a rectangular section 300 mm wide by 600 mm deep is reinforced with 4 bars of 25 mm diameter at an effective depth of 550 mm . The effective span of the beam is $7 \mathrm{~m}, \mathrm{fy}=415 \mathrm{~N} / \mathrm{mm}^{2}$ and $\mathrm{fck}=20 \mathrm{~N} / \mathrm{mm}^{2}$, find the uniformly distributed ultimate load on the beam.

## Or

2 a) Find out the ultimate moment of resistance of a rectangular beam $300 \mathrm{~mm} \times 550$ mm . The area of tension and compression reinforcement is $250 \mathrm{~mm}^{2}$ and 400 $\mathrm{mm}^{2}$ respectively. Take an effective cover as 50 mm . Assume M 25 grade of concrete and Fe 415 steel.
b) Draw the cross-section of a singly reinforced rectangular beam and show the strain and stress diagrams.

## UNIT-II

3 a) Explain the terms balanced, over-reinforced and under-reinforced section in bending. Explain which of these should be recommended in design.
b) Design balanced singly reinforced concrete beam section for an applied moment of 60 kNm , the width of the beam is limited to 175 mm . use M20 concrete and Fe 415 bars.

## Or

4 a) What do you mean by neutral axis and lever arm? Explain briefly with neat sketches.
b) Design a doubly reinforced simply supported beam resting on walls of 300 mm thick \& $6.5 \mathrm{~m} \mathrm{c} / \mathrm{c}$. The beam has to carry a live load of $15 \mathrm{kN} / \mathrm{m}$ \& dead load of 9 $\mathrm{kN} / \mathrm{m}$. The size of the beam is 300 mm X 500 mm and has to carry a point load of 40 kN at 2 m from left support. Assume 30 mm clear cover and M25 grade concrete.

## UNIT-III

5 a) Explain the Step by step design procedure for shear reinforcement.
b) A simply supported reinforced concrete beam is 250 mm wide and 500 mm effective depth and is reinforced with $4-20 \mathrm{~mm}$ diameter as tensile steel. If the beam is subjected to a factored shear of 65 kN at the support. Find the nominal shear stress at the support. Use M20 concrete and Fe 250 steel.

SET - 1

6 a) What are the IS 456:2000 code requirements for bond?
b) An R.C.C. Beam $250 \times 400 \mathrm{~mm}$ effective depth is carried a uniformly distributed load of $15 \mathrm{kN} / \mathrm{m}$. The beam is reinforced with 4 bars of 22 mm dia. The clear span of the beam is 4 m . Design the shear reinforcement; use M 20 concrete and plain mild steel bars.

## UNIT-IV

7 a) Explain the difference in the behavior of one-way and two-way slabs.
b) Design a simply supported slab to cover a hall with internal dimensions $4.0 \mathrm{~m} \times 6.0 \mathrm{~m}$. The slab is supported on masonry walls 230 mm thick. Assume a live load of $3 \mathrm{kN} / \mathrm{m}^{2}$ and a finish load of $1 \mathrm{kN} / \mathrm{m}^{2}$. Use M 20 concrete and Fe 415 steel. Assume that the slab corners are free to lift up.

## Or

8 a) Write the procedure for design two way simply supported slabs.
b) Design continuous RC slab for a hall 6.5 m wide and 13.5 m long. The slab is supported on rcc beams, each 240 mm wide which are monolithic. The ends of the slab are supported on walls 300 mm wide. Design the slab for $L L$ of $2 \mathrm{kN} / \mathrm{m}^{2}$ assume weight of roof finishing equal to $1.5 \mathrm{kN} / \mathrm{m}^{2}$ use M20 grade concrete and Fe 415 grade steel.

## UNIT-V

9 a) Derive the expression for the ultimate load for axially loaded short columns.
b) Determine the longitudinal steel required for column for $400 \times 600 \mathrm{~mm}$ carrying $\mathrm{Pu}=166 \mathrm{kN}$, factored moment M (major axis) $=120 \mathrm{kN}-\mathrm{m}$ and factored M (minor axis) $=90 \mathrm{kN}-\mathrm{m}$, assume fck $=15 \mathrm{~N} / \mathrm{mm}^{2}$, fy $=415 \mathrm{~N} / \mathrm{mm}^{2}$, ' d ' $=60 \mathrm{~mm}$.

## Or

10 a) Explain the step-by-step procedure for design of centrally loaded short columns.
b) Design the reinforcements in a circular column of diameter 300 mm to support a service axial load of 800 kN . The column has unsupported length of 3 m and is braced against side way. The column is reinforced with helical ties. The material to be used is M 25 grade of concrete and HYSD steel bars of grade Fe 415.

SET-1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 ENGINEERING GEOLOGY

(Civil Engineering)
Time: 3 hours
Max. Marks: 75

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

1 a) Explain the role of importance of geology in Civil Engineering.
b) What is weathering? Explain.

Or
2 a) What are the allied branches of geology? Explain.
b) Write short note on development of a Valley.

3 a) Explain the typical forms of mega scopic identification of minerals.
b) What are the Sedimentary rocks? Explain the structures with sketches.

Or
4 a) Define the terms of streak, luster, cleavage and Fracture.
b) Describe the textures of Igneous rocks with sketches.

5 a) What are the parts of Folds? Explain with sketches.
b) What are Joints? Explain with sketches.

Or
6 a) Explain the mechanism of Folding.
b) What is the importance of Faults with reference to strength?

7 a) Enumerate the investigations of Groundwater.
b) What are the causes of Earthquakes?

Or
8 a) What are the branches of Geophysics? Give their necessity of investigations.
b) What are the internal and external causes of Landslides?

9 a) What are the purposes of Dams?
b) Explain the influence of water table for successful construction of reservoir.

Or
10 a) What are the associated geological structures for Tunneling? Explain with sketches.
b) What are the stages of investigations in the selection of a Dam site?

1 of 1
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# II B. Tech II Semester Supplementary Examinations, June/July - 2022 DIGITAL ELECTRONICS 

(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
1 a) Express the following numbers in decimal
(i) $(26.24)_{8} \quad$ (ii) $(16.5 \mathrm{~A})_{16} \quad$ (iii) $(101011001)_{2} \quad$ (iv) $(52.74)_{8}$
b) Given the 8 bit data word 0101 , generate the 7 bit composite word for the hamming code that corrects and detects single error.

Or
2 a) Perform the subtraction using 1's complement and 2's complement methods.
(i) 11010 - 10011
(ii) $11000-1011$
b) How are negative numbers represented? Represent signed numbers from +7 to -8 using different ways of representation.
3 a) Convert the given expression in standard POS form $\mathrm{y}=\mathrm{A} .(\mathrm{A}+\mathrm{B}+\mathrm{C})$
b) Using the Quine-Mc Cluskey tabular method, find the minimum sum of products for $\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C})=\sum \mathrm{m}(0,1,3,5,6,7)$

Or
4 a) Minimize the expression using k-map
for $\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\sum \mathrm{m}(1,5,6,12,13,14)+\sum \mathrm{d}(2,4)$
b) Define PAL,PPL and PROM with suitable example?

5 a) Perform the realization of full subtractor and full adder using decoders and logic gates.
b) Realize and explain the following function

$$
f(A, B, C, D)=\sum(1,2,5,6,7,8,10,14,15) \text { using } \quad \text { (i) } 8: 1 \mathrm{MUX} \text { and } \text { (ii) } 4: 1 \mathrm{MUX}
$$

Or
6 a) Design a BCD adder using 4-bit parallel binary adder and logic gates.
b) Draw the logic diagram of a 3 to 8 line decoder with enable input and explain its operation with the help of truth table.
7 a) Design a SR flip flop using NAND gates. Explain the operation of the SR flip
flop with the help of characteristic table and characteristic equation.
b) Explain the operation of 4-bit ring counter with circuit diagram and timing diagrams.

Or

8 a) What are the different types of registers? Explain the Parallel Input Serial Output shift register in detail.
b) Draw the logic diagram of a JK flip- flop and using excitation table explain its operation.
9 a) Discuss Mealy Machine models of sequential circuits.
b) Design a Moore type sequence detector to detect a serial input sequence of 101 .

Or
10 Convert the following Mealy machine into a corresponding Moore machine

| Present | Input, $\mathrm{X}=0$ | Input, $\mathrm{X}=1$ |
| :--- | :--- | :--- |
| State | Next state, output | Next state, output |
| A | $\mathrm{B}, 0$ | E, 0 |
| B | E, 0 | D 0 |
| C | D, 1 | A, 0 |
| D | C, 1 | E, 0 |

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 APPLIED THERMODYNAMICS 

(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

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1 a) Explain with the help of diagram a Regenerative cycle. Derive an expression for its thermal efficiency.
b) Steam at a pressure of 15 bar and at a temperature of \(300^{\circ} \mathrm{C}\) is supplied to a steam turbine working on the Rankine cycle. If the exhaust takes place at 0.15 bar, Evaluate the Rankine efficiency. Calculate the steam consumption in \(\mathrm{Kg} / \mathrm{h}\) to develop 750 KW , if efficiency is 0.6

\section*{Or}

2 a) Briefly explain reheating cycle with a neat sketch and give expression for its thermal efficiency.
b) A steam engine receives steam at a pressure of 5.6 bar and \(190^{\circ} \mathrm{C}\). The pressure at release is 2.8 bar and back pressure 1.0 bar. Determine
(a) Work done in \(\mathrm{KJ} / \mathrm{kg}\) of steam
(b) Efficiency of the cycle

3 a) Explain the working of the Lamont boiler with the neat sketch.
b) Explain the working of Orsat apparatus to analyze the flue gases of combustion.

\section*{Or}

4 a) Explain the working of blow off cock and fusible plug with neat sketches.
b) A chimney has a height of 60 meters. The temperature of air is \(27^{\circ} \mathrm{C}\).Find the draught in mm of water when the temperature of chimney gases is such as to cause the mass of these gases discharged in a given time to be maximum.
5 a) What do you mean by a supersaturated flow? Explain with the help of H-s diagram.
b) Dry saturated steam enters a steam nozzle at pressure of 10 bar and is discharged to a pressure of 3 bar. If the dryness fraction of a discharged steam is 0.95 . What will be the final velocity of steam? Neglect initial velocity of steam. If \(8 \%\) of the heat drop is lost in friction, find the percentage reduction in the final velocity.


6 The velocity of the steam exiting the nozzle of the impulse stage of a turbine is \(300 \mathrm{~m} / \mathrm{s}\). The blades operate close to the maximum blading efficiency. The nozzle angle is \(20^{\circ}\). Considering equiangular blades and neglecting blade friction, calculate for a steam flow of \(0.8 \mathrm{~kg} / \mathrm{s}\), the diagram power and the diagram efficiency.
\(7 \quad\) A reaction turbine running at 360 r.p.m consumes 5 kg of steam per second. Tip leakage is \(10 \%\). Discharge blade tip angle for both moving and fixed blades is \(20^{0}\).Axial velocity of flow is 0.75 times blade velocity. The power developed by a certain pair is 4.8 kW , where the pressure is 2 bar and dryness fraction is 0.95 . Find the drum diameter and blade height.

Or
8 a) Explain briefly ejector type jet flow condenser with the neat sketch.
b) Separate air pump and water pump are installed in a condenser. Steam enters the condenser at \(40^{\circ} \mathrm{C}\) and condensate is removed at \(37^{\circ} \mathrm{C}\). The quantity of air infiltrating into the condenser through various zones is \(5 \mathrm{~kg} / \mathrm{hr}\).
(i) What will be the volume of air handled by the air pump
(ii) What will be the quantity handled by a combined air and condensate pump at \(38^{\circ} \mathrm{C}\).
9 Derive the expression for work done with clearance volume for the reciprocating compressor.

\section*{Or}

10 An axial flow compressor having eight stages and with \(50 \%\) efficiency reaction design compresses air in the pressure ratio \(4: 1\). The air enters the compressor at \(20^{\circ} \mathrm{C}\) and flows through it with a constant speed of \(90 \mathrm{~m} / \mathrm{s}\). The rotating blades of compressor rotate with a mean speed of \(180 \mathrm{~m} / \mathrm{s}\). Isentropic efficiency of the compressor may be taken as \(82 \%\). Calculate:
(i) Work done by the machine (ii) Blade angles.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022
}

ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
(Electronics Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

1 a) Starting from the equivalent circuit, derive the transmission line equation for V and I in terms of the source parameters.
b) A lossless transmission line of length 100 m has an inductance of \(28 \mu \mathrm{H}\) and a

Capacitance of 20 nF . Find out i) propagation velocity ii) phase constant at an operating frequency of 100 KHz iii) characteristic impedance of the line.

Or
2 a) Using the general line equations obtain an expression for the input impedance of a transmission line.
b) Explain the need of 2-wire transmission line? Draw the equivalent circuit of it and explain each term?

3 a) Explain the construction of a Smith Chart.
b) A \(100 \Omega\) loss less line connects a signal of 100 KHz to load of \(140 \Omega\). The load power is 100 mW .Calculate (i) Voltage reflection coefficient (ii) VSWR

Or
4 a) Explain with sketches, how the input impedance varies with length of transmission line.
b) Write the applications of smith chart.

5 a) Derive expression for electric field intensity due to an Infinite line charge distribution.
b) On a flat conducting surface, if a surface charge density \(\rho=1\) coulomb per square meter is placed on it, what would be the value of the electric field strength E at its surface?

\section*{Or}

6 a) Define Electric potential and derive the relationship between electric potential and electric field.
b) Point charges 1 mC and -2 mC are located at \((3,2,-1)\) and \((-1,-1,4)\) respectively.

Calculate the electric force on a 10 nC charge located at \((0,3,1)\) and Electric field intensity at that point.
7 a) State Ampere's circuit law. What are its applications?
b) State all Maxwell's equations in differential and integral form for time varying fields.

Or

8 a) Explain the following terms:
(i) Transformer EMF
(ii) Motional EMF
b) Assume that dry soil has \(\sigma=10 \mathrm{~S} / \mathrm{m}, €=3 €_{0}\) and \(\mu=\mu_{0}\). Determine the frequency at which the ratio of the conduction current density and the displacement current density is unity.
9 a) Derive the relation between E and H in uniform plane wave propagation.
b) A plane wave with \(\mathrm{E}=2.0 \mathrm{~V} / \mathrm{m}\) and has a frequency of 300 MHz is moving in free space impinging on thick copper sheet located perpendicular to the direction of the propagation.
Find i) E and H at the plane surface and ii) Depth of penetration
Or
10 a) Derive an expression for reflection coefficient when a wave is incident on a dielectric obliquely with parallel polarization.
b) What is Brewster Angle? Derive the expression for Brewster angle?

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2021 OPERATING SYSTEMS
}
(Com to CSE, IT)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit}

All Questions carry Equal Marks
1 a) What are the advantages of system utilities? Explain.
b) Distinguish between traditional computing and client-server computing.

Or
2 Define the essential properties of the following types of operating systems:
a) Batch
b) Interactive
c) Time sharing
d) Real time
e) Network
f) Parallel
g) Distributed

3 a) Describe creating a separate process using the Win32 API.
b) Explain about thread cancellation and signal handling.

Or
4 a) Discuss about priority scheduling algorithm with example.
b) Describe a solution to the readers and writers problem.

5 a) Explain in detail about basic method of paging in detail.
b) Describe shared memory in the Win32 API.

Or
6 a) Define segmentation. Explain about segmentation hardware.
b) What is Demand paging? Give its advantages.

7 a) Distinguish between single-level and hierarchical directory systems.
b) What are conditions for resource deadlocks? Explain deadlock modelling.

8 a) Explain in detail about virtual file systems.
b) What is RAID? What are RAID levels? Explain.

9 a) Discuss about environmental subsystems of Windows XP.
b) How does firewall protect the Systems and Networks? Give their classification?

\section*{Or}

10 a) Explain about user authentication in system security.
b) What are Kernel modules in the Linux system? Explain.

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 THEORY OF MACHINES}
(Agricultural Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
1 a) Define and explain the term Kinematic chain. Write the relation showing number of links and number of joints. A five link chain with five joints is shown in the figure. Prove that it is an unconstrained chain.

b) Locate all the instantaneous centres of the slider crank mechanism shown in the figure. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 \(\mathrm{rad} / \mathrm{s}\), find: 1. Velocity of the slider A, and 2. Angular velocity of the connecting \(\operatorname{rod} A B\).


Or

1 of 3

2 a) Differentiate between
i) Completely constrained and incompletely constrained motion
ii) Mechanism and machine

With their suitable examples.
b) The oscillating link OAB of a mechanism, as shown in the figure is pivoted at O and is moving at 90 r.p.m. anticlockwise. If \(\mathrm{OA}=150 \mathrm{~mm} ; \mathrm{AB}=75 \mathrm{~mm}\), and
\(\mathrm{AC}=250 \mathrm{~mm}\), calculate i) the velocity of the block C ; ii) the angular velocity of the link AC ; iii) the rubbing velocities of the pins at O , A and C , assuming that these pins are of equal diameters of 20 mm .


3 a) Derive an expression for the velocity of sliding between a pair of involute teeth.
State the advantages of involute profile as a gear tooth profile.
b) The number of teeth on each of the two equal spur gears in mesh are 40 . The teeth have \(20^{\circ}\) involute profile and the module is 6 mm . If the arc of contact is 1.75 times the circular pitch, find the addendum.

Or
4 a) Explain the working of bevel gears and worm gears. Write their applications.
b) In a reverted epicyclic gear train shown, the arm A carries two gears B and C and a compound gear \(\mathrm{D}-\mathrm{E}\). The gear B meshes with gear E and the gear C meshes with gear D . The number of teeth on gears \(\mathrm{B}, \mathrm{C}\) and D are 75,30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise.


2 of 3

Code No: R1922353


5 a) An effort of 1500 N is required to just move a certain body up an inclined plane of angle \(12^{0}\), force acting parallel to the plane. If the angle of inclination is increased to \(15^{0}\), then the effort required is 1720 N . Find the weight of the body and the coefficient of friction.
b) Derive the expression to find the length of the belt in an open belt drive.

Or
6 a) Discuss relative merits and demerits of belt, rope and chain drive for transmission of power.
b) Derive an expression for the friction moment for a flat collar bearing in terms of the inner radius \(r_{1}\), outer radius \(r_{2}\), axial thrust W and coefficient of friction \(\propto\). Assume uniform intensity of pressure.

7 a) Explain the construction and working of Porter governor also draw the neat sketch.
b) Derive the expression to evaluate Effort and Power of a Porter Governor.

Or
8 a) Explain the terms sensitiveness, stability, hunting related to governors.
b) A Porter governor has all four arms 250 mm long. The upper arms are attached on the axis of rotation and the lower arms are attached to the sleeve at a distance of 30 mm from the axis. The mass of each ball is 5 kg and the sleeve has a mass of 50 kg . The extreme radii of rotation are 150 mm and 200 mm . Determine the range of speed of the governor.

9 a) Discuss how a single revolving mass is balanced by two masses revolving in different planes.
b) Four masses m1, m2, m3 and m4 are \(200 \mathrm{~kg}, 300 \mathrm{~kg}, 240 \mathrm{~kg}\) and 260 kg respectively. The corresponding radii of rotation are \(0.2 \mathrm{~m}, 0.15 \mathrm{~m}, 0.25 \mathrm{~m}\) and 0.3 m respectively and the angles between successive masses are \(45^{\circ}, 75^{\circ}\) and \(135^{\circ}\). Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m .

Or
10 a) Define the following terms as applied to cam with a neat sketch :
(i) Base circle
(ii) Pitch circle
(iii) Pressure angle and
(iv) Stroke of the follower
b) Explain balancing of reciprocating mass considering slider crank mechanism as an example.

II B. Tech II Semester Supplementary Examinations, June/July - 2022
TRANSPORTATION ENGINEERING-I
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

\section*{PART -A}
1. a) Show different road network patterns with neat sketches. What pattern has been adopted in our road development plans? Explain obligatory points with illustrations; discuss how these control the alignment.
b) Discuss under what circumstance rotary and Channelized Intersections are suggested.
c) Define the term Level of service concept for urban roads with neat sketches.
d) List out the desirable properties of bitumen. Explain why the viscosity grading of bitumen better over-penetration grading.
e) Classify the types of pavements and draw the cross-section and explain the functions of each layer and their materials requirements.
f) List out the different types of bituminous pavement construction adopted in India for low volume road and high volume roads. Discuss Surface dressing construction.

\section*{PART -B}
2. a) Briefly outline the highway classification based on location and function, as suggested in the Nagpur Road Plan.
b) Explain about different road development plans.
3. a) At a right-angled intersection of two roads, Road 1 has four lanes with a total width of 14.0 m and Road 2 has two lanes with an entire width of 7.0 m . The volume of traffic approaching the intersection during design hour are 1140 and \(980 \mathrm{pcu} / \mathrm{hour}\) on the two approaches of Road 1 and 480 and \(350 \mathrm{pcu} / \mathrm{hour}\) on the two approaches of Road 2. Design two-phase traffic signal by Webster's method.
b) Define the term road accident. Draw the condition diagram and collision diagrams and indicate the signs.
4. a) A new four-lane divided highway (with two lanes on each side of the median) is to be constructed on a subgrade of CBR \(1.8 \%\). The ADT of commercial truck traffic based on the last count was 8000 (in both the directions). The directional split of traffic is 55: 45 . Vehicle damage factor based on axle load survey was 4.0. Pavement section to be designed for a life of 15 years. The last traffic count was taken one year back, and the project would be completed in 2 years from now. The growth rate of traffic is \(7 \%\). Calculate the design of cumulative standard axles on the road.
b) A traffic survey was conducted on the rural road the traffic volume is found to be (20) Heavy commercial vehicles, (10) medium commercial vehicles, other (100) and non-motorized 150 VPD. There are two harvesting seasons in the area; duration of each harvesting season is found to be 75 days. Estimate the ESALs as per design of flexible pavement as per IRS SP 72: 2015 for low volume flexible pavement. The following information may be used.
\begin{tabular}{ccc} 
Vehicle Type & Laden (unit) & Unladen/Partially Laden (unit) \\
HCV & 2.86 & 0.31 \\
MCV & 0.34 & 0.02
\end{tabular}
5. a) Calculate the warping stresses at interior, edge and corner for a concrete pavement of thickness 20 cm with transverse joints at 4.5 m spacing. The width of slab is 3.5 m . For concrete \(\mathrm{E}=3 \times 105 \mathrm{~kg} / \mathrm{cm} 2\) and \(\mu=0.15, \mathrm{~K}\) value for subgrade \(=6 \mathrm{~kg} / \mathrm{cm} 3\). Temperature differential is 0.9 C per cm . Assume thermal coefficient for concrete as \(10 \times 10^{-6}\) per \(0^{\mathrm{C}}\)
b) Explain spot speed and delay studies, along with their importance.
6. a) List out the physical requirements of materials for the construction of Wet Mix Macadam layer and discuss step by step construction procedure.
b) What are the desirable properties of Bituminous mixes? How are these properties assessed in the Marshall Method of Mix Design?
7. a) Discuss the construction of joints in cement concrete pavement with net sketches
b) Define the term pavement evaluation. Discuss the step by step procedure for strengthening of existing pavements with suitable examples.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 \\ ELECTRICAL MEASUREMENTS \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) What types of torques are present in analog measuring instruments? 3 M
b) Define creeping error. \(\quad 2 \mathrm{M}\)
c) Write some applications of potentiometers. 2 M
d) List out the bridges used for measurement of unknown inductance. 3 M
e) Write the applications of flux meter. 2 M
f) What are the advantages of DMM? 2 M

\section*{PART -B}
2. a) Classify and explain the electrical instruments with examples. 7M
b) Explain the operation of potential transformer. 7 M
3. a) Derive the expression for power factor angle in two wattmeter method for 7 M measurement of three phase power.
b) What is phantom loading? Explain. 7 M
4. a) Explain the principle and operation of DC Crompton's potentiometer. 7M
b) Explain the process of standardization in DC Crompton's potentiometer. 7 M
5. a) Draw the circuit diagram of Wien's bridge and explain the measurement 7M procedure for measuring unknown frequency using this bridge. Derive the formula used.
b) Describe how an unknown capacitance can be measured with the help of D'Sauty's bridge. What are the limitations of this bridge and how are they overcome by using modified D'Sauty's bridge?
6. a) Explain how core loss is determined by bridges and potentiometer.
b) Explain flux meter with suitable diagram. 7 M
7. a) Explain the functioning of a successive approximation type digital voltmeter. 7M
b) Explain the working of Digital frequency meter with a neat block diagram. 7 M

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 PRODUCTION TECHNOLOGY}
(Com to ME, AME)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

PART -A
1. a) What is the difference between pattern and casting?
b) What are the advantages and applications of investment casting?
c) What is the function of shielding gas in wilding?
d) Explain the heat affected zones in welding.
e) Write a short notes on forward extrusion process.
f) Define coining operation.

\section*{PART -B}
2. a) Enumerate the various types of commonly used patterns and their applications.
b) Explain top and bottom gate with a neat sketch.
3. a) What are the main advantages of casting techniques over the metal forming methods?
b) What do you understand by centrifugal casting? How are the centrifugal casting methods classified?
4. a) Compare gas welding and arc welding techniques.
b) Explain TIG welding and MIG welding with its merits, demerits and application.
5. a) List the various welding techniques classified under solid state welding and explain two of them.
b) Explain soldering? What fluxes are generally used in soldering?
6. a) Write the differences Hot working and Cold working.
b) With the help of neat sketches briefly discuss about forward extrusion and backward extrusion.
7. a) Draw a progressive die for producing a washer and explain its working.
b) Explain the principle of drawing operation. Mention its application.

\section*{1 of 1}

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 ELECTROMAGNETIC WAVES AND TRANSMISSION LINES}
(Com to ECE, EIE)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1.Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) A plane \(\mathrm{z}=1 \mathrm{~m}\) has a uniform charge density of \(\rho_{\mathrm{s}}=2 \mathrm{pC} / \mathrm{m}^{2}\). Find the electric field \(\mathbf{E}\) above the plane.
b) Define magnetic flux density.
c) Write the relationship between \(\mathbf{E}\) and \(\mathbf{H}\) in a lossy medium.
d) Write short notes on complex poynting vector.
e) Draw the L-type equivalent circuit of a transmission line.
f) Define VSWR and write the significance of it.

\section*{PART -B}
2. a) Derive the expression for capacitance of a parallel plate capacitor.
b) Derive the relationship between electric field intensity and electric potential.
3. a) Explain about force on charged particle and current element due to magnetic field.
b) In free space, \(\mathbf{E}=10 \sin (\omega \mathrm{t}-\beta \mathrm{z}) \mathbf{a}_{\mathbf{y}} \mathrm{V} / \mathrm{m}\). Determine \(\mathbf{D}, \mathbf{B}\) and \(\mathbf{H}\).
4. a) Define Polarization. Explain the various types of polarization.
b) Find the depth of penetration of an EM wave in copper at \(f=60 \mathrm{~Hz}\) and \(\mathrm{f}=100\) MHz . For copper, \(\sigma=5.8 \times 10^{7} \mathrm{mho} / \mathrm{m}, \mu_{\mathrm{r}}=1, \varepsilon_{\mathrm{r}}=1\).
5. a) Derive the expression for reflection coefficient when an EM wave normally incident on dielectric-dielectric interface.
b) In a non-magnetic medium, \(\mathbf{E}=4 \sin \left(2 \pi \times 10^{7} \mathrm{t}-0.8 \mathrm{x}\right) \mathbf{a}_{\mathbf{z}} \mathrm{V} / \mathrm{m}\), determine
(i) \(\varepsilon_{\mathrm{r}}, \eta\)
(ii) the time average power carried by the wave.
6. a) Explain about various transmission line parameters.
b) A transmission line has \(\mathrm{R}=30 \Omega / \mathrm{m}, \mathrm{G}=0, \mathrm{~L}=100 \mathrm{mH} / \mathrm{m}, \mathrm{C}=200 \mathrm{nF} / \mathrm{m}\) and operating at \(\mathrm{f}=1 \mathrm{MHz}\). Determine its characteristic impedance and phase constant.
7. a) Derive the expression for input impedance of open circuited and short circuited transmission lines.
b) Explain about single stub matching.

SET-1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 ADVANCED DATA STRUCTERES}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

PART -A
1. a) Explain the need for External sorting. 2 M
b) Given input \(\{4371,1323,6173,4199,4344,9679,1989\}\) and a hash function 3 M
\(h(x)=x(\bmod 10)\), show the resulting of open hash table
c) Explain Binary heap structure property. 3 M
d) List the different AVL tree rotations to insert a node. 2 M
e) Explain, how do you find the number of elements in a B-Tree? 2 M
f) Differentiate Binary Tries and Multiway Tries. 2 M

\section*{PART -B}
2. a) Determine the running time of merge sort for:
a. sorted input
b. reverse-ordered input
c. random input
b) How do we get optimal merging of runs explain? 7M
3. a) Explain the Dynamic Hashing using Directives. 7M
b) A large number of deletions in an open hash table can cause the table to be fairly 7 M empty, which wastes space. In this case, we can rehash to a table half as large. Assume that we rehash to a larger table when there are twice as many elements as the table size. How empty should an open table be before we rehash to a smaller table?
4. a) What is an Ascending Priority Queue? Explain how to implement this using

Binary Heap? Explain the insertion and deletion operation performed on binary heap, with an example.?
b) What is binomial queue? Discuss binomial amortized analysis.
5. a) Explain the splitting of Red Black Trees with an example. 6M
b) Insert the following sequence of elements into an AVL tree, starting with an empty 8 M tree: \(10,20,15,25,30,16,18,19\) and delete 30 in the AVL tree that you got?

1 of 2
6. a) Discuss the advantage of using m-way search trees over binary search trees?
b) Assume that \(\mathrm{t}=2\). Draw the tree that will result from deleting the element G , and then M .

7. a) Explain about Patricia with examples. 7M
b) List the advantages and disadvantages of Tries. 7M

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ ENVIRONMENTAL ENGINEERING
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

UNIT-I
1 a) What are the Importance and Necessity of Protected Water Supply systems.
b) Explain the significance of indicator organisms like E.coli in bacteriological analysis of water? List various methods of enumerating them.

\section*{Or}

2 a) How the water consumed by the customers measured? Describe any suitable device for the same. Discuss on the policy of metering the water supply systems?
b) Write an account on the common water-borne diseases?

\section*{UNIT-II}

3 a) Design five slow sand filter beds from the following data for the water works of a town population 125,000, per capita demand \(=135\) liters/per/ capita.
Rate of filtration \(=250\) litres \(/\) hour \(/ \mathrm{m} 2\).
Assume maximum demand as 1.5 times the average demand. Out of five units, one is to be kept standby and used while repairing other units.
b) Write about (i) Bar Screens (ii) Grit Chamber(iii) Skimming Tank (iv) Primary Sedimentation Tank

\section*{Or}

4 a) Explain pressure filter with a neat sketch and mention its advantages and disadvantages.
b) Write short notes on Dual media filters.

\section*{UNIT-III}

5 a) Explain about dead end system with neat sketch. What are the advantages and disadvantages of dead end system?
b) What is a distribution system? What are general requirements that are to be satisfied by the distribution system?

\section*{Or}

6 a) Discuss about laying and testing of pipe lines.
b) What do you understand by an equivalent pipe? How do you determine its length when the pipes are (i) in series (ii) in parallel?

1 of 2

\section*{UNIT-IV}

7 a) Write about the Layouts of Distribution networks,
b) What are the various on which the design of distribution system depend?

Or
8 a) Write the design of drainage in Gated communities.
b) Write the working principle of Septic tank..

UNIT-V
9 a) What is sewage sickness?
b) What are the methods of disposal of sewage into sea and land?

\section*{Or}

10 a) Explain the term concentration and its significance in design of storm sewers.
b) Differentiate between separate and combined systems of sewerage suitable to a town. List their merits and demerits?

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ ENVIRONMENTAL ENGINEERING
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ UNIT-I}

1 a) The population of the past three successive decades of a city is given below.
Estimate the population of the city for the year 2021 by decreasing rate of growth method.
Census year Population
198147050
199154500
200161000
b) Discuss the factors affecting water demand.

Or
2 a) Explain about aquifers and list out their relative merits and demerits.
b) What are the WHO guidelines for drinking water - IS 105002012 .

\section*{UNIT-II}

3 a) Compare and contrast between slow sand filter and rapid gravity filters.
b) Explain about the removal of Iron and manganese.

\section*{Or}

4 a) Design a rectangular sedimentation tank to supply water for a population of 50,000 with an assured average supply of 135 lpcd, detention time of the tank is 4 hours. Assume data needed suitably.
b) Explain any one water treatment method?

\section*{UNIT-III}

5 a) List out common methods of disinfection usually employed in water treatment. Determine the annual requirement of bleaching powder to treat 6MLD of water which requires 0.3 ppm of chlorine. The available chlorine in bleaching powder was found to be \(25 \%\) only.
b) Enlist various pipe appurtenances in a water distribution network and with neat sketches explain any two of them.

Or

6 a) Explain the factors governing the selection of intake structure.
b) Explain about ideal water supply system.

\section*{UNIT-IV}

7 a) Explain the design considerations and working principles of septic tank with sketch?
b) Explain in detail different types of sanitary fittings.

\section*{Or}

8 a) What are the different parameters that are considered in the sewer design?
b) Explain the classification of traps.

\section*{UNIT-V}

9 a) Discuss how the symbiotic relationship between algae and bacteria is useful in the treatment of sewage in an oxidation pond.
b) i. Explain BOD and derive the expression for it.
ii. Explain COD and derive the expression for it. Or

10 a) Write short notes on the various materials used in sewer construction.
b) Design and sketch an oxidation pond of population 30,000 in a tropical country like India, assuming necessary data. Determine detention time also.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ ENVIRONMENTAL ENGINEERING
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

\section*{UNIT-I}

1 a) The population of a locality as obtained from census report is as follows :
Census year 2011200119919811971
Population 2,76,000 4,12,000 9,40,000 15,06,000 15,69,000
Estimate the population of the locality in the year 2021 by using Incremental method.
b) What are the common impurities mostly found in natural water? Explain their effect on the quality of water.

\section*{Or}

2 a) What is B-coli index? How is it determined?
b) Write about water quality standards for agriculture and construction.

UNIT-II
3 a) Differentiate between temporary and permanent hardness. Mention any three methods of softening of water.
b) What do you understand by the term „disinfection of water"? What should be the requirements of good disinfectant?

\section*{Or}

4 a) Write short notes on the following,
i. Pre-chlorination and double chlorination
ii. Chlorine demand
iii. Chlorine compounds
b) Design a circular sedimentation tank to treat 1 MLD of domestic waste water treatment plant. Make suitable assumptions. UNIT-III

5 a) Write about pipe materials and pipe joints.
b) Write about the pressure and Gravity Conduits

6 a) Write the design aspects of pipe lines.
b) Explain about the check valves and hydrants.

7 a) Explain the different principles that should be considered while designing a house drainage system.
b) State the factors on which the storm water flow of an area depends.

\section*{Or}

8 a) What is different method used for the analysis of flow in pipe network. Explain
i. Hardy-cross method and
ii. Equivalent pipe method
b) What is the foundation of storm water regulator in sewerage systems? Draw a neat sketch of "leaping weir storm regulator.
9 a) Explain the activated sludge process with a flow diagram.
b) Give advantage and disadvantages of ASP.

\section*{Or}

10 a) Write down advantages and disadvantages of combined systems of sewage.
b) Define the terms,
(i) BOD
(ii) Sullage
(iii) Sewage
(iv) Aerobic Bacteria
(v) Time of Concentration


\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ ENVIRONMENTAL ENGINEERING}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ UNIT-I}

1 a) With the help of neat sketches, explain Infiltration gallery and Infiltration well?
b) Enlist any four type of pumps usually used in water supply systems and the main factors which are to be considered while selecting a suitable pump.

\section*{Or}

2 a) What are the various factors affecting "per capita demand"?
b) Explain Logistic curve method of population forecasting.

\section*{UNIT-II}

3 a) Explain the theory of sedimentation.
b) Design a rapid sand filter for a total demand of 6 MLD of water with all its principal components.

\section*{Or}

4 a) Explain the various methods of disinfection of water.
b) Explain breakpoint chlorination and super chlorination.

\section*{UNIT-III}

5 a) What are the types of pipes and pipe materials? Explain them neatly.
b) Write about the Design aspects of pipe lines.

Or
6 a) Write briefly about the Capacity of storage Reservoirs.
b) Write briefly about the mass curve analysis.

\section*{UNIT-IV}

7 a) With neat sketch, explain about septic tank.
b) Design a septic tank for a small colony of 200 persons with daily sewage flow of 120lpcd.

\section*{Or}

8 a) What is sewage? Explain about the estimation of sewage flow?
b) Discuss about sewer appurtenances.

\section*{UNIT-V}

9 a) Write about the characteristics of Sewage?
b) Explain about Trickling Filter with neat sketch?

\section*{Or}

10 a) Discuss the appurtenances in sewerage.
b) Write about different types of pumps and factors to be considered in the selection of pumps for sewerage.

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ INDUCTION AND SYNCHRONOUS MACHINES}
(Electrical and Electronics Engineering)
Time: 3 hours

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}
\(\qquad\)

\section*{UNIT-I}

1 a) Describe the constructional features of both squirrel-cage induction motor and slipring induction motor. Also discuss the merits of one over other?
b) A \(20 \mathrm{~kW}, 6\) pole, \(400 \mathrm{~V}, 50 \mathrm{~Hz}, 3\) Phase induction motor has a full load slip of 0.025 .

If the torque lost in mechanical losses is 10 Nm , find the rotor ohmic losses, motor input and efficiency. Stator losses are 800 watts.

Or
2 a) Discuss the similarities between transformer and an induction machine. Hence, explain why an induction machine is called a generalized transformer?
b) A 6-pole, \(50 \mathrm{~Hz}, 3\)-phase induction motor running on full load develops a useful torque of \(160 \mathrm{~N}-\mathrm{m}\) when the rotor emf makes 120 complete cycles per minute. Calculate the shaft power output. If the mechanical torque lost in friction and that for core-loss is \(10 \mathrm{~N}-\mathrm{m}\), compute (i) The copper-loss in the rotor windings (ii) The input to the motor, and (iii) The efficiency The total stator loss is given to be 800 W .

UNIT-II
3 a) Derive the general expression for the torque developed in the three-phase induction motor? Also derive the expression for maximum torque?
b) A 3 phase SCIM has a rotor starting current of 6 times its full load value. The motor has a full load slip of \(5 \%\). Determine
(i) the starting torque in terms of full load torque
(ii) slip at which max. torque occurs
(iii) maximum torque in terms of full load torque

\section*{Or}

4 a) Write a short note on cogging and crawling?
b) A 6 pole, \(50 \mathrm{~Hz}, 3\) Phase IM has a rotor resistance of \(0.2 \Omega\) per phase and a maximum torque of 160 Nm at 875 rpm . Calculate
(i) the torque for a full load slip of \(4 \%\)
(ii) the resistance to be added to the rotor circuit to obtain \(80 \%\) of full load torque at starting
Rotational losses and stator impedance are neglected.

\section*{UNIT-III}

5 a) With the help of a neat diagram, explain the working of DOL starter used for starting three phase IM.
b) The ratio of maximum torque to full - load torque in a 3- phase squirrel -cage induction motor is \(2: 1\). Determine the ratio of actual starting torque to full - load torque for the following cases: (i) Direct starting, (ii) Star -delta starting, and (iii) Autotransformer started tapping of \(70 \%\). The rotor resistance and standstill reactance per phase are \(0.5 \Omega\) and \(5 \Omega\) respectively.

\section*{Or}

6 a) Using double field revolving field theory explain the torque-slip characteristics of a single-phase induction motor and prove that it cannot produce starting torque.
b) Explain the construction and working of AC series motor. What are the differences between AC series motor and DC series motor?

UNIT-IV
7 a) List the differences between salient pole and non-salient pole alternators.
b) A 3 phase 16 -pole alternator has the following data: Number of slots=192, conductors/slot \(=8\); coil span 10 slots, speed of the alternator= \(=375 \mathrm{rpm}\), flux per pole \(=55 \mathrm{~m} \mathrm{wB}\). Calculate phase and line emf voltage.

\section*{Or}

8 a) Explain the effect of variation of mechanical input on the parallel operation of alternators with necessary phasor diagrams
b) Write Short notes on two reaction theory and hence draw and explain the phasor diagram of a salient pole alternator for leading p.f. load.

\section*{UNIT-V}

9 a) Derive an expression for power developed in a cylindrical rotor synchronous motor in terms of load angle and synchronous impedance?
b) A 3-Phase, \(50 \mathrm{~Hz}, 2000 \mathrm{~V}\), synchronous motor has a synchronous reactance of 10 \(\Omega / \mathrm{ph}\) and negligible armature resistance. The motor delivers a power of 120 kW and the efficiency is \(88 \%\). If the torque angle is \(12^{0}\) electrical, determine the back emf of the motor. Assume the armature winding is star connected.

\section*{Or}

10 a) What is hunting phenomenon in synchronous motor? What are the drawbacks of hunting? What are different methods of suppression?
b) A \(1000 \mathrm{kVA}, 11,000 \mathrm{~V}, 3\)-Phase star connected synchronous motor has an armature resistance and reactance per phase of \(3.5 \Omega\) and \(40 \Omega\) respectively. Determine the induced emf and angular retardation of the motor when fully loaded at (i) unity pf and (ii) 0.8 pf lead.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ INDUCTION AND SYNCHRONOUS MACHINES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

\section*{UNIT-I}

1 a) Describe the principle of operation of 3 phase IM. Explain why the rotor is forced to rotate in the direction of Rotating Magnetic Field.
b) A \(10 \mathrm{~kW}, 3\) Phase, \(50 \mathrm{~Hz}, 4\) pole IM has a full load slip of 0.03 . Mechanical and stray load losses at full load are \(3.5 \%\) of output power. Compute
(i) Power delivered by stator to rotor
(ii) Electromagnetic (internal) torque at full load
(iii)Rotor ohmic losses at full load

\section*{Or}

2 a) Explain the terms: Airgap power \(\mathrm{P}_{\mathrm{g}}\), internal mechanical power developed \(\mathrm{P}_{\mathrm{m}}\) and shaft power \(\mathrm{P}_{\text {sh. }}\). How are these terms related with each other? Also show that, \(\mathrm{P}_{\mathrm{g}}\) : rotor ohmic loss: \(\mathrm{P}_{\mathrm{m}}=1: \mathrm{s}\) : (1-s)
b) A 3 phase, 50 Hz IM has full load speed of 1440 rpm . For this motor, calculate the following: (i) number of poles (ii) full load slip (iii) rotor frequency (iv) speed of stator field with respect to stator structure and rotor structure (v) speed of rotor field with respect to rotor structure, stator structure and stator field

\section*{UNIT-II}

3 a) Derive the condition for maximum torque developed in a 3 phase IM and hence prove that, to increase the starting torque extra resistance must be added in the rotor circuit?
b) In a 3 phase IM, stator reactance equals the rotor reactance at standstill while each resistance is one-fourth of this value. If the motor develops 220 Nm at \(3 \%\) slip, what will be its starting torque and pull out torques.

Or
4 a) Draw the torque-slip characteristics of a 3-phase induction motor. Explain them briefly.
b) Write a short note on double cage rotor and deep bar rotor SCIMs.

\section*{UNIT-III}

5 a) Explain the starting of IM using Auto transformer starter.
b) The short circuit current of SCIM on normal voltage is 3.5 times the full load current and the full load slip ids \(4 \%\). Determine the percentage tapping required to an autotransformer starter to start the motor against \(1 / 3^{\text {rd }}\) full load torque. Neglect magnetizing current.

\section*{Or}

1 of 2

6 a) Using double field revolving field theory explain the torque-slip characteristics of a single-phase induction motor and prove that it cannot produce starting torque?
b) Write a short note on (i) AC series motor (ii) Split phase IM

\section*{UNIT-IV}

7 a) What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator at ZPF lag and ZPF lead with the help of necessary phasor diagram.
b) The open and short circuit test readings for a three-phase star connected 1000 kVA 2000 V and 50 Hz alternator are
\begin{tabular}{|l|l|r|r|r|l|l|}
\hline \(\mathrm{V}_{\mathrm{OC}}(\) Line \()\) & 800 & 1500 & 1760 & 2000 & 2350 & 2600 \\
\hline \(\mathrm{I}_{\mathrm{SC}}(\mathrm{A})\) & - & 200 & 250 & 300 & - & - \\
\hline \(\mathrm{I}_{\mathrm{F}}(\mathrm{A})\) & 10 & 20 & 25 & 30 & 40 & 50 \\
\hline
\end{tabular}

The armature effective resistance is \(0.2 \Omega /\) phase. Estimate the full load voltage regulation using M.M.F. method for 0.8 pf lag.

Or
8 a) What is synchronizing power of an alternator? Derive an expression for synchronizing power between the two alternators when they are connected in parallel?
b) The governors of each 2000 kW , rating turbo alternators running in parallel are so adjusted that the frequency of one of the alternators drops uniformly from 50 Hz to 45 Hz and that of other from 50 Hz to 47 Hz from No load to full load. Calculate the load on each machine when the total load is 3000 kW

\section*{UNIT-V}

9 a) Explain different methods of starting synchronous motor.
b) A synchronous motor takes 20 kW at 400 V supply mains. The synchronous reactance of the motor is \(4 \Omega\). Find the p.f. at which the motor would operate when the exciting current is so adjusted that the generated e.m.f. is 550 V . Assume the star connected stator.

\section*{Or}

10 a) What is synchronous condenser? What are the advantages of installing a synchronous condenser in an electrical system? Illustrate your answer with an example?
b) An industrial plant has an average load demand of 800 kW at a pf of 0.71 lag. A synchronous motor of 400 kVA is installed for driving an additional load and improving the plant power factor. The synchronous motor load is 160 kW at an efficiency of \(90 \%\). For synchronous motor operation at rated kVA, calculate the total load kVA and the resultant pf.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 INDUCTION AND SYNCHRONOUS MACHINES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ UNIT-I}

1 a) Develop the phasor diagram of three phase IM. How does it differ from the phasor diagram of transformer?
b) A 3-phase \(400 \mathrm{~V}, 50 \mathrm{~Hz}\) induction motor takes a power input of 35 kW at its full load speed of 980 rpm . The total stator losses are 1 kW and friction and windage losses are 1.5 kW . Calculate (i) slip (ii) rotor ohmic losses (iii) Shaft power (iv) shaft torque and (v) efficiency

\section*{Or}

2 a) Develop and explain the equivalent circuit of Three phase IM.
b) A \(10 \mathrm{~kW}, 400 \mathrm{~V}, 3\) phase, 4 pole, 50 Hz delta connected IM is running at no load with a line current of 8 A and an input power of 660 W . At full load, the line current is 18 A , and the input power is 11.2 kW . Stator effective resistance per phase is 1.2 \(\Omega\) and friction, windage loss is 420 watts. For negligible rotor ohmic losses to at no load, calculate (i) stator core loss (ii) total rotor losses at full load (iii) full load speed (iv) internal torque (v) shaft torque (vi) motor efficiency

UNIT-II
3 a) Explain the speed control of three phase IM with V/f control.
b) A \(746 \mathrm{~kW}, 3\) phase, \(50 \mathrm{~Hz}, 16\) pole IM has a rotor impedance of \((0.02+\mathrm{j} 0.15) \Omega\) at stand still. Full load torque is obtained at 360 rpm . Calculate (i) the ratio of maximum torque to full load torque (ii) speed at maximum torque (iii) the rotor resistance to be added to get maximum starting torque
Or

4 a) Briefly explain the procedure to draw the circle diagram of three phase IM.
b) A 12pole, 3Phase, \(600 \mathrm{~V}, 50 \mathrm{~Hz}\). Star connected IM has rotor resistance and standstill reactance of 0.03 and \(0.5 \Omega\) per phase respectively. Calculate (i) Speed at maximum torque (ii) ratio of full load torque to maximum torque, if the full load speed is 495 rpm.

\section*{UNIT-III}

5 a) With the help of neat circuit, explain the starting of IM suing Y/ \(\Delta\) starter.
b) Calculate the steps in a 5 -step rotor resistance starter for a 3 phase IM. The slip at the maximum starting current is \(2 \%\) with slip ring short circuited and the rotor resistance per phase is \(0.02 \Omega\).

\section*{Or}

6 a) Write a short note on different methods of starting single phase IM.
b) Explain the construction and working of AC series motor. What are the differences between AC series motor and DC series motor?

\section*{UNIT-IV}

7 a) Why stationary armature is preferred over rotating armature? Explain the classification of alternators based on rotor used.
b) A three-phase star connected alternator has an open circuit voltage of 6000 V . The armature resistance and synchronous resistance are \(0.4 \Omega\) and \(4 \Omega\) per phase respectively. Find the terminal voltage and the phase difference between terminal voltage and open circuit EMF at a power factor of 0.9 leading. Given load current is 140A.

\section*{Or}

8 a) Explain the effect of armature reaction on the performance of an alternator. How it depends on the load p.f. Explain with suitable diagrams.
b) Two identical 3 MVA alternators are running in parallel. The frequency drops from no load to full load for the two alternators are 50 Hz to 47 Hz and 50 Hz to 48 Hz respectively.
i. How they will share a load of 4000 kW ?
ii. What is maximum unity factor load which they can supply jointly without any one of them over loaded?

\section*{UNIT-V}

9 a) Explain, why synchronous motor is not self-starting? Explain any one method of starting a synchronous motor.
b) A 3-phase star connected synchronous motor is designed for a terminal voltage of 3300 V and its synchronous impedance is \((0.25+\mathrm{j} 2.00) \Omega / \mathrm{ph}\). The excitation is adjustable to a value which corresponds to an open circuit terminal voltage of 3500 V . Determine the current and p.f. from an input of 750 kW .

\section*{Or}

10 a) Explain the variation of current and power factor with excitation in synchronous motor.
b) A synchronous motor absorbing 50 kW is connected in parallel with a factory load of 200 kW at 0.80 lagging pf. If the resultant power factor after connecting SM is 0.92 lagging, how much leading kVAR is to be supplied by synchronous motor? At what power factor is it working?

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 INDUCTION AND SYNCHRONOUS MACHINES
}
(Electrical and Electronics Engineering)
Time: 3 hours

\author{
Max. Marks: 70
}

Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

\section*{UNIT-I}

1 a) Explain why a 3 phase IM, at no load, operates at a very low pf.
b) A 3 phase, 50 Hz IM has a full load speed of 960 rpm . Calculate
(i) number of poles (ii) slip frequency (iii) Speed of rotor field with respect to rotor structure, with respect to stator structure and with respect to stator field.

\section*{Or}

2 a) With the help of rotor equivalent circuit of an IM, show that the power transferred magnetically from stator to rotor is given by \(I_{2}^{2} \frac{r_{2}}{s}\).
b) A 40 Hp three-phase induction motor has a full load slip of \(4 \%\). The stator losses amount to \(4 \%\) of the input and the mechanical losses are \(1 \%\) of the output. If the current in each phase of the rotor is 50 A . Find the resistance per phase of the rotor and the efficiency of this machine.

\section*{UNIT-II}

3 a) Draw and explain the torque Vs slip characteristics of three phase IM in all modes of operation.
b) Explain the speed control of IM using V/f control method.

\section*{Or}

4 Draw the circle diagram for a \(3.73 \mathrm{~kW}, 200 \mathrm{~V}, 50 \mathrm{~Hz}, 4\) pole, 3 Phase Y connected IM from the following test data:
No- Load test data: 200 V, 5 A, 350 W
Blocked rotor test: \(100 \mathrm{~V}, 26 \mathrm{~A}, 1700 \mathrm{~W}\)
Estimate from the diagram for full load condition, the line current, power factor and the maximum torque in terms of the full load torque. The rotor cu loss at stand still is half the total Cu loss.

\section*{UNIT-III}

5
a) Explain the construction and working of AC series motor.
b) Develop the equivalent circuit of single-phase IM using double field revolving theory.

6 a) Explain the construction and working of DOL starter used for IM.
b) A SCIM, when started by means of a Y/ \(\Delta\) starter takes \(180 \%\) of full load line current and develops \(35 \%\) of full load torque at starting. Calculate the starting torque and current in terms of full load values, if an auto transformer with \(75 \%\) tapping is employed.

\section*{UNIT-IV}

7 a) Explain the constructional details of rotor of both salient pole and cylindrical rotor synchronous machines.
b) The stator of a three phase, 16 pole alternator has 144 slots and there are 4 conductors per slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375 rpm , calculate the emf induced per phase. Resultant flux in the air gap is 0.05 Webers per pole sinusoidally distributed. Assume the coil span as \(150^{\circ}\) electrical.

\section*{Or}

8 a) Derive the EMF equation of Alternator from fundamentals clearly showing the expressions for pitch and distributions factors.
b) A \(100 \mathrm{kVA}, 3000 \mathrm{~V}, 50 \mathrm{~Hz}, 3\) phase Y connected alternator has an effective armature resistance of \(0.2 \Omega\). The filed current of 40 A produces a short circuit current of 200 A and an open circuit emf of 1040 V (Line value), find the full load voltage regulation at 0.8 pf lagging and 0.8 pf leading.

\section*{UNIT-V}

9 a) Draw and explain the 'V-curves' and 'inverted V-curves' of synchronous motor.
b) A \(3-\phi, 6000 \mathrm{~V}\), star connected synchronous motor has effective per phase synchronous reactance/ phase of \(15 \Omega \&\) negligible armature resistance. For a certain load, the input is 800 kW at normal voltage and the induced line EMF is 8500 V. Determine: (i) Line current (ii) Power factor.
Or

10 a) Explain hunting of synchronous machines and methods of its prevention.
b) A 500 V , 6 -pole, 3 -phase, 50 Hz , star-connected synchronous motor has a resistance and synchronous reactance of \(0.3 \Omega\) and \(3 \Omega\) per phase respectively. The open circuit voltage is 600 V . If the friction and core losses total 1 kw , calculate the line current and power factor when the motor output is 100 hp .

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ THERMAL ENGINEERING-I}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 Derive the air standard .efficiency of Dual Cycle.

\section*{Or}

2 a) How the Actual cycles differ from the air standard cycles?
b) Discuss about the time loss factor occurred in IC engine with a neat sketch.

\section*{UNIT-II}
a) Explain the working of splash lubricating system with neat sketch.
b) Mention the reasons why the water cooling system is superior to air cooling system.

\section*{Or}

4 a) Explain the working of the fuel injector with a neat sketch.
b) What is the importance of spark plug in SI engine? Explain the working of spark plug with a neat diagram.

\section*{UNIT-III}

5 a) Explain the phenomenon of knocking in SI engine. State the adverse effects caused due to knocking.
b) List out the functions of nozzles in CI Engines. Explain why the nozzles are so important in compression ignition engines.

Or
6 a) Discuss why the preignition is more dangerous in multi cylinder engines than in single cylinder engine.
b) Discuss the advantages and disadvantages of F-head combustion chambers over the normal combustion chamber.

\section*{UNIT-IV}

7 A four stroke engine having a cylinder of 250 mm diameter and stroke 450 mm has a volumetric efficiency of \(80 \%\), ratio of air to gas is 8 to 1 , calorific value of gas is \(20 \mathrm{MJ} / \mathrm{m}^{3}\) at NTP. Find the heat supplied to the engine per working cycle. If the compression ratio is 5 , what is the heating value of the mixture per working stroke per \(\mathrm{m}^{3}\) of total cylinder volume?

\section*{Or}

8
The air flow to a four cylinder four stroke gasoline engine was measured by means data were recorded.
Bore \(=10 \mathrm{~cm}\), Stroke \(=15 \mathrm{~cm}\), Engine speed=2500 rpm, Brake power=36 kW, Fuel consumption \(=10 \mathrm{~kg} / \mathrm{hr}\), Calorific value of fuel \(=42 \mathrm{MJ} / \mathrm{kg}\), Pressure drop across the orifice \(=4 \mathrm{~cm}\) of water. Atmospheric temperature and pressure are \(17^{\circ} \mathrm{C}\) and 1 bar respectively. Calculate (i) Brake thermal efficiency (ii) Brake mean effective pressure (iii) Volumetric efficiency based on free air condition.

\section*{UNIT-V}

9 a) State the fundamental differences between the jet propulsion and rocket propulsion.
b) Explain inter cooling method with neat sketch applied to gas turbine to improve the thermal efficiency of gas turbine.
Or

10 a) Explain with a neat sketch the working of a open cycle gas turbine with the P-v and T-s diagrams.
b) Explain the working of turbo jet engine with a neat sketch.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ THERMAL ENGINEERING-I \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ UNIT-I}

1 In an air standard Diesel cycle, the compression ratio is 16 , and at the beginning of isentropic compression, the temperature is \(15^{\circ} \mathrm{C}\) and the pressure is 0.1 Mpa . Heat is added until the temperature at the end of the constant pressure process is \(1480^{\circ} \mathrm{C}\).Calculate (a) the cut-off ratio (b) the heat supplied per kg of air (c) the cycle efficiency (d) the m.e.p

\section*{Or}

2 a) Mention the methods to improve the volumetric efficiency of IC engine.
b) Discuss the exhaust blow down loss of internal combustion engine with a neat sketch.

\section*{UNIT-II}

3 a) Explain the working of Magneto ignition system with a neat sketch.
b) Explain the essential properties of good lubricating oil.

Or
4 a) Explain how the turbo charged engine differ from the actual IC engines.
b) Differentiate the working of Four stoke CI engine and SI engine.

\section*{UNIT-III}

5 a) Explain the basic requirements of good SI engine combustion chamber.
b) What is ignition lag? Discuss the effect of engine variables on ignition lag.

\section*{Or}

6 a) Mention the differences between the 'air swirl 'in CI engines with 'turbulence' in SI engines.
b) Explain the methods to control the knock in CI engine.

\section*{UNIT-IV}

7 A six cylinder petrol engine has a volume compression ratio of 7:1.The clearance volume of each cylinder is \(0.000116 \mathrm{~m}^{3}\). The engine consumes 10 kg of fuel per hour whose calorific value is \(42000 \mathrm{~kJ} / \mathrm{kg}\). The engine runs at 3200 rpm and the efficiency ratio is 0.8 . Calculate the average indicated mean effective pressure developed.

\section*{Or}

8 a) What are the methods available for improving the performance of an engine?
b) Explain the measurement of Break power.

\section*{UNIT-V}

9 a) Explain the working of solid rocket with a neat sketch.
b) Derive the expression for the thermal efficiency of gas turbine with regeneration using P -v and T -s diagram.

Or
10 A turbo-jet engine flying at a speed of \(960 \mathrm{~km} / \mathrm{h}\) consumes air at the rate of 54.5 \(\mathrm{kg} / \mathrm{s}\). Calculate: (i) Exit velocity of jet when the enthalpy change for the nozzle is \(200 \mathrm{~kJ} / \mathrm{kg}\) and velocity -coefficient is 0.97 (ii) fuel flow rate in \(\mathrm{kg} / \mathrm{s}\) when air-fuel ratio is 75:1 (iii) Thrust specific fuel consumption (iv) Thermal efficiency of the plant when the combustion efficiency is \(93 \%\) and calorific value of the fuel is \(45000 \mathrm{~kJ} / \mathrm{kg}\) (v) Propulsive power (vi) Propulsive efficiency (vii) overall efficiency.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 THERMAL ENGINEERING-I
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

\section*{UNIT-I}

1 Derive an expression for efficiency of Brayton cycle by representing the processes on P-v and T-s diagrams.

\section*{Or}

2 a) Derive the air standard efficiency of Diesel cycle.
b) Explain the rubbing loss of engine with a neat sketch.

\section*{UNIT-II}

3 a) Classify the Internal combustion engines.
b) Explain the working of thermo-syphon cooling system with neat sketch.

\section*{Or}

4 a) Differentiate the Four stoke and Two stroke IC engines.
b) Explain the working of Battery Ignition system with neat sketch.

\section*{UNIT-III}

5 a) Explain how the diesel knock is differ from the detonation in SI engines.
b) List out the advantages and disadvantage of induction swirl.

\section*{Or}

6 Explain how the engine variables affects the Delay period in IC engines.
UNIT-IV
7 During a test on a diesel engine the following observations were made:
The power developed by the engine is used for driving a D.C. generator. The output of the generator was 220 A at 220 V ; the efficiency of generator being \(80 \%\).The quantity of fuel supplied to the engine was \(12 \mathrm{~kg} / \mathrm{h}\); calorific value of fuel being \(42000 \mathrm{~kJ} / \mathrm{kg}\). The air-fuel ratio was 20:1.
The exhaust gases were passed through a exhaust gas calorimeter for which the observations were as follows: Water circulated through exhaust gas calorimeter \(=550\) liters \(/ \mathrm{hr}\). Temperature rise of water through calorimeter \(=40^{\circ}\). Temperature of exhaust gases at exit from calorimeter \(=98^{\circ} \mathrm{C}\). Ambient temperature \(=20^{\circ} \mathrm{C}\). Heat lost to jacket cooling water is \(32 \%\) of the total heat supplied.
If the specific heat of exhaust gases be \(1.05 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\). Draw up the heat balance sheet on minute basis.

Or

1 of 2

8 a) Explain the working of rope brake dynamometer with a neat sketch.
b) Explain the air box method for the measurement of air consumption in internal combustion engine.

\section*{UNIT-V}

9 Find the required air-fuel ratio in a gas turbine whose turbine and compressor efficiencies are \(75 \%\) and \(82 \%\) respectively. Maximum cycle temperature is \(865^{\circ} \mathrm{C}\). The working fluid can be taken as air \(\left(\mathrm{C}_{\mathrm{p}}=1 . \mathrm{kJ} / \mathrm{kgK}, \gamma=1.4\right)\) which enters the compressor at 1 bar and \(29^{\circ} \mathrm{C}\). The pressure ratio is 5 . The fuel used has calorific value of \(41500 \mathrm{~kJ} / \mathrm{kg}\). There is a loss of \(10 \%\) of calorific value in the combustion chamber.

\section*{Or}

10 a) Explain the working of liquid propellant rocket engine with a neat sketch.
b) List out the functions of components of gas turbines. State the difference between the open cycle and closed cycle gas turbines.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 THERMAL ENGINEERING-I
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

\section*{UNIT-I}

1 Derive an expression for efficiency of an Otto cycle by representing the processes on \(\mathrm{P}-\mathrm{v}\) and T -s diagram.

Or
2 a) Compare between OttO and Diesel Cycles.
b) Explain the loss occurred due to gas exchange process with a suitable example.

UNIT-II
3 a) Explain the importance of valve timing diagram and also quote the differences of actual and theoretical valve timing diagrams.
b) Explain the working of Wankel engine with a neat sketch.

\section*{Or}

4 a) Explain the working of four stroke CI engine with a neat sketch.
b) Explain how the super charging engine is differ from the actual engine.

UNIT-III
5 a) Discuss the different methods to suppress the abnormal compulsion in engines.
b) Explain the procedure to rate the fuels used in the IC engines.

\section*{Or}

6 Briefly explain the stages of combustion in SI engines elaborating the flame front propagation.

7 A six cylinder, 4 stroke SI engine having a piston displacement of \(750 \mathrm{~cm}^{3}\) per cylinder developed 80 kW at \(3500 \mathrm{r} . \mathrm{p} . \mathrm{m}\). and consumed 27 kg of petrol per hour. The calorific value of petrol is \(42 \mathrm{MJ} / \mathrm{kg}\). Estimate:
(i)The volumetric efficiency of the engine if the air-fuel ratio is 10 and intake air is at 0.9 bar, \(32^{\circ} \mathrm{C}\) (ii) The brake thermal efficiency (iii) The brake torque For air, \(\mathrm{R}=0.287 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\)

Or

1 of 2

9 Derive the expression for the thermal efficiency of reheating gas turbine with the Pv and T-s diagram.

Or
10 A compressor of a turbojet engine operates in standard sea level. Air with a pressure
ratio of 5 and an consumption of \(35 \mathrm{~kg} / \mathrm{s}\) at an isentropic efficiency of \(86 \%\).calculate the work per kg of air, the power required to drive the air compressor, and the total head temperature at the compressor discharge. observations were made:
Compression ratio \(=15\), Oil consumption \(=11 \mathrm{~kg} / \mathrm{hr}\), Calorific value of fuel \(=44000\) \(\mathrm{kJ} / \mathrm{kg}\), Air consumption=4 kg/min. Speed=2000 r.p.m, Torque on the brake drum \(=190 \mathrm{~N}-\mathrm{m}\), Quantity of cooling water used \(=15 \mathrm{~kg} / \mathrm{min}\), Temperature rise \(=40^{\circ} \mathrm{C}\), Exhaust gas temperature \(=410^{\circ} \mathrm{C}\), Room temperature \(=20^{\circ} \mathrm{C}, \mathrm{Cp}\) for exhaust gases \(=1.17 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\)
Calculate: (i) Brake power, (ii) Brake specific fuel consumption (iii) Brake thermal efficiency. Draw heat balance sheet on minute basis

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ LINEAR CONTROL SYSTEMS \\ (Common to ECE\&EIE)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}
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\section*{UNIT-I}

1 a) Define control system, open loop and closed loop control systems. Compare their merits and demerits.
b) Derive the transfer function of Translational Mechanical System.

\section*{Or}

2 a) Define transfer function. Explain its advantages and limitations.
b) Design the force voltage analogy \& force- current analogy circuit and develop the transfer function of the mechanical system shown in figure 1?


UNIT-II
3 a) Derive the transfer function and develop the block diagram of Armature controlled DC servo motor.
b) Apply Mason's gain formula to find the transfer function of the system shown below?


Or
4 a) Obtain the time response of a first order system for a unit step input and plot its response.
b) Damping factor and natural frequency of the system are 0.12 and \(84.2 \mathrm{rad} / \mathrm{sec}\) respectively. Determine the rise time ( \(\mathrm{t}_{\mathrm{r}}\) ), peak time ( \(\mathrm{t}_{\mathrm{p}}\) ), maximum peak overshoot \(\left(\mathrm{m}_{\mathrm{p}}\right)\) and settling time \(\left(\mathrm{t}_{\mathrm{s}}\right)\).

\section*{UNIT-III}

5 a) Differentiate Qualitative Stability \& Conditional Stability.
b) Explain the construction rules for root locus technique.

\section*{Or}

6 a) Test the stability of the system with the following characteristic equation by Routh's test
\(s^{6}+2 s^{5}+8 s^{4}+20 s^{2}+16 s+16=0\)
b) Define and derive the breakaway point on the root locus.

UNIT-IV
7 a) Explain the design rules of Bode Plot.
b) Explain about correlation between time \& frequency response.

\section*{Or}

8 a) Sketch the Bodeplot and determine the following.
\(\begin{array}{ll}\text { (i) Gain cross over frequency } & \text { ii) Phase cross over frequency } \\ \text { (iii) Gain Margin } & \text { (iv) Phase margin }\end{array}\)
For the transfer function is given by
\[
G(s)=\frac{10}{s(1+0.4 s)(1+0.1 s)}
\]
b) State and explain the Nyquist stability criterion.

\section*{UNIT-V}

9 a) Define the controllability and observability.
b) Determine the state controllability and observability of the system described by
\[
\begin{gathered}
{[\dot{X}]=\left[\begin{array}{ccc}
-3 & 1 & 1 \\
-1 & 0 & 1 \\
0 & 0 & 1
\end{array}\right] x+\left[\begin{array}{ll}
0 & 1 \\
0 & 0 \\
2 & 1
\end{array}\right] u ; y=\left[\begin{array}{lll}
0 & 0 & 1 \\
1 & 1 & 0
\end{array}\right] x} \\
\text { Or }
\end{gathered}
\]

10 a) Explain the concepts of state, state variables and state model
b) Determine the state model of the system characterized by the differential equation
\[
\left(s^{4}+2 s^{2}+8 s^{3}+4 s+3\right) Y(s)=10 U(s)
\]

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ LINEAR CONTROL SYSTEMS
}
(Common to ECE \& EIE)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

UNIT-I
1 a) Analyze in detail the effects of feedback on overall gain, sensitivity of the system.
b) Define control system, Explain traffic control system with suitable diagram.

\section*{Or}

2 Determine the transfer function of the following block diagram.


UNIT-II
3 a) Discuss the response of a standard under damped second order system for unit step input.
b) Determine the step, ramp and parabolic error constants of the following unity feedback control system whose open loop transfer function is given by
\[
G(s)=\frac{1000}{(1+2 s)(1+0.5 s)}
\]
Or

4 a) Explain the field controlled DC servomotor and develop its transfer function.
b) Discuss the response of a standard first order system for unit step input.

\section*{UNIT-III}

5 a) Define the following terms
i) absolute stability ii) marginal stabilityiii) conditional stability
iv) relative stabilityv) instability
b) Summarize the advantages and limitations of Routh-Hurwitz criterion?

\section*{Or}

6 a) Determine the stability of the closed loop system that has the following characteristic equation and also determine the number of roots that are in the right half s-plane and on the imaginary axis using Routh-Hurwitz criterion
\[
s^{4}+4 s^{3}+7 s^{2}+16 s+12=0
\]
b) The characteristics equation of feedback control system is \(s^{3}+3 K s^{2}+(K+2) s+\) \(4=0\). Examine the range of K for which system is stable?

\section*{UNIT-IV}

7 a) List out steps involved in the design of phase -lag controller.
b) Obtain a frequency response plot for this system when \(\mathrm{K}>0\) and \(\mathrm{K}<\infty\). By using the Nyquist criterian, find the range of values for K over which the Unity feedback closed-loop systems will be stable?

\section*{Or}

8 a) Explain about Polar Plot- how it is used for stability analysis.
b) Construct the polar plot of \(G(s) H(s)=\frac{K}{s(s+3)(s+5)}\) and there from determine range of K for stability using Nyquist Criterion?

\section*{UNIT-V}

9 a) What are the advantages and limitations of state space analysis over conventional methods?
b) Consider the following system with differential equation is given by \(\dddot{y}+4 \ddot{y}+9 \dot{y}+4 y+u=0\).
Find the state space model in diagonal canonical form.

\section*{Or}

10 A system is characterized by the following state space equations.
\[
\left[\begin{array}{l}
\dot{X_{1}} \\
\dot{X_{2}}
\end{array}\right]=\left[\begin{array}{ll}
-3 & 1 \\
-2 & 0
\end{array}\right]\left[\begin{array}{l}
X_{1} \\
X_{2}
\end{array}\right]+\left[\begin{array}{l}
0 \\
1
\end{array}\right] u(t) ; y=\left[\begin{array}{ll}
1 & 0
\end{array}\right]\left[\begin{array}{l}
X_{1} \\
X_{2}
\end{array}\right]
\]
(i) Find the transfer function of the system.
(ii) Determine the state transition matrix.
(iii) Solve the state equation for the unit step input under zero initial conditions.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ LINEAR CONTROL SYSTEMS
}
(Common to ECE \& EIE)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

\section*{UNIT-I}

1 a) Draw the free body diagram and write the differential equations describing the dynamics of the system shown in below figure and obtain the transfer function \(\mathrm{X}_{1}(\mathrm{~s}) / \mathrm{U}(\mathrm{s})\) ?

b) Discuss about the Open Loop and closed loop control systems and their differences.

Or
2 a) Write and explain feedback characteristics with an example.
b) What is the classification of control systems? Discuss the importance of mathematical modeling of a control system.

\section*{UNIT-II}

3 a) Explain theoperationand Derive the transfer function of field controlled DC Servo motor.
b) Explain about the signal flow-graph with an example.

\section*{Or}

4 a) A unity feedback system has an open-loop transfer function \(G(s)=\) \(\frac{K}{s(s+10)}\) Determine K so that the system will have a damping ratio 0.5 . For this value of K, determine peak over shoot and time for peak over shoot for the unit step input?
b) Calculate the steady state errors due to a unit step input, a unit ramp input and a unit parabolic input for a unity feedback control system whose open loop transfer function is
(i) \(G(s)=\frac{1}{s^{2}(s+6)}\)
(ii) \(G(s)=\frac{1}{s^{2}+3 s+1}\)

\section*{UNIT-III}

5 Sketch the root locus of the system whose open loop transfer function is
\[
G(s) H(s)=\frac{K}{s(s+2)(s+4)} \text {.Find the value of } \mathrm{k} \text { for damping ratio of } 0.5
\]

Or
6 a) For a unity feedback system with open loop transfer function \(G(s) H(s)=\) \(\frac{K}{s(s+4)(s+6)}\). Find the range of K for which the system will be stable using RH Criterion?
b) Using Routh-Hurwitz criterion, determine the stability of the closed loop system thathas the following characteristic equation and also determine the number of roots thatare in the right half s-plane and on the imaginary axis \(P(s)=s^{6}+2 s^{5}+8 s^{4}+\) \(12 s^{3}+20 s^{2}+16 s+16\).

\section*{UNIT-IV}

7 Consider a unity feedback system having an open loop transfer function \(G(s)=\) \(\frac{K}{s(1+0.5 s)(1+2 s)}\) sketch the Bode plot and determine the value of ' k ' sothat gain margin is 20 dB and phase margin is \(20^{\circ}\) ?

\section*{Or}

8 a) Find resonant peak, resonant frequency and bandwidth of the unity feedback system whose open loop transfer function is as follows: \(\quad G(s)=\frac{0.5}{s^{2}+3 s+2}\)
b) The forward path transfer function of a unity feedback system is given by \((s)=\frac{K}{(s+3)^{2}}\).Using Nyquist Stability Criterion; determine the range of K for the closed loop system to be stable?

UNIT-V
9 a) A system is characterized by the following state space equations.
\[
\left[\begin{array}{l}
\dot{X}_{1} \\
\dot{X}_{2}
\end{array}\right]=\left[\begin{array}{cc}
-3 & -1 \\
-2 & 0
\end{array}\right]\left[\begin{array}{l}
X_{1} \\
X_{2}
\end{array}\right]+\left[\begin{array}{l}
0 \\
1
\end{array}\right] u(t) ; y=\left[\begin{array}{ll}
1 & 0
\end{array}\right]\left[\begin{array}{l}
X_{1} \\
X_{2}
\end{array}\right]
\]
(i) Find the transfer function of the system.
(ii) Compute the state transition matrix and the Eigen values of A.
(iii) Solve the state equation for the unit step input under zero initial conditions.
b) The transfer function of a control system is given by \(\frac{Y(s)}{U(s)}=\frac{s+2}{s^{3}+9 s^{2}+24 s+24}\) check for controllabilityand observability.

\section*{Or}

10 a) Draw the electrical circuit diagram that represents the Lead Compensator and explain in detail.
b) Draw the electrical circuit diagram that represents the Lag Compensator and explain in detail.

SET - 4

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ LINEAR CONTROL SYSTEMS}
(Common to ECE \& EIE)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ \(\qquad\) \\ UNIT-I}

1 a) Explain the reduction of parameter variation by feedback.
b) Derive transfer function of Rotational Mechanical Systems.

Or
2 a) With a neat diagram, explain temperature control systems?
b) Define differential equation and derive differential equations of electrical circuits.

\section*{UNIT-II}

3 a) Describe the AC servo motor and draw its torque Vs speed characteristics.
b) Derive steady state errors \& error constants.

\section*{Or}

4 a) Explain the construction and principle of operation synchro transmitter.
b) Explain the working of DC servo motor and find its transfer function.

\section*{UNIT-III}

5 a) Explain the special cases in Routh's stability criterion.
b) Sketch the root locus for the characteristic equation is \(s(s+1)(s+2)+k(s+1.5)=0\)

\section*{Or}

6 a) Write and explain limitations of Routh's stability.
b) Define the following terms: (i) Stability (ii) Absolute Stability (iii) Marginal Stability (vi) Conditional Stability

\section*{UNIT-IV}

7 a) Sketch the Bode plot and determine the Gain margin and phase margin for the transfer function is given, \(G(s)==10 / \mathrm{s}(1+0.4 \mathrm{~s})(1+0.1 \mathrm{~s})\)
b) Derive the relation between phase margin and damping ratio.

\section*{Or}

8 a) Discuss the calculation of gain crossover frequency and phase crossover frequency with respective to the polar plots.
b) Derive the correlation between time domain and frequency domain specifications.

\section*{UNIT-V}

9 a) State and prove the properties of State Transition Matrix.
b) Explain the concepts of state, state model, state variable, state space.

\section*{Or}

10 a) State and explain the concepts of Controllability and Observability.
b) Given, \(G(s)=\frac{K}{s^{2}+5 s+6}\) obtain the state space model of the system in the diagonal

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ JAVA PROGRAMMING \\ (Common to CSE,IT,CSE(CSBS),\&CS)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ UNIT-I}

1 a) List and explain the Tokens in the Java language.
b) Demonstrate Bitwise operators using a Java program.

\section*{Or}

2 a) List and explain the control statements with examples.
b) Demonstrate the operator precedence using a Java program.

\section*{UNIT-II}

3 a) Compare the working of constructor overloading with method overloading.
b) Demonstrate method overriding with an example java program.

\section*{Or}

4 a) Compare the pass-by-value with the pass-by-reference method using an example.
b) Demonstrate Nested class concept with an example.

\section*{UNIT-III}

5 a) Is it possible to implement multiple inheritances in Java? Justify your answer.
b) Develop a Java program to perform Binary search.

Or
6 a) Demonstrate the Nested Interfaces using an example program.
b) Develop a program to perform matrices multiplication.

\section*{UNIT-IV}

7 a) Discuss the advantages of Wrapper classes.
b) Demonstrate the class Throwable with the help of a Java program.

Or
8 a) Is it possible to Rethrow exceptions? Justify your answer.
b) List and explain any four packages in Java language.

UNIT-V
9 a) Discuss the issues of Race condition and Deadlock.
b) Demonstrate Inter-thread communication with a Java program.

\section*{Or}

10 a) Develop a JDBC application to establish a link between MySQL and Java to save and access a table.
b) List and explain any three methods of a String class.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ JAVA PROGRAMMING \\ (Common to CSE,IT,CSE(CSBS),\&CS)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ UNIT-I}
a) List and explain the blocks of Exception handling with examples.
b) Explain any two classes with method in Java.lang package.
a) Demonstrate Auto boxing and Auto unboxing with an example program.
b) Demonstrate Checked exceptions with an example Java program.

\section*{Or}
a) Is there is a need for multi-threading? Justify your answer.
b) Illustrate JDBC architecture with a neat sketch.

\section*{Or}

10
a) Explain the concepts Deadlock and race condition.
b) List and explain any three methods of String class.

1 of 1

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ JAVA PROGRAMMING \\ (Common to CSE,IT,CSE(CSBS),\&CS)}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

UNIT-I
1 a) List and explain the features of Java language.
b) Demonstrate Nested if and else using an example.

\section*{Or}

2 a) List and explain the formatted input and output statements.
b) Demonstrate implicit and explicit type casting with an example program.

\section*{UNIT-II}

3 a) Develop a program to compute the GCD of two numbers using Recursion.
b) Discuss the advantage of final and static attributes.

\section*{Or}

4 a) Is it possible to access Private members of a class? Justify your answer.
b) Demonstrate pass-by-value with an example Java program.

\section*{UNIT-III}

5 a) Discuss the advantage of the Super keyword with a Java program.
b) Develop a Java program to read students' six subject marks and computes the aggregate (\%).

\section*{Or}

6 a) Demonstrate multi-level inheritance with an example program.
b) Develop a program to declare and access the three-dimensional arrays.

UNIT-IV
7 a) Is it possible to define multiple catch blocks in Java? Justify your answer.
b) Demonstrate Wrapper classes in Java language.

\section*{Or}

8 a) Demonstrate the formatting for Date / Time in Java with an example program.
b) Discuss the importance of Throws keyword.

\section*{UNIT-V}

9 a) Develop a Java program to sort the set of input strings.
b) Demonstrate Thread prioritization with an example program.

\section*{Or}

10 a) Explain the steps to establish MySQL with Java.
b) Illustrate the possible states of Thread with a suitable diagram.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ JAVA PROGRAMMING \\ (Common to CSE,IT,CSE(CSBS),\&CS)
}

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Explain the usage of Static variables and methods with an example Java program.
b) List and explain the Unary, Binary and Ternary operators with examples.

\section*{Or}

2 a) Demonstrate logical operators with an example Java program.
b) Develop a program to compute factorial of a number.

\section*{UNIT-II}

3 a) Demonstrate the Final method with an example.
b) Discuss the advantage of a constructor.

\section*{Or}

4 a) Define recursion. Discuss the advantages of recursion.
b) Is it possible to define a class within another class? Justify your answer.

\section*{UNIT-III}

5 a) Illustrate types of Inheritance with a suitable diagram.
b) Discuss the advantages of the Interface.

\section*{Or}

6 a) Develop a program to compute the inverse of a given matrix.
b) Demonstrate multiple Inheritance with an example Java program.

\section*{UNIT-IV}

7 a) Demonstrate unchecked and checked exceptions with an example program.
b) Is it possible to Rethrow exceptions? Justify your answer.

\section*{Or}

8 a) Illustrate the Hierarchy of standard Exception class with a neat sketch.
b) Demonstrate Temporal Adjusters class with an example Java program.

\section*{UNIT-V}

9 a) Illustrate the JDBC architecture with a neat sketch.
b) Demonstrate Thread prioritization with a Java Program.

\section*{Or}

10 a) Propose any solutions to Deadlock and Race condition issues.
b) Illustrate the Thread states transitions with a neat sketch.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ SOIL MECHANICS \\ (Agricultural Engineering)
}

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

UNIT - I
1 a) Give the soil classification chart with all the conditions mentioned as per Indian Standard Soil Classification System.
b) A sand deposit consists of two layers. The top layer is 2.5 m thick \(\left(\gamma=1709.7 \mathrm{~kg} / \mathrm{m}^{3}\right)\) and the bottom layer is 3.5 m thick ( \(\gamma_{\text {sat }}=2064.52 \mathrm{~kg} / \mathrm{m}^{3}\) ). The water table is at a depth of 3.5 m from the surface and the zone of capillary saturation is 1 m above the water table. Draw the total, neutral and effective stress diagrams for the given soil condition.

Or
2 a) Classify the following soils using Unified Soil Classification System. Give the group symbols and the group names.
\begin{tabular}{|l|c|l|c|c|c|c|}
\hline \multirow{2}{*}{\begin{tabular}{l} 
So \\
il
\end{tabular}} & \multicolumn{2}{|c|}{ Sieve Analysis, \%finer } & Liquid limit \\
\cline { 2 - 3 } & 4.75 mm & 0.075 mm & \begin{tabular}{c} 
Plastic limit \\
\(\%\)
\end{tabular} & \(\mathrm{C}_{\mathrm{u}}\) & \(\mathrm{C}_{\mathrm{c}}\) \\
\hline 1 & 70 & 30 & 33 & 12 & - & - \\
\hline 2 & 100 & 2 & - & NP & 7.2 & 2.2 \\
\hline 3 & 48 & 20 & 41 & 19 & - & - \\
\hline 4 & 88 & 78 & 69 & 31 & - & - \\
\hline
\end{tabular}
b) Inadepositoffinesandthewatertableis3mbelowthegroundsurfacebutthesandupto a height of 1 m above the water table is saturated by capillary water. The sand above thisheight may be considered dry. For the sand, \(G_{s}=2.68\) and \(n=40 \%\). Calculate the effectivestressat adepth of 8 m .
UNIT - II

3 a) A uniformly distributed pressure of \(200 \mathrm{kN} / \mathrm{m}^{2}\) is transferred by a square footing 2 m x 2 m at the ground surface. Construct an isobar for \(\sigma_{z}=20 \mathrm{kN} / \mathrm{m}^{2}\).
b) A concentrated load of 40 kN acts on the surface of a soil. Determine the vertical stress increment at points directly beneath the load up to a depth of 10 m and draw a plot. Also plot the variation of vertical stress increment due to load on horizontal planes at depths of \(1 \mathrm{~m}, 2 \mathrm{~m}\) and 3 m up to a horizontal distance of 3 m on either side of center.

\section*{Or}

4 a) A concentrated load of 50 kN acts on the surface of a homogenous soil mass of large extent. Determine the stress intensity at a depth of 5 m , directly under the load and at horizontal distances of \(0.5,1,1.5,2\) and 2.5 m . Plot the variation with distance.
b) Compare the Westergaard's and Boussinesq's theory of vertical stresses.


5 a) A series of consolidated-undrained tests was conducted on an over-consolidated clay and the following results were obtained.
\begin{tabular}{|c|c|c|c}
\hline Sample No. & \begin{tabular}{c} 
Cell pressure \\
\(\left(\mathrm{kN} / \mathrm{m}^{2}\right)\)
\end{tabular} & \begin{tabular}{c} 
Deviator stress \\
\(\left(\mathrm{kN} / \mathrm{m}^{2}\right)\)
\end{tabular} & \begin{tabular}{c} 
Pore-water pressu \\
\(\left(\mathrm{kN} / \mathrm{m}^{2}\right)\)
\end{tabular} \\
\hline 1 & 125 & 510 & -70 \\
\hline 2 & 250 & 620 & -10 \\
\hline 3 & 500 & 850 & +120 \\
\hline
\end{tabular}

Plot the strength envelopes in terms of total stress and effective stresses, and hence determine the strength parameters.
b) What are the factors influencing compaction of soils. Explain the effect of any three factors in detail.

Or
6 a) Compare the suitability of direct shear test and the triaxial test conditions on a given soil.
b) An earthen embankment of \(10^{6} \mathrm{~m}^{3}\) volume is to be constructed with a soil having a void ratio of 0.80 after compaction. There are three borrow pits marked A, B and C, having soils with void ratios of \(0.90,1.50\) and 1.80 respectively. The cost of excavation and transporting the soil is Rs. 0.25 , Rs. 0.23 and Rs. 0.18 per \(\mathrm{m}^{3}\), respectively. Calculate the volume of soil to be excavated from each pit. Which borrow is the most economical? \(\left(\mathrm{G}_{\mathrm{s}}=2.65\right)\)
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UNIT - IV
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7 a) A 3 m thick clay layer beneath a building is overlain by a permeable stratum and is underlain by an impervious rock. The coefficient of consolidation of the clay was found to be \(0.025 \mathrm{~cm}^{2} /\) minute. The final expected settlement for the layer is 8 cm . (i) How much time will it take for \(80 \%\) of the total settlement to take place? (ii)Determine the time required for a settlement of 2.5 cm to occur, (iii) Compute the settlement that would occur in one year.
b) Explain the procedure adopted for determination of consolidation parameters using oedometer in the laboratory.

\section*{Or}

8 a) For a normally consolidated clay specimen, the following data are obtained from a laboratory consolidation test.
\(\mathrm{e}_{1}=1.10, \sigma_{1}{ }^{\prime}=65.0 \mathrm{kN} / \mathrm{m}^{2}, \mathrm{e}_{2}=0.85, \sigma_{2}{ }^{\prime}=240.0 \mathrm{kN} / \mathrm{m}^{2}\)
i. Find the compression index \(\mathrm{C}_{\mathrm{c}}\).
ii. Determine the void ratio at the end of consolidation when the next pressure increment raises the pressure to \(460.0 \mathrm{kN} / \mathrm{m}^{2}\) ?
b) Explain the effect of soil type and role of stress history on the compressibility of a soil, with proper graphs wherever required.

9 a) Give the assumptions of Rankine's earth pressure theory. Also derive an expression for passive pressure.
b) Aninfiniteslopeconsistsof5mofsoillyingontopofabedrock.Thebedrockandthesoilsurfa cearebothinclined at \(23^{0}\) to the horizontal. The soil properties are:
\(\gamma=18.5 \mathrm{kN} / \mathrm{m}^{3}, \mathrm{c}^{\prime}=15 \mathrm{kN} / \mathrm{m}^{2}\) and \(\phi^{\prime}=20^{\circ}\).Assumethattheslopeisdry.
i) Obtainthemaximumshearstressdevelopedwithinthe soil.
ii) Calculatethemaximumshearstrengthavailablewithinthe soil.
iii) Determinethefactorofsafetyfortheslope.

\section*{Or}

10 a) A retaining wall has a vertical back and is 8 m high. The back face of the wall is smooth and the upper surface of the fill is horizontal. Determine the thrust on the wall per unit length. Take \(c=10 \mathrm{kN} / \mathrm{m}^{2}, \gamma=19 \mathrm{kN} / \mathrm{m}^{3}\) and \(\phi=20^{\circ}\). Neglect tension.
b) What are different types of slope failures? State the assumptions made in the analysis of stability of slopes.

SET-1

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 TRANSPORTATION ENGINEERING - II
}
(Civil Engineering)
Time: 3 hours Max. Marks: 75

\author{
Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks
}

1 a) What is Ballast? What are the different types and enumerate the requirements of Good ballast.
b) Determine the number of sleepers required for the construction of 2000 m of BG track, with a sleeper density of \(\mathrm{N}+7\).

\section*{Or}

2 a) Write about the cross section of a permanent way.
b) Write about the theories related to creep.

3 a) Draw a neat sketch of Right hand turn out, clearly showing the various elements.
b) A cross over is to be laid connecting two BG parallel tracks spaced 4.5 m apart.

Assuming that 1 in 8.5 crossings are to be used, work out the various details required for setting the cross over.

> Or

4 a) With the help of a neat sketch, show the various components of a typical Railway track.
b) Explain the following terms (i) Track modulus, (ii) Coning of Wheels. Draw neat sketches, wherever necessary

5 a) Write a note about - (i) Ruling gradient and (ii) Pusher gradient.
b) Calculate the super elevation, maximum permissible speed and transition length for a 4 degree curve on a high speed BG section with a maximum allowable speed of 100 kmph . Assume the equilibrium speed to be 70 kmph and the booked speed of the goods train to be 45 kmph .

\section*{Or}

6 a) A turn out is to be laid off a straight BG track with a 1 in 11 crossing. Determine the lead and radius for the turn out, given the following data. Heel divergence \(d=\) 113 mm , the straight length between the TNC and the tangent point of the crossing curve, \(\mathrm{h}=1.325 \mathrm{~m}\), crossing angle \({ }_{-}=3^{\circ} 25^{\prime} 40^{\prime \prime}\) and switch angle \({ }_{-}=1^{\circ} 8^{\prime} 20^{\prime \prime}\).
b) Describe the three aspects in Upper quadrant signaling. Briefly describe one method of interlocking used by Indian Railways.

1 of 2

7 a) The length of runway under standard conditions is 1620 m . The airport site has an elevation of 270 m . Its reference temperature is \(32.90^{\circ} \mathrm{C}\). If the runway is to be constructed with an effective gradient of 0.20 percent, determine the corrected runway length.
b) If the proposed runway grading permits an effective gradient of 0.20 percent, determine the actual runway length required at the site.

Or
8 a) Explain with neat sketches, the various markings on Runways.
b) Explain in brief the difference between functional and structural evaluation of airfield pavements.

9 a) Define (i) Semi diurnal tides, (ii) Mixed diurnal tides, (iii) Neap tides and (iv) Age of tide.
b) What are Navigational aids? Briefly describe the different types of Floating signals.

Or
10 a) Differentiate between a Jetty and a Wharf. State the conditions under which you will prefer their construction.
b) Write short notes about (i) Transition sheds and (ii) Work houses.

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 CONTROL SYSTEMS \\ (Electrical and Electronics Engineering)}

Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Compare Open loop and closed loop control systems. shown in figure (a). Also obtain the analogous electrical circuits based on (i) force - current analogy and (ii) force - voltage analogy. Also find the transfer function \(X_{1}(s) / F(s)\).


Or
2 a) What is DC servomotor? Derive its transfer function and explain its characteristics.
b) Apply the Mason's gain formula to the signal flow graph shown in fig (b) 8 M Find the transfer function \(\mathrm{x}_{5} / \mathrm{x}_{1}\).


3 a) Define the steady state error and error constants of different types of inputs.
b) Draw the root locus diagram for the system
\[
G(s)=\frac{K(s+2)}{s(s+1)}
\]
and show the exact breakaway points.
Or
4 a) Determine the stability of the system by means of Routh criterion.
\(S^{6}+4 S^{5}-2 S^{4}-6 S^{3}-7 S^{2}-8 S-4=0\).
b) The open loop transfer function of unity feedback system is given by as follows \(t_{p}\) : peak time 1 sec per unit overshoot of \(5 \%\). In the above system, can these two specifications be met simultaneously?

5 a) Explain about gain crossover frequency and phase cross over frequency.
b) Sketch the Bode plot for the following transfer function and find the system gain K for the gain cross over frequency to be \(10 \mathrm{rad} / \mathrm{s}\).
\[
\mathrm{G}(\mathrm{~s})=\frac{K s^{2}}{(1+\mathrm{s})(1+0.1 \mathrm{~s})(1+0.01 \mathrm{~s})}
\]
or
6 a) Sketch the Nyquist plot and assess the stability of the closed loop system whose open loop transfer function is
\[
\mathrm{G}(\mathrm{~s}) \mathrm{H}(\mathrm{~s})=\frac{K(s-6)}{(s+2)(s+2)}
\]
b) Explain the procedure for designing a polar plot of a system with an example.

7 a) Explain the procedure for the design of Lag - lead compensator.
b) What is compensation? What are the different types of compensators?

Or
8 a) What is a lag compensator, obtain the transfer function of lag compensator and draw pole-zero plot?
b) Explain the different steps to be followed for the design of compensator using Bode plot.
9 a) Obtain the state equation and output equation of the electric network as shown in Fig below.


Fig
b) Write a short note on concepts of controllability and observability.

Or
10 a) Obtain the state space representation of an armature controlled dc motor.
b) The state equation of a linear system is given by
\[
\dot{x}=\left[\begin{array}{cc}
-2 & -5 \\
0 & -4
\end{array}\right] x+\left[\begin{array}{l}
1 \\
0
\end{array}\right] u
\]

Obtain the state transition matrix.

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 FLUID MECHANICS \& HYDRAULIC MACHINES}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

1 a) What's the importance of Manometer Explain the types manometers in brief.
b) An oil film of thickness 1.5 mm is used for lubrication between a square plate of size \(0.9 \mathrm{~m} \times 0.9 \mathrm{~m}\) and an inclined plane having an angle of inclination \(20^{\circ}\). The weight of the square plate is 392.4 N and it slides down the plane with a uniform velocity of \(0.2 \mathrm{~m} / \mathrm{s}\). Find the dynamic viscosity of the oil.

Or
2 a) What are the modes of measuring pressure? How can you convert pressure in k Pa into the liquid columns and vice versa?
b) Explain the differences between manometer and mechanical gauges. What are the different types of mechanical pressure gauges.
3 a) What is Euler's equation? How will you obtain Bernoulli's equation from it?
b) The water is flowing through a taper pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end at the rate of \(50 \mathrm{lit} / \mathrm{s}\). The pipe has a slope of 1 in 30 . Find the pressure at the lower end if the pressure at the higher level is \(19.62 \mathrm{~N} / \mathrm{cm}^{2}\).

Or
4 a) Define minor losses in pipes and obtain equation for any four losses.
b) Oil flows from 1 to 2 through a 100 m long horizontal steel pipe of 150 mm diameter, the pressure at 1 is 1.08 Mpa and 2 is 0.95 Mpa . The kinematic viscosity is \(412.5 \times 10^{-6} \mathrm{~m}^{2} / \mathrm{sec}\), Density \((\rho)=918 \mathrm{~kg} / \mathrm{m}^{3}\). Find Reynolds's number and discharge if flow is laminar.
5 a) What are different methods of dimensional analysis? Write procedure used for solving problems by Buckingham's \(\pi\) theorem.
b) Write short notes on Streamlined body and Bluff Body. Listout its applications.

Or
6 a) Derive the expressions for the displacement thickness and momentum thickness of the boundary layer. Explain their significances in the boundary layer theory.
b) Explain the concept of boundary layer? Derive Von Karman momentum integral equation.
7 a) Derive an expression for the force exerted by the jet of water on a stationary inclined plate.
b) Show that for the maximum efficiency, the bucket speed of a pelton wheel should be equal to one half of the jet speed.

Or

8 a) A hydraulic turbine under a head of 25 metres develops 7260 kW running at 110 rpm . What is the specific speed of the turbine? What type of turbine is this? Find also the normal speed and output if the head on the turbine is reduced to 20 metres.
b) Draw the velocity triangle for Pelton wheel, Francis turbine and Kaplan turbine.

9 a) Compare Reciprocating pump with Centrifugal pump. 7M
b) What is the necessity of a Surge Tank in turbines? Explain different types of 8 M Surges with the aid of neat diagrams.

Or
10 a) What is a manometric head of a centrifugal pump? How do you define the specific speed of a centrifugal pump?
b) Define the term 'Governing of a turbine'. Describe with a neat sketch the 8M working of an oil pressure governor.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 \\ ANALOG COMMUNICATIONS
}
(Electronics Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

1 a) What is the principle of Amplitude modulation? Derive expression for the AM wave and draw its spectrum.
b) An AM modulation has the following: \(\mathrm{s}(\mathrm{t})=10(1+5 \operatorname{Cos} 2000 \mathrm{t})\) volts. Considering \(1 \Omega\) load, find Side-band power and Modulation Index.

Or
2 a) Obtain a relationship between carrier and side band powers in an AM DSBFC wave and explain how power distribution takes place in AM DSB FC system.
b) A transmitter radiates 9 kW with the carrier unmodulated and 10.123 kW when the carrier is sinusoidally modulated. Then (i) Calculate the modulation index. (ii) If another sine wave corresponding to \(40 \%\) modulation is transmitted simultaneously, determine the total radiated power.

3 a) Explain briefly the effects of frequency and phase errors in synchronous detection of AMDSB - SC.
b) With the help of block diagram, explain Frequency Division Multiplexing (FDM).

Or
4 a) Explain the concepts of Carrier Acquisition in DSB.
b) Draw the block diagram for the generation of a VSB signal and explain the principle of operation.

5 a) A 20 MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 100 kHz . Determine the modulation index and the approximate bandwidth of the FM signal if the frequency of the modulating signal is: (i) 1 kHz (ii) 15 kHz .
b) Explain the reactance modulator method using FET for the generation of FM. Why is it necessary to use AFC in this method of generation?

6 a) What do you mean by narrowband FM? Explain the generation of narrowband frequency modulation.
b) Write the comparisons between FM and AM.

7 a) Explain the similarities and differences between FM and AM receivers.
b) Describe the functional block diagram of FM receiver.

Or
8 a) Explain the important parameters in Radio receiver measurements.
b) Explain about frequency changing and tracking.
\(9 \quad\) Briefly explain about: (i) Threshold effect in FM, (ii) Noise equivalent Bandwidth and (iii) Bandpass noise representation.

Or
10 a) Explain the noise performance of SSB-SC scheme with the help of neat block diagram.
b) Explain the generation of PWM with relevant diagrams.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 DATABASE MANAGEMENT SYSTEMS \\ (Com to CSE, IT)
}

Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Describe the overall system architecture of database systems and explain the role of users, query processor and storage manager components in it.
b) Explain the drawbacks of file systems and how database systems offer solutions to all those problems? Discuss.

\section*{Or}

2 a) Write about the functionalities of parsing \& translation, optimization and evaluation modules in query processing in detail.
b) How to view the data in different levels of abstraction? Explain.

3 a) Explain how different key constraints help a relation to uniquely identify a tuple.
b) Consider Engineering College database, define various tables and perform Data Manipulation operations.

Or
4 a) Explain the following
i) Relation ii) Relation Schema and Instance
iii) Unity and Degree of relation iv) Domain constraints.
b) Illustrate simple database schema for e-commerce application and perform different Data definition operations.

5 a) Design ER model for Airline Reservation system. Identify entities, attributes, entity sets and relationships in that and explain each of them.
b) How effective are View tables? Explain views, updatable and non-updatable views with examples.

\section*{Or}

6 a) Design ER model for Airline Reservation system. Represent various constraints imposed, inheritance, super and sub classes in that and explain each of them?
b) What are various key constraints? Explain them in detail with their importance. How are they different from integrity constraints?

7 a) Write the following i) Differentiate 3NF and BCNF ii) Properties of decomposition.
b) Consider the relation R with 5 attributes ABCDE with dependencies
\(\mathrm{A} \rightarrow \mathrm{B}, \mathrm{BC} \rightarrow \mathrm{E}\) and \(\mathrm{ED} \rightarrow \mathrm{A}\) then
i) List all Keys for \(\mathrm{R} \quad\) ii) Is R in 3 NF ? iii) Is R in BCNF ?

Or

8 a) What is minimal cover? Write about minimal cover for set of FDs and How it helps perform \(3^{\text {rd }}\) form normalization? Explain.
b) Illustrate the implementation of 4 NF and 5 NF with examples.

9 Explain the following
a) Concurrent Executions
b) Serializability
c) Primary and secondary indexes

Or
10 Explain the following
a) Transaction State
b) Implementation of Atomicity and Durability
c) Clustering file organization

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 SOIL MECHANICS \\ (Agricultural Engineering)}

Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

1 a) Derive an expression for bulk density in terms of its water content, void ratio, specific gravity of solids and density of water.
b) What is the difference between the classification based on particle size and the textural classification? Discuss the limitations of the two systems.

Or
2 a) Give the step-by-step procedure for classification of a soil by Indian standard classification system.
b) A sample of sand has a volume of 1000 ml in its natural state. Its minimum volume when compacted is 840 ml . When gently poured in a measuring cylinder, its maximum volume is 1370 ml . Determine the relative density.

3 a) What is an influence diagram? What are its uses in practice?
b) Describe the method of calculating the stress at a point below the corner of a rectangular load.

\section*{Or}

4 a) Discuss comparisons between Bousinesq's and Westerguard's solutions.
b) A concentrated load of 2000 kN is applied at the ground surfacc. Determine the vertical stress at a point P which is 6 m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6 m but at a horizontal distance of 5 m from the axis of the load.

5 a) Differentiate between the stress-controlled and the strain-controlled tests.
b) Discuss the shear characteristics of cohesion less soils and cohesive soils.

Or
6 a) Explain the working of the Pore pressure measurement device of a triaxial test apparatus.
b) Discuss how the shear test conditions are decided. Where would you use the effective stress analysis?

7 a) Define and explain the following terms :
(i) Compression index, (ii) Expansion index and (iii) Recompression index
b) Describe the consolidometer test. Show how the results of this test are used to predict the magnitude of settlement.

Or
1 of 2

8 a) Differentiate between normally consolidated and the over consolidated soils.
b) What is the time factor? How is it related to the average degree of consolidation?

9 a) What are different types of earth pressure? Give examples.
b) What are the assumptions of Rankine's theory? Derive the expressions for passive pressure.

Or
10 a) What are different factors of safety used in the stability of slopes?
b) Describe Culmann's method for the stability analysis of homogenous slopes. What are its limitations?

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 CONCRETE TECHNOLOGY}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B \\ 4. I S code is allowed}

\section*{PART - A}
1. a) Discuss about the effect of mineral admixtures on mass concreting.
b) What are the different types of tests for finding the physical properties of cement?
c) What are the retarders and accelerators?
d) What is segregation and bleeding?
e) What is the Effect of time and temperature on workability of concrete?
f) Write about Gel space Ratio.

\section*{PART -B}
2. a) Write about bulking of aggregate and soundness of aggregate.
b) What are the different types of admixture? Write about flyash and silica fume.
3. a) What are the different steps in the manufacture of concrete?
b) Define workability. Write the factors influencing the workability.
4. a) What are the different tests performed on hardened concrete? Explain two tests.
b) Explain the principle and methodology non-destructive testing of concrete using Rebound Hammer Method.
5. a) Write the factors effecting the modulus of elasticity.
b) What is shrinkage of concrete? Explain about classification of shrinkage.
6. Design a concrete mix for characteristic strength of 30 MPa at 28 days with a standard deviation of 4MPa. The specific gravity of FA and CA are 2.60 and 2.70 respectively. A slump of 50 mm is necessary. The specific gravity of cement is 3.15 . Assuming the necessary data design the mix as per IS code method.
7. Write about the following
a) High density concrete
b) Self consolidating concrete
c) No fines concrete

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 \\ CONTROL SYSTEMS \\ (Electrical and Electronics Engineering)}

Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
1. a) Define a terms: Open Loop Control System \& Closed Loop Control System with suitable examples.
b) Obtain the state variable representation of the RLC series circuit fed by DC voltage ( \(\mathrm{V}_{\text {in }}\) ) source. Consider the voltage across the capacitor as output voltage.
c) Sketch the positions of the roots of the characteristics equation
\(S^{2}+2 \delta \omega_{n} S+\omega_{n}^{2}=0\) for damping factor ( \(\delta\) ) ranges from -10 to +10 in S-plane. Also, explain reasons for treating entire RHS of S-plane as unstable region.
d) Draw and explain Nyquist contour. Define and discuss the Nyquist stability criterion.
e) Briefly describe the need of Lead and Lag compensators in control systems.
f) Obtain the state transition matrix, if \(A=\left[\begin{array}{cc}-2 & -4 \\ 1 & -2\end{array}\right]\)

\section*{PART -B}
2. a) For the Control System shown in Fig.Q2(a), determine the C/R ratio using Mason's Gain formula. Also, develop system equations describing the given system. Further, compare the merits and demerits of Block diagram reduction technique and Mason's Gain formula.


Fig. Q2(a)
b) Develop dynamic equations of Field Controlled and Armature Controlled DC motors. Depict them by Block diagram representation.
3. a) Find all the time domain specifications for a unity feedback control system whose open-loop transfer function is given by \(G(S)=\frac{25}{S(S+6)}\).
b) Explain with example the first order system and also, explain types of the system and steady state error constants for the same.

\section*{1 of 2}
4. Discuss various steps involved to develop Root-Locus diagram of a given Control System. Illustrate all the steps for a system given by \(G H(S)=\frac{K(S+5)}{S^{2}\left(S^{2}+8 S+100\right)}\).
5. a) For a system described by \(G H(S)=\frac{K}{S(S+2)(S+8)}\), illustrate Nyquist path and Nyquist plots and hence, determine the range of K for absolute stability of a given system. Estimate the value of K for a GM of 8 dB .
b) Consider Open Loop transfer Function \(G(S)=\frac{60(1+0.5 S)}{(1+0.1 S)(1+2 S)(1+0.02 S)}\) with

Unity Feedback. Sketch the Bode Plot; hence find the Phase and Gain Margin of the system. Also, comment on the stability of the system.
6. a) Explain the procedure for the design of Lag Compensator.
b) Consider a unity feedback uncompensated system with the open loop transfer function as \(G(S)=\frac{K}{s(s+1)(s+4)}\). Design a lead compensator for the system such that the compensated system has damping ratio \(\xi=0.5\) and un-dumped natural frequency \(\mathrm{W}_{\mathrm{n}}=2 \mathrm{rad} / \mathrm{sec}\).
7. a) Consider a given system as; \(\overline{\dot{X}}=A X\), where \({ }_{A}=\left[\begin{array}{cc}2 & 0 \\ -1 & -6\end{array}\right]\). Find \(\phi(\mathrm{s}), \quad \phi(\mathrm{t})\) and \(X(\mathrm{t})\), if \(\overline{X(0)}=\left[\begin{array}{l}0 \\ 1\end{array}\right]\).
b) Obtain the appropriate state model for a system represented by an electric circuit in Fig.7(b).


Fig. 7(b)

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 DESIGN OF MACHINE MEMBERS-I}
(Mechanical Engineering)

\section*{Time: 3 hours}

Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

\section*{PART -A}
1. a) Define shock factor and what does it indicate.
b) What is endurance limit?
c) Discuss, why are ACME threads preferred over square thread for power screw?
d) Define the term critical speed of a shaft.
e) What are possible modes of failure of the pin (bolt) in a flexible coupling?
f) List out the various functions of a spring.

\section*{PART -B}
2. a) A solid circular shaft of diameter 45 mm is loaded by bending moment 650 Nm , torque \(900 \mathrm{~N}-\mathrm{m}\) and an axial tensile force of 30 KN . The shaft material is ductile with yield strength of 280 MPa . Determine the factor of safety according to Maximum Principal stress, Tresca and Von misses theories of failure.
b) A 50 mm wide, 5 mm high rectangular plate has 5 mm diameter central hole. The allowable tensile stress is 700 MPa . Find (i) The maximum tensile force that can be applied (ii) the maximum bending moment that can be applied to reach the maximum stress.
3. a) A machine component is subjected to fluctuating stress that varies from 40 to 100 \(\mathrm{N} / \mathrm{mm}^{2}\). The corrected endurance limit stress for the machine component is 270 \(\mathrm{N} / \mathrm{mm}^{2}\). The ultimate tensile strength and yield strength of the material are 600 and \(450 \mathrm{~N} / \mathrm{mm}^{2}\) respectively. Find the factor of safety using Soderberg line and Goodman line.
b) Determine the thickness of a 120 mm wide uniform plate for safe continuous operation if the plate is to be subjected to a tensile load that has a maximum value of 250 kN and aminimum value of 100 kN . The properties of the plate material are as follows: Endurance limit stress \(=225 \mathrm{MPa}\), and Yield point stress \(=300 \mathrm{MPa}\). The factor of safety based on yield point may be taken as 1.5 .

SET - 1
4. a) A steam engine cylinder of 300 mm effective diameter is subjected to a steam pressure of 1.5 MPa . The cylinder head is connected by means of 8 bolts having strength of 330 MPa and endurance limit of 240 MPa . The bolts are tightened with an initial preload of 1.5 times that of steam load. A soft copper gasket is used to make the joint leak proof assuming a factor of safety of 2 ; determine the size of the bolts required. The stiffness factor for copper gasket may be taken as 0.5 .
b) A welded connection as shown in fig. below is subjected to an eccentric force of 7.5 KN . Determine the size of welds if the permissible shear stress for the weld is \(100 \mathrm{~N} / \mathrm{mm}^{2}\). Assume static conditions.

5. a) A shaft mad of AISI 1030 cold drawn steel transmits 50 KW at 900 rpm through a gear. Select an appropriate square key for the gear.
b) Design a shaft to transmit power from an electric motor to a lathe headstock through a pulley be means of a belt drive. The pulley weights 200 N and is located at 300 mm from the centre of the bearing. The diameter of the pulley is 200 mm and the maximum power transmitted is 1 kW at 120 rpm . The angle of the belt is \(180^{\circ}\) and coefficient of friction between the belt and the pulley is 0.3 . The shock and fatigue factors for bending and twisting are 1.5 and 2.0 respectively. The allowable shear stress in the shaft may be taken as 35 MPa .
6. a) A rigid coupling is used to transmit 50 KW power at 300 rpm . There are six bolts the outer diameter of the flanges is 220 mm , while the recess diameter is 150 mm . The coefficient of friction between the flanges is 0.15 mm . The bolts are made of steel 45 C 8 (Syt \(=380 \mathrm{~N} / \mathrm{mm}^{2}\) ) and the factor of safety is 3 . Determine the diameter of the bolts. Assume that the bolts are fitted in large clearance holes.
b) Design a bushed-pin type of flexible coupling to connect a pump shaft to a motor shaft transmitting 32 kW at 960 rpm . The overall torque is \(20 \%\) more than mean torque. The material properties are as follows. The allowable shear and crushing stress for the shaft and key material is 40 MPa and 80 MPa . The allowable shear stress for cast iron is 15 MPa . The allowable bearing pressure for rubber bush is \(0.8 \mathrm{~N} / \mathrm{mm} 2\). The material of the pin is same as that of shaft and key.
7. a) Design a helical compression spring to sustain an axial load of 3 KN . The deflection is 60 mm . Spring index is 6 . The shear stress is not to exceed 300 MPa . Rigidity modulus for spring material is 81 GPa .
b) A spring loaded safety valve for a boiler is required to blow-off at a pressure \(1.2 \mathrm{~N} / \mathrm{mm}^{2}\). The diameter of the value is 60 mm . Design a suitable compression spring for the safety valve, assuming spring index to be 5 , and 35 mm initial compression. The maximum lift of the valve is 10 mm . The shear stress in the spring material is to be limited to 500 MPa . Take \(\mathrm{G}=0.8 \times 10^{5} \mathrm{MPa}\).

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 ELECTRONIC CIRCUIT ANALYSIS}
(Com to ECE, EIE)

\section*{Time: 3 hours}

Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) Define frequency response of an amplifier. 2 M
b) What are the merits of Cascode amplifier? \(\quad 2 \mathrm{M}\)
c) Write the expression for input and output resistance of voltage series 3M feedback amplifier.
d) Draw the equivalent circuit of crystal oscillator.
e) What are the different kinds of power amplifiers?
f) What are the disadvantages of tuned amplifiers?

\section*{PART -B}
2. a) Derive the expression for the CE current gain with resistive load at high 7M frequencies.
b) Give the analysis of common drain Amplifier circuit at high frequencies.
3. a) With neat sketch explain cascaded transistor amplifier and its analysis.
b) Discuss about differential amplifier using BJT.
4. a) Explain the classification of amplifiers.
b) Explain current series feedback amplifiers. 7 M
5. a) Explain Barkhausen criterion with necessary equations and an example. 7 M
b) In an Hartley oscillator, if \(\mathrm{L} 1=0.2 \mathrm{mH}, \mathrm{L} 2=0.3 \mathrm{mH}\) and \(\mathrm{C}=0.003 \mu \mathrm{~F}\), calculate the frequency of oscillation. Draw the circuit diagram of Colpitt's oscillator.
6. a) Derive the expression for conversion efficiency of Class B push pull power 7 M amplifier.
b) Discuss about Thermal stability and Heat sinks.
7. a) Explain the classification of tuned amplifier.
b) Draw the circuit of single tuned capacitance coupled amplifier and explain its 7M operation.

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 COMPUTER ORGANIZATION}

\author{
(Com to CSE, IT, ECC)
}

Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) Obtain the performance of a processor with clock rate 800 MHz , Number of instructions executed 1000 , average number of steps needed/machine instruction 20.
b) Write a short note on 4 types of operational instructions performed in a computer.
c) Differentiate register and absolute accessing modes used to access variables.
d) Write about Universal Serial Bus structure.
e) Explain the concept of interleaving.
f) Describe micro program and micro code.

\section*{PART -B}
2. a) Discuss various registers used and typical operating steps with respect to connections between processor and the memory.
b) Explain various bus structures used to connect different parts inside a computer together and issues in it.
3. a) In how many ways the location of an operand is specified in an instruction? Explain each mode with suitable examples.
b) Perform left and right shift operations on any binary data of size 8 bits. And also illustrate the role of stacks and queues in computer programming operation.
4. a) With suitable examples explain shift and rotate operations.
b) What are the typical branch and Bit manipulation instructions? Explain.
5. a) Discuss the role of DMA in accessing the I/O devices. And show that it has improved the performance of the system.
b) Write about bus arbitration? Explain different implementations of bus arbitration.
6. a) Describe the working principle of flash memory and read only memories. And also explain the applications.
b) Compare the operations and performance of write-through protocol, copy-back protocol and early restart protocol of cache memory.
7. Explain the following.
a) Role of MDR in fetching a word from memory.
b) Control sequence that implements unconditional branch instructions.
c) Block diagram of a complete processor.

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 SURFACE WATER HYDROLOGY}
(Agricultural Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART-A}
1. a) Explain in brief about, methods of presentation of rain fall data.
b) Draw a single peaked hydrograph and explain its components.
c) Describe curve number technique in design of peak runoff rate.
d) Briefly explain curve extension method of base flow separation.
e) State general methods of flood forecasting used in India.
f) How does channel routing differ from the reservoir routing?

\section*{PART -B}
2. a) What do you understand by precipitation? Explain various types of precipitation.
b) A catchment has five rain gauge stations. In a year, the annual rainfall recorded by the gauges are \(78.8 \mathrm{~cm}, 90.2 \mathrm{~cm}, 98.6 \mathrm{~cm}, 102.4 \mathrm{~cm}\) and 70.4 cm . For a \(6 \%\) error in the estimation of the mean rainfall, determine the additional number of gauges needed.
3. a) Define runoff and explain its components.
b) Table below gives the time distribution of a rainfall lasting for nine hours. If the direct runoff is 9.3 cm , determine the \(\Phi\)-index of the storm and time of rainfall excess.
\begin{tabular}{|l|l|l|l|l|l|l|l|l|l|}
\hline \begin{tabular}{l} 
Time from \\
start (h)
\end{tabular} & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\
\hline \begin{tabular}{l} 
Incremental \\
rainfall in each \\
hour \((\mathrm{cm})\)
\end{tabular} & 0.7 & 1.4 & 2.4 & 3.7 & 2.9 & 2.6 & 1.7 & 0.8 & 0.5 \\
\hline
\end{tabular}
4. a) Write down step by step methodology for design of flood discharge using rational method.
b) Explain wire gauge, staff gauge and automatic stage recorders.
5. a) Discuss effects of the characteristics of storms on the shape of resulting hydrographs.
b) Explain uses of unit hydrograph in construction of flood hydrograph resulting from two or more period of rainfall.
6. a) Define S-curve hydrograph. How is it constructed and what are its uses?
b) The following data pertain to a drainage basin having an area of \(3000 \mathrm{~km}^{2}\), develop a synthetic unit hydrograph. Length of main channel is 130 km , distance from the centroid of drainage area to the outlet is 80 km . Assume \(\mathrm{C}_{\mathrm{t}}=1.50\), and \(\mathrm{C}_{\mathrm{p}}=4.0\).
7. a) What are the different methods of flood estimation? Discuss unit hydrograph method.
b) A watershed has a runoff coefficient of 0.20 , area 150 hectares with the general slope of 0.001 and maximum length of travel of overland flow of 1.25 km . Information on the storm of 50 years return period is given as follows:
\begin{tabular}{|l|l|l|l|l|l|}
\hline \begin{tabular}{l} 
Duration \\
(minutes)
\end{tabular} & 15 & 30 & 45 & 60 & 80 \\
\hline \begin{tabular}{l} 
Rainfall \\
(mm)
\end{tabular} & 40 & 60 & 75 & 100 & 120 \\
\hline
\end{tabular}

Estimate the peak flow to be drained by a culvert for a 50 years storm.

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July- 2022 ADVANCED DATA STRUCTURES \\ (Com. to CSE, IT)}

Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any THREE Questions from Part-B

\section*{PART -A}
1. a) Mention the advantages and disadvantages of skip lists.
b) What is height balanced tree? Give an example.
c) Differentiate between Binary Heaps and Binomial Queues.
d) Give a brief note about All pair shortest path.
e) List the complexities for different sorting methods.
f) Write short notes on binary trie with an example.

\section*{PART -B}
2. a) Explain in detail about operations on dictionaries.
b) Perform the Linear probing with the elements \(8,26,37,51,11,36,42\) with table size 10
3. a) Explain the operations of B Tree with an example.
b) Construct an AVL Tree for the following elements 2,1,4,5,9,3,6,7,8
4. a) Explain the priority queue operations with an example.
b) Discuss about lazy Binomial queues.
5. a) Perform Dijkstra's shortest path Algorithm for the given graph.

b) Write an algorithm to perform Prims Algorithm with an example.
6. a) Consider the given elements \(78,56,32,45,8,23,19\) perform heap sort
b) Apply the merge sort technique for the word "EXAMINATIONS".
7. a) For the given string " SHE SELLS SEA SHELLS ON THE SEA SHORE" and Pattern String "SHELL" apply Boyeer-Moore Algorithm.
b) Discuss about File Structure concepts in detail.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 MANAGERIAL ECONOMICS \& FINANCIAL ANALYSIS \\ (Common to CE, EEE, EIE, ECT, AGE \& FE)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

\section*{UNIT-I}

1 a) Discuss the nature, Scope of Managerial economics in detail.
b) What is Elasticity of demand and its types of Elasticity of Demand?

Or
2 a) Write a note on Survey Methods.
b) Explain the concept of supply and law of supply.

\section*{UNIT-II}

3 a) Explain 'Law of returns to scale' with an example.
b) Explain Iso-quant and Iso-cost curves and state characteristics.

Or
4 a) A firm has Fixed Cost of Rs 60000/-, selling price per unit is Rs.60/- and variable cost per unit is Rs. 30/-. Determine Break Even Point in terms of Volume and Sales Value.
b) Explain the production function with one variable inputs and laws of returns.

\section*{UNIT-III}

5 a) Define Market. Explain the structure of market with suitable examples.
b) Explain the need for public enterprises in India. Do you think Public Enterprises as a whole have fulfilled that need?
Or

6 a) What is Oligopoly? Explain price and output determination in Oligopoly.
b) Discuss the advantages and disadvantage of partnership.

\section*{UNIT-IV}

7 a) Explain the Classification of Accounts and their Principles (Rules of Debit and Credit).
b) What is Double Entry System? What are the advantages and limitations of Double Entry System?

8 a) Describe the functions / scope of Financial Accounting.
b) What is ratio analysis? Explain different types of ratio analysis.

UNIT-V
9 a) Find out the Net Present Value of the following project of a firm during five years.
The cost of the project is 30,000 and given discount rate @ \(9 \%\)
\begin{tabular}{|l|l|}
\hline Year & Cash Inflow \\
\hline 1 & 12,000 \\
2 & 10,000 \\
3 & 5,000 \\
4 & 9,000 \\
5 & 8,000 \\
& \\
\hline
\end{tabular}
b) Explain the concept of time value of money. Discuss the various methods of appraising project profitability that considers time value of money.

Or
10 a) The project involves a total initial expenditure of Rs. 2,00,000 and its estimated to generate a future cash inflows of Rs. 30,000; Rs.38,000; Rs.25,000; Rs.22,000;
Rs.36,000; Rs.40,000; Rs.40,000; Rs,28,000; Rs.24,000 and Rs,24,000 for ten years. Calculate payback period and ARR.
b) Explain the traditional methods of project profitability appraisal.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ MANAGERIAL ECONOMICS \& FINANCIAL ANALYSIS
}
(Common to CE, EEE, EIE, ECT, AGE \& FE)
Time: 3 hours

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

\section*{UNIT-I}

1 a) What is demand forecasting? Explain various factors involved in demand forecasting.
b) Explain Time Series Analysis.

Or
2 a) State the 'Law of Demand'. What are the various factors that determine the demand for a Product? Give Example.
b) What is Elasticity of demand and its types of Elasticity of Demand?

\section*{UNIT-II}

3 a) Explain the concepts of the choice of least cost factor combination.
b) Calculate the BEP in units and rupees using the following details: \(\cdot\) Selling price per unit is Rs. 200 • Variable cost per unit is Rs. 120 • Fixed costs Rs. 40,000 • Actual sales Rs. 4,00,000

Or
4 a) Explain the law of variable propositions.
b) Define Break-even point with graph. Explain BEP assumptions.

\section*{UNIT-III}

5 a) Define partnership. Explain its features and evaluate it as against sole proprietorship.
b) Explain different methods of Pricing. Give Examples.

Or
6 a) Discuss how the Price-Output determination is done under Monopoly Markets.
b) Explain the Marris and Williamson's model of a firm.

\section*{UNIT-IV}

7 a) What are the accounting concepts that govern accounting process? Explain in brief.
b) Explain the steps involved in preparation of financial statements.

Or
8 a) What is the Journal? What are the advantages/ Importance and Limitations/ Disadvantages of the Journal?
b) Compare and contrast funds flow and cash flow analysis.

UNIT-V
9 a) What do you mean by capital budgeting? Explain its significance to an industry.
b) Explain the concept of net present value with suitable example.

Or
10 a) An Asset is purchased for Rs. 1, 10,000, it has an estimated life of 10 years and its estimated scrap value after 5 years is Rs. 10, 000 then calculate Annual Depreciation under SLM method?
b) Explain the IRR method with examples.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ MANAGERIAL ECONOMICS \& FINANCIAL ANALYSIS \\ (Common to CE, EEE, EIE, ECT, AGE \& FE)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

\section*{UNIT-I}

1 a) Discuss why studying Managerial Economics is important for a youngster of a country?
b) Explain the relationship of other subjects with managerial economics.

Or
2 a) Explain the concept of and law of supply law of demand with examples.
b) Explain various techniques of demand forecasting techniques.

\section*{UNIT-II}

3 a) Define Cost. Explain the different cost concepts used in the process of Cost Analysis.
b) Explain the law of variable prepositions.
b) A firm has Fixed Cost of Rs 20000/- Selling price per unit is Rs.10/- variable cost per unit is Rs. 6/- Calculate Break Even Point in terms of sales units and Sales revenue.

\section*{UNIT-III}

5 a) What is Perfect Competition? Describe features of Perfect Competition.
b) Explain the pricing strategies for a new product.

Or
6 a) Explain the phases of business cycle.
b) Explain the features and evaluation of sole traders.

\section*{UNIT-IV}

7 a) Describe the functions / scope of Financial Accounting.
b) Explain Journal and Ledger with format.

Or

1 of 2

8 a) Explain the preparation of funds flow statement format.
b) Explain the significance of ratio analysis. Explain any four ratios used in financial statement.

\section*{UNIT-V}

9 Determine the average rate of return and payback period from the following data of two machines A \& B. Suggest which is more viable.
\begin{tabular}{|l|l|l|}
\hline Particulars & Machine A & Machine B \\
\hline Cost (in Rs.) & 56,125 & 56,125 \\
\hline \multicolumn{2}{|l|}{ Annual estimated income in Rs. after depreciation \& IT } \\
\hline Year 1 & 3,375 & 11,375 \\
\hline Year 2 & 5,375 & 9,375 \\
\hline Year 3 & 7,375 & 7,375 \\
\hline Year 4 & 9,375 & 5,375 \\
\hline Year 5 & 11,375 & 3,375 \\
\hline
\end{tabular}

Estimated life is 5 years for both the machines.
Estimated salvage value is Rs.3,000 for each machine

> Or

10 a) An Asset is purchased for Rs. 1, 10,000, it has an estimated life of 10 years and its estimated scrap value after 5 years is Rs. 10, 000 then calculate Annual Depreciation under SLM method?
b) Explain the modern methods of capital budgeting with formulas.

\section*{R20}

II B. Tech II Semester Regular Examinations, June/July - 2022
MANAGERIAL ECONOMICS \& FINANCIAL ANALYSIS
(Common to CE, EEE, EIE, ECT, AGE \& FE)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ UNIT-I}
1. a) Define demand. Explain the determinants of demand.
b) Explain Law of Demand with its exceptions.

Or
2 a) Explain the methods of forecasting demand.
b) Explain the demand schedule and demand curve.

\section*{UNIT-II}

3 a) Define Production function. How can a producer find it useful? Illustrate.
b) Calculate the BEP in units and rupees using the following details: • Selling price per unit is Rs. 100 • Variable cost per unit is Rs. 60 • Fixed costs Rs. 20,000 • Actual sales Rs. 2,00,000.

Or
4 a) Explain Cost -Volume - Profit analysis with an example.
b) Explain Iso-quant and Iso-cost curves and state characteristics.

\section*{UNIT-III}

5 a) What is Perfect Competition? Explain its features.
b) Explain the features and advantages of joint stock company.

Or
6 a) A firm has declared the following details about its sales:
Year 1
Sales (Rs.) 1,50,000
Year 2
2,00,000
Profit (Rs.) 15,000
25,000
(i) Calculate PV Ratio.
(ii) Find out the firm's BEP
(iii) How much should the company produce and sell to earn profit of Rs.50, 000?
b) Discuss how the Price-Output determination is done under Monopoly Markets.

\section*{UNIT-IV}

7 a) Explain the Classification of Accounts and their Principles (Rules of Debit and Credit).
b) Explain the format of trail balance and its significance in final accounts.

\section*{Code No: R2022015}

8 a) Explain the journal and ledger with format.
b) Journalize the following transactions of Mr. Ram.

Jan 3 Paid into bank Rs.80,000
Jan 5 Purchased building for Rs.3,00,000
Jan 7 Purchase goods for Rs,70,000
Jan 10 Sold goods for Rs.80,000
Jan 15 Withdrew cash from bank Rs.10,000
Jan 25 Paid electric charges Rs.3,000
Jan 30 Paid salary Rs.15,000

\section*{UNIT-V}

9 a) Find out the Net Present Value of the following project of a firm during five years.
The cost of the project is 30, 000 and given discount rate @ \(9 \%\)
\begin{tabular}{|l|l|}
\hline Year & \begin{tabular}{l} 
Cash \\
Inflow
\end{tabular} \\
\hline 1 & 12,000 \\
2 & 10,000 \\
3 & 5,000 \\
4 & 9,000 \\
5 & 8,000 \\
\hline
\end{tabular}
b) Discuss about the financial analysis using ratios.

Or
10 a) ABC Co. Ltd. Is proposing to undertake one project. Two projects \(A\) and \(B\) are available. The initial cost of the project in each case is Rs.4,00,000/-. A discount factor of \(10 \%\) is used to compare the projects. Cash flows after taxes (in Rs.) are as under
\begin{tabular}{|l|l|l|}
\hline Year & Project A & Project B \\
\hline 1 & \(1,75.000\) & 50.000 \\
\hline 2 & \(2,00,000\) & \(1,50,000\) \\
\hline 3 & \(2,50,000\) & \(2,00,000\) \\
\hline 4 & \(1,50,000\) & \(3,00,000\) \\
\hline 5 & \(1,00,000\) & \(2,00,000\) \\
\hline
\end{tabular}
which proposal would you recommend under Net Present Value method?
b) What is capital budgeting? Explain the need for capital budgeting.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ INDUSTRIAL ENGINEERING AND MANAGEMENT
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~ \\ UNIT-I}

1 a) Define Industrial Engineering and explain its applications.
b) What do you mean by scientific management? Explain its principles.

Or
2 a) Compare and contrast between industrial engineering and production management.
b) Explain about Theory X and Theory Y.

\section*{UNIT-II}

3 a) What are factors affecting for selecting location? Explain in detail.
b) Define plant layout and explain importance of layout decision.

Or
4 a) Explain the principles of plant layout.
b) Discuss about pros and corns of process layouts.

\section*{UNIT-III}

5 a) How can work study and method study enable an organization to improve productivity?
b) What are the steps required in making 'time study'? Explain.

\section*{Or}

6 a) What is work sampling? Explain the procedure of work sampling.
b) Explain the various techniques used in work measurement.

\section*{UNIT-IV}

7 a) Define quality and explain various attributes of quality.
b) What is statistical quality control? Explain with examples.

\section*{Or}

8 a) Explain the concept and objectives of Total Quality management.
b) Define six sigma and explain its concepts and uses.

UNIT-V
9 a) Compare and contrast between HRM and personal management.
b) What is job evaluation? Explain the process of job evaluation.

\section*{Or}

10 a) Define wage incentive and explain different types wage incentives.
b) What do you mean by supply chain management? Explain its components.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 INDUSTRIAL ENGINEERING AND MANAGEMENT
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit}

All Questions carry Equal Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

UNIT-I
1 a) What are the different developments observed in ancient Industrial Engineering and modern Industrial Engineering?
b) Explain about quantitative tools of industrial engineering.

## Or

2 a) What are the different techniques used in Industrial Engineering for its development.
b) Discuss about the Fayol's fourteen principles of management.

## UNIT-II

3 a) Describe the concept of layout and different types of production layouts.
b) Explain the different types preventive and break down maintenance.

## Or

4 a) How to design and develop the optimal design of layout?
b) What do you mean by plant maintenance? Explain effective maintenance methods.

## UNIT-III

5 a) Define work measurement and its objectives.
b) Explain the concept and process of micro-motion study.

## Or

6 a) What do you mean by rating techniques? Explain its objectives and procedure.
b) Discuss the various tools and techniques of work study.

## UNIT-IV

7 a) Explain about Queing assurance and its importance.
b) Illustrate different control charts.

## Or

8 a) What is the importance and objectives of quality control in an industry?
b) Explain the concept of SQC and how you can construct control charts for variables.

## UNIT-V

9 a) Define HRM and explain the functions of HRM.
b) What do you mean by job evaluation and explain its techniques?

## Or

10 a) Discuss the concept and objectives of value engineering.
b) Explain in brief about quantitative methods in Resource management.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> INDUSTRIAL ENGINEERING AND MANAGEMENT 

(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) Explain the role of Industrial Engineering.
b) Discuss about the productivity measurement techniques.

## Or

2 a) Define management and explain the functions of management.
b) What are the thumb rules of scientific management?

UNIT-II
3 a) What is plant layout? Explain the various principles of plant layout.
b) How do you classify the different types of layouts? Explain in brief.

## Or

4 a) Name and describe the various tools and techniques used in layout planning.
b) Describe a product layout and explain its principles.

## UNIT-III

5 a) Define work study. State its objectives and basic procedure.
b) Explain about PMTS.

## Or

6 a) Compare and contrast between work study and method study.
b) Explain about "SIMO Charts" and state its applications.

## UNIT-IV

7 a) What do you mean by SQC? What are its advantages and benefits?
b) Discuss about attribute sampling and how will we inspect it.

## Or

8 a) Explain about the zero defect concept with examples.
b) Write about the concept and implementation of quality circles.

UNIT-V
9 a) Define merit rating and explain the uses and importance of merit rating.
b) What do you mean by industrial relations? Explain its objectives.

## Or

10 a) Discuss the different types of wage incentive plans.
b) Explain the objectives and functions of supply chain management.

1 of 1

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> INDUSTRIAL ENGINEERING AND MANAGEMENT 

(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) Explain the concept and importance functions of management.
b) What do you mean by production management? Explain its components.

## Or

2 By considering an example, Explain Taylors principle in detail.

3 a) What general considerations are made in preparing the layout of an industrial concern?
b) Describe the process layout and explain its principles with examples.

## Or

4 a) Discuss the various techniques for optimal design of layouts.
b) Explain about the preventive and breakdown maintenance.

## UNIT-III

5 a) What is need and objectives of production management?
b) Discuss the different types and methods of method study.

Or
6 a) Explain about the string diagrams and Therbligs .
b) What is flow chart? Discuss its utility for method study engineers.

## UNIT-IV

7 a) Define Total quality management and explain how it will be implemented.
b) Discuss about the rating techniques and its process of implementation.

## Or

8 a) Define quality, quality management and discuss dimensions of quality.
b) Write a note on ISO and benefits of ISO certification.

## UNIT-V

9 a) Explain the concept and functions of human resource management.
b) Distinguish between job evaluation and merit rating.

## Or

10 a) Discuss the step by step procedure of value engineering.
b) What are the objectives and limitations of enterprise resource planning?

# II B. Tech II Semester Regular Examinations, June/July - 2022 MANAGEMENT AND ORGANIZATIONAL BEHAVIOR <br> (Common to ECE\&PE) 

## Time: 3 hours

Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) What are the principles of scientific management theory and explain them?
b) Discuss the Pros \& Cons of social responsibilities of management.

## Or

2 What is Departmentationand Decentralization and write about its importance for the management of business enterprise?

UNIT-II
3 a) Explain about Job Evaluation, Performance Appraisal, Manpower Planning and Grievance Handling.
b) Explain the elements of Market Mix with suitable example.

## Or

4 a) Explain the concepts of HRM.
b) Explain the concepts of Marketing.

## UNIT-III

5 a) Explain the importance of Goals and Objectives for a business with example.
Or
6 Explain about SWOT analysis for newly entered business in Indian Telecom Industry.

## UNIT-IV

7 What is Perception and write about its nature and process of Perception?

## Or

8 What is motivation? Explain about theories of Motivation.

## UNIT-V

9 a) Explain about Group and its types.
b) What is Stress? What are the strategies to handle stress in business?

## Or

10 Explain about organizational conflicts, types of conflicts and strategies for managing conflicts.

# II B. Tech II Semester Regular Examinations, June/July - 2022 MANAGEMENT AND ORGANIZATIONAL BEHAVIOR 

 (Common to ECE \& PE)
## Time: 3 hours

Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

UNIT-I
1 a) What is management? Explain about the functions of Management.
b) What is systems approach to Management?

2 a) What are elements and tools of Scientific Management?
b) What is MBO and write about the process of MBO?

## UNIT-II

3 What is Human Resource Management? Explain its significance in providing competitive advantage for an organization with an example.

Or
4 a) Write about the 7P's of Marketing with suitable examples.
b) Explain the concepts of wages, salary administration job evaluation and merit rating. Discuss its significance.

## UNIT-III

5 a) What is environment scanning of a business?
b) Explain the concepts of bench marking and balanced score card.

## Or

6 What are different steps in strategy formulation and implementation? Explain with suitable example.

## UNIT-IV

$7 \quad$ What is learning and write about the nature and characteristics of learning and mention learning theories?

## Or

8 a) Explain about Douglas McGregor's theory X and theory Y ?
b) Explain the concepts of change management and attitude formation process.

## UNIT-V

9 Explain how interpersonal conflict occurs and give two examples of substantive conflict and two examples of emotional, interpersonal conflict.

## Or

10 "A supermarket is functioning well because it has the right mix of cashiers, stockers, baggers, and shift managers on every shift. Their success is because of group composition". Make a comment stating the group dynamic concepts.

1 of 1

# II B. Tech II Semester Regular Examinations, June/July - 2022 MANAGEMENT AND ORGANIZATIONAL BEHAVIOR 

 (Common to ECE \& PE)
## Time: 3 hours

Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

## UNIT-I

1 Explain about Fayol's principles of Management.

## Or

2 a) What are modern trends in organization structure design?
b) Explain the features of scientific management in detail.

## UNIT-II

3 Explain about the functions of Human Resource Managers in the organization.

## Or

4 a) Explain about different methods of recruitment.
b) Write 4 P 's of Marketing with suitable examples.

## UNIT-III

5 a) What is organization policy and write its importance?
b) Explain about Porter's Generic Strategies.

## Or

6 The strategic management process encompasses three phases-strategy formulation, implementation, and evaluation and control. -Discuss.

UNIT-IV
$7 \quad$ What is Personality and write about the determinants of personality?

## Or

8 a) Explain Herzberg's Two-Factor Theory of Motivation.
b) Explain the process of reinforcement motivation with example.

## UNIT-V

9 a) What are the steps involved in measuring organizational culture? Explain.
b) What are the stages of group development?

Or
10 What is Organizational Conflict? Explain the Factors Influencing Organizational Conflict and explain the Types of Organizational Conflict.

## II B. Tech II Semester Regular Examinations, June/July - 2022 MANAGEMENT AND ORGANIZATIONAL BEHAVIOR <br> (Common to ECE \& PE)

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks <br> UNIT-I

1 a) Explain about the nature of Management.
b) Write about different types of leadership styles?

## Or

2 a) Discuss the advantages and disadvantages of decentralization of authority.
b) What is MBO? Explain the concepts of MBO.

UNIT-II
3 a) Explain the types of performance appraisal methods.
b) Explain about STP in marketing with suitable examples.

## Or

4 a) Explain the various components of wages.
b) Define Market and Marketing. Explain the features of Marketing.

## UNIT-III

5 Explain value chain analysis concept with example of McDonald.

## Or

6 Explain how Bench Marking and Balanced Score Card will in designing contemporary business strategies.

## UNIT-IV

7 a) What is personality? Discuss how personality development can happen.
b) Explain the importance of learning organization in today's dynamic environment.

## Or

8 a) Explain Maslow's theory of Human Needs.
b) Define Attitude. Explain the Attitude formation process.

UNIT-V
9 a) Explain about the various types of organization culture.
b) What are the causes and effects of stress?

Or
10 a) Explain about the organization conflicts and strategies for managing conflicts.
b) What is organization climate and organization culture?

1 of 1

II B. Tech II Semester Regular Examinations, June/July - 2022
MANAGERIAL ECONOMICS \& FINANCIAL ACCOUNTANCY (Common to CSE, CST, IT, MM,CSE(AIML),CSE(AI)CSE(DS),CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, AIML )
Time: $\mathbf{3}$ hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

## UNIT-I

1 a) Discuss the nature, Scope of Managerial economics in detail.
b) What is Elasticity of demand and its types of Elasticity of Demand?
Or

2 a) Write a note on Survey Methods.
b) Explain the concept of supply and law of supply.

UNIT-II
3 a) Explain 'Law of returns to scale' with an example.
b) Explain Iso-quant and Iso-cost curves and state characteristics.

Or
4 a) A firm has Fixed Cost of Rs 60000/-, selling price per unit is Rs.60/- and variable cost per unit is Rs. 30/-. Determine Break Even Point in terms of Volume and Sales Value.
b) Explain the production function with one variable inputs and laws of returns.

## UNIT-III

5 a) Define Market. Explain the structure of market with suitable examples.
b) Explain the need for public enterprises in India. Do you think Public Enterprises as a whole have fulfilled that need?

Or
6 a) What is Oligopoly? Explain price and output determination in Oligopoly.
b) Discuss the advantages and disadvantage of partnership.

## UNIT-IV

7 a) Explain the Classification of Accounts and their Principles (Rules of Debit and Credit).
b) What is Double Entry System? What are the advantages and limitations of Double Entry System?

Or

8 a) Describe the functions / scope of Financial Accounting.
b) What is ratio analysis? Explain different types of ratio analysis.

UNIT-V
9 a) Find out the Net Present Value of the following project of a firm during five years.
The cost of the project is 30,000 and given discount rate @ $9 \%$

| Year | Cash Inflow |
| :--- | :---: |
| 1 | 12,000 |
| 2 | 10,000 |
| 3 | 5,000 |
| 4 | 9,000 |
| 5 | 8,000 |
|  |  |

b) Explain the concept of time value of money. Discuss the various methods of appraising project profitability that considers time value of money.

Or
10 a) The project involves a total initial expenditure of Rs. 2,00,000 and its estimated to generate a future cash inflows of Rs. 30,000; Rs.38,000; Rs.25,000; Rs.22,000;
Rs.36,000; Rs.40,000; Rs.40,000; Rs,28,000; Rs.24,000 and Rs,24,000 for ten years. Calculate payback period and ARR.
b) Explain the traditional methods of project profitability appraisal.

II B. Tech II Semester Regular Examinations, June/July - 2022
MANAGERIAL ECONOMICS \& FINANCIAL ACCOUNTANCY
(Common to CSE, CST, IT, MM,CSE(AIML),CSE(AI)CSE(DS),CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, AIML )
Time: $\mathbf{3}$ hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

## UNIT-I

1 a) What is demand forecasting? Explain various factors involved in demand forecasting.
b) Explain Time Series Analysis.

Or
2 a) State the 'Law of Demand'. What are the various factors that determine the demand for a Product? Give Example.
b) What is Elasticity of demand and its types of Elasticity of Demand?

## UNIT-II

3 a) Explain the concepts of the choice of least cost factor combination.
b) Calculate the BEP in units and rupees using the following details: $\cdot$ Selling price per unit is Rs. 200 • Variable cost per unit is Rs. 120 • Fixed costs Rs. 40,000 • Actual sales Rs. 4,00,000

Or
4 a) Explain the law of variable propositions.
b) Define Break-even point with graph. Explain BEP assumptions.

## UNIT-III

5 a) Define partnership. Explain its features and evaluate it as against sole proprietorship.
b) Explain different methods of Pricing. Give Examples.

Or
6 a) Discuss how the Price-Output determination is done under Monopoly Markets.
b) Explain the Marris and Williamson's model of a firm.

## UNIT-IV

7 a) What are the accounting concepts that govern accounting process? Explain in brief.
b) Explain the steps involved in preparation of financial statements.

Or
8 a) What is the Journal? What are the advantages/ Importance and Limitations/ Disadvantages of the Journal?
b) Compare and contrast funds flow and cash flow analysis.

UNIT-V
9 a) What do you mean by capital budgeting? Explain its significance to an industry.
b) Explain the concept of net present value with suitable example.

Or
10 a) An Asset is purchased for Rs. 1, 10,000, it has an estimated life of 10 years and its estimated scrap value after 5 years is Rs. 10, 000 then calculate Annual Depreciation under SLM method?
b) Explain the IRR method with examples.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> MANAGERIAL ECONOMICS \& FINANCIAL ACCOUNTANCY (Common to CSE, CST, IT, MM,CSE(AIML), CSE(AI)CSE(DS),CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, AIML ) <br> Time: 3 hours <br> Max. Marks: 70 

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

## UNIT-I

1 a) Discuss why studying Managerial Economics is important for a youngster of a country?
b) Explain the relationship of other subjects with managerial economics.

Or
2 a) Explain the concept of and law of supply law of demand with examples.
b) Explain various techniques of demand forecasting techniques.

UNIT-II
3 a) Define Cost. Explain the different cost concepts used in the process of Cost Analysis.
b) Explain the law of variable prepositions.

Or
4 a) Explain economics of scales and diseconomies of scales.
b) A firm has Fixed Cost of Rs 20000/- Selling price per unit is Rs.10/- variable cost per unit is Rs. 6/- Calculate Break Even Point in terms of sales units and Sales revenue.

UNIT-III
5 a) What is Perfect Competition? Describe features of Perfect Competition.
b) Explain the pricing strategies for a new product.

Or
6 a) Explain the phases of business cycle.
b) Explain the features and evaluation of sole traders.

## UNIT-IV

7 a) Describe the functions / scope of Financial Accounting.
b) Explain Journal and Ledger with format.

Or

8 a) Explain the preparation of funds flow statement format.
b) Explain the significance of ratio analysis. Explain any four ratios used in financial statement.

## UNIT-V

9 Determine the average rate of return and payback period from the following data of two machines A \& B. Suggest which is more viable.

| Particulars | Machine A | Machine B |
| :--- | :--- | :--- |
| Cost (in Rs.) | 56,125 | 56,125 |
| Annual estimated income in Rs. after depreciation \& IT |  |  |
| Year 1 | 3,375 | 11,375 |
| Year 2 | 5,375 | 9,375 |
| Year 3 | 7,375 | 7,375 |
| Year 4 | 9,375 | 5,375 |
| Year 5 | 11,375 | 3,375 |

Estimated life is 5 years for both the machines.
Estimated salvage value is Rs.3,000 for each machine

> Or

10 a) An Asset is purchased for Rs. 1, 10,000, it has an estimated life of 10 years and its estimated scrap value after 5 years is Rs. 10, 000 then calculate Annual Depreciation under SLM method?
b) Explain the modern methods of capital budgeting with formulas.

II B. Tech II Semester Regular Examinations, June/July - 2022
MANAGERIAL ECONOMICS \& FINANCIAL ACCOUNTANCY
(Common to CSE, CST, IT, MM,CSE(AIML),CSE(AI)CSE(DS),CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(IOT), AIDS, AIML )
Time: $\mathbf{3}$ hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

UNIT-I

1. a) Define demand. Explain the determinants of demand.
b) Explain Law of Demand with its exceptions.

Or
2 a) Explain the methods of forecasting demand.
b) Explain the demand schedule and demand curve.

## UNIT-II

3 a) Define Production function. How can a producer find it useful? Illustrate.
b) Calculate the BEP in units and rupees using the following details: • Selling price per unit is Rs. 100 • Variable cost per unit is Rs. 60 • Fixed costs Rs. 20,000 • Actual sales Rs. 2,00,000.

## Or

4 a) Explain Cost -Volume - Profit analysis with an example.
b) Explain Iso-quant and Iso-cost curves and state characteristics.

## UNIT-III

5 a) What is Perfect Competition? Explain its features.
b) Explain the features and advantages of joint stock company.

## Or

6 a) A firm has declared the following details about its sales:

Year 1
Sales (Rs.) 1,50,000
Profit (Rs.) 15,000

Year 2
2,00,000
25,000
(i) Calculate PV Ratio.
(ii) Find out the firm's BEP
(iii) How much should the company produce and sell to earn profit of Rs.50, 000 ?
b) Discuss how the Price-Output determination is done under Monopoly Markets.

## UNIT-IV

7 a) Explain the Classification of Accounts and their Principles (Rules of Debit and Credit).
b) Explain the format of trail balance and its significance in final accounts.

## Code No: R2022055



8 a) Explain the journal and ledger with format.
b) Journalize the following transactions of Mr. Ram.

Jan 3 Paid into bank Rs.80,000
Jan 5 Purchased building for Rs.3,00,000
Jan 7 Purchase goods for Rs,70,000
Jan 10 Sold goods for Rs.80,000
Jan 15 Withdrew cash from bank Rs.10,000
Jan 25 Paid electric charges Rs.3,000
Jan 30 Paid salary Rs. 15,000

## UNIT-V

9 a) Find out the Net Present Value of the following project of a firm during five years.
The cost of the project is 30, 000 and given discount rate @ $9 \%$

| Year | Cash <br> Inflow |
| :--- | :--- |
| 1 | 12,000 |
| 2 | 10,000 |
| 3 | 5,000 |
| 4 | 9,000 |
| 5 | 8,000 |

b) Discuss about the financial analysis using ratios.

## Or

10 a) ABC Co. Ltd. Is proposing to undertake one project. Two projects $A$ and $B$ are available. The initial cost of the project in each case is Rs.4,00,000/-. A discount factor of $10 \%$ is used to compare the projects. Cash flows after taxes (in Rs.) are as under

| Year | Project A | Project B |
| :--- | :--- | :--- |
| 1 | $1,75.000$ | 50.000 |
| 2 | $2,00,000$ | $1,50,000$ |
| 3 | $2,50,000$ | $2,00,000$ |
| 4 | $1,50,000$ | $3,00,000$ |
| 5 | $1,00,000$ | $2,00,000$ |

which proposal would you recommend under Net Present Value method?
b) What is capital budgeting? Explain the need for capital budgeting.

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 ENVIRONMENTAL ENIGNEERING - I

(Civil Engineering)
Time: 3 hours Max. Marks: 75

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

1 a) What is meant by design period? Write the factors effecting design period.
b) Write the significance of Environmental Engineer in evolution of water supply system.

Or
2 Predict the population for the year 2040 and 2050 using the following data by Arithmetical Incremental increase\& geometrical increase method.

| Census year | Population |
| :--- | :--- |
| 1950 | 75000 |
| 1980 | $1,10,000$ |
| 1990 | $1,50,000$ |
| 2000 | $2,00,000$ |
| 2010 | $2,42,000$ |

a) What is an impounding reservoir? What factors consider in deciding a suitable site for its location?
b) Define infiltration gallery. Explain the quality and yields from infiltration galleries.

Or
4 a) What is meant by spring? Explain gravity spring and artesian spring.
b) Discuss the quality and quantity of water from a tube well.

5 a) Write the limitations of biological analysis of water quality.
b) Discuss briefly water quality standards for construction purpose.

Or
6 a) What is the significance? What are the various TDS present in water and in drinking water quality?
b) Explain the significance of physical characteristics of water.

7 a) Define softening of water. Explain temporary and permanent hardness.
b) What do you understand by fluoridization and defluoridation?

## Or

8 a) What is "ion exchange"? Explain electro dialysis in detail.
b) Write a note on dechlorination and super chlorination.

9 Write short note on following:
i. Sluice valve
ii. Reflux valve
iii. Air valve
iv. Scour valve
v. Check valve

10 a) What are the methods available for supply of water to consumer?
b) What is service reservoir? Give its importance explain how its capacity is [7M] estimated in distribution system.

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 METAL CUTTING \& MACHINE TOOLS 

(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

1 a) Obtain an expression for shear angle in orthogonal cutting. How does the shear angle affect the cutting force?
b) Calculate
i. Back rake
ii. Side rake and
iii. Normal rake for cutting tool having an inclination of 5 degree and an orthogonal rake of $12^{0}$ with a side cutting edge angle of $15^{0}$.

Or
2 a) Discuss various methods of applying cutting fluid.
b) How do the following parameters effect the cutting forces in metal cutting
i. Rake angle
ii. Depth of cut
iii. Cutting speed.

3 a) Give the guide lines for selecting speed and feed in metal cutting operation on
lathe.
b) What are the different methods of holding work pieces in a lathe?

## Or

4 a) While taper turning a taper of 1 in 6 , the tool is wrongly set at a distance 4 mm below the work piece centre. If the small end of the work piece is 35 mm in diameter, calculate the actual taper obtained.
b) Compare the merits and demerits of turret and capstan lathe with engine lathe.

5 a) Describe the different methods of accurate location of holes in jig boring. 8 M
b) With simple sketches explain the various shaping operations.

Or
6 a) How will you adjust the length of stroke and ram position in shaper?
b) A part measuring $250 \mathrm{~mm} * 100 \mathrm{~mm} * 40 \mathrm{~mm}$ is to be machined using a hydraulic shaper along its wide face ( $250 \mathrm{~mm} * 100 \mathrm{~mm}$ ). Calculate the machining time taking approach as well as over travel as 20 mm each. Take cutting speed as $5 \mathrm{~m} / \mathrm{min}$, and a machining allowance on either side of plate width is 3 mm and feed is $1 \mathrm{~mm} /$ stroke.

7 a) Describe a method used for manufacturing (machining) the flutes on a twist drill with a neat sketch.
b) Calculate the indexing requirement for 127 divisions on a milling machine equipped with a differential indexing head. The index plates available are Plate No.1: 151617181920 holes
Plate No.2: 212327193133 holes Plate No.3: 373941434749 holes

## Or

8 a) Explain the following milling operations: 8 M
(i) Cam milling (ii) Straddle milling.
b) A surface 115 mm wide and 250 mm long is to be rough milled with a depth of cut of 6 mm by a 16 -tooth cemented carbide face mill 150 mm in diameter. The work material is medium hard cast iron ( $220-260 \mathrm{BHN}$ ). Estimate the cutting time and justify the process parameters used.

9 a) Explain the terms grit, grade and structure of grinding wheels. 8 M
b) What for lapping is used? How much stock is left for lapping? How does it differ 7M from grinding? What are its advantages and disadvantages?

Or
10 a) Explain clearly the advantages and limitations of Broaching. 8M
b) What is centreless grinding? Explain the different centreless griding operations. 7M

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 COMPUTER ARCHITECTURE AND ORGANIZATION 

(Electronics Communication Engineering)
Time: 3 hours Max. Marks: 75

Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

1 a) With a neat diagram, explain basic operational concepts between processor and memory.
b) Explain about program sequencing and control instructions in computer 7 M architecture.

Or
2 a) Does increasing RAM increase computer performance? Give justification to your answer.
b) Describe the four basic types of instructions in a general purpose computer.

3 a) Explain about Logic, Rotate and Shift instructions with examples. 8M
b) Differentiate between direct and indirect addressing mode with an example. 7 M

4 a) Explain about the role of Stacks and Queues in computer programming equation. 8 M
b) Draw and Explain basic computer instruction formats. 7 M

5 a) Discuss various ways of enabling and disabling interrupts. 8M
b) Justify "synchronous buyer are faster than asynchronous buyer" this statement. 7M

Or
6 a) Write short notes on
i) DMA controller
ii) Synchronous and Asynchronous bus
iii)PCI bus

7 a) Explain the following
i)Random Access Memory ii)Read Only Memory iii)Flash Memory

Or
8 a) What is a Cache memory? What are the characteristics of Cache memory?
How many types of cache levels are there? Explain.
b) Discuss the merits and demerits of Magnetic and Optical storage devices. 7M

9 a) Depict the control steps involved in fetching a word from memory. 8M
b) Write the control sequence for executing the instruction MUL R3 R2 R1 7M

Or
10 a) Explain in detail about various approaches for generating control signals to 15 M execute an instruction.

$$
1 \text { of } 1
$$

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 

FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

## Answer any FIVE Questions each Question from each unit

All Questions carry Equal Marks

1 a) Why is it important to study automata theory?
b) Give an $\in$-NFA for strings of the form $01 * 0^{*} 1$ over the alphabet $\Sigma=\{0,1\}$
c) Explain the sequence of steps for converting NFA with $\varepsilon$ to equivalent DFA with an example.

Or
2
a) Define Deterministic and Non-deterministic Finite Automaton. 8M
b) Convert the following Moore machine into equivalent Mealy machine.


3 a) State and Explain the pumping lemma for Regular languages. 8 M
b) Convert the following DFA to Regular Expression.


Or

1 of 2

4 a) Prove that $\mathrm{L}=\left\{0^{\mathrm{k}} 1^{2 \mathrm{k}} \mid \mathrm{k}>0\right\}$ is not regular using pumping lemma.
b) Describe the Chomsky classification of formal languages.

5 a) What are the components of context free grammar? Give an example?
b) Consider the CFG with $\{\mathrm{S}, \mathrm{X}, \mathrm{Y})$ as the non-terminal alphabet, $\{\mathrm{m}, \mathrm{n}, \mathrm{o})$ as the
terminal alphabet, S as the start symbol and the following set of production rules
$S \rightarrow X Y|X n| p$
$\mathrm{X} \rightarrow \mathrm{mX} \mid \mathrm{m}$
$\mathrm{Y} \rightarrow \mathrm{Xn} \mid \mathrm{o}$
Convert the given CFG into Greibach Normal Form.
Or
6 a) Consider the CFG with $\{S, A, B\}$ as the non-terminal alphabet, $\{0,1)$ as the
terminal alphabet, S as the start symbol and the following set of production rules
$\mathrm{S} \rightarrow \mathrm{A1B}$
$\mathrm{A} \rightarrow 0 \mathrm{~A} / \epsilon$
$\mathrm{B} \rightarrow 0 \mathrm{~B} / 1 \mathrm{~B} / \epsilon$
For the string $\mathrm{w}=00101$, find the Leftmost derivation, Rightmost derivation, and Parse Tree.
b) Show that language $L=\left\{a^{i} b^{j} c^{k} \mid i>j>k\right\}$ is not a Context Free. 10M

7 a) Define Push Down Automata. Explain the basic structure of PDA with a neat 5M graphical representation.
b) Design a PDA for accepting a language $\left\{0^{\mathrm{n}} 1^{\mathrm{m}} 0^{\mathrm{n}} \mid \mathrm{m}, \mathrm{n}>=1\right\}$.

## Or

8 a) What are the two different ways to define PDA acceptability? 7M
b) Convert the following grammar to a PDA that accepts the same language.
$\mathrm{S} \rightarrow \mathrm{aSb}$
$S \rightarrow a|b| \in$
9 a) Describe various components of Turning machine.
b) Explain the relationship among the NP, NP-hard, NP complete and P problems.

## Or

10 a) Write about Instantaneous Description of Turing Machine with an example. 5M
b) Construct a Turing machine for $L=\left\{a^{i} b^{j} c^{k} \mid i^{*} j=k ; i, j, k \geq 1\right\}$.

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 SURFACE WATER HYDROLOGY 

(Agricultural Engineering)
Time: 3 hours
Max. Marks: 75

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

1 a) What do you understand by precipitation? Explain various types of precipitation?
b) A catchment has five rain gauge stations. In a year, the annual rainfall recorded by the gauges are $78.8 \mathrm{~cm}, 90.2 \mathrm{~cm}, 98.6 \mathrm{~cm}, 102.4 \mathrm{~cm}$ and 70.4 cm . For a $6 \%$ error in the estimation of the mean rainfall, determine the additional number of gauges needed.

## Or

2 a) Describe various methods of computing average rainfall over a basin.
b) Explain in detail Symon's rain gauge station.

3 a) What are the methods of computing run-off from a catchment area? Give various
b) What is run-off? Explain its types.

## Or

4 a) Explain various methods of determining flood discharge in stream. 8M
b) What is infiltration index? Explain in detail.

5 a) Explain the method of determining direct run-off from a given storm hydrograph. 8M
b) Write a note on linear response and time invariance in unit hydrograph theory.

## Or

6 a) Mention the steps in derivation of average unit hydrographs from several storms of the same duration.
b) Explain the Effects of the characteristics of storms on the shape of the resulting hydrographs.

7 a) What do you mean by synthetic unit hydrograph write a note on it. 8M
b) On a catchment area of 200 sq . km, rainfalls of 7.5 cm 2.0 cm and 5.0 cm occurred on three consecutive days. The -index was $2.5 \mathrm{~cm} /$ day. The distribution graph percentages of surface runoff which extended over six days for every rainfall of such magnitudes are $5,15,40,25,10$ and 5 . Determine the ordinates of the discharge hydrograph and determine the peak discharge. Neglect base flow.

Or
1 of 2

8 a) Differentiate Synthetic unit hydrograph and Instantaneous unit hydrograph. 8M
b) In a frequency analysis of rainfall, based on 15 years of data of 10 minutes storm, the following values were obtained. Arithmetic mean of data $=1.65 \mathrm{~cm}$, standard deviation $=0.45 \mathrm{~cm}$. Find, using Gumbel's extreme distribution, the recurrence interval of a storm of 10 minutes duration and a depth equal to 3 cm .

9 a) Differentiate flood routing and channel routing in detail. 8M
b) Discuss in detail the applications of hydrology in watershed management. 7M

Or
10 a) Differentiate semi-graphical and graphical methods of flood routing. 8M
b) What is Hydrologic storage routing? Explain in detail. 7M

2 of 2

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 <br> STRUCTURAL ANALYSIS-I <br> (Civil Engineering)

Max. Marks: 70
Time: 3 hours
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

| PART - A |  |  |  |
| :---: | :---: | :---: | :---: |
| 1. | a) | A propped cantilever is subjected to uniformly distributed load. What is the indeterminate moment at the support? | 2M |
|  | b) | Is the fixed beams are statically determinate? Explain how. | 2M |
|  | c) | How clapeyron's theorem of three moments can be applied to the overhanging beams? | 3M |
|  | d) | Explain slope deflection method considering a continuous beam with three supports and with uniformly distributed load W/m. | 3M |
|  | e) | Write the expression of strain energy due to axial load? | 2M |
|  | f) | Draw Influence line diagrams for a Pratt truss. | 2M |
| PART -B |  |  |  |
| 2. |  | A cantilever of length ' $L$ ' carries a concentrated load ' $W$ ' at its mid-span. If the free end is supported by a prop, find the reaction at the prop and also draw the S.F. and B.M. diagrams. | 14M |
| 3. |  | Determine fixed End moments of a fixed beam of span 4 m . If support at right end sinks by 1 cm due to UDL of $1500 \mathrm{~N} / \mathrm{m} . \mathrm{I}=40000 \mathrm{~cm}^{4}, \mathrm{E}=2 \times 106 \mathrm{~N} / \mathrm{mm}^{2}$. | 14M |
| 4. |  | Draw the Shear force and bending moment diagram for the beam shown in below Figure. Use Clapeyorn's theorem of three moments. $\mathrm{EI}=1 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}$. | 14M |
| 5. |  | A continuous beam is built in at A and it is carried over rollers at B and C with spans of $A B$ and $B C$ being 10 m . The beam carries a uniformly distributed load of $7.5 \mathrm{KN} / \mathrm{m}$ over AB and a point load of 50 KN over BC 2.5 m from the support B , which sinks by 20 mm . Values of E and I are $2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}$ and $2 \times 10^{9} \mathrm{~mm}^{4}$. Calculate the support moments and draw bending moment diagram giving critical values. Use Slope deflection method. | 14M |
| 6. |  | Determine the Reaction at A and the moment at B as shown in below Figure. Use Strain Energy method $2 \mathrm{kN} / \mathrm{m}$ <br> B | 14M |

SET - 1


## II B. Tech II Semester Supplementary Examinations, June/July - 2022 <br> POWER SYSTEMS-I

(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
PART -A

1. a) What are the circuits having the modern thermal station?
b) What are the factors to be considered for locating a nuclear power plant?
c) Define the secondary distribution system.
d) What are the merits of indoor substation?
e) What are the advantages of underground cables over overhead lines?
f) What are the types of tariffs?

## PART -B

2. a) What is condenser? Explain its function with neat diagram.
b) What is the need of cooling tower in thermal station? Discuss the various types of cooling towers.
3. a) Describe the nuclear chain reaction.
b) What are the various types of commercial types of reactors? Explain pressurized water reactor with diagram.
4. a) What is a rind distributor? How many types of ring distributors do we have? What are the merits of providing interconnectors in the ring distributor?
b) A 400 m distributor fed from both ends $F_{1}$ and $F_{2}$ is loaded uniformly at the rate of $2.5 \mathrm{~A} / \mathrm{m}$ run. The resistance of loop is $0.15 \Omega / \mathrm{km}$. Find the minimum voltage and the point where it occurs, if the feeding points $\mathrm{F}_{1}$ and $\mathrm{F}_{2}$ are maintained at 220 V and 215 V respectively. Find also the currents supplied from the feeding points $\mathrm{F}_{1}$ and $\mathrm{F}_{2}$.
5. List out the equipments of substations? Discuss them.
6. a) Classify the underground cables according to various parameters. Give the applications of each type of the cable.
b) The inner conductor of a concentric cable has a diameter of 5 cm , the diameter over the insulation being 9 cm . The cable is insulated with corresponding safe working stresses of $38 \mathrm{kV} / \mathrm{cm}$ and $26 \mathrm{kV} / \mathrm{cm}$ respectively. Calculate the radial thickness of each insulating layer and the safe working voltage of the cable.
7. a) Explain how a load duration curve is plotted. What is its use?
b) A power station has an installed capacity of $20,00 \mathrm{~kW}$. The cost of the station is Rs. $1,200 / \mathrm{kW}$. The fixed cost is $13 \%$ of the cost of investment. On full load at $100 \%$ load factor, the variable costs of the station per year are 1.5 times the fixed costs. Assume that there is no reserve capacity of the plant and that the variable costs are proportional to energy production. Find the cost of generation per kWh at load factors of $100 \%$ and $40 \%$.

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 CONTROL SYSTEMS

(Com to ECE, EIE, ECC)
Time: 3 hours
Max. Marks: 70

## Note: 1. Question Paper consists of two parts (Part-A and Part-B) <br> 2. Answer ALL the question in Part-A <br> 3. Answer any FOUR Questions from Part-B

PART -A

1. a) What is the basis for framing the rules of block diagram reduction technique? 3 M
b) Name the test signals used in control system. $\quad 2 \mathrm{M}$
c) How will you find root locus on real axis? 2 M
d) What is frequency response? $\quad 2 \mathrm{M}$
e) When lag lead compensator is required? Explain. 3 M
f) What are phase variables?

## PART -B

2. a) Obtain the closed loop transfer function $C(S) / R(S)$ of the system whose block diagram is shown in fig.

b) Discuss about Linearizing effect of feedback. 7M
3. a) Derive the transfer function for Armature controlled DC servo motor. 7M
b) Explain the Effect of adding a zero to a system. 7 M
4. a) Sketch the root locus for the open loop transfer function of unity feedback control $\quad 7 \mathrm{M}$
system given below: system given below: $\mathrm{G}(\mathrm{S}) \mathrm{H}(\mathrm{S})=\mathrm{K} / \mathrm{S}(\mathrm{S}+2)(\mathrm{S}+4)$.
b) What will be the nature of impulse response when the roots of characteristic equation are lying on imaginary axis? Explain with neat sketch.
5. a) Write short notes on correlation between the time and frequency response.
b) Construct the polar plot for the function $\mathrm{GH}(\mathrm{S})=2(\mathrm{~S}+1) / \mathrm{S}^{2}$. Find Gain cross over frequency, Phase cross over frequency.
6. a) Explain the procedure for lead compensator.
b) Design a suitable lead compensators for a system with unity feedback and having 7M open loop transfer function $\mathrm{G}(\mathrm{S})=\mathrm{K} / \mathrm{S}(\mathrm{S}+1)(\mathrm{S}+4)$ to meet the specifications.
(i) Damping ratio $=0.5$ (ii) Undamped natural frequency $\omega \mathrm{n}=2 \mathrm{rad} / \mathrm{sec}$.
7. a) Explain state space representation for continuous time system. 7M
b) Given the transfer function of a system, determine a state variable representation for 7 M the system $\mathrm{Y}(\mathrm{S}) / \mathrm{U}(\mathrm{S})=1 /(\mathrm{S}+2) *(\mathrm{~S}+3) *(\mathrm{~S}+4)$

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 <br> FORMAL LANGUAGES AND AUTOMATA THEORY <br> (Computer Science and Engineering)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)<br>2. Answer ALL the question in Part-A<br>3. Answer any FOUR Questions from Part-B

## PART -A

1. a) How to check acceptance of string by finite automata? 3 M
b) Relate regular grammars and regular expressions. 2 M
c) Specify the reason for eliminating useless symbols? How to identify them? 2 M
d) How to convert the grammar to Push down automata? 2M
e) What is Turing machine halting problem? 3 M
f) Give example problems of type NP-Complete. 2M

## PART -B

2. a) Define Finite Automation? Explain about the model of Finite Automaton. 7M
b) Explain the sequence of steps in converting the $\in$-NFA obtained in previous 7 M question 2(a) to an equivalent DFA.
3. a) Explain about the Closure Properties of Regular sets.
b) Explain the Pumping Lemma for regular sets. Show that $L=\left\{a^{p} \mid p\right.$ is a prime $\}$ is not regular.
4. a) Write in detail the Chomsky hierarchy of formal languages.
b) Construct CNF for the Grammar $\mathrm{S} \rightarrow \mathrm{ABC}, \mathrm{A} \rightarrow 0 \mathrm{~B}, \mathrm{~B} \rightarrow \mathrm{CD} / 0, \mathrm{C} \rightarrow 1$. 7M
5. a) Construct a pushdown automaton which accepts the language of words over 7M the alphabet $\{\mathrm{a}, \mathrm{b}\}$ containing more a's than b's.
b) Consider the CFG with $\{\mathrm{S}, \mathrm{A}, \mathrm{X}\}$ as the non-terminal alphabet, $\{\mathrm{a}, \mathrm{b}\}$ as the terminal alphabet, S as the start symbol and the following set of production rules
$\mathrm{S} \rightarrow \mathrm{XS} \mid \epsilon$,
$\mathrm{A} \rightarrow \mathrm{aXb}|\mathrm{Ab}| \mathrm{ab}$
Construct a PDA for the given CFG
6. a) Design a Turing Machine "Parantheses Checker" that outputs 1 or 0 depending 7M on whether the sequence is properly formed or not.
b) Discuss in brief about Turing reducibility.
7. a) How to determine a problem $L$ is NP-complete? Explain with an example. 7M
b) Explain about the Decidability and Undecidability Problems. 7M

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 SOIL MECHANICS <br> (Agricultural Engineering)

Time: 3 hours
Max. Marks: 70

## Note: 1. Question Paper consists of two parts (Part-A and Part-B) <br> 2. Answer ALL the question in Part-A <br> 3. Answer any FOUR Questions from Part-B

## PART -A

1. a) Define Relative Density. 3 M
b) Explain about Stress distribution in soils. 3M
c) What is shear strength? 2 M
d) Write briefly on Stability of slopes. 2 M
e) Write on Jodhpur mini compaction test. 2 M
f) Write the difference between active and passive states of earth pressure. 2 M

## PART -B

2. a) What is the use of classification of soils? Discuss Indian Standard classification 7 M system.
b) Explain with sketches various types of soil structures.
3. a) Explain stress distribution in soils for concentrated loads by Boussinesq theory. 7M
b) Find the intensity of vertical pressure at a point 4.5 m below a 20 kN point load acting at a horizontal ground surface. What will be vertical pressure at a point 2 m horizontally away from the axis of loading but at the depth of 5 m ?
4. a) Explain the principle of the direct shear test, what are the advantages of this
test.

b) What is Mohr's strength theory for soils? Sketch typical strength envelopes for
a clean sand.
5. What is coefficient of consolidation? What is its use in the settlement analysis? ..... 14M
How is it determined?
6. a) Explain how a negative pore water pressure develops in a consolidated - ..... 10M undrained test on a over-consolidated clay.

b) Differentiate between consolidation and compaction. ..... 4M
7. a) Explain Rankine's theory of earth pressure. ..... 7M
b) Write about Friction Circle method. ..... 7M

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 DESIGN OF MACHINE MEMBERS-I 

(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

## Answer any FIVE Questions each Question from each unit <br> All Questions carry Equal Marks

1 a) The various loads acting on the cantilever beam are shown in figure 1. Determine the various types of stresses acting at the points A and B along with their values. Find the principal stresses at the A and B points. Also evaluate the maximum shear stress and von-Mises stresses at these points.


Figure 1
Note all dimensions are in "mm"
b) What are the factors to be considered for deciding the magnitude of factor of safety?

## Or

2 a) Explain which theories of failure are applicable to ductile materials.
b) A shaft is subjected to a twisting moment of 5 kN m with a negligible bending moment. If the material has yield strength of 300 MPa and safety factor of 2 , find the diameter of the shaft using the maximum normal stress theory, the maximum shear stress theory and the Distortion energy theory.
3 a) Enumerate the factors that affect endurance limit of a machine part.
b) A carbon steel rod of circular cross-section is subjected to a bending moment which varies between 250 Nm to 500 N m and axial load which varies between 5000 to 10000 N . Determine the diameter of the rod for a factor of safety 2. Take ultimate strength and yield strength as 600 MPa and 450 MPa .

4 a) Why is Goodman's equation preferred to Soderberg's criterion for designing a machine part subjected to fluctuating loads?
b) A machine member is subjected to bending stresses that varies from 200 MPa in tensile to 100 MPa in compressive. Find the minimum ultimate tensile strength using Goodman's and Soderberg's formula. Assume other relevant parameters.
5 a) Two identical low carbon steel plates with same thickness are to be joined by welding process. A butt joint and lap joint are proposed. The welded joint is supposed to carry a static tension load. The allowable tensile stress of the weld is 200 MPa and the allowable shear stress is 150 MPa . Which joint design is better? Justify.
b) Discuss on bolts of uniform strength giving examples of practical applications of such bolts.

6 Design and draw a neat sketch of a cotter joint for the transmission of 25 kN tensile or compressive load. Allowable stresses for all the three components, i.e., socket, spigot and cotter may be taken as follows:
Allowable stress in tension $=50 \mathrm{MPa}$,
Bearing pressure $=80 \mathrm{MPa}$,
Allowable stress in shear $=40 \mathrm{MPa}$
7 A long line shaft rotating at 250 rpm , supported between bearings 2 m apart, is used to transmit 30 kW power through two pulleys of 0.5 m and 0.3 m diameter respectively. The pulleys, weighing 75 kg and 50 kg , are located from left hand bearing at a distance of 0.5 m and 1.2 m respectively. Both the pulleys transmit 20 kW and 10 kW respectively at $45^{\circ}$ to the vertical. Take the belt tension ratio of $3: 1$ for both pulleys. Design the shaft.

## Or

Describe, with the help of neat sketches, the types of various shaft couplings mentioning the uses of each type.
9 a) What are the requirements for spring wire materials? List commonly used spring materials.
b) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm . If the permissible shear stress is 320 MPa and modulus of rigidity 80 kPa , find the axial load which the spring can carry and the deflection.

## Or

10 A concentric spring consists of two helical compression springs, one inside the other. The free length of the outer spring is 25 mm greater than the inner spring. The wire diameter and mean coil diameter of the inner spring are 8 and 64 mm respectively. Also, the wire diameter and mean coil diameter of the outer spring are 10 and 80 mm respectively. The numbers of active coils in inner and outer springs are 10 and 15 respectively. Assume same material for two springs and the modulus of rigidity of spring material is 80 GPa .
Calculate:
(i) the stiffness of spring when the deflection is from 0 to 25 mm
(ii) the stiffness of spring when the deflection is more than 25 mm .

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 MANAGEMENT AND ORGANIZATIONAL BEHAVIOR 

(Electronics Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

1 a) Define management and explain the system approach to management.
b) What do you mean by MBO? Explain its process.

Or
2 a) Explain the nature and importance of management.
b) What do you mean by departmentation? Explain its role in organization structure.

3 a) Discuss about the recruitment and selection in HRM.
b) What are the statutory welfare administrative facilities?

Or
4 a) Write about different types of performance appraisal system in an organization.
b) What do you mean by marketing? Explain in detail.

5 a) What is the Strategic Management? What is the importance of Strategic Management?
b) What do you mean by environmental scanning? Discuss the role it plays in strategy formulation.

Or
6 a) What is bench marking? Explain in detail.
b) Discuss about the generic strategic alternatives.

7 a) Explain the meaning of personality. What are the determinants of personality.
b) Contrast Classical Conditioning and Operant conditioning Theories of Learning.

Or
8 a) Explain Social Learning Theory with reference to your Role Model.
b) Discuss the various reasons for individual resistance to change.

9 a) What is group cohesiveness? How its helps in group development?
b) Define organizational culture and how its influences the group.

Or
10 a) What are the different types of conflicts?
b) Define group behavior and how does it influence in group performance?

# II B.Tech II Semester Supplementary Examinations, June/July - 2022 <br> FARM POWER AND TRACTOR SYSTEMS <br> (Agricultural Engineering) 

Time: 3 hours

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

1 a) What are the main components of IC engine? Explain them along with neat sketches.
b) What are the different sources of farm power in India?

Or
2 a) Define conventional and non-conventional energy sources? Explain any two 8M non-conventional energy sources with neat sketches.
b) What is the principle of diesel engine? How does it differ from Spark 7M ignition engine?

3 a) What do you mean by valve timing diagram of a four-cylinder four stroke engine? Explain with a neat circular sketch.
b) With the help of neat diagram, describe the fuel supply system of SI Engine. 7M

4 a) How forced feed system of lubrication works in an IC engine? 8M
b) What do you mean by water cooling? What are different methods of water 7M cooling, describe one of them?

5 a) Write the merits and demerits of different gear boxes used in tractor.
b) Explain different types of gears which are used in Farm Tractor. 7M

Or
6 a) Explain constructional details and working principle of cone type clutch 8M using diagram.
b) Explain how to design a single plate clutch by using appropriate derivations.
b) How does hydraulic brake works? Explain one mechanical brake. 7M
Or
a) Explain how position control and draft control of tractor works in the field. 8 M
b) Write about the precautions required for hydraulic system. 7 M

9 a) Explain briefly about P.T.O, belt pulley and drawbar outlet. 8M
b) What is the need of tractor testing? Explain about drawbar test. 7 M

Or
10 a) Explain about weight transfer and instability of tractor chasis issues in detail 8 M
b) Derive the expression for centre of gravity. 7 M

1 of 1

SET - 1
II B. Tech II Semester Supplementary Examinations, June/July - 2022
STRENGTH OF MATERIALS-II
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)<br>2. Answer ALL the question in Part-A<br>3. Answer any FOUR Questions from Part-B

## PART -A

1. a) Define and explain the maximum principal strain theory.
b) Define polar modulus and derive the expression for polar modulus for a solid shaft.
c) State and explain the straight line formula for column.
d) What are different conditions under which a dam is going to fail?
e) How to find the resultant stress in unsymmetrical bending.
f) Define the terms: perfect frame, imperfect frame, deficient frame and redundant frame.

## PART - B

2. a) An element subjected to a plane stress system has the stresses $\sigma_{x}=-40 \mathrm{~N} / \mathrm{mm}^{2}$,
$\sigma_{\mathrm{y}}=90 \mathrm{~N} / \mathrm{mm}^{2}$ and $\tau_{\mathrm{xy}}=20 \mathrm{~N} / \mathrm{mm}^{2}$. Draw the Mohr's circle and find the stresses on a plane whose normal is inclined at $-30^{\circ}$ to $x-$ axis.
b) The principal stresses at a point in an elastic material are $180 \mathrm{~N} / \mathrm{mm}^{2}$ (tensile), $110 \mathrm{~N} / \mathrm{mm}^{2}$ (tensile) and $55 \mathrm{~N} / \mathrm{mm}^{2}$ (compressive). If the stress at the elastic limit in tension is $200 \mathrm{~N} / \mathrm{mm}^{2}$, determine whether the failure of material will occur or not according to maximum strain energy theory.
3. a) Determine the maximum shear stress developed in a solid circular shaft of radius 100 mm , subjected to a twisting moment of $120 \mathrm{kN}-\mathrm{m}$. Also determine the angle of twist per meter length of the shaft. If a hole of diameter 100 mm is bored at the centre of the shaft along the length, find the percentage increase of the maximum stress and angle of twist. Take G = 80 GPa .
b) A laminated spring 0.9 m long is made of plates each by 6 cm wide and 1 cm thick. If the bending stress in the plate is limited to $100 \mathrm{~N} / \mathrm{mm}^{2}$. How many plates are required to enable the spring to carry a central point load of 2.5 kN . And also find the deflection under the load. Take $\mathrm{E}=2.1 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}$.
4. a) A 1.6 m long column has a circular cross section of 60 mm diameter. One of the ends of the column is fixed in direction and position and the other end is free. Taking factor safety as 3, calculate the safe load using Rankine's formula. Take yield stress $=500 \mathrm{~N} / \mathrm{mm}^{2}$ and $\alpha=1 / 1600$ for pinned ends.
b) An equal angle of dimensions $100 \mathrm{~mm} \times 100 \mathrm{~mm} \times 10 \mathrm{~mm}$ is used as a strut with a length of 3.5 m . The strut is hinged at both the ends. Calculate the critical load by using Euler's formula. Take $\mathrm{E}=2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}$.
5. a) A column of rectangular section $100 \mathrm{~mm} \times 80 \mathrm{~mm}$ carries a load of 50 kN at a point 25 mm from the longer side and 45 mm from the shorter side. Determine the maximum compressive and tensile stresses in the section.
b) A masonry dam of rectangular section 10 m high and 4 m wide has water upto the top on its one side. If the density of the masonry is $2200 \mathrm{~kg} / \mathrm{m}^{3}$, find the resultant force and the point at which it cuts the base of the dam.
6. The channel section of dimensions, web $250 \mathrm{~mm} \times 10 \mathrm{~mm}$ and flanges 100 mm x 10 mm is used as a cantilever beam of span 3 m . The plane of the udl on the span is inclined at $30^{\circ}$ to the vertical. Find the maximum allowable load w, if the permissible stress in the material is 140 MPa in tension and 90 MPa in compression.
7. a) A simply supported truss is supported and loaded as shown in Fig.1. Find the axial forces in the members CD, CG, FG and CF.


Fig. 1
b) Determine the forces in all the members of the truss shown in Fig.2.


Fig. 2

SET - 1

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 <br> ELECTRICAL MACHINES-II <br> (Electrical and Electronics Engineering) 

Time: 3 hours
Max. Marks: 70

## Note: 1. Question Paper consists of two parts (Part-A and Part-B) <br> 2. Answer ALL the question in Part-A <br> 3. Answer any FOUR Questions from Part-B

## PART -A

1. a) Derive the expression for rotor frequency in terms stator frequency.
b) Mention the applications of circle diagram.
c) What are the advantages of single phase capacitor start motors?
d) Draw the potier triangle and show all the parameters involved in it.
e) What do you understand by infinite bus?
f) Draw the V and inverted V curves for a synchronous motor.

## PART -B

2. a) Explain the power flow diagram in a three phase induction motor and deduce the relation between mechanical power output and electrical input power to a three phase induction motor.
b) A 6 -pole, 50 Hz , three phase induction motor running on full load develops a useful torque of 150 Nm at rotor frequency of 1.5 Hz . Calculate the shaft power output. If the mechanical torque lost in friction be 10 Nm , determine i) rotor copper loss, ii) the input to the motor and iii) the efficiency.
3. a) Explain the working of double cage and deep bar rotors for achieving high torque.
b) Discuss the method of auto -transformer starting of three phase induction motor with neat sketch and mention its applications.
4. a) Explain various methods of starting methods of single phase induction motor.
b) A $230 \mathrm{~V}, 50 \mathrm{~Hz}$, 4-pole single phase induction motor has the following equivalent circuit impedances referred towards stator side:
$\mathrm{R}_{1 \mathrm{~m}}=3.2 \Omega \mathrm{R}_{2}{ }^{\prime}=4.5 \Omega, \mathrm{X}_{1 \mathrm{~m}}=3.1 \Omega \mathrm{X}_{2}{ }^{\prime}=1.6 \Omega$ and $\mathrm{X}_{\mathrm{M}}=80 \Omega$
Friction, wind age and core loss $=40 \mathrm{~W}$
Calculate:
(i) input current ii) power factor iii) developed power iv) output power and v) efficiency, for a slip of 0.025 pu ,
5. a) Discuss the two reaction analysis of salient pole machines with phasor diagrams.
b) A three phase, 16 -pole synchronous generator has a resultant air-gap flux of 0.06 Wb per pole. The flux is distributed sinusoidally over the pole. The stator has 2 slots per pole per phase and 4 conductors per slot are accommodated in two layers. The coli span is $150^{\circ}$ electrical. Calculate the phase and line induced voltages when the machine runs at 375 rpm .
6. a) Explain the synchronization of three phase alternators.
b) Explain the effect of increasing excitation of one of the alternators in a parallel connection.
7. a) What is Synchronous Condenser and explain its purpose in detail.
b) A three phase, $400 \mathrm{~V}, 50 \mathrm{~Hz} 37.3 \mathrm{~kW}$, star connected synchronous motor has a full-load efficiency of $88 \%$. The synchronous impedance of motor is $(0.2+\mathrm{j} 1.6)$ $\Omega /$ phase. If the excitation of the motor is adjusted to give a leading power factor of 0.9 , calculate i) the induced emf $\quad$ ii) total mechanical power developed.

2 of 2

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 <br> ANALOG COMMUNICATION <br> (Electronics \&Communication Engineering)

Time: 3 hours
Max. Marks: 70

## Note: 1. Question Paper consists of two parts (Part-A and Part-B) <br> 2. Answer ALL the question in Part-A <br> 3. Answer any FOUR Questions from Part-B

## PART -A

1. a) Define amplitude modulation.
b) Plot the spectrum of USSB-SC signal.
c) Give the time-domain representation of FM wave.
d) Define sensitivity of a radio receiver.
e) Draw the power spectral density of thermal noise current.
f) Plot double polarity PAM wave.

## PART -B

2. a) Determine $\eta$ and the percentage of the total power carried by the sidebands of the

AM wave for tone modulation when (i) $\mu=0.5$ and (ii) $\mu=0.3$.
b) Describe the operation of envelope detector for AM.
3. a) Find $s_{S S B}(t)$ when the modulating signal is a sinusoid $m(t)=\cos \left(\omega_{m} t\right)$.
b) Find $e(t)$ and $d(t)$ of the following system. What is the name of this system?

4. a) An angle-modulated signal with carrier frequency $\omega_{c}=2 \pi \times 10^{5}$ is described by the equations $(t)=10 \cos \left(\omega_{c} t+5 \sin 3000 t+10 \sin 2000 \pi t\right)$ Find the power of modulated signal.
b) Explain the method of generation of NBFM signals.
5. a) Draw the block diagram of FM receiver and explain its operation.
b) What are the different types of AM transmitters? Explain briefly.
6. a) What is the effect of noise in SSB-SC system? Explain.
b) Write brief notes on the need for pre-emphasis in FM system.
7. a) What is TDM? Explain neat sketches.
b) Write notes on flat-top sampling.

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 PRINCIPLES OF PROGRAMMING LANGUAGES

(Com to CSE, IT)
Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)<br>2. Answer ALL the question in Part-A<br>3. Answer any FOUR Questions from Part-B

PART -A

1. a) Define attribute grammar?
b) What do you mean by type coercion?
c) What is a Co-routine? Explain?
d) Differentiate overloading and overriding.
e) What is Lamda calculus?
f) List the features of Prolog?

## PART -B

2. a) Explain in detail about various language evaluation criteria and the characteristics that affect them.
b) Write about static and dynamic semantics.
3. a) Explain the problems associated with Unconditional Branching.
b) Illustrate the differences between primitive data types and derived data types.
4. a) What are the advantages and disadvantages of dynamic type binding?
b) Explain the significance of nested subprograms with examples.
5. a) Define monitor. Explain how cooperation synchronization and competition
b) What is an event? How the events are handled in various OOP languages?
6. a) Discuss the applications of functional languages.
b) Describe the two common mathematical functional forms that are provided by scheme.
7. a) Discuss Terms and Goal statements in Prolog.
b) Briefly explain about multi - paradigm languages

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 THEORY OF STRUCTURES <br> (Agricultural Engineering)

Time: 3 hours
Max. Marks: 70

## Note: 1. Question Paper consists of two parts (Part-A and Part-B) <br> 2. Answer ALL the question in Part-A <br> 3. Answer any FOUR Questions from Part-B <br> PART -A

1. a) Write down the properties of reinforced concrete.
b) Write a short note on development of length.
c) Write about Rankine - Grashoff theory.
d) How to decide the curtailment of bars.
e) Differentiate between long columns and short columns..
f) Listout different types of foundations.

## PART -B

2. a) Write down the steps for designing of rectangular section.
b) Explain why tensile strength of concrete is much less than the compressive strength.
3. a) Write briefly about balanced, over reinforced and under reinforced sections?
b) A beam $250 \mathrm{~mm} \times 500 \mathrm{~mm}$ in section is reinforced with 2 bars of 16 mm diameter at top and 4 bars of 22 mm diameter at the bottom each at an effective cover of 380 mm . If safe stresses in the materials are 5 MPa and 140 MPa respectively, find the stress in concrete surrounding compression steel. Take $\mathrm{m}=19$.
4. a) What is bond length in RCC? Derive an expression for the minimum length for which a bar is tension should be embedded in concrete?
b) Discuss the anchorage bars in compression along with neat sketches.
5. An Isolated T-Bean Simply Supported over a span of 6 m has a flange width of 1500 mm . The thickness of the flange is 80 mm and the beam has an effective depth of 500 mm up to the center of tensile reinforcement which consists of 425 mm dia. bars. Calculate the moment of resistance of the section neglecting compression resistance of the area of web above the N.A, the width of the web is $250 \mathrm{~mm} .=5 \mathrm{~N} / \mathrm{mm}^{2}=140 \mathrm{~N} / \mathrm{mm}^{2}, \mathrm{~m}=17$ ?
6. a) Design a short circular RC column to carry an axial load of 388 kN . The column is to be provided with circular lateral ties. Adopt M20 grade of concrete and mild steel reinforcement.
b) Explain about basic rules for the design of columns.

SET-1
7. A retaining wall 4 m light has a smooth vertical back. The back fill has a 14M horizontal in level with the top of the wall. There is uniformly distributed surcharge load of $35 \mathrm{kN} / \mathrm{m}^{2}$ intensity over the back fill. The unit weight of the back fill is $17 \mathrm{kN} / \mathrm{m}^{3}$, its angle of shearing resistance is 300 and cohesion is zero. Determine the magnitude and points of application of active pressure per meter length of the wall.

## II B. Tech II Semester Supplementary Examinations, June/July - 2022 STRUCTURAL ANALYSIS-I

(Civil Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any THREE Questions from Part-B

## PART -A

1. a) Write the difference between statically determinate and indeterminate structure.
b) Write down the compatibility conditions for a fixed beam.
c) What are the factors that affect bending moment in the continuous beam due to support settlements?
d) Write the expression $\mathrm{M}_{\mathrm{AB}}$ in terms of fixed moments, slopes $\theta_{A}, \theta_{\mathrm{B}}$ and settlement $\Delta$.
e) Explain briefly about strain energy in linear elastic system.
f) What is the condition for absolute maximum bending moment due to moving UDL longer than the span?

## PART -B

2. A propped cantilever beam is shown in figure. Calculate the prop Reaction and also draw the BM \& SF diagrams.

3. A fixed beam of span 6 m is subjected a UDL of $10 \mathrm{kN} / \mathrm{m}$ on the left half of the span and a point load of 25 kN at the middle of the right half of the span. Draw the S.F. and B.M. diagrams.
4. Analyze the continuous beam shown in figure, using three-moment equation. Draw S.F and B.M diagrams.

5. Analyze the beam ABC shown in figure by Slope-Deflection method and draw 16M bending moment diagram.

6. A truss is loaded as shown in figure. All the members of the truss have same cross sectional area. Find the axial force in the member BC and DE.

7. Draw the influence line diagram for B.M at a point 8 m from the left abutment on a bridge girder of span 30 m and find the maximum B.M at that point due to a series of wheel loads $80 \mathrm{kN}, 160 \mathrm{kN}, 160 \mathrm{kN}$ and 160 kN at centre to centre distances of $4 \mathrm{~m}, 2.5 \mathrm{~m}, 2.5 \mathrm{~m}$ and 2.5 m respectively. The loads can cross in either directions with the 80 kN load leading.

SET - 1

## II B. Tech II Semester Supplementary Examinations, June/July- 2022 FORMAL LANGUAGES AND AUTOMATA THEORY <br> (Computer Science and Engineering)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)<br>2. AnswerALL the question in Part-A<br>3. Answer any THREE Questions from Part-B

## PART -A

1. a) What are state diagram and state transition table?
b) Present the properties of recursively enumerable languages.
c) Construct an NFA accepting the set of all strings over $\{0,1\}$ whose second symbol from last is 1 .
d) Construct a regular grammar for $\mathrm{L}=\left\{0^{\mathrm{n}} 11 \mid \mathrm{n} \geq 1\right\}$.
e) Give the formal definition of Moore machine.
f) Define P and NP classes.

## PART -B

2. a) What is Computation? What are the different models of Computation? Explain.
b) Explain the applications of Finite State Machines in real world.
3. a) What are different types of languages in automata theory? Present the rules for each of these languages and the relationship among these languages.
b) Show that the language $L=\left\{a^{n} b^{n} c^{n} \ln >=0\right\}$ is not context free.
4. a) Design an $\varepsilon$-NFA for the regular expression $\left(a^{*} b c\right)+\left(a b^{*}\right)+c^{*}$.
b) Convert the answer obtained in question 4(a) into an NFA without $\varepsilon$ moves.
5. a) Construct a Finite Automata equivalence to the regular expression $(0+1) *(00+11)(0+1)^{*}$.
b) State and explain Arden's Theorem.
6. a) With an example, explain the procedure to simplify a CFG.
b) What is normalization of a Grammar? Define CNF and GNF. What is the difference between these two normal forms?
7. Define Turing Machine and design it to recognize the language $L=\left\{0^{n} 1^{n} 0^{n}\right.$ । $\mathrm{n} \geq 1\}$. Illustrate the action of Turing machine in accepting the word $0^{3} 1^{3} 0^{3}$.

# II B. Tech II Semester Supplementary Examinations, June/July - 2022 <br> MACHINE DRAWING 

(Com. to ME, AME, MM)
Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)<br>2. Answer TWO question from Part-A<br>3. Part-B is compulsory

## PART -A

1. Draw the sectional front view and top view of double riveted lap joint of chain 11 M type to connect two plates of 10 mm thick.
2. Draw proportionate diagram of Sleeve and cotter joint to connect two shafts of 11M Ø 30 mm .
3. a) Two views of a taper sunk key positioned in a shaft of diameter 25 mm and hub 6 M of diameter 50 mm and mark dimensions on it.
b) Sketch a feather key with proportions.

## PART -B

4. a) Draw the sectional front view and top view of the assembled stuffing box, the 48 M parts of which are shown in the given Figure 1.

1 of 2
Code No: RT22035

(3)

Parts list

| Part No. | Name | Matl | Qty |
| :---: | :--- | :---: | :---: |
| 1 | Body | Cl | 1 |
| 2 | Gland | Brass | 1 |
| 3 | Bush | Brass | 1 |
| 4 | Stud | MS | 2 |
| 5 | Nut, M12 | MS | 2 |

Figure 1: Stuffing Box

## II B. Tech II Semester Regular Examinations, June/July - 2022 <br> COMPLEX VARIABLES AND STATISTICAL METHODS <br> (Common to CE, ME, AME \& MM)

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit

 All Questions carry Equal Marks$\qquad$

## UNIT-I

1 a)
Show that for $f(z)=\left\{\begin{array}{ll}\frac{\left(x^{3}-y^{3}\right)+i\left(x^{3}+y^{3}\right)}{x^{2}+y^{2}}, & z \neq 0 \\ 0 & , z=0\end{array}\right.$ the Cauchy-Riemann
equations are satisfied at the origin but the derivative of $f(z)$ at origin does not exist.
b)

Evaluate $\int_{0}^{3+i} z^{2} d z$ along the paths the real axis to 3 and then vertically to $3+i$.

## Or

2 a) Find the analytic function $f(z)=u+i v$ where $v=e^{x} \sin y$.
b) Use Cauchy's integral formula to evaluate $\int_{c} \frac{1}{z^{2}+9} d z$ where C is the circle (i)
$|z-3 i|=4$ (ii) $|z+3 i|=2$.
3 a)
Find the Laurent series of $f(z)=\frac{(z-2)(z+2)}{(z+1)(z+4)}$, for $1<|z|<4$.
b) Use residue theorem to evaluate $\int_{0}^{2 \pi} \frac{d \theta}{5-3 \sin \theta}$.
Or

4 a) Find Taylor's expansion of $f(z)=\log (1+z)$ about the point $z=0$.
b) Use residue theorem to evaluate $\int_{-\infty}^{\infty} \frac{x^{2}}{\left(x^{2}+1\right)\left(x^{2}+4\right)} d x$.

## UNIT-III

5 a) In a certain college $25 \%$ of boys and $10 \%$ of girls are studying mathematics. The girls constitute $60 \%$ of the student body. (i) What is the probability that mathematics is being studied? (ii) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl? (iii) a boy?
b) Find the mean and variance of the Uniform distribution.

## Or

6 a) Determine the discrete probability distribution, expectation, variance, S.D. of a discrete random variable X which denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once.
b) If z is normally distributed with mean 0 and variance 1 , find
i) $\mathrm{P}(\mathrm{z} \geq-1.64)$
ii) $\mathrm{P}(-1.96 \leq \mathrm{z} \leq 1.96)$
iii) $\mathrm{P}(\mathrm{z} \leq 1)$
iv) $\mathrm{P}(\mathrm{z} \geq 1)$

## UNIT-IV

7 a) Explain t-distribution.
b) In an air-pollution study performed at an experiment station, the following amount of suspended benzene solubleorganic matter (in micrograms per cubic meter) was obtained for eight different samples of air: $2.2,1.8,3.1,2.0,2.4,2.0,2.1,1.2$ Assuming that the population sampled is normal, construct a $95 \%$ confidence interval for the corresponding true mean.

Or
8 a) A survey is proposed to be conducted to know the annual earnings of the old Statistics graduates of Delhi University. How large should the sample be taken in order to estimate the mean annual earnings within plus and minus Rs. 1,000 at $95 \%$ confidence level? The standard deviation of the annual earnings of the entire population is known to be Rs. 3,000.
b) Assuming that the population standard deviation is 0.3 , calculate the (i) $95 \%$ and (ii) $99 \%$ confidence intervals for the mean lead concentration in a river if the mean lead concentration recovered from a sample of lead measurements in 36 different locations is $2.6 \mathrm{gms} / \mathrm{ml}$.

## UNIT-V

9 a) The length of life X of certain computers is approximately normally distributed with mean 800 hours and standard deviation 40 hours. If a random sample of 30 computers has an average life of 788 hours, test the null hypothesis that $\mu=800$ hours against the alternative that $\mu=800$ hours at $5 \%$ level of significance.
b) Before an increase in excise duty on tea, 800 persons out of a sample of 1,000 persons were found to be tea drinkers. After an increase in duty, 800 people were tea drinkers in a sample of 1,200 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea after the increase in excise duty at $5 \%$ level?

## Or

10 a) A random sample of 40 'geyers' produced by company A have a mean lifetime of 647 hours of continuous use with a S.D. of 27 hours, while a sample 40 produced by another company B have a mean lifetime of 638 hours with S.D. 31 hours. Does this substantiate the claim of company A that their 'geyers' are superior to those produced by company B at (i) 0.05 (ii) 0.01L.O.S.
b) An ambulance service company claims that on an average it takes 20 minutes between a call for an ambulance and the patient's arrival at the hospital. If in 6 calls the time taken (between a call and arrival at hospital) are 27, 18, 26, 15, 20, 32. Can the company's claim be accepted at $1 \%$ level?

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> COMPLEX VARIABLES AND STATISTICAL METHODS <br> (Common to CE, ME, AME \& MM) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

$\qquad$
UNIT-I
1 a)
Show that for $f(z)=\left\{\begin{array}{ll}\frac{x y^{2}(x+i y)}{x^{2}+y^{4}}, & z \neq 0 \\ 0 & , z=0\end{array}\right.$ the Cauchy-Riemann equations are
satisfied at the origin but the derivative of $f(z)$ at origin does not exist.
b) Use Cauchy's integral formula to evaluate $\int_{C} \frac{e^{2 z}}{(z-1)(z-2)} d z$ where $C$ is the circle $|z|=3$.

## Or

2 a) Find the analytic function $f(z)=u+i v$ where $u=\sin x \cos h y$.
b) Integrate $f(z)=x^{2}+i x y$ from $A(1,1)$ to $B(2,8)$ along
the curve $x=t, y=t^{3}$.

## UNIT-II

3 a) Find Taylor's expansion of $f(z)=\cos z$ about the point $z=\frac{\pi}{2}$.
b) Apply the calculus of residues, evaluate $\int_{0}^{2 \pi} \frac{d \theta}{2+\cos \theta}$.

Or
4 a) Find the Laurent series of $f(z)=\frac{z^{2}-1}{(z+2)(z+3)}$, for $|z|>3$.
b) Use residue theorem to evaluate $\int_{-\infty}^{\infty} \frac{\cos x}{x^{2}+1} d x$.

## UNIT-III

5 a) A businessman goes to hotels X, Y, Z $20 \%, 50 \%, 30 \%$ of the time, respectively. It is known that $5 \%, 4 \%, 8 \%$ of the rooms in $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ hotels have faulty plumbing.
(i) Determine the probability that the businessman goes to hotel with faulty plumbing
(ii) What is the probability that businessman's room having faulty plumbing is assigned to hotel Z?
b) Find the mean and variance of the Normal distribution.

## Or

6 a) Determine the discrete probability distribution, expectation, variance, S.D. of a discrete random variable X which denotes the maximum of the two numbers that appear when a pair of fair dice is thrown once.
b) Out of 800 families with 5 children each, how many would you expect to have girls.

## UNIT-IV

7 a) Explain F-distribution.
b) A cafe records that in $n=81$ cases, the coffee beans for the coffee machine lasted an average of 225 cups with a standard deviation of 22 cups. Obtain a $90 \%$ confidence interval for $\mu$, the population mean number of cups before the coffee machine needs to be refilled with beans.

## Or

8 a) The mean muscular endurance score of a random sample of 60 subjects was found to be 145 with a s.d. of 40 . Construct a $95 \%$ confidence interval for the true mean. Assume the sample size to be large enough for normal approximation. What size of sample is required to estimate the mean within 5 of the true mean with a $95 \%$ confidence?
b) Explain Point estimation and Maximum error of estimate.

## UNIT-V

9 a) A machine runs on an average of 125 hours/year. A random sample of 49 machines has an annual average use of 126.9 hours with standard deviation 8.4 hours. Does this suggest to believe that machines are used on the average more than 125 hours annually at 0.05 level of significance?
b) A company has the head office at Calcutta and a branch at Bombay. The personnel director wanted to know if the workers at the two places' would like the introduction of a new plan of work and a survey was conducted for this purpose. Out of a sample of 500 workers at Calcutta, $62 \%$ favoured the new plan. At Bombay out of a sample of 400 workers, $41 \%$ were against the new plan. Is there any significant difference between the two groups in their attitude towards the new plan at $5 \%$ level ?

## Or

10 a) To test the effects a new pesticide on rice production, a farm land was divided into 60 units of equal areas, all portions having identical qualities as to soil, exposure to sunlight etc. The new pesticide is applied to 30 units while old pesticide to the remaining 30. Is there reason to believe that the new pesticide is better than the old pesticide if the mean number of kgs of rice harvested / unit using new pesticide (N.P.) is 496.31 with s.d. of 17.18 kgs while for old pesticide (O.P.) is 485.41 kgs and 14.73 kgs . Test at a level of significance (i) $\alpha=0.05$ (ii) 0.01 .
b) In a random sample of 10 bolts produced by a machine the mean length of bolt is 0.53 mm and standard deviation 0.03 mm . Can we claim from this that the machine is in proper working order if in the past it produced bolts of length 0.50 mm ? Use (i) 0.05 (ii) 0.01 L.O.S.

# II B. Tech II Semester Regular Examinations, June/July - 2022 COMPLEX VARIABLES AND STATISTICAL METHODS 

(Common to CE, ME, AME \& MM)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a)
Show that $f(z)=\left\{\begin{array}{c}\frac{x^{2} y^{5}(x+i y)}{x^{4}+y^{10}}, z \neq 0 \\ 0 \quad, z=0\end{array} \quad\right.$ is not analytic at $z=0$, although the
Cauchy-Riemann equations are satisfied at the origin
b) Use Cauchy's integral formula to evaluate $\int_{c} \frac{e^{z}}{z-2 i} d z \quad$ where C is the circle

$$
|z-2 i|=4 .
$$

## Or

2 a) Find the analytic function $f(z)=u+i v$ where $u=e^{x} \cos y$.
b) Evaluate $\int_{0}^{1+i}\left(x^{2}+i y\right) d z$ along the paths $y=x$ and $y=x^{2}$.

## UNIT-II

3 a) Find Taylor's expansion of $f(z)=\frac{2 z^{3}+1}{z^{2}+z}$ about the point $z=i$.
b) Use residue theorem to evaluate $\int_{0}^{2 \pi} \frac{d \theta}{\sqrt{2}-\cos \theta}$.

4 a) Find the Laurent series of $f(z)=\frac{1}{z^{2}-4 z+3}$, for $1<|z|<3$.
b) Apply the calculus of residues, to evaluate $\int_{-\infty}^{\infty} \frac{x^{2}-x+2}{x^{4}+10 x^{2}+9} d x$.

## UNIT-III

5 a) Companies $\mathrm{B}_{1}, \mathrm{~B}_{2}, \mathrm{~B}_{3}$ produce $30 \%, 45 \%$ and $25 \%$ of the cars respectively. It is known that $2 \%, 3 \%$ and $2 \%$ of the cars produced from $\mathrm{B}_{1}, \mathrm{~B}_{2}$ and $\mathrm{B}_{3}$ are defective.
(i) What is the probability that a car purchased is defective?
(ii) If a car purchased is found to be defective what is the probability that this car is produced by company $\mathrm{B}_{3}$ ?
b) Find the mean and variance of the Poisson distribution.

## Or

6 a) Determine the discrete probability distribution, expectation, variance, S.D. of a discrete random variable $X$ which denotes the sum of the two numbers that appear when a pair of fair dice is thrown once.
b) Determine the probability of getting 9 exactly twice in 3 throws with a pair of fair dice.

SET - 3

## UNIT-IV

7 a) Explain $\chi^{2}$-distribution.
b) The dean of a college wants to use the mean of a random sample to estimate the average amount of time students take to get from one class to the next, and she wants to be able to assert with $99 \%$ confidence that the error is at most 0.25 minute. If it can be presumed from experience that $\sigma=1.40$ minutes, how large a sample will she have to take?

## Or

8 a) Define Point and Interval estimations.
b) If on the average, the test strips painted across heavily travelled roads in 15 different locations, disappeared after they had been crossed by 146692 cars with s.d. 14380 cars, calculate $99 \%$ confidence intervals for the true average number of cars it takes to wear off the paint, assuming normal population.

## UNIT-V

9 a) A manufacturer of tyres guarantees that the average lifetime of its tyres is more than 28000 miles. If 40 tyres of this company tested, yields a mean lifetime of 27463 miles with S.D. of 1348 miles, can the guarantee be accepted at 0.01 L.O.S.?
b) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal, are same against that they are not, at $5 \%$ level.

## Or

10 a) In a survey of buying habits, 400 women shoppers are chosen at random in super market 'A' located in a certain section of the city. Their average weekly food expenditure is Rs. 250 with a standard deviation of Rs. 40 . For 400 women shoppers chosen at random in super market 'B' in another section of the city, the average weekly food expenditure is Rs. 220 with a standard deviation of Rs. 55. Test at $1 \%$ level of significance whether the average weekly food expenditure of the two populations of shoppers are equal.
b) An auditor claims that he takes on an average 10.5 days to file income tax returns (I.T. returns). Can this claim be accepted if a random sample shows that he took $13,19,15,10,12,11,14,18$ days to file I.T. returns? Use (i) 0.01 (ii) 0.05 L.O.S.

SET - 4

## II B. Tech II Semester Regular Examinations, June/July - 2022 <br> COMPLEX VARIABLES AND STATISTICAL METHODS

(Common to CE, ME, AME \& MM)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

## UNIT-I

1 a) Show that $f(z)=\sqrt{|x y|}$ is not analytic at $z=0$, although the CauchyRiemann equations are satisfied at the origin.
b) Integrate $f(z)=x^{2}+$ ixy from $A(1,1)$ to $B(2,4)$ along the curve $x=t, y=t^{2}$.

Or
2 a) Are the following function harmonic? If your answer is yes, find a corresponding
analytic function $f(z)=u(x, y)+i v(x, y)$. Where $u(x, y)=e^{-x} \sin 2 y$.
b) Use Cauchy's integral formula to evaluate $\int_{C} \frac{e^{z}}{\left(z^{2}+\pi^{2}\right)^{2}} d z \quad$ where $C$ is the circle $|z|=4$.

## UNIT-II

3 a) Find Taylor's expansion of $f(z)=\cos z$ about the point $z=\frac{\pi}{4}$.
b) Use residue theorem to evaluate $\int_{0}^{2 \pi} \frac{d \theta}{7+6 \cos \theta}$.

## Or

4 a) Find the Laurent's series of $f(z)=\frac{z^{2}-1}{z^{2}+5 z+6}$ about $z=0$ in the region $2<|z|<3$.
b) Use residue theorem to evaluate $\int_{-\infty}^{\infty} \frac{d x}{\left(x^{2}+1\right)\left(x^{2}+9\right)}$.

UNIT-III
5 a) Box I contains 1 white, 2 red, 3 green balls, Box II contains 2 white, 3 red, 1 green balls, Box III contains 3 white, 1 red, 2 green balls. Two balls are drawn from a box chosen at random. These are found to be one white and one red. Determine the probability that the balls so drawn came from box II.
b) Find the mean and variance of the Binomial distribution.

## Or

6 a) Suppose a continuous R.V. $x$ has the probability density
$f(x)= \begin{cases}k\left(1-x^{2}\right) & , \text { for } 0<x<1 \\ 0 & , \text { elsewhere }\end{cases}$
(i) Find $k$ (ii) Find $\mathrm{P}(0.1<\mathrm{x}<0.2)$ (iii) $\mathrm{P}(\mathrm{x}>0.5)$.
b) The average number of phone calls/minute coming into a switch board between

2 and 4 PM is 2.5 . Determine the probability that during one particular minute there will be (i) 0 (ii) 1 (iii) 2 (iv) 3 .

## UNIT-IV

7 a) Define Population and Sample with example.
b) A random sample of size $n=100$ is taken from a population with $\sigma=5$.1. Given that the sample mean is $\bar{x}=21.6$, construct a $95 \%$ confidence interval for the population mean $\mu$.

## Or

8 a) Construct a $99 \%$ confidence interval for the true mean weight loss if 16 persons on diet control after one month had a mean weight loss of 3.42 kgs with s.d. of 0.68 kgs .
b) For an F -distribution find
i). $\mathrm{F}_{0.05}$ with $v 1=7$ and $v 2=15$
ii). $\mathrm{F}_{0.01}$ with $v 1=24$ and $v 2=19$
iii). $\mathrm{F}_{0.95}$ with $v 1=19$ and $v 2=24$
iv). $\mathrm{F}_{0.99}$ with $v 1=28$ and $v 2=12$.

## UNIT-V

9 a) In a random sample of 100 tube lights produced by company $A$, the mean lifetime of tube light is 1190 hours with standard deviation of 90 hours. Also in a random sample of 75 tube lights from company $B$ the mean lifetime is 1230 hours with standard deviation of 120 hours. Is there a difference between the mean lifetimes of the two brands of tube lights at a significance level of (i) 0.05 (ii) 0.01 ?
b) In a sample of 1,000 people in Maharashtra, 540 are rice eaters and the rest are wheal eaters. Can we assume that both rice and wheat are equally popular in this State at $1 \%$ level of significance?

## Or

10 a) Mean lifetime of computers manufactured by a company is 1120 hours with standard deviation of 125 hours. Test the hypothesis that mean lifetime of computers has not changed if a sample of 8 computers has a mean lifetime of 1070 hours .Use (i) 0.05 (ii) 0.01 L.O.S.
b) A study of TV viewers was conducted to find the opinion about the mega serial 'Ramayana'. If $56 \%$ of a sample of 300 viewers from south and $48 \%$ of 200 viewers from north preferred the serial, test the claim at 0.05 L.O.S. that (i) there is a difference of opinion between south and north (ii) 'Ramayana' is preferred in the south.

# II B. Tech II Semester Regular Examinations, June/July - 2022 PYTHON PROGRAMMING 

(Common to EEE\&FE)

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

$\qquad$

## UNIT-I

1 a) List and explain the phases in the Program development cycle.
b) Develop a Python program to perform the addition of two given matrices.

## Or

2 a) List and explain various Data types in Python programming.
b) Compare the features of C with Python language.

## UNIT-II

3 a) Develop Python program to perform sorting of given input strings.

## b) Develop a Python program to convert a given octal number to Decimal and Hexa decimal.

## Or

a) Develop a Python program to perform string concatenation and copy operations.
b) List and explain various operations on text files.

UNIT-III
5 a) List and explain any four packages of Python language.
b) Define recursion and develop a program that performs merge sort using recursion.

## Or

6 a) List and explain the methods of list structure with examples.
b) List and explain any three standard modules in Python.

## UNIT-IV

7 a) Demonstrate the log file writing in Python program.
b) Demonstrate the design with classes using a case study.

## Or

8 a) Define Inheritance and explain types of Inheritance with examples.
b) Demonstrate operator overloading with an example program.

## UNIT-V

9 a) List and explain any four built-in error types in Python
b) Define exceptions and how to handle exceptions in a Python program?

Or
10 a) Demonstrate GUI-based program coding with an example.
b) List and explain any three clean-up actions with examples.

# II B. Tech II Semester Regular Examinations, June/July - 2022 PYTHON PROGRAMMING 

(Common to EEE \& FE)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks
$\qquad$
UNIT-I
1 a) Demonstrate Nested decision structure with example program.
b) List and explain various Data types in Python programming.

Or
2 a) Develop a function that computes the GCD of given two numbers.
b) Demonstrate expression evaluation in Python programming.

UNIT-II
3 a) Develop a program to convert a decimal number into base 4 and base 6 numbers using Python program.
b) List and explain various string methods in Python.

## Or

4 a) Develop a program to concatenate and compare two given strings in Python.
b) Demonstrate the read-write operations of the text file in Python language.

## UNIT-III

5 a) List and explain various methods of Dictionary structure.
b) Discuss various methods to draw the Plots in Python.

## Or

6 a) List and explain various methods of List structure.

## b) Define recursion. Develop a program that applies recursion to compute the factorial of a number. Discuss the advantages of recursion.

UNIT-IV
7 a) List and explain types of Inheritance with examples.
b) Develop a program that applies Seek function on files.

Or
$8 \quad$ a) Add and retrieve dynamic attributes of classes.
b) Demonstrate read, readline, and readlines with examples.

## UNIT-V

9 a) List and explain the GUI based resources for Python programming.
b) Develop a Python program to handle division by zero exception.

## Or

10 a) Is it possible to implement multiple exception blocks in Python exception handling? Justify your answer.
b) Discuss the importance of GUI based programs with an example.

# II B. Tech II Semester Regular Examinations, June/July - 2022 PYTHON PROGRAMMING 

(Common to EEE \& FE)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

UNIT-I
1 a) Develop a Python program to perform matrix multiplication.
b) Compare Python with any one object oriented programming language.

Or
2 a) Develop a Python program to sort the given input strings.
b) List and explain various operators in Python language.

## UNIT-II

3 a) Develop a Python program to find the substring within a given string.
b) List and explain various string methods in Python with examples.

## Or

4 a) Demonstrate Data Encryption in Python with an example.
b) Develop a Python program to convert a given decimal into binary, octal, and hexa [7M] decimal.

UNIT-III
5 a) Discuss the advantages of recursion and propose alternate solutions for recursion using a case study.
b) Discuss the importance and implementation of Abstraction mechanism in Python.

## Or

6 a) List and explain any three packages in Python.
b) Discuss the problem solving with Top-Down Design.

## UNIT-IV

7 a) List and explain any three object-oriented concepts.
b) Demonstrate inheritance using a Python program.

Or
8 a) Demonstrate Polymorphism using an example Python program.
b) Demonstrate Data modeling with an example.

UNIT-V
9 a) Demonstrate GUI based programming with an example.
b) List and explain the exception handling mechanism in Python?

## Or

10 a) Define Exception and discuss how to handle exceptions with an example in Python
b) Compare terminal based with GUI-based programs.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> PYTHON PROGRAMMING <br> (Common to EEE \& FE) 

## Time: 3 hours

Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks

UNIT-I
1 a) Demonstrate nested if-else with an example Python program.
b) List and explain various looping statements in Python.

Or
2 a) Develop a function that finds the roots of a quadratic equation.
b) List and explain the numeric data types in Python.

## UNIT-II

3 a) Explain various conditional controlled and loop controlled statements available in python?
b) Develop a python program to convert base 4 numbers to base 8 and 16 numbers.

5 a) Compare Lists with Dictionaries with suitable examples.
b) Demonstrate recursion with an example python program.

## Or

6 a) List and explain methods of Dictionary methods to access and manipulate its [7M] structure.
b) Demonstrate the advantages of the abstraction mechanism in python with an [7M] example.

## UNIT-IV

7 a) Demonstrate file operations with a suitable Python program.
b) Explain the functions write and write lines with examples.

## Or

8 a) Demonstrate the use of Destructor with a Python program.
b) Develop a program to read Config files in Python.

## UNIT-V

9 a) Compare the GUI-based programs with Terminal-based programs.
b) Demonstrate user-defined exception handling mechanism with an example.

Or
10 a) Discuss the resources for developing GUI based programs in Python.
b) List and explain any three clean-up actions supported by python?

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ELECTRONIC CIRCUIT ANALYSIS <br> (Common to ECE, EIE, \& ECT) 

Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> ~~~~~~~~~~~~~~~~~~~~~~~~

## UNIT-I

1 a) Derive the voltage gain equation for common source amplifier at high frequencies.
b) Explain various high frequency parameters of a BJT and derive the relations between them.

## Or

2 Determine the all hybrid $-\pi$ parameters of a Transistor operating at Collector Current $\mathrm{I}_{\mathrm{C}}(\mathrm{Q})=2 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}(\mathrm{Q})=20 \mathrm{~V}$ and $\mathrm{I}_{\mathrm{B}}(\mathrm{Q})=20 \mu \mathrm{~A}$. Transistor specifications are $\beta_{0}=100$, unity gain frequency $\mathrm{f}_{\mathrm{T}}=50 \mathrm{MHz}, \mathrm{C}_{\mathrm{OB}}=3 \mathrm{pF}, \mathrm{h}_{\mathrm{iE}}=1.4 \mathrm{~K} \Omega, \mathrm{~h}_{\mathrm{re}}=2.5 * 10^{-4}$, hoe $=25 \mu \mathrm{mhos}$. Assume that the Operating temperature is $300^{\circ} \mathrm{K}$.

## UNIT-II

3 a) Draw the circuit of Boot-strap follower and explain its operation.
b) How Differential amplifier using BJT works?- Discuss.

## Or

4 A CE-RC coupled amplifier uses transistor with the following h-parameters:
$\mathrm{h}_{\mathrm{fe}}=50, \mathrm{~h}_{\mathrm{oe}}=30 \times 10^{-6}$ mhos, $\mathrm{h}_{\mathrm{re}}=2.5 \times 10^{-4}$. The value of $\mathrm{g}_{\mathrm{m}}$ at the operating point is 50 m mhos. The biasing resistor R1 between Vcc and base is $100 \mathrm{~K} \Omega$ and R2 between base and ground is $10 \mathrm{~K} \Omega$. The load resistor $\mathrm{R}_{\mathrm{C}}=5 \mathrm{~K} \Omega$. let $\mathrm{C}=160 \mathrm{pF}$ be the total shunt capacitance in the input circuit and the coupling capacitor $\mathrm{Cc}=6 \mu \mathrm{~F}$, Calculate for one stage of the amplifier:
(i) mid-band current gain
(ii) mid-band voltage gain

## UNIT-III

5 a) With neat block diagram, show that input resistance increases with series mixing.
b) Draw the circuit diagram of a current series feedback amplifier, Deriveexpressions of input \& output impedances, Gain, and feedback factor.

## Or

6 a) An amplifier has a gain of 50 with negative feedback. For a specified output voltage, if the input required is 0.1 V without feedback and 0.8 V with feedback, Compute $\beta$ and open loop gain.
b) Explain the concept of feedback with block diagram. What are the merits and demerits of positive feedback?

## UNIT-IV

7 a) Derive the expression frequency of oscillation and condition for sustained oscillations of a Colpitts oscillator.
b) Derive the basic conditions for oscillations and classify oscillators based on their applications.

8 a) With the help of suitable schematic, explain the operation of a Wien Bridge oscillator and derive an expression for its frequency of operation.
b) In the Wien-bridge oscillator, if the RC network consists of resistors of $200 \mathrm{~K} \Omega$ and the capacitors of 300 pF , find its frequency of oscillation.

## UNIT-V

9 a) Distinguish Single and Double tuned amplifiers.
b) Derive Q factor of a single tuned amplifier.

## Or

10 a) Explain the operation of class A push-pull power amplifier.
b) Show that the conversion efficiency of a transformer coupled power amplifier is 50\%.

# II B. Tech II Semester Regular Examinations, June/July - 2022 ELECTRONIC CIRCUIT ANALYSIS 

(Common to ECE, EIE, \& ECT)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> ~~~~~~~~~~~~~~~~~~~~~~~~ <br> UNIT-I

1 a) Define $f_{T}$ and derive an expression for it.
b) Explain various hybrid-pi capacitances and conductance of a BJT.

Or
a) What are the typical values of various components in hybrid $-\pi$ model? Show that at lowfrequencies the hybrid $-\pi$ model with $\mathrm{r}_{\mathrm{be}}$ taken as infinite reduces to the approximate CE- h - parameter model.
b) A FET has Drain saturation current $\mathrm{I}_{\text {DSs }}$ of 10 mA and Quiescent point Drain current $\mathrm{I}_{\mathrm{D}}$ is 5 mA , with pinch -off voltage $\mathrm{Vp}=-4 \mathrm{~V}$, calculate the value of VGS and the value of Trans conductance gm.

## UNIT-II

3 a) Derive an expression for the overall higher cut-off frequency of a two stage amplifier with identical stages of individual higher cut-off frequency, $\mathrm{f}_{\mathrm{H}}$.
b) Discuss about the effect of cascading on bandwidth of multistage amplifiers.

Or
a) Discuss the effect of coupling capacitors of a CE amplifier on the over all frequency response of the amplifier.
b) Draw the circuit diagram, equivalent circuit of a Darlington pair and derive expressions for overall voltage gain and input impedance.

UNIT-III
5
a) Explain the concept of feedback with block diagrams? What are the advantages and disadvantages of negative feedback?
b) An amplifier has a gain of 50 with negative feedback. For a specified output voltage, if the input required is 0.1 V without feedback and 0.8 V with feedback, Compute $\beta$ and open loop gain.

> Or

6 Through the block schematics,
i. Explain four types of negative feedback amplifiers.
ii. Derive and compare their parameters.

UNIT-IV
7 a) Derive the expression frequency of oscillation and condition for sustained oscillations of a Colpitt's oscillator.
b) Explain the concept of frequency and amplitude stability of oscillators.

## Or

8 a) Derive the expression frequency of oscillation and condition for sustained oscillations of a FET based RC Phase shift oscillator.
b) State and explain Barkhausen criterion with different conditions of Loop gain.

## UNIT-V

9 a) Draw the equivalent circuit of capacitance coupled single tuned amplifier and derive the equation for voltage gain.
b) What is a Q-factor, Derive the expression for Q-factor of a capacitor?

Or
10 a) Explain the operation of class B Push-Pull power amplifier.
b) What is a cross over distortion and explain a remedy for it.

## Code No:R2022041

SET - 3

## II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ELECTRONIC CIRCUIT ANALYSIS

(Common to ECE, EIE, \& ECT)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

Define Hybrid- $\pi$ model. Draw and derive the expressions for different elements of the Hybrid $-\pi$ model
(i) Determination of Trans Conductance
(ii) Determination of input conductance
(iii) Determination of feedback conductance
(iv) Determination of outputconductance

## UNIT-II

3 a) With the help of a neat circuit diagram, describe the working of a cascade amplifier.
b) Differentiate between direct and capacitive coupling of multiple stages ofamplifiers. With the help of a neat circuit diagram, describe the working of a cascade amplifier.

Or
4 Draw the equivalent circuits of RC coupled amplifier for Mid-band, Low frequency range, high frequency range and derive the expressions for current gain and voltage gain.

## UNIT-III

5 a) Derive the expression for output resistance of a voltage sampled circuit.
b) Explain the method of identifying feedback Topology.

> Or

6 a) With a neat sketch explain a negative feedback amplifier and obtain expression for its closed loop gain.
b) A voltage-series negative feedback amplifier has a voltage gain without feedback of $\mathrm{A}=500$, input resistance $\mathrm{Ri}=3 \mathrm{~K} \Omega$, output resistance of $\mathrm{Ro}=20 \mathrm{~K} \Omega$ and feedback ratio $\beta=0.01$, calculate the voltage gain $A_{f}$, input resistance $R_{i f}$ and output resistance $R_{o f}$ of the amplifier with feedback.

## UNIT-IV

7 a) Derive the expression frequency of oscillation and condition for sustained oscillations of a Hartley oscillator.
b) In an Hartley oscillator, if $\mathrm{L} 1=0.2 \mathrm{mH}, \mathrm{L} 2=0.3 \mathrm{mH}$ and $\mathrm{C}=0.003 \mu \mathrm{~F}$, calculate the frequency of its oscillation.

Or

8 Discuss and explain the basic circuit of an LC oscillator and derive the condition for the oscillations.

## UNIT-V

9 a) With the help of a suitable circuit diagram, show that the maximum conversion [7M] efficiency of a class B power amplifier is $78.5 \%$.
b) Write short notes on Thermal stability and Heat sinks.

Or
10 a) Draw the diagram of a capacitance coupled tuned amplifier and derive an expression [7M] for its quality factor.
b) Define efficiency for a power amplifier. Classify power amplifiers based on their [7M] class of operation and compare them.

# II B. Tech II Semester Regular Examinations, June/July - 2022 <br> ELECTRONIC CIRCUIT ANALYSIS 

(Common to ECE, EIE, \& ECT)
Time: 3 hours
Max. Marks: 70

## Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks <br> UNIT-I

1 a) Derive the expression for CE short-circuit current gain with resistive load.
b) Derive the expressions for $f_{T}$ and $f_{\beta}$.

Or
2 Draw the Hybrid- $\pi$ model for a common emitter transistor. At room temperature (300K) at $\mathrm{IC}=10 \mathrm{~mA}$ and VCE $=8 \mathrm{~V} . \mathrm{h}_{\mathrm{ie}}=500$, hoe $=2 * 10^{-4} \mu \mathrm{~s}, \mathrm{~h}_{\mathrm{fe}}=100$ and $\mathrm{h}_{\mathrm{re}}=10^{-4}$. At the same operating point $\mathrm{f}_{\mathrm{T}}=50 \mathrm{MHz}$ and $\mathrm{c}_{\mathrm{ob}}=3$ PF. Calculate the values of hybrid$\pi$ parameters.

## UNIT-II

3 a) Derive the expression for input resistance of a Darlington pair circuit.
b) With the help of a neat circuit diagram, describe the working of a bootstrapping.

Or
4 a) Derive expressions for Ri, Ro, Av \&Ai using h-parameter model of a CC- CE amplifier?
b) Draw the circuit diagram of Direct Coupled Amplifier and explain its operation in detail.

## UNIT-III

5 a) Draw the block diagram of Current Shunt feedback system and derive theexpression for $\mathrm{R}_{\mathrm{if}}$ and $\mathrm{R}_{\text {of }}$
b) What is meant by negative feedback in amplifier, enumerate the effects of negative feedback on the various characteristics of the amplifier.

Or
6 a) Draw the circuit of a voltage series feedback amplifier and derive the expressions for $\mathrm{R}_{\mathrm{if}}$ and $\mathrm{R}_{\mathrm{of}}$
b) With neat block diagram Derive the expression for overall gain of a negative feedback circuit.

## UNIT-IV

7 a) Derive the expression for frequency of oscillation of BJT- RC phase-shift oscillator with necessary explanation.
b) Discuss about Frequency and amplitude stability of oscillators.

8 a) Write down the expression for frequency of oscillation in Hartley and Colpitts Oscillators.
b) A Colpitts Oscillator is designed with $\mathrm{C}_{2}=100 \mathrm{pF}$ and $\mathrm{C}_{1}=7500 \mathrm{pF}$. The inductance is variable, determine the range of inductance values, if the frequency of oscillation is to vary between 950 and 2050 KHz .

## UNIT-V

9 a) Draw the Class-A Power Amplifier and explain operation in detail withnecessary equations. Also derive the expression for maximum conversionefficiency.
b) What is meant by distortion in power amplifiers, explain the given different types of distortions?

Or
10 a) Explain the reasons for oscillations in a tuned amplifier. Briefly explain the methods used to stabilize the tuned amplifiers against oscillations.
b) Explain the operation of a double tuned amplifier. Explain the advantages of double

## II B. Tech II Semester Regular Examinations, June/July - 2022 PROBABILITY AND STATISTICS

(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), AIDS, \& AIML)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

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1 a) What are the main methods of collecting primary data? State briefly the advantages and disadvantages of each.
b) What do you understand by skewness. What are the various methods of measuring skewness?

Or
2 a) What do you understand by a measure of dispersion? What purpose does a measure of dispersion serve?
b) Calculate the mean and standard deviation for the following table giving the age distribution of 542 members.
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline Age (in years) & \begin{tabular}{c}
\(20-\) \\
30
\end{tabular} & \begin{tabular}{c}
\(30-\) \\
40
\end{tabular} & \begin{tabular}{c}
\(40-\) \\
50
\end{tabular} & \begin{tabular}{c}
\(50-\) \\
60
\end{tabular} & \begin{tabular}{c}
\(60-\) \\
70
\end{tabular} & \begin{tabular}{c}
\(70-\) \\
80
\end{tabular} & \begin{tabular}{c}
\(80-\) \\
90
\end{tabular} \\
\hline \begin{tabular}{c} 
No. of \\
members
\end{tabular} & 3 & 61 & 132 & 153 & 140 & 51 & 2 \\
\hline
\end{tabular}

3 a) Calculate correlation coefficient to the following data;
\begin{tabular}{|l|l|l|l|l|l|l|l|l|l|l|}
\hline x & 10 & 15 & 12 & 17 & 13 & 16 & 24 & 14 & 22 & 20 \\
\hline y & 30 & 42 & 45 & 46 & 33 & 34 & 40 & 35 & 39 & 38 \\
\hline
\end{tabular}
b) Fit an exponential curve of the form \(y=a b^{x}\) to the following data:
\begin{tabular}{|c|c|c|c|c|c|c|c|c|}
\hline x & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\hline y & 1.0 & 1.2 & 1.8 & 2.5 & 3.6 & 4.7 & 6.6 & 9.1 \\
\hline
\end{tabular}

4 a) Obtain the equations of two lines of regression for the following data. Also obtain the estimate of X for \(\mathrm{Y}=70\).
\begin{tabular}{|l|l|l|l|l|l|l|l|l|}
\hline X & 65 & 66 & 67 & 67 & 68 & 69 & 70 & 72 \\
\hline Y & 67 & 68 & 65 & 68 & 72 & 72 & 69 & 71 \\
\hline
\end{tabular}
b) State the principle of least squares and write the normal equations for the fitting of the Straight line.

5 a) The probability that a turbine will have a defective coil is 0.10 , the probability that it will have defective blades is 0.15 , and the probability that it will have both defects is 0.04 .
(i) What is the probability that a turbine will have one of these defects?
(ii) What is the probability that a turbine will have either of these defects?
b) A shipment of 20 similar laptop computers to a retail outlet contains 3 that are defective. If a school makes a random purchase of 2 of these computers, find the probability distribution for the number of defectives.

Or

6 a) The diameter of an electric cable, say \(X\), is assumed to be a continuous random variable with p.d.f. \(f(x)=6 x(1-x), 0 \leq x \leq 1\).
(i) Check that \(f(x)\) is p.d.f., and
(ii) Determine a number \(b\) such that \(P(X<b)=P(X>b)\).
b) Given a standard normal distribution, find the area under the curve that lies
(i) to the right of \(\mathrm{z}=1.84\) and
(ii) between \(\mathrm{z}=-1.97\) and \(\mathrm{z}=0.86\).

7 a) Define Population and sample with examples.
b) For a chi-squared distribution, find
(i) \(\chi_{0.025}^{2}\) when \(v=15\);
(ii) \(\chi_{0.01}^{2}\) when \(v=7\).

\section*{Or}

8 The pulse rate of 50 yoga practitioners decreased on the average by 20.2 beats/minute with s.d. of 3.5 . (a) If \(\bar{x}=20.2\) is used as a point estimate of the true average decrease in the pulse rate, what can we assert with \(95 \%\) confidence about the maximum error E. (b)Construct \(99 \%\) confidence intervals for the true average decrease in pulse rate.

9 a) A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance.
b) An urban community would like to show that the incidence of breast cancer is higher in their area than in a nearby rural area. If it is found that 20 of 200 adult women in the urban community have breast cancer and 10 of 150 adult women in the rural community have breast cancer, can we conclude at the 0.05 level of significance that breast cancer is more prevalent in the urban community?

Or
10 a) Past experience indicates that the time required for high school seniors to complete a standardized test is a normal random variable with a mean of 35 minutes. If a random sample of 20 high school seniors took an average of 33.1 minutes to complete this test with a standard deviation of 4.3 minutes, test the hypothesis, at the 0.05 level of significance, that \(\mu=35\) minutes against the alternative that \(\mu<35\) minutes.
b) A manufacturer claims that the average tensile strength of thread \(A\) exceeds the average tensile strength of thread \(B\) by at least 12 kilograms. To test this claim, 50 pieces of each type of thread were tested under similar conditions. Type \(A\) thread had an average tensile strength of 86.7 kilograms with a standard deviation of 6.28 kilograms, while type \(B\) thread had an average tensile strength of 77.8 kilograms with a standard deviation of 5.61 kilograms. Test the manufacturer's claim using a 0.05 level of significance.

SET - 2

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 PROBABILITY AND STATISTICS \\ (Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), AIDS, CS, \& AIML)}

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1 a) Distinguish between primary and secondary data and discuss the various methods of collecting primary data.
b) What do you understand by skewness and kurtosis? Point out their role in analyzing a frequency distribution.

## Or

2 a) What do you understand by dispersion? Explain briefly the various methods used for measuring dispersion.
b) Calculate the coefficient of skewness based on mean and median from the following distribution

| Class | $0-$ | $10-$ | $20-$ | $30-$ | $40-$ | $50-$ | $60-$ | $70-$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| interval | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| Frequency | 6 | 12 | 22 | 48 | 56 | 32 | 18 | 6 |

3 a) Obtain the correlation coefficient for the following data :
[7M]

| x | 48 | 60 | 72 | 62 | 56 | 40 | 39 | 52 | 30 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| y | 62 | 78 | 65 | 70 | 38 | 54 | 60 | 32 | 31 |

b) Fit a parabola $y=a+b x+c x^{2}$ to the following data:
[7M]

| $x$ | 2 | 4 | 6 | 8 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $y$ | 3.07 | 12.85 | 31.47 | 57.38 | 91.29 |

> Or

4 a) In a partially destroyed laboratory, record of an analysis of correlation data, the following only are legible: Variance of $X=9$, Regression equations:
$8 X-10 Y+66=0,40 X-18 Y=214$. What are: (i) the mean values $X$ and $Y$,
(ii) the correlation coefficient between $X$ and $Y$, and (iii) the standard deviation of $Y$ ?
b) The ranks of same 16 students in Mathematics and Physics are as follows. Two numbers within brackets denote the ranks of the students in Mathematics and
Physics: $(1,1)(2,10)(3,3)(4,4)(5,5)(6,7)(7,2)(8,6)(9,8)(10,11)(11,15)$
$(12,9)(13,14)(14,12)(15,16)(16,13)$.Calculate the rank correlation coefficient for proficiencies of this group in Mathematics and Physics.
5
a) The probability that a construction company will get the tender for constructing a flyover is 0.33 , the probability that it will get the tender for constructing an underpass is 0.28 , and the probability that it will get both tenders is 0.13 .
(i) What is the probability that it will get at least one tender?
(ii) What is the probability that it will get neither tender?
b) Find the mean and the variance of the uniform probability distribution given by

6 a) Find the probabilities that a random variable having the standard normal distribution will take on a value
(i) between 0.87 and 1.28 ;
(ii) between -0.34 and 0.62 ;
(iii) greater than 0.85 ;
(iv) greater than -0.65 .
b) In a certain industrial facility, accidents occur infrequently. It is known that the probability of an accident on any given day is 0.005 and accidents are independent of each other.
(i) What is the probability that in any given period of 400 days there will be an accident on one day?
(ii) What is the probability that there are at most three days with an accident?

7 a) State the Central limit theorem.
b) For an $F$-distribution, find
i) $F_{0.05}$ with $v_{1}=7$ and $v_{2}=15$;
ii) $F_{0.01}$ with $v_{1}=24$ and $v_{2}=19$;
iii) $F_{0.95}$ with $v_{1}=19$ and $v_{2}=24$;
iv) $F_{0.99}$ with $v_{1}=28$ and $v_{2}=12$.

## Or

8 a) Assuming that the population standard deviation is 0.3 , calculate the (i) $95 \%$ and (ii) $99 \%$ confidence intervals for the mean lead concentration in a river if the mean lead concentration recovered from a sample of lead measurements in 36 different locations is $2.6 \mathrm{gms} / \mathrm{ml}$.
b) The contents of seven similar containers of sulfuric acid are 9.8, 10.2, 10.4, 9.8, $10.0,10.2$, and 9.6 liters. Find a $95 \%$ confidence interval for the mean contents of all such containers, assuming an approximately normal distribution.

9 a) A manufacturer of sports equipment has developed a new synthetic fishing line that the company claims has a mean breaking strength of 8 kilograms with a standard deviation of 0.5 kilogram. Test the hypothesis that $\mu=8$ kilograms against the alternative that $\mu \neq 8$ kilograms if a random sample of 50 lines is tested and found to have a mean breaking strength of 7.8 kilograms. Use a 0.01 level of significance.
b) A commonly prescribed drug for relieving nervous tension is believed to be only $60 \%$ effective. Experimental results with a new drug administered to a random sample of 100 adults who were suffering from nervous tension show that 70 received relief. Is this sufficient evidence to conclude that the new drug is superior to the one commonly prescribed? Use a 0.05 level of significance.

## Or

10 a) A vote is to be taken among the residents of a town and the surrounding county to determine whether a proposed chemical plant should be constructed. The construction site is within the town limits, and for this reason many voters in the county believe that the proposal will pass because of the large proportion of town voters who favor the construction. To determine if there is a significant difference in the proportions of town voters and county voters favoring the proposal, a poll is taken. If 120 of 200 town voters favour the proposal and 240 of 500 county residents favor it, would you agree that the proportion of town voters favoring the proposal is higher than the proportion of county voters? Use an $\alpha=0.05$ level of significance.
b) It is claimed that automobiles are driven on average more than 20,000 kilometers per year. To test this claim, 100 randomly selected automobile owners are asked to keep a record of the kilometers they travel. Would you agree with this claim if the random sample showed an average of 23,500 kilometers and a standard deviation of 3900 kilometers?

SET - 3

## II B. Tech II Semester Regular Examinations, June/July - 2022 PROBABILITY AND STATISTICS

(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), AIDS, CS, \& AIML)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

~~~~~~~~~~~~~~~~~~~~~~~~~~
1 a) Explain the various methods that are used in the collection of primary data pointing out their merits and demerits.
b) The following table shows the marks obtained by 100 candidates in an examination. Calculate the mean and standard deviation:
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline Marks obtained & \(1-10\) & \(11-20\) & \(21-30\) & \(31-40\) & \(41-50\) & \(51-60\) \\
\hline No. of candidates & 3 & 16 & 26 & 31 & 16 & 8 \\
\hline
\end{tabular}

\section*{Or}

2 a) Define the various measures of central tendency. What purposes do these measurements serve.
b) Obtain Karl Pearson's measure of skewness for the following data:
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline Values & \(5-10\) & \(10-15\) & \(15-20\) & \(20-25\) & \(25-30\) & \(30-35\) & \(35-40\) \\
\hline Frequency & 6 & 8 & 17 & 21 & 15 & 11 & 2 \\
\hline
\end{tabular}

3 a) Two random variables have the regression lines with equations \(3 x+2 y=26\) and
\(6 x+y=31\).Find the means values and the correlation co-efficient between \(x\) and \(y\).
b) Fit a polynomial of the second degree to the form \(y=a+b x+c x^{2}\) to the following data by the method of least squares:
\begin{tabular}{|c|c|c|c|c|c|}
\hline\(x\) & 0 & 1 & 2 & 3 & 4 \\
\hline\(y\) & 1 & 0 & 3 & 10 & 21 \\
\hline
\end{tabular}

\section*{Or}

4 a) A sample of 12 fathers and their eldest sons gave the following data about their
height in inches:
\begin{tabular}{|c|l|l|l|l|l|l|l|l|l|l|l|l|}
\hline Father & 65 & 63 & 67 & 64 & 68 & 62 & 70 & 66 & 68 & 67 & 69 & 71 \\
\hline Son & 68 & 66 & 68 & 65 & 69 & 66 & 68 & 65 & 71 & 67 & 68 & 70 \\
\hline
\end{tabular}

Calculate coefficient of rank correlation.
b) Write the properties of regression coefficients.
a) Two cards are drawn at random from an ordinary deck of 52 playing cards. What is the probability of getting two aces if
(i) the first card is replaced before the second card is drawn;
(ii)the first card is not replaced before the second card is drawn?
b) It is known that \(5 \%\) of the books bound at a certain bindery have defective defective bindings using
(i) the formula for the binomial distribution;
(ii)the Poisson approximation to the binomial distribution.

Or

6 a) A continuous random variable \(X\) has a p.d.f. \(f(x)=3 x^{2}, 0 \leq x \leq 1\).. Find \(a\) and \(b\) such that (i) \(P(X \leq a)=P(X>a)\), and(ii) \(P(X>b)=0.05\).
b) In a certain city district, the need for money to buy drugs is stated as the reason for \(75 \%\) of all thefts. Find the probability that among the next 5 theft cases reported in this district,
(i) exactly 2 resulted from the need for money to buydrugs;
(ii) at most 3 resulted from the need for money to buy drugs.

7 a) Find the value of \(F_{0.95}\) for \(v_{1}=10\) and \(v_{2}=20\) degrees of freedom.
b) Determine \(99 \%\) confidence interval for the mean of contents of soft drink bottles if contents of 7 such soft drink bottles are \(10.2,10.4,9.8,10.0,9.8,10.2,9.6 \mathrm{ml}\).

\section*{Or}

8 The efficiency expert of a computer company tested 40 engineers to estimate the average time it takes to assemble a certain computer component, getting a mean of 12.73 minutes and s.d. of 2.06 minutes. (a) If \(\bar{x}=12.73\) is used as a point estimate of the actual average time required to perform the task, determine the maximum error with \(99 \%\) confidence (b) construct \(98 \%\) confidence intervals for the true average time it takes to do the job (c) with what confidence can we assert that the sample mean does not differ from the true mean by more than 30 seconds.

9 a) A random sample of 64 bags of white cheddar popcorn weighed, on average, 5.23 ounces with a standard deviation of 0.24 ounce. Test the hypothesis that \(\mu=5.5\) ounces against the alternative hypothesis, \(\mu<5.5\) ounces, at the 0.05 level of significance.
b) An experiment was performed to compare the abrasive wear of two different laminated materials. Twelve pieces of material 1 were tested by exposing each piece to a machine measuring wear. Ten pieces of material 2 were similarly tested. In each case, the depth of wear was observed. The samples of material 1 gave an average(coded) wear of 85 units with a sample standard deviation of 4 , while the samples of material 2 gave an average of 81 with a sample standard deviation of 5 . Can we conclude at the 0.05 level of significance that the abrasive wear of material lexceeds that of material 2 by more than 2 units? Assume the populations to be approximately normal with equal variances.

Or
10 a) A commonly prescribed drug for relieving nervous tension is believed to be only
\(60 \%\) effective. Experimental results with a new drug administered to a random sample of 100 adults who were suffering from nervous tension show that 70 received relief. Is this sufficient evidence to conclude that the new drug is superior to the one commonly prescribed? Use a 0.05 level of significance.
b) Test the hypothesis that the average content of containers of a particular lubricant is 10 liters if the contents of a random sample of 10 containers are \(10.2,9.7,10.1\), \(10.3,10.1,9.8,9.9,10.4,10.3\), and 9.8 liters. Use a 0.01 level of significance and assume that the distribution of contents is normal.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 PROBABILITY AND STATISTICS
}
(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), AIDS, CS, \& AIML)
Time: 3 hours

\author{
Max. Marks: 70
}

\section*{Answer any FIVE Questions each Question from each unit}

All Questions carry Equal Marks
\(\qquad\)
1 a) Distinguish between primary source and secondary source of statistical data. What precautions would you take before using data from a secondary source?
b) Calculate the quartile coefficient of skewness from the following data:
\begin{tabular}{|c|c|c|c|c|c|c|c|c|}
\hline Weight (lbs) & \begin{tabular}{c}
\(70-\) \\
80
\end{tabular} & \(80-90\) & \(90-100\) & \(100-110\) & \(110-120\) & \(120-130\) & \(130-140\) & \(140-150\) \\
\hline \begin{tabular}{c} 
No. of \\
persons
\end{tabular} & 12 & 18 & 35 & 42 & 50 & 45 & 20 & 8 \\
\hline
\end{tabular}

2 a) What is meant by measures of central tendency? What are the characteristics of a good measure of central tendency?
b) Assume that a firm has selected a random sample of 100 from its production line and has obtain the data shown in the table below:
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline \begin{tabular}{c} 
Class \\
interval
\end{tabular} & \begin{tabular}{c}
\(130-\) \\
134
\end{tabular} & \begin{tabular}{c}
\(135-\) \\
139
\end{tabular} & \(140-144\) & \(145-149\) & \(150-154\) & \(155-159\) & \(160-164\) \\
\hline Frequency & 3 & 12 & 21 & 28 & 19 & 12 & 5 \\
\hline
\end{tabular}

Compute the following: (i) The arithmetic mean, (ii) The standard deviation.
3 a) Calculate the correlation coefficient for the following heights(in inches) of fathers
(X) and their sons (Y):
\begin{tabular}{|l|l|l|l|l|l|l|l|l|}
\hline X & 65 & 66 & 67 & 67 & 68 & 69 & 70 & 72 \\
\hline Y & 67 & 68 & 65 & 68 & 72 & 72 & 69 & 71 \\
\hline
\end{tabular}
b) Find the normal equations for fitting of the parabola \(y=a+b x+c x^{2}\) to a set of \(n\) points.

> Or

4 a) Fit the curve of the form \(y=a e^{b x}\) to the following data:
\begin{tabular}{|c|c|c|c|c|c|}
\hline\(x\) & 77 & 100 & 185 & 239 & 285 \\
\hline\(y\) & 2.4 & 3.4 & 7.0 & 11.1 & 19.6 \\
\hline
\end{tabular}
b) Explain the difference between the correlation coefficient and rank correlation coefficient.

5 a) Among 40 condensers produced by a machine, 6 are defective. If we randomly check 5 condensers, what are the probabilities that
(i) none are defective;
(ii) all are defective?
b) A total of 46 percent of the voters in a certain city classify themselves as Independents, whereas 30percent classify themselves as Liberals and 24 percent say that they are Conservatives. In a recent local election, 35 percent of the Independents, 62percent of the Liberals, and 58 percent of the Conservatives voted. A voter is chosen at random. Given that this person voted in the local election, what is the probability that he or she is (i) an Independent?(ii) a Liberal?(iii) a Conservative?.

\section*{Or}

6 a) If the probability density of a random variable is given by
\(f(x)=\left\{\begin{array}{cl}(k+2) x^{3} & , 0<x<10 \\ 0 & , \text { elsewhere }\end{array}\right.\)
find the value \(k\) and the probability that the random variable takes on a value
(a) greater than \(3 / 4\); (b) between \(1 / 3\) and \(2 / 3\).
b) The probability that a certain kind of component will survive a shock test is 3/4.Find the probability that exactly 2 of the next 4 components tested survive.

7 a) We know that silk fibers are very tough but in short supply. Engineers are making breakthroughs to create synthetic silk fibers that can improve everything from car bumpers to bullet-proof vests or to make artificial blood vessels. One research group reports the summary statistics \(n=18, \bar{x}=22.6, s=15.7\) for the toughness ( \(\mathrm{MJ} / \mathrm{m} 3\) ) of processed fibers. Construct a \(95 \%\) confidence interval for the mean toughness of these fibers. Assume that the population is normal.
b) Find the values of
(i) \(F_{0.95}\) for 15 and 12 degrees of freedom;
(ii) \(F_{0.99}\) for 5 and 20 degrees of freedom.

8 a) Using the mean of a random sample of size 150 to estimate the mean mechanical aptitude of mechanics of a large workshop and assuming \(\sigma=6.2\), what can we assert with 0.99 probability about the maximum size of the error.
b) The average zinc concentration recovered from a sample of measurements taken in 36 different locations in a river is found to be 2.6 grams per milliliter. Find the \(95 \%\) and \(99 \%\) confidence intervals for the mean zinc concentration in the river. Assume that the population standard deviation is 0.3 gram per milliliter.

9 a) An electrical firm manufactures light bulbs that have a lifetime that is approximately normally distributed with a mean of 800 hours and a standard deviation of 40 hours. Test the hypothesis that \(\mu=800\) hours against the alternative, \(\mu \neq 800\) hours, if a random sample of 30 bulbs has an average life of 788 hours.
b) In a study to estimate the proportion of residents in a certain city and its suburbs who favor the construction of a nuclear power plant, it is found that 63 of 100 urban residents favor the construction while only 59 of 125 suburban residents are in favor. Is there a significant difference between the proportions of urban and suburban residents who favor construction of the nuclear plant at \(1 \%\) level?

Or
10 a) In a study conducted by the Department of Human Nutrition and Foods at Virginia Tech, the following data were recorded on sorbic acid residuals, in parts per million, in ham immediately after dipping in a sorbate solution and after 60 days of storage:
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{ Sorbic Acid Residuals in Ham } \\
\hline Slice & Before Storage & After Storage \\
\hline 1 & 224 & 116 \\
\hline 2 & 270 & 96 \\
\hline 3 & 400 & 239 \\
\hline 4 & 444 & 329 \\
\hline 5 & 590 & 437 \\
\hline 6 & 660 & 597 \\
\hline 7 & 1400 & 689 \\
\hline 8 & 680 & 576 \\
\hline
\end{tabular}

Assuming the populations to be normally distributed, is there sufficient evidence, at the 0.05 level of significance, to say that the length of storage influences sorbic acid residual concentrations?
b) A builder claims that heat pumps are installed in \(70 \%\) of all homes being constructed today in the city of Richmond, Virginia. Would you agree with this claim if a random survey of new homes in this city showed that 8 out of 15 had heat pumps installed? Use a 0.10 level of significance.

SET - 1

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ HEAT AND MASS TRANSFER}
(Agricultural Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
~~~~~~~~~~~~~~~~~~~~~~~~
UNIT - I
1 a) What are the different modes of heat transfer, define and explain with examples
b) The brick work of a terrace is built up of layers laid of fire clay and red brick and the space between the two layers of brick work is filled with crushed diatomite brick. The fire clay is 120 mm thick. The thickness of the diatomite filling is 50 mm and thickness of the red brick layer is 250 mm . The thermal conduction of these three materials are \(0.93,0.13,0.7 \mathrm{~W} / \mathrm{m}^{\circ} \mathrm{C}\). What should be the thickness of red brick layer of the brick work which is to be laid without the diatomite filling between the two layers so that the heat flux through the brick work remain constant.

Or
2 a) Derive an expression for steady state heat conduction through a plane wall with internal heat generation.
b) A 5 m height and 12 m long composite wall of a cold storage is made up of 100 mm thick brick wall as the outside wall. The inner wall surface is of fibre glass of 60 mm thick. In between the two walls an insulating board 20 mm thick is placed. The coefficient of thermal conductivity for the three layers are given below:
Brick wall=1.5 W/m.K
Fibre glass \(=0.05 \mathrm{~W} / \mathrm{m} . \mathrm{K}\)
Insulating board \(=0.08 \mathrm{~W} / \mathrm{m} . \mathrm{K}\)
If the outside atmospheric temperature is \(30^{\circ} \mathrm{C}\) and cold room temperature is \(10^{\circ} \mathrm{C}\). Calculate the heat loss per hour through the wall. Also determine the interface temperature.

\section*{UNIT - II}

3 a) Calculate the critical radius of insulation for asbestos ( \(\mathrm{k}=0.172 \mathrm{~W} / \mathrm{m} \mathrm{K}\) ) surrounding a pipe and exposed to room air at 300 K with \(\mathrm{h}=2.8 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\). Also Calculate the heat loss from a \(475 \mathrm{~K}, 60 \mathrm{~mm}\) diameter pipe when covered with the critical radius insulation and without insulation.
b) Derive an equation for calculating combined conduction and convection and overall heat transfer coefficient

\section*{Or}

4 a) Define critical thickness of insulation and derive an expression for critical insulation thickness for a cylinder.
b) A 10 mm cable is to be laid in atmosphere of \(20^{\circ} \mathrm{C}\) with outside heat transfer coefficient \(8.5 \mathrm{~W} / \mathrm{m}^{2 \circ} \mathrm{C}\). The surface temperature of cable is likely to be \(65^{\circ} \mathrm{C}\) due to heat generation within. Will the rubber insulation, \(\mathrm{k}=0.155 \mathrm{~W} / \mathrm{m}^{\circ} \mathrm{C}\), be effective? If yes how much?

SET - 1

\section*{UNIT - III}

5 a) Explain the terms blackbody, white body and grey body with the help of absorptivity \((\alpha)\), reflectivity \((\rho)\) and transmissivity \((\tau)\).
b) A polished metal pipe 5 cm outside diameter and 370 K temperature at the outer surface is exposed to ambient conditions at 295 K temperature. The emissivity of the surface is 0.2 and the convection coefficient of heat transfer is \(11.35 \mathrm{~W} / \mathrm{m}^{2}{ }^{\circ} \mathrm{C}\). Calculate the heat transfer by radiation and natural convection per metre length of the pipe. Take thermal radiation constant. What would be the overall coefficient of heat transfer by the combined mode of convection and radiation?

\section*{Or}

6 a) Define a geometrical or shape factor and derive an expression for the shape factor in case of radiation exchange between two parallel surfaces.
b) A thin metal plate of 4 cm diameter is suspended in atmospheric air whose temperature is 290 K . The plate attains a temperature of 295 K when one of its face receives radiant energy from a heat source at the rate of 2 W . If heat transfer coefficient on both surfaces of the plate is stated to be \(87.5 \mathrm{~W} / \mathrm{m}^{2 \circ} \mathrm{C}\), workout the reflectivity of the plates.

\section*{UNIT - IV}

7 a) What is the role of fin heat transfer, list the application of fins/extended surfaces and draw the different configurations of fins.
b) Show dimensional analysis for free convection \(\mathrm{Nu}=\varnothing(\mathrm{Pr}, \mathrm{Gr})\)

\section*{Or}

8 a) Discuss the physical significance of the following dimensionless numbers \(\mathrm{Re}, \mathrm{Nu}\), \(\mathrm{Pr}, \mathrm{St}, \mathrm{Gr}\).
b) Derive an expression for heat transfer in an unsteady state system with negligible internal thermal resistance.

\section*{UNIT - V}

9 a) Derive an expression for effectiveness of a parallel flow heat exchanger by NTU method.
b) Milk is being pasteurized in a concentric tube heat exchanger using hot water as a heating medium. The inlet temperature of milk and water are \(30^{\circ} \mathrm{C}\) and \(95^{\circ} \mathrm{C}\), respectively. The outlet temperature of water is \(65^{\circ} \mathrm{C}\). The heat exchanger is counter flow type. Specific heat capacitance of milk and water are 3.8 and \(4.2 \mathrm{~kJ} / \mathrm{Kg}-\mathrm{K}\). The flow rate of milk and water are 0.3 and \(0.4 \mathrm{~kg} / \mathrm{s}\), respectively. Calculate the milk outlet temperature and the area of the heat exchanger. Overall heat transfer coefficient is \(1000 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\).

\section*{Or}

10 a) Briefly discuss about the principles of Mass Transfer?
b) In a counter flow type heat exchanger milk is being cooled by chilled water \(1^{\circ} \mathrm{C}\). of water is four times the flow rate of milk. If the overall thermal conductance of the exchange is \(510 \mathrm{kcal} / \mathrm{hr}-\mathrm{m}^{2 \circ} \mathrm{C}\) and the specific heat of milk is \(0.93 \mathrm{kcal} / \mathrm{kg}-{ }^{\circ} \mathrm{C}\), estimate the cooler surface area.

Code No: R1922011
SET-1

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 STRENGTH OF MATERIALS - II
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Show that shear stress in a body acted upon by two equal perpendicular stresses is zero.
b) At a point in a material, the stresses on two mutually perpendicular planes are 75 MPa (Tension) and \(25 \mathrm{MPa}(\) Tension). The shear stress across these planes is 15 MPa . Using concept of Mohr circle, find the magnitude and direction of the resultant stress on a plane making an angle of \(25^{\circ}\) with the plane of the first stress. Find also the normal and tangential stresses on this plane.

> Or

2 a) Briefly illustrate the maximum shear stress theory.
b) In a two dimensional stress system the direct stresses on two mutually perpendicular planes are ' \(\sigma\) ' and 120 MPa . In addition these planes carry a shear stress of 40 MPa . Find the value of ' \(\sigma\) ' at which the shear strain energy is least. If the failure occurs at this value of the shear strain energy, estimate the elastic limit of the material in simple tension. Take the factor of safety on elastic limit as 3 .

3 a) A solid shaft has to transmit the power 110kw at 2500 r.p.m. The maximum torque transmitted in each revolution exceeds the mean by \(35 \%\). Find the suitable diameter of the shaft, if the shear stress is not to exceed \(80 \mathrm{~N} / \mathrm{mm}^{2}\) and maximum angle of twist is 1.5 in a length of 3.30 m and \(\mathrm{G}=0.80 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}\).
b) Derive the equation \(\mathrm{T} / \mathrm{J}=\tau / \mathrm{R}=\mathrm{G} \theta / \mathrm{L}\)

Or
4 a) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm . If the permissible shear stress is 350 MPa and modulus of rigidity 84 \(\mathrm{kN} / \mathrm{mm}^{2}\), find the axial load which the spring can carry and the deflection per active turn.
b) Derive a relation for deflection of a closely coiled helical spring subjected to an axial compressive load ' \(w\) '.

5 a) A solid round bar of 60 mm diameter and 2.5 mm long is used as a strut. Find the safe compressive load for the strut using Euler's formula if (i) both ends are hinged (ii) both ends are fixed. Take \(\mathrm{E}=2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}\) and factor of safety \(=3\).
b) Develop the secant formula. Discuss its importance.

6 a) Derive the Rankine's formula for crippling load?
b) Compare the crippling loads given by Euler's and Rankine's formulae, for a tubular steel strut 2.5 m long, having outer and inner diameters as 40 mm and 30 mm respectively. loaded through pin joints at the ends. Take yield stress as \(320 \mathrm{~N} / \mathrm{mm}^{2}\) the Rankine's constant \(=1 / 7500\) and \(\mathrm{E}=2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}\). For what length of the strut of this cross-section does the Euler's formula cease to apply.
\(7 \quad\) A propeller of 40 kN weight is carried by a shaft of 25 cm diameter, and overhangs the supporting bracket by 50 cm . The propeller receives 3000 kW at a speed of 300 rpm . If the propeller thrust is 10 kN , calculate the principal stresses at a point on the surface of the shaft and drawn a diagram showing how these principal stresses at that point vary throughout a complete revolution.

Or
8 A 20 m high brick chimney is 2 m square at the base and tapers to 1 m square at the top. The tapered central flue is circular in cross section and 1 m diameter at the base. If the total weight of the brickwork above the base is 1200 kN , find for what uniform intensity of wind pressure on the face of the chimney the stress distribution across the base just ceases to be wholly compressive. What is then the maximum value of the compressive stress on the section.
9 A simply supported beam of T section, 2.5 cm long carries a central concentrated load inclined at \(30^{\circ}\) to the \(y\)-axis as shown in fig below. If the maximum compressive and tensile stresses in bending are not to exceed 75 MPa and 35 MPa respectively find the maximum load the beam can carry.


> Or

10 Find the shear centre of the section shown in fig below.


\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 ELECTRICAL MEASUREMENTS \& INSTRUMENTATION
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

1 a) Derive the torque equation of a moving iron instrument and further comment up on the nature of scale.
b) A moving coil meter gives a full scale deflection with a current of 5 mA . If the coil of the instrument has the resistance of \(10 \Omega\), how it can be adopted to work as (i) Ammeter of range \(0-10 \mathrm{~A}\) (ii) Voltmeter of range \(0-10 \mathrm{~V}\)

Or
2 a) Explain the following in relation to a potential transformer:
(i) Effect of change in secondary burden
(ii) Effect of change in frequency
b) Explain the following with respect to the permanent magnet moving coil meter:-
i) Deflecting torque
ii) Controlling torque
iii) Damping torque

3 a) Explain the working of double element dynamometer wattmeter with a neat diagram?
b) A dynamometer wattmeter reading correctly on D.C. is used to measure power in circuit if resistance of \(2 \Omega\) and inductance of 0.25 H . The supply is 200 V at 50 Hz and the pressure coil circuit of wattmeter has a resistance o \(1000 \Omega\) and inductance of 5.6 mH . What is the actual reading of the wattmeter? Neglect the impedance of the current coil of the wattmeter.

\section*{Or}

4 a) Explain the working of moving iron type power factor meter.
b) A dynamometer type wattmeter is connected across \(100 \mathrm{~V}, 50 \mathrm{~Hz}\) supply with a load of 5 A of zero power factor. The inductance and resistance of the pressure coil are 5 mH and \(3000 \Omega\) respectively. If the voltage drop in the current coil of the wattmeter is negligible, calculate the percent error in the reading of wattmeter for full scale of 500W.
5 a) Explain Kelvin's double bridge and derive the expression for unknown resistance.
b) Derive the bridge balance condition for the Schering bridge.

Or
6 a) Explain how Wien's Bridge can be used for the determination of frequency. Derive the expression for frequency in terms of bridge parameters.
b) All four resistances in a Wheatstone bridge are \(1 \mathrm{k} \Omega\), the galvanometer has a 100 \(\Omega\) resistance and \(0.05 \mu \mathrm{~A} / \mathrm{mm}\) sensitivity, and the supply is 20 V . Determine the minimum change that can be detected in the measured resistance.
7 a) Enumerate the differences between a PN diode and a Photo diode and briefly explain the working of Photo diode.
b) Explain briefly about Wire wound Strain gauge and Capacitive Strain gauge with neat diagrams

8 Explain with diagram the construction and working of LVDT? Discuss how the displacement is measured using LVDT. Mention its advantages and disadvantages?
9 a) Explain the working of Digital Tachometer with a neat block diagram
b) Explain about Lissajious patterns in Cathode Ray Oscilloscope.

Or
10 a) Explain the working of Dual slope Integrating type Digital Voltmeter with a neat schematic diagram
b) Explain the basic scheme of Digital multimeter along with its advantages.

\title{
II B. Tech II Semester Regular Examinations, July - 2021 \\ COMPLEX VARIABLES \& STATISTICAL METHODS \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a)
Show that for \(f(z)=\left\{\begin{array}{ll}\frac{x y^{2}(x+i y)}{x^{2}+y^{4}}, & z \neq 0 \\ 0 \quad, z=0\end{array}\right.\) the Cauchy-Riemann equations are
satisfied at the origin but the derivative of \(f(z)\) at origin does not exist.
b) Find the analytic function \(f(z)=u+i v\) where \(u=\sin x \cos h y\).

Or
2 a) Evaluate \(\int_{0}^{1+i}\left(x^{2}+i y\right) d z\) along the paths \(y=x\) and \(y=x^{2}\).
b) Use Cauchy's integral formula to evaluate \(\int_{C} \frac{e^{z}}{\left(z^{2}+\pi^{2}\right)^{2}} d z \quad\) where \(C\) is the circle \(|z|=4\).
3 a) Determine the poles of the function \(f(z)=\frac{z^{2}+1}{z^{2}-z}\) and the residue at each pole.
b) Use residue theorem to evaluate \(\int_{-\infty}^{\infty} \frac{d x}{\left(x^{2}+1\right)\left(x^{2}+9\right)}\).

4 a)
Find the Laurent series of \(f(z)=\frac{\left(z^{2}-4\right)}{(z+1)(z+4)}\), for \(1<|z|<4\).
b) Evaluate \(\int_{C} \frac{z^{2}-2 z}{(z+1)^{2}\left(z^{2}+4\right)} d z \quad\) where C is The Circle \(|z|=10\).

5 a) Define Binomial distribution and find its mean.
b) Suppose three companies X, Y, Z produce T.V's. X produce twice as many as Y while \(Y\) and \(Z\) produce the same number. It is Known that \(2 \%\) of \(X, 2 \%\) of \(Y\) and \(4 \%\) of Z are defective. All the TV's produced are put into one shop and then one TV is chosen at random.
(i). What is the probability that the TV is defective?
(ii).Suppose a TV chosen is defective, what is the probability that this TV is produced by company X ?

6 a) A discrete random variable X has the following probability distribution
\begin{tabular}{|l|l|l|l|l|l|l|l|l|}
\hline Value of \(X\) & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\hline\(P(X=x)\) & \(2 k\) & \(4 k\) & \(6 k\) & \(8 k\) & \(10 k\) & \(12 k\) & \(14 k\) & \(4 k\) \\
\hline
\end{tabular}
(i) Find the value of ' \(k\) '. (ii) Find \(P(X<3)\) and \(P(X \geq 5)\)
(iii) Find the distribution function of X .
b) A sample of 100 dry battery cells tested to find the length of life produced the following results :
\(\bar{x}=12\) hours, \(\sigma=3\) hours.
Assuming the data to be normally distributed, what percentage of battery cells are expected to have life
(i) more than 15 hours (ii) less than 6 hours (iii) between 10 and 14 hours?

7 a) Define Population and sample with examples.
b) Explain the following i). F-distribution, ii). Central limit theorem,
ii). Sampling distribution of Means.

Or
8 a) Explain \(\chi^{2}\)-distribution.
b) The average zinc concentration recovered from a sample of zinc measurements in 36 different locations is found to be 2.6 grams per millilitre. Find a \(95 \%\) confidence intervals for the mean zinc concentration in the river. Assume that the population standard deviation is 0.3 .
9 a) The 9 items of a sample have the following values \(45,47,50,52,48,47,49,53\), 51.Does the mean of these values differ significantly from the assumed mean 47.5? Use a 0.05 level of significance.
b) A storekeeper wanted to buy a large quantity of bulbs from two brands A and B respectively. He bought 100 bulbs from each brand A and B and found by testing brand A had mean life time of 1120 hrs and the S.D of 75 hrs and brand B had mean life time 1062 hrs and S.D of 82 hrs . Examine whether the difference of means is significant. Use a 0.01 level of significance.

\section*{Or}

10 a) A study of TV viewers was conducted to find the opinion about the mega serial 'Ramayana'. If \(56 \%\) of a sample of 300 viewers from south and \(48 \%\) of 200 viewers from north preferred the serial, test the claim at 0.05 level of significance that there is a difference of opinion between south and north.
b) The mean life of 10 electric motors was found to be 1450 hrs with a S.D. of 423 hrs. A second sample of 17 motors chosen from a different batch showed a mean life of 1280 hrs with a S.D. of 398 hrs . Is there a significant difference between the means of the two samples? Use a 0.01 level of significance.

\section*{Note : - Statistical tables are required}

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 ELECTRONIC CIRCUIT ANALYSIS
}
(Electronics Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Explain the significance of all resistive components of hybrid- \(\pi\) model and give their typical values.
b) Short circuit CE current gain of transistor is 25 at a frequency of 2 MHz if \(f_{\beta}=200 \mathrm{kHz}\). Calculate i) \(f_{T}\) ii) \(h_{f e}\) iii) Find lAil at frequency of 10 MHz and 100 MHz .

Or
2 a) Derive the expression of gain bandwidth product for voltage and current?
b) A high frequency amplifier uses a transistor which is driven from a source with \(R s=0\). Calculate value of \(f_{H}\), if \(R_{L}=0\) and \(R_{L}=1 \mathrm{k} \Omega\). Assume typical value of hybrid- \(\pi\) parameters.

3 a) What are the effects of coupling capacitors in CE amplifier on the frequency response of the amplifier? Explain?
b) Compute the overall lower and upper cut-off frequency of an identical three stage cascade of amplifiers with individual lower and upper cut-off frequency given as 20 Hz and 20 KHz .

Or
4 a) List out the features of differential amplifier? Explain about differential gain, common mode gain and CMRR.
b) Let us consider the two stage amplifier circuit, the first stage in the circuit is a common emitter amplifier and second stage is common collector amplifier. Calculate input impedance, output impedance, and individual as well as overall current and voltage gains with the help of following transistor parameters at the corresponding quiescent point \(\mathrm{R}_{\mathrm{s}}=1 \mathrm{k} \Omega, \mathrm{R}_{\mathrm{c} 1}=3.3 \mathrm{k} \Omega, \mathrm{R}_{\mathrm{e} 2}=4.7 \mathrm{k} \Omega, \mathrm{h}_{\mathrm{ie}}=2 \mathrm{k} \Omega, \mathrm{h}_{\mathrm{fe}}=50\), \(h_{\text {re }}\) and \(h_{\mathrm{oe}}=0\).

5 a) With suitable diagrams explain current shunt and voltage shunt feedback amplifiers?
b) An amplifier requires an input signal of 60 mV to produce a certain output with a negative feedback to get the same output the required signal is 0.5 V . The voltage gain with feedback is 90 . Find the open loop gain and feedback factor.

Or
6 a) Draw the block diagrams of four types of negative feedback amplifier circuits and explain the advantages and disadvantages with necessary derivations.
b) An amplifier has an input resistance of \(200 \mathrm{~K} \Omega\), with a certain negative feedback introduced in the above amplifier the input resistance is found to be \(20 \mathrm{M} \Omega\) and overall gain is found to be 1000. Calculate the loop gain and feedback factor.

7 a) Draw the circuit diagram of RC-Phase shift oscillator using BJT and derive the expressions for frequency of oscillations and condition on gain.
b) Starting from the description of a generalized Oscillator, derive the expression for frequency of Oscillation in a Colpitt's Oscillator.

Or
8 a) Derive an expression for frequency of oscillation of a RC phase-shift oscillator using a FET.
b) Design a RC phase-shift oscillator to operate at a frequency of 5 KHz . Use a MOSFET with \(\mu=51\) and \(\mathrm{rd}=5.5 \mathrm{Kohm}\). The phase - shift network not load the amplifier, Find the minimum value of the drain - circuit resistance for which the circuit will oscillate?
9 a) Derive the expression for the harmonic distortion in a power amplifier if the relation between input and output currents is \(\mathrm{n}^{\text {th }}\) order.
b) Explain the operation of class B push-Pull power amplifier with neat sketch.

Or
10 a) What is stagger tuning? Explain the frequency response of stagger tuned pair.
b) Derive an expression for bandwidth of a capacitive coupled tuned amplifier.

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 PROBABILITY AND STATISTICS}
(Com to CSE, IT)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
1 a) What do you understand by skewness? How it measured explain
b) Calculate the median for the following data
\begin{tabular}{|l|l|l|l|l|l|l|l|l|}
\hline C.I & \(0-4\) & \(4-8\) & \(8-12\) & \(21-14\) & \(14-18\) & \(18-22\) & \(22-26\) & \(26-30\) \\
\hline \begin{tabular}{l} 
freque \\
ncy
\end{tabular} & 10 & 12 & 18 & 7 & 5 & 3 & 4 & 6 \\
\hline
\end{tabular}

Or
2 a) Compare mean, median and mode as measure of central tendency?
b) Calculate the kurtosis for the following data
\begin{tabular}{|l|l|l|l|l|l|l|l|}
\hline C.I & \(5-10\) & \(10-15\) & \(15-20\) & \(20-25\) & \(25-30\) & \(30-35\) & \(35-40\) \\
\hline \begin{tabular}{l} 
freque \\
ncy
\end{tabular} & 6 & 8 & 17 & 21 & 15 & 11 & 2 \\
\hline
\end{tabular}

3 a) Fit the curve \(\mathrm{y}=\mathrm{a} \mathrm{e}^{\mathrm{bx}}\) for the following data
\begin{tabular}{|l|l|l|l|l|}
\hline x & 0 & 1 & 2 & 3 \\
\hline y & 1.05 & 2.10 & 3.85 & 8.30 \\
\hline
\end{tabular}
b) Calculate the coefficient of correlation from the following data.
\begin{tabular}{|l|l|l|l|l|l|l|l|l|l|}
\hline x & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\
\hline y & 12 & 11 & 13 & 15 & 14 & 17 & 16 & 19 & 18 \\
\hline
\end{tabular}

Or
4
a) Fit the curve \(y=a b^{x}\) for the following data
\begin{tabular}{|l|l|l|l|l|}
\hline\(x\) & 1 & 2 & 3 & 4 \\
\hline\(y\) & 4 & 11 & 35 & 100 \\
\hline
\end{tabular}
b) Fit the curve \(y=a x^{2}+b x+c\) for the following data
\begin{tabular}{|l|l|l|l|l|l|}
\hline\(x\) & 2 & 4 & 6 & 8 & 10 \\
\hline\(y\) & 3 & 13 & 32 & 57 & 91 \\
\hline
\end{tabular}

5 a) A box A contains 2 white, and 3 red balls and box B contains 4 white and 5 red
Find the probability that the red ball is drawn from box A .
b) Find the mean and variance of the distribution.
\[
f(x)=\left\{\begin{array}{c}
k x^{3} \text { if } 0 \leq x \leq 3 \\
0 \text { if ot } \square \text { erwise }
\end{array}\right.
\]

Or
6 a) A random variable X has the following distribution.
[8M]
\begin{tabular}{|l|l|l|l|l|l|l|l|}
\hline X & 0 & 1 & 3 & 4 & 5 & 6 & 7 \\
\hline \(\mathrm{P}(\mathrm{X})\) & 0 & K & 2 k & 2 k & 3 k & \(\mathrm{k}^{2}\) & \(7 \mathrm{k}^{2}+\mathrm{k}\) \\
\hline
\end{tabular}

Then find (i) Mean (ii) Variance.
b) A binomial distribution with mean 25 and probability of success is \(1 / 5\) then find \(P(X<\mu-2 \sigma)\) where \(\mu\) and \(\sigma\) are the mean and variance of the distribution

7 Samples of size 2 are taken from the population 3,7, 5, 11 with replacement. Find
(i) The mean of the population
(ii) The standard deviation of the population
(iii) Mean of the sampling distribution of means
(iv) The standard deviation of the sampling distribution of means

Or
8 a) Determine the expected number of random samples having their means (i) between 22.39 and 22.41 (ii) less than 22.37 for the data \(\mu=22.4, \sigma=\) \(0.47 \& n=300\)
b) Construct \(99 \%\) confidence interval for a sample size 81 was taken whose mean is 32 and variance 20.25 .
9 a) A sample of 500 apples in A.P 280 are rice eaters, and the rest are chapati eaters. Can we assume that both rice and chapati eaters are equally popular test at 5\% level?
b) Test whether the variances of two samples are significant at 5\% level for the following data.
\begin{tabular}{|l|l|l|}
\hline S.NO & Sample size & Sample S.D \\
\hline 1 & 22 & 3 \\
\hline 2 & 20 & 4 \\
\hline \multicolumn{2}{|c|}{ Or }
\end{tabular}

10 a) 500 articles from a factory A are examined and found \(2 \%\) are defective. 800 articles from a factory Bare examined and found \(3 \%\) are defective. Can conclude that factory A articles are inferior to those factory B .Test at \(1 \%\) level.
b) A sample analysis of examinations results of 500 students was made. It was found that 220 had failed, 170 secured thirdclass, 90 secured second class and 20 got first class. Do this data support that the examination results are in the ration of \(4: 3: 2: 1\) for the above categories respectively at \(5 \%\) level.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 THEORY OF STRUCTURES \\ (Agricultural Engineering)
}

Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
1 a) A rectangular beam section is 20 cm wide and 40 cm deep up to the centre of tension steel, which consist of \(4-20 \mathrm{~mm}\) TOR bars. Find the position of the neutral axis, the lever arm, forces of compression and tension, cracking moment and safe moment of resistance of concrete is of M20 mix and steel is of Fe500 grade
b) State two differentiations between Under reinforced and Balanced section with example.

Or
2 a) I) Define cover provided for reinforcement in RC section and state its recommendations as per IS 456:2000.
II) Define over reinforced section and state two reasons due to which they are avoided in actual practice.
b) Write four assumptions made in Limit state of collapse.

3 a) Design the smallest reinforced concrete section for a simply supported beam of 4 m clear span with bearing support of 300 mm . It carries a udl of \(30 \mathrm{kN} / \mathrm{m}\) including self-weight. The width of the beam is 250 mm and reinforced on tension side only. The materials used are M 20 concrete and Fe 415 steel.
b) State two functions of bent up bars provided in flexure section.

Or
4 a) Explain about the designing of double reinforced sections.
b) Design a section of a ring beam 50 cm wide and 65 cm deep subjected to a bending moment of 120 kNm , twisting moment of \(7.5-\mathrm{kNm}\) and shear force of 150 kN at ultimate. Use M20 mix and Fe 415 grade steel
5 a) A Tee-beam of effective flange width of 1200 mm , thickness of slab 110 mm , width of the rib 300 mm and effective depth 470 mm is reinforced with 4 numbers of 16 mm diameter bars. Calculate the moment of resistance of the section. Use M20 concrete and Fe 415 steel.
b) State four factors affecting development length in RC design.

Or

6 Design the shear reinforcement for a simply supported beam of span 5.0 m having size \(230 \times 450 \mathrm{~mm}\) effective. It carries a central point load of 30 kN . It is reinforced with 4 bars of 16 mm diameter out of which one bar is bent having grade of Fe 415 . Use two legged vertical stirrups of 8 mm diameter. Take \(\zeta \mathrm{c}=\) \(0.57 \mathrm{~N} / \mathrm{mm}^{2}\) and \(\zeta \mathrm{c} \max =3.1 \mathrm{~N} / \mathrm{mm}^{2}\).
7 a) Design a slab having internal room size \(3 \times 4.5 \mathrm{~m}\). Take live load of \(2 \mathrm{kN} / \mathrm{m}^{2}\) ,floor finish of \(1 \mathrm{kN} / \mathrm{m}^{2}\). Assume width of support \(=230 \mathrm{~mm}\). Take BM coefficients as \(\alpha x=0.104\) and \(\alpha y=0.046\). Use M 20 concrete and Fe 415 steel. Draw the reinforcement details along longer span. Do not apply checks for shear, bond and deflection.
b) Differentiate between one way slab and two way slabs with respect to aspect ratio, spanning direction, bending curvature and placing of steel.

Or
8 a) Design the suitable slab for a 3 m wide passage, supported on 230 mm thick side walls. It carries a superimposed load of \(3.75 \mathrm{kN} / \mathrm{m} 2\) including floor finish. Take M.F. \(=1.4\). Use effective cover of \(20 \mathrm{~mm}, \mathrm{M} 20\) concrete and Fe 415 steel. Do not apply check for shear and bond. Sketch the cross-section along shorter span
b) Define Partial safety factor and write its values for load and material.

9 a) Write IS 456: 2000 requirements for RC column and footing -
(i) Percentage, spacing and diameter of longitudinal steel
(ii) Diameter and pitch of transverse steel
b) Write an expression for design strength of axially loaded short column as per IS 456:2000 along with meaning of each term.

Or
10 a) Design a slender circular column of 35 cm diameter with the following data. Unsupported length \(=8 \mathrm{~m}\). Effective length \(=5 \mathrm{~m}\). Axial load \(=500 \mathrm{kN}\). Moment at top \(=60 \mathrm{kNm}\). Moment at bottom \(=40 \mathrm{kNm}\). The column bends in double curvature
b) Write the different types of retaining wall and explain any one type with sketch

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 MANAGEMENT SCIENCE}
(Com to EEE, ECE, ECC)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

\section*{PART -A}
1. Write short notes for the following:
a) Scientific Management
b) Line Organization
c) Economic order quantity
d) Objectives of Merit rating
e) CPM and PERT
f) Strategy

\section*{PART -B}
2. a) Explain the Nature and Scope of Management.
b) Enumerate and explain the Principles of management contributed by Henry Fayol.
3. a) What are the important steps in the process of Organizing?
b) Describe the charts used for recording information for Method study.
4. a) What are the Operative functions of Human Resource Manager?
b) Discuss the Marketing Strategies that may be adopted during different stages of Product life cycle.
5. a) Write a note on "Total Float", "Free Float" and "Independent Float"
b) Construct a Network diagram with the following data
\begin{tabular}{|l|l|}
\hline Event & Immediate Predecessor \\
\hline B & A \\
\hline C, D, E & B \\
\hline F & C \\
\hline F & D \\
\hline F & E \\
\hline G & F \\
\hline
\end{tabular}
6. a) What do you understand by SWOT analysis?
b) Identify the factors to be diagnosed in an organisation's External environment.
7. a) State the benefits and limitations of Just-in-Time (JIT) system.
b) Discuss the activities involved in Supply Chain Management.


\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 KINEMATICS OF MACHINARY}
(Com to ME, AME, MIN)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

\section*{PART -A}
1. a) What is the difference between a linkage and a mechanism?
b) Explain why two Hooke's joints are used to transmit motion from the engine to the differential of an automobile.
c) Graphically represent centripetal and tangential components of acceleration.
d) Differentiate between the tangent cam and a circular arc convex cam, both being operated by a roller follower.
e) State and derive the law of gearing.
f) Explain the phenomena of 'slip' and 'creep' in a belt drive.

\section*{PART -B}
2. a) Define Grashof's law. State how is it helpful in classifying the four bar mechanisms into different types. Give example to each one of them.
b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centers O and C is 200 mm . The driving crank CP is 75 mm long. The pin Q on the slotted lever, 360 mm from the fulcrum O , is connected by a link QR 100 mm long, to a pin R on the ram. The line of stroke of R is perpendicular to OC and intersects OC produced at a point 150 mm from C. Determine the ratio of times taken on the cutting and return strokes.
3. a) Show that in Watt's straight line motion mechanism, the tracing point \(P\) on the coupler divides it in the ratio of the length of the oscillating links which are connected by it.
b) Draw the Ackerman's steering gear and explain its working. Does this steering gear satisfy the condition for correct steering for any angle of turn? If not, why is it still preferred to the Davis steering gear mechanism?
4. For the four bar mechanism shown in figure 1, find the angular velocities of the links BC and CD using both the relative velocity method and the instantaneous centre method. The link lengths in mm are shown along the links.


Figure 1
1 of 2
5. Draw the profile of a cam to raise a valve with SHM through 40 mm in \((1 / 4)^{\text {th }}\) of the cam rotation, keep it fully raised through \((1 / 10)^{\text {th }}\) of the cam rotation, and to lower it with uniform and equal acceleration and retardation in \((1 / 6)^{\text {th }}\) of the cam rotation. The valve remains closed during the rest of the cam rotation. The diameter of roller follower is 20 mm , and the minimum radius of cam is to be 30 mm . The axis of the follower passes through the axis of the cam shaft.
6. Two gear wheels mesh externally and are to give a velocity ratio of 3 . The teeth are involute form with diametral pitch 2. Use standard addendum values and pressure angle is \(18^{\circ}\). Determine,
i. The number of teeth in each wheel to avoid interference,
ii. The lengths of path and arc of contact,
iii. The number of pairs of teeth in contact and
iv. The angle of rotation of the pinion for one pair of teeth in contact.
7. a) A pulley is driven by a flat belt running at a speed of \(500 \mathrm{~m} / \mathrm{min}\). The coefficient of friction between the pulley and the belt is 0.3 and the angle of lap is \(175^{\circ}\). If the maximum tension in the belt is 700 N , find the power transmitted by a belt.
b) What is a differential gear of an automobile? How does it function?

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 HEAT AND MASS TRANSFER
}
(Agricultural Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
4. Use of properties Table is permitted.

PART -A
1. a) What is heat flux? How it is related to the heat transfer?
b) Explain the terms thermal conductance and thermal resistance.
c) Distinguish between absorptivity and emissivity of a surface.
d) List out the uses of fins.
e) List out the differences between the parallel flow and counter flow heat Exchangers.
f) Define convective mass transfer coefficient and what are its units.

\section*{PART -B}
2. The rate of heat generation in a slab thickness \(140 \mathrm{~mm}(\mathrm{k}=190 \mathrm{~W} / \mathrm{m} 0 \mathrm{C})\) is 1.4 x \(10^{6} \mathrm{~W} / \mathrm{m}^{3}\). If the temperature of each of the surface of solid is \(125^{\circ} \mathrm{C}\), determine:
(i) The temperature at the mid and quarter planes
(ii) The heat flow rate and temperature gradients at the mid and quarter planes
3. a) Explain the electrical analogy of heat transfer. Illustrate the concept of electrical analogy considering a multi-layer composite wall.
b) Hot water at \(60^{\circ} \mathrm{C}\) is flowing through a 10 m length steel pipe (thermal conductivity, \(\mathrm{k}=38 \mathrm{~W} / \mathrm{m} \mathrm{K}\) ) whose inner and outer diameters are 5 cm and 5.4 cm respectively. The pipe is exposed to outside environment at \(20^{\circ} \mathrm{C}\) with a convective heat transfer coefficient of \(15 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\). Find the rate of heat loss from the water and interface temperature.
4. a) State the Plank's law. Derive the expression for radiation intensity of a black body.
b) Assuming the sun to be a black body emitting radiation with maximum intensity at \(\lambda=0.49 \mu \mathrm{~m}\), Calculate the following:
(i) The surface temperature of the sun, and
(ii) The heat flux at surface of the sun.
5. a) Using dimensional analysis show that in forced convection Nusselt number is a function of Reynolds and Prandtl number.
b) A long fin of 10 mm diameter made of steel (thermal conductivity, \(\mathrm{k}=43 \mathrm{~W} / \mathrm{m}\) K ) is attached to a plate at \(200^{\circ} \mathrm{C}\) and extends to surroundings at \(30^{\circ} \mathrm{C}\) with a convective heat transfer coefficient of \(20 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\). Find the heat flow rate through the fin.
6. a) Derive the expression for effectiveness in terms of NTU for a counter flow heat exchanger.
b) Water at \(50^{\circ} \mathrm{C}\) enters a 1.5 cm diameter and 3 m long tube with a velocity of 1 \(\mathrm{m} / \mathrm{s}\). The tube wall is maintained at a constant temperature of \(90^{\circ} \mathrm{C}\). Calculate the heat transfer coefficient and the total amount of heat transferred if the exit water temperature is \(64^{\circ} \mathrm{C}\).
7. a) Explain about the steady state equimolar counter diffusion with an suitable example
b) Explain about Fick's law and state the important aspects of Fick's law

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ STRENGTH OF MATERIALS - II
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ UNIT - I}

1 a) The stresses at a point is given by normal stress of \(120 \mathrm{~N} / \mathrm{mm}^{2}\) (compressive) along x - axis, \(50 \mathrm{~N} / \mathrm{mm}^{2}\) (tensile) along y -axis and shear stress of \(-20 \mathrm{~N} / \mathrm{mm}^{2}\). Find the principal stresses and planes on which they act. Draw the Mohr's circle for the stress system.
b) Axial load acting on the bolt is 6 kN along with the transverse shear of 3 kN . Calculate the diameter of the bolt by using maximum principal stress theory and maximum shear stress theory. Factor of safety is 2, Poisson's ratio is 0.3 and yield stress is 280 MPa .

\section*{OR}

2 a) An element in a structure is subjected to a tensile stress of \(120 \mathrm{~N} / \mathrm{mm}^{2}\) accompanied by a shear stress of \(50 \mathrm{~N} / \mathrm{mm}^{2}\) on the xy- plane. Draw the Mohr's circle and find the principal stresses and maximum shear stress.
b) A thin cylindrical shell of 1.2 m diameter is subjected to an internal pressure of 2 MPa. Find the thickness of the shell plate by using maximum shear stress and maximum strain energy theories. Take Factor of safety 2.5 and elastic limit is 200 MPa.

\section*{UNIT - II}

3 a) A composite shaft made of aluminium rod of 40 mm diameter enclosed in steel tube of external diameter 60 mm and 10 mm thick. The shaft is required to transmit a torque of \(1100 \mathrm{~N}-\mathrm{m}\). Determine the shear stresses developed in aluminium and steel, if both the shafts have equal lengths and welded to a plate at each end, so that their twists are equal. Take modulus of rigidity for steel is three times that of aluminium.
b) A close coiled spring is made of 18 mm diameter rod has 20 complete turns and a mean diameter of 130 mm . It is subjected to an axial tensile force of 600 N . Find the maximum stress and the deflection in the spring, if modulus of rigidity is 80 GPa .

OR
4 a) A composite shaft 6 m long consists of a steel rod 200 mm in diameter surrounded by a closely fitting 25 mm thick bronze tube. If the shear stress in the steel shaft shall not exceed \(15 \mathrm{~N} / \mathrm{mm}^{2}\), find the power transmitted by the shaft at 250 rpm . Take \(\mathrm{C}_{\mathrm{s}}=8.5\) \(\times 10^{4} \mathrm{~N} / \mathrm{mm}^{2}\) and \(\mathrm{C}_{\mathrm{b}}=4.2 \times 10^{4} \mathrm{~N} / \mathrm{mm}^{2}\).
b) A open coiled helical spring is made of a wire of diameter 12 mm . the coil has a mean radius of 64 mm . The spring has 13 turns and angle of helix is \(15^{\circ}\). Find the deflection and bending stress for an axial load of 300 N . Take \(\mathrm{G}=80 \mathrm{GPa}\) and \(\mathrm{E}=200 \mathrm{GPa}\).

\section*{UNIT - III}

5 a) Calculate the safe compressive load on a hallow steel column of one end rigidly fixed and other end hinged with 12 cm external diameter and 8 cm internal diameter and 10 m length. Use Euler's formula with a factor of safety 3 and \(\mathrm{E}=200 \mathrm{GPa}\).
b) An angle section \(150 \mathrm{~mm} \times 150 \mathrm{~mm} \times 10 \mathrm{~mm}\) is used as a strut 3 m long. Find the load carrying capacity of strut using Euler's and Rankine's formulae. \(\mathrm{E}=200 \mathrm{GPa}\) and \(\sigma_{y}=300 \mathrm{~N} / \mathrm{mm}^{2}\).

\section*{OR}

6 a) A solid circular bar 5 m long and 5 cm diameter was found to extend 4 mm under a tensile load of 50 kN . The bar is used as a strut with both ends hinged. Determine the buckling load for the bar and also find the safe load by taking factor of safety 2 .
b) Calculate the safe compressive load on a hallow cast iron column with one end fixed and other end hinged having 12 cm external diameter and 8 cm internal diameter and 6 m length. Use Euler's with factor of safety 4 and \(\mathrm{E}=100 \mathrm{GPa}\).

UNIT - IV
7 a) Write the difference between direct and Bending stress.
b) A trapezoidal masonry dam is of 13 m height. The dam is having water up to a depth of 10 m on its vertical side. The top and bottom width of the dam are 2.5 m and 5 m respectively. The density of the masonry is \(21 \mathrm{kN} / \mathrm{m}^{3}\), find the resultant force on the dam.

\section*{OR}

8 a) A small concrete dam 10 m high has a top width of 2.5 m and base width of 6 m , with the water face vertical. Determine the stress intensities at the base.
b) A masonry wall 7 m high, 3 m wide and 1 m thick is subjected to design wind pressure of \(4 \mathrm{kN} / \mathrm{m}^{2}\) of the projected area. Find the extreme stress intensities at the base.

\section*{UNIT - V}

9 a) Determine the maximum stress and the position of neutral axis for an angle of dimensions \(50 \mathrm{~mm} \times 30 \mathrm{~mm} \times 5 \mathrm{~mm}\). The given angle is used as cantilever of length 600 mm carrying a load of 1.5 kN at free end with 50 mm leg horizontal.
b) Find the position of shear centre of a channel having dimensions, flanges 120 mm x 20 mm and web \(160 \mathrm{~mm} \times 10 \mathrm{~mm}\).

\section*{OR}

10 a) Find the position of principal axes and the values of the principal moment of Inertia for an unequal angle \(75 \mathrm{~mm} \times 45 \mathrm{~mm} \times 6 \mathrm{~mm}\)
b) Find the position of shear centre for a channel section of \(400 \mathrm{~mm} \times 200 \mathrm{~mm}\) outside and 5 mm thick.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ STRENGTH OF MATERIALS - II
}

\section*{(Civil Engineering)}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

\section*{UNIT - I}

1 a) An element in a structure is subjected to plane stress system with the stresses 120 MPa in x - direction, 150 MPa in y - direction and shear stress 50 MPa in xy plane. Draw the Mohr's circle and find the principal stresses, principal directions and maximum shear stress.
b) The internal pressure in a steel pipe is 12 MPa . The maximum circumference stress is 75 MPa and maximum longitudinal stress is 20 MPa . Find the equivalent tensile stress in a simple tensile test by using maximum shear stress theory.

\section*{OR}

2 a) At a point in a strained material, the principal stresses are 90 MPa tensile and 30 MPa compressive. Determine the resultant stress in magnitude and direction on a plane inclined at \(60^{\circ}\) to the axis of the major principal stress. Also find the maximum shear stress in the material at the point.
b) A steel bolt is subjected to a load of 30 kN along with a transverse shear of 10 kN . Find the safe diameter of the bolt by using all the theories of failure. Assume factor of safety as 2.5 , Poisson's ratio as 0.3 and yield stress as 250 MPa .

\section*{UNIT - II}

3 a) A solid circular shaft of diameter 25 mm is enclosed within a brass hallow circular shaft of external diameter 35 mm and internal diameter of 25 mm . If the two shafts are rigidly connected and the angle of twist due to torque of 500 Nm is \(2^{\circ}\) in a length of 350 mm . Find the value of rigidity modulus for brass if G for steel is 80 GPa . Also find the maximum shearing stress in the two materials.
b) Two springs connected in series and carry a load of 3 kN . One spring has 12 turns of 6 mm wire wound in a diameter of 20 mm , and the other spring has 16 turns of wire diameter 8 mm wound in a diameter of 30 mm . Find the spring constant for the composite system and the maximum stress produced in the wire. Take \(\mathrm{G}=85 \mathrm{GPa}\)

\section*{OR}

4 a) Determine the maximum shear stress developed in a solid circular shaft of radius 100 mm , subjected to a twisting moment of \(120 \mathrm{kN}-\mathrm{m}\). Also determine the angle of twist per meter length of the shaft. If a hole of diameter 100 mm is bored at the centre of the shaft along the length, find the percentage increase of the maximum stress and angle of twist. Take G = 80 GPa .
b) A closely coiled helical spring of round steel wire 10 mm in diameter having 12 complete turns with mean diameter of 120 mm is subjected to an axial load of 200 N . Find the deflection of the spring and also find the maximum shear stress in the wire. Take G \(=85 \mathrm{GPa}\)

\section*{UNIT - III}

5
a) Calculate the safe compressive load on a hallow cast iron column with one end hinged and other end fixed of 25 cm external diameter and 20 cm internal diameter and 6 m in length. Use Euler's formula with factor of safety 3 and \(\mathrm{E}=100 \mathrm{GPa}\)
b) Derive an expression for the Euler's crippling load for a column with both ends hinged.

\section*{OR}

6 a) A simply supported beam of length 3 m is subjected to ud 1 of \(12 \mathrm{kN} / \mathrm{m}\) over the entire length and deflects 5 mm at the centre. Determine the crippling load when the beam is used as a column with one end fixed and other end hinged.
b) Explain how Rankine - Gordon formula for a column to calculate the intensity of stress in short columns.
UNIT - IV

7 a) A short hallow column has an outside diameter 150 mm and an inside diameter 120 mm . If the compressive stress is limited to \(150 \mathrm{~N} / \mathrm{mm}^{2}\), find the maximum load that can be applied at the middle of the section.
b) A masonry dam of rectangular cross section 6 m high and 3 m wide has water upto the top on its one side. If the density of the masonry is \(19.5 \mathrm{kN} / \mathrm{m}^{3}\). Find the resultant force and the point at which it cuts the base of the dam.

\section*{OR}

8 a) A column 200 mm external diameter and 110 mm internal diameter supports an axial load of 1500 kN and eccentric load of P (in N ) at an eccentricity of 230 mm . If the compressive and tensile stresses are not to exceed \(120 \mathrm{~N} / \mathrm{mm}^{2}\) and \(50 \mathrm{~N} / \mathrm{mm}^{2}\) respectively. Find the value of \(P\). respectively. Find the value of \(P\).
b) A masonry dam of rectangular section 10 m high and 3.5 m wide has water upto the top on its one side. If the density of the masonry is \(2100 \mathrm{~kg} / \mathrm{m}^{3}\), find the resultant force and the point at which it cuts the base of the dam.

\section*{UNIT - V}

9 a) For an unequal angle of dimensions \(100 \mathrm{~mm} \times 50 \mathrm{~mm} \times 8 \mathrm{~mm}\) thick, determine the position of principal axes and magnitude of principal moments of Inertia.
b) Determine the position of shear centre for a channel section of \(140 \mathrm{~mm} \times 140 \mathrm{~mm}\) outside and 10 mm thick.

\section*{OR}

10 a) A cantilever of length 1.2 m carries a point load of 2 kN at the free end and cross section is an unequal angle of dimensions \(100 \mathrm{~mm} \times 60 \mathrm{~mm} \times 10 \mathrm{~mm}\) thick. Long leg is vertical and load passes through the centroid of cross section. Determine the position of neutral axis.
b) Find the position of shear centre of a channel having dimensions, flanges 140 mm x 25 mm and web \(150 \mathrm{~mm} \times 10 \mathrm{~mm}\).

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 STRENGTH OF MATERIALS - II
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

\section*{UNIT - I}

1 a) An Element subjected to a plane stress system having the stresses, - 30 MPa in x - direction, +60 MPa in y - direction and shear stress of 15 MPa in xy plane. Draw the Mohr's circle and fine the stresses on a plane whose normal is inclined at \(30^{\circ}\) to the x - axis and also find the principal stresses.
b) A hallow shaft of 25 mm internal diameter and 50 mm external diameter is subjected to a twisting moment of 600 Nm and axial compressive force of 30 kN . Find the factor of safety according to the strain energy theory, if yield stress is 260 MPa and Poisson's ratio is 0.3.

\section*{OR}

2 a) A circular shaft 120 mm diameter is subjected to a twisting moment of 7000 Nm along with a bending moment of 5000 Nm . By using maximum principal stress and strain theory, check the safety of the shaft and also find the factor of safety. Assume Poisson's ratio as 0.3 and elastic limit is 250 MPa .
b) A tension member of cross sectional area \(1200 \mathrm{~mm}^{2}\) is subjected to an axial load of 80 kN . Find the normal, tangential and resultant stresses on plane makes an angle of \(30^{\circ}\) with the axis of the bar. Also find on which planes, these stresses are maximum.

UNIT - II
3 a) A hallow steel shaft 4 m long is to transmit 150 kW power at 150 rpm . The total angle of twist in this length is not to exceed \(2.5^{\circ}\) and the allowable shear stress 60 \(\mathrm{N} / \mathrm{mm}^{2}\). Determine the inside and outside diameters, if \(\mathrm{N}=0.082 \times 10^{6} \mathrm{~N} / \mathrm{mm}^{2}\). Take inside diameter is 0.5 times the outside diameter.
b) Two springs are connected in parallel. One has 16 coils of 6 mm diameter wire with an outside diameter of 36 mm and second has 18 coils of 4 mm diameter wire with an outside diameter of 40 mm . Find the maximum load that the system can carry without exceeding the shear stress of 350 MPa . Take \(\mathrm{G}=85 \mathrm{GPa}\).

\section*{OR}

4 a) A solid circular shaft transmits 75 kW power at 250 rpm . Calculate the shaft diameter (based on twist and shear stress), if the twist in the shaft is not to exceed \(1^{\circ}\) in 2.5 m length of shaft, and shear stress is limited to \(50 \mathrm{~N} / \mathrm{mm}^{2}\). Take \(\mathrm{C}=1 \times 10^{5}\) \(\mathrm{N} / \mathrm{mm}^{2}\).
b) An open coiled helical spring has 12 turns. Assume the mean diameter of coil is eight times the diameter of the wire. An axial load is subjected, then the maximum bending and shear stresses are 120 MPa and 130 MPa respectively. Find the diameter of the wire. Take \(\mathrm{E}=200 \mathrm{GPa}\) and \(\mathrm{N}=85 \mathrm{GPa}\).

\section*{UNIT - III}

5 a) A column of length 5 m with internal diameter 180 mm and thickness 10 mm carries a load at an eccentricity of 20 mm . Find the value of the load carried by the column by using Secant formula, if permissible stress is not to exceed 150 MPa . Both the ends of the column are hinged. \(\mathrm{E}=200 \mathrm{GPa}\).

SET - 3
b) A hollow mild steel tube 5 m long 6 cm internal diameter and 8 mm thick is used as a strut with both ends fixed. Find the crippling load and safe load by taking factor of safety as 2.5 and \(\mathrm{E}=200 \mathrm{GPa}\).

\section*{OR}

6 a) The external and internal diameters of a hollow cast iron column are 5 cm and 4 cm respectively. If the length of this column is 2 m and both of its ends are fixed. Determine the crippling load using Rankine's formula. Take the values of crushing stress as \(550 \mathrm{~N} / \mathrm{mm}^{2}\) and \(\alpha=1 / 1600\) in Rankine's formula.
b) Determine the safe load that can be carried by a column, 30 cm diameter and 3 m long, if both the ends are hinged. Use factor of safety as 2 . If the proportional limit is 35 MPa , determine the minimum length upto which Euler's formula can apply. Take E = 15 GPa .

\section*{UNIT - IV}

7 a) A column of rectangular section \(120 \mathrm{~mm} \times 90 \mathrm{~mm}\) carries a load of 60 kN at a point 30 mm from the longer side and 35 mm from the shorter side. Determine the maximum compressive and tensile stresses in the section.
b) A masonry retaining wall of trapezoidal section is 10 m high and retains earth which is level upto the top. The width of the top is 3 m and at the bottom is 8 m and the exposed face is vertical. Density of earth and masonry is \(1500 \mathrm{~kg} / \mathrm{m}^{3}\) and 2200 \(\mathrm{kg} / \mathrm{m}^{3}\) respectively and angle of repose is \(30^{\circ}\). Find the maximum and minimum normal stresses at the base.

\section*{OR}

8 a) A column of rectangular section \(200 \mathrm{~mm} \times 300 \mathrm{~mm}\) carries a compressive load of 600 kN . The load is applied at a point \((-50,100)\) considering the centroid of the section as the origin. Find the stresses at the four corners of the section.
b) A steel column of length 5 m with both ends hinged, external diameter 180 mm and thickness 15 mm carries a load of an eccentricity 20 mm . Find the maximum value of load if the permissible stress is limited to \(150 \mathrm{~N} / \mathrm{mm}^{2}\). Take \(\mathrm{E}=2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}\).

UNIT - V
9 a) For an unequal angle of dimensions \(120 \mathrm{~mm} \times 60 \mathrm{~mm} \times 10 \mathrm{~mm}\) thick, determine the magnitude of principal moments of Inertia.
b) Determine the position of shear centre for a channel section of \(150 \mathrm{~mm} \times 150 \mathrm{~mm}\) outside and 8 mm thick.

\section*{OR}

10 a) Find the position of principal axes and the values of the principal moment of Inertia for an unequal angle \(100 \mathrm{~mm} \times 60 \mathrm{~mm} \times 8 \mathrm{~mm}\)
b) Find the position of shear centre for a channel section of \(300 \mathrm{~mm} \times 150 \mathrm{~mm}\) outside and 6 mm thick.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 STRENGTH OF MATERIALS - II
}
(Civil Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ UNIT - I}

1 a) Determine the diameter of the bolt which is subjected to an axial pull of 8 kN and a transverse shear force of 4 kN using maximum principal stress theory. Take elastic limit of material in tension \(=230 \mathrm{~N} / \mathrm{mm}^{2}\), factor of safety \(=2\) and Poisson's ratio \(=\) 0.3
b) The stresses at a point is given by normal stress of \(125 \mathrm{~N} / \mathrm{mm}^{2}\) (compressive) along \(\mathrm{x}-\) axis, \(50 \mathrm{~N} / \mathrm{mm}^{2}\) (tensile) along y -axis and shear stress of \(-35 \mathrm{~N} / \mathrm{mm}^{2}\). Find the principal stresses and planes on which they act. Draw the Mohr's circle for the stress system.

\section*{OR}

2 a) At a point in a beam the normal stress along its length is \(100 \mathrm{~N} / \mathrm{mm}^{2}\). The shear stress at that point is \(45 \mathrm{~N} / \mathrm{mm}^{2}\). Find the stresses on a plane whose normal is inclined at \(30^{\circ}\) to the longitudinal axis. Also find the principal stresses and planes on which they act
b) The principal stresses at a point in an elastic material are \(200 \mathrm{~N} / \mathrm{mm}^{2}\) (tensile), 100 \(\mathrm{N} / \mathrm{mm}^{2}\) (tensile) and \(50 \mathrm{~N} / \mathrm{mm}^{2}\) (compressive). If the stress at the elastic limit in tension is \(250 \mathrm{~N} / \mathrm{mm}^{2}\), determine whether the failure of material will occur or not according to maximum strain energy theory.

UNIT - II
3 a) A composite shaft consists of copper rod of 30 mm diameter enclosed in a steel tube of external diameter 50 mm and 10 mm thick. The shaft is required to transmit a torque of \(1200 \mathrm{~N}-\mathrm{m}\). Determine the shear stresses developed in copper and steel, if both the shafts have equal lengths and welded to a plate at each end, so that their twists are equal. Take \(\mathrm{C}_{\text {steel }}=2 \mathrm{C}_{\text {copper }}\).
b) An open coiled helical spring is made of a wire of diameter 10 mm . The coil has a mean radius of 50 mm . The spring has 11 turns and the angle of helix is \(15^{\circ}\). Find the deflection, maximum bending and shear stresses under an axial load of 250 N . Take \(\mathrm{G}=80 \mathrm{GPa}\) and \(\mathrm{E}=200 \mathrm{GPa}\).

\section*{OR}

4 a) A hallow shaft is to transmit 325 kW at 120 rpm . If the shear stress is not to exceed \(70 \mathrm{~N} / \mathrm{mm}^{2}\) and the internal diameter is 0.5 of the external diameter, find the internal and external diameters by assuming the maximum torque is 1.2 times the average torque.
b) A close coiled helical spring is made of a wire of diameter 20 mm . The mean radius of the coils is 80 mm . Find the number of turns required and the maximum axial load, if the shear stress is not to exceed 100 MPa and maximum elongation is limited to 30 mm . Take \(\mathrm{G}=80 \mathrm{MPa}\).

\section*{UNIT - III}

5 a) A steel pipe of outside diameter 20 mm and thickness 3 mm is deflected by 3 mm when used as a beam supported at its ends, 1 m apart, and subjected to a central load of 150 N . Find the buckling load when the pipe is used as a column with hinged ends.

1 of 2
b) A hallow alloy tube 5 m long with external and internal diameters 40 mm and 20 mm respectively was found to extend 5.8 mm under a tensile load of 50 kN . Find the buckling load for the tube when used as column with both ends pinned. Also find the safe load the column carry by taking factor of safety as 3 .

\section*{OR}

6 a) Compare the ratio of the strength of a hollow steel column to that of solid of the same cross sectional areas. The internal diameter of the hollow column is \(3 / 4\) of the external diameter. The columns have the same length and are pinned at the ends.
b) An equal angle of dimensions \(100 \mathrm{~mm} \times 100 \mathrm{~mm} \times 10 \mathrm{~mm}\) is used as a strut with a length of 3.5 m . The strut is hinged at both the ends. Calculate the critical load by using Euler's formula. Take \(\mathrm{E}=2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}\).

\section*{UNIT - IV}

7 a) A short column made of rectangular box section of outside dimensions \(250 \mathrm{~mm} x\) 200 mm and inside dimensions 230 mm x 180 mm . Determine the permissible eccentricity along either of the principal axes of a load of 600 kN . The permissible stresses in tension and compression are 5 MPa and 60 MPa .
b) A compression member of hallow circular section of 250 mm outer diameter and 10 mm thick, is subjected to a compressive load at \((80,80)\) with reference to the centre of the circular section. Find the maximum stress in the section, if the load is 400 kN .

OR
8 a) A hallow circular section of outside diameter 280 mm and thickness 10 mm carries a load of 1200 kN . Determine at what eccentricity along a diameter the load can be placed if the permissible stresses in compression and tension are 160 MPa and 70 MPa respectively.
b) A square chimney, 20 m high has a flue opening of size \(1.5 \mathrm{~m} \times 1.5 \mathrm{~m}\). Find the minimum width required at the base for no tension if the masonry weighs \(20 \mathrm{kN} / \mathrm{m}^{3}\) and the wind pressure is \(1.5 \mathrm{kN} / \mathrm{m}^{2}\). The permissible stress in the masonry is 1 MPa .

\section*{UNIT - V}

9 a) A cantilever of length 1 m carries a point load of 2 kN at the free end and cross section is an unequal angle of dimensions \(75 \mathrm{~mm} \times 45 \mathrm{~mm} \times 8 \mathrm{~mm}\) thick. Long leg is vertical and load passes through the centroid of cross section. Determine the position of neutral axis.
b) Find the position of shear centre of a channel having dimensions, flanges 150 mm x 20 mm and web \(170 \mathrm{~mm} \times 15 \mathrm{~mm}\).

\section*{OR}

10 a) For an unequal angle of dimensions \(140 \mathrm{~mm} \times 70 \mathrm{~mm} \times 10 \mathrm{~mm}\) thick, determine the position of principal axes and magnitude of principal moments of Inertia.
b) Determine the position of shear centre for a channel section of \(150 \mathrm{~mm} \times 120 \mathrm{~mm}\) outside and 8 mm thick.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL ELECTRONICS \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\ UNIT-I}

1 a) Convert the numbers \((0.3125)_{10}\) and \((1101.01)_{2}\) in base 8.
b) i. List the truth table of \(F=x y+x y^{\prime}+y^{\prime} z\)
ii. Draw logic diagrams to implement the Boolean expression \(\mathrm{Y}=\mathrm{A}+\mathrm{B}+\mathrm{B}^{\prime}\left(\mathrm{A}+\mathrm{C}^{\prime}\right)\)

Or
2 a) Subtract the two numbers using 10's complement and 9's complement 6,428-3,409
b) Represent the decimal number 5.137 in (i) BCDcode (ii) Excess- 3 code

\section*{UNIT-II}

3 a) Simplify the following Boolean function, using three-variable maps:
\(F(x, y, z)=\sum(0,2,6,7)\)
b) Explain a four-bit binary adder circuit with relevant diagram.

Or
4 a) Why is a four-bit adder circuit implemented with full adders? Explain the designing procedure?
b) Draw a circuit for a two's complement implementer using the 4-bit adder cum subtractor circuit.

\section*{UNIT-III}

5 a) Design a 8 to 1 digital multiplexer? Also design with 4:1 MUX? Explain?
b) Give the schematic circuit of a 2-to-4 binary decoder with an active-low enable input. Show theTruth Table.

Or
6 a) Show a multiplexer is also a Boolean expression implementer.
b) Draw a block diagram of a PLA and explain it's architecture. Write differences between PLA and PROM. What is the design procedure of a PLA based circuit?

\section*{UNIT-IV}

7 a) Explain the designing procedure of Master Slave JK Flip-Flop with suitable diagram?
b) Draw the waveforms to enter a serial data 11101 into a SIPO shift register. Explain?

Or
8 a) What is a decade counter? Explain its circuit and write the applications of a decade counter?
b) What do we mean by SIPO, PISO, PIPO and SISO Shift registers? Explainwith timing diagram (i) shift left in each and (ii) shift right in each.

UNIT-V
9 a) Distinguish between a Transition table and Excitation table? Explain with an example.
b) Define Finite State machine for the state table using JK Flip-Flop.
\begin{tabular}{|c|c|c|c|c|}
\cline { 2 - 5 } \multicolumn{1}{c|}{} & \multicolumn{4}{c|}{ Inputs \((\boldsymbol{A B})\)} \\
\hline \begin{tabular}{c} 
Present state \\
\(\left(\boldsymbol{Q}_{\mathbf{1}} \boldsymbol{Q}_{\mathbf{0}}\right)\)
\end{tabular} & \(\mathbf{0 0}\) & \(\mathbf{0 1}\) & \(\mathbf{1 0}\) & \(\mathbf{1 1}\) \\
\hline 00 & 01 & 00 & 00 & 01 \\
\hline 01 & 10 & 00 & 00 & 10 \\
\hline 10 & 11 & 00 & 00 & 11 \\
\hline 11 & 01 & 00 & 00 & 01 \\
\hline & \multicolumn{4}{c|}{ Next State \(\left(Q_{1}{ }^{*} Q_{0}{ }^{*}\right)\)} \\
\cline { 2 - 5 } & \multicolumn{3}{c|}{} & \multicolumn{3}{c|}{} \\
\hline
\end{tabular}

Or
10 a) What is the importance of reduction of number of states? What is the advantage of standard form for state tables? Explain with an example.
b) Explain the design procedure of Asynchronous sequential circuits.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL ELECTRONICS \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70
\begin{tabular}{|c|}
\hline Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks \\
\hline UNIT I \\
\hline UNIT-I \\
\hline
\end{tabular}

1 a) Given the two binary numbers \(\mathrm{X}=10101111\) and \(\mathrm{Y}=10000101\), perform the subtraction
(i) \(X-Y\) and (ii) \(Y-X\) by using 2's complement technique?
b) i. Express the Boolean function \(F=x y+\mathrm{x}^{\prime} \mathrm{z}\) as a product of maxterms
ii. Find the complement of \(\mathrm{F}=\mathrm{wx}+\mathrm{yz}\); then show that \(\mathrm{FF}^{\prime}=0\) and \(\mathrm{F}+\mathrm{F}^{\prime}=1\)

Or
2 a) Convert the following expressions into sum of products and product of sums:
\[
\begin{array}{ll}
\text { i. } & \left(\mathrm{AB}+\mathrm{C}^{\prime} \mathrm{D}\right)\left(\mathrm{B}+\mathrm{C}^{\prime} \mathrm{D}\right) \\
\text { ii. } & \mathrm{X}^{\prime}+\mathrm{x}\left(\mathrm{x}+\mathrm{y}^{\prime}\right)\left(\mathrm{y}+\mathrm{z}^{\prime}\right)
\end{array}
\]
b) Draw the logic diagram to the following Boolean expressions without simplifying them:
\(\begin{array}{ll}\text { i. } & \mathrm{BC}^{\prime}+\mathrm{AB}+\mathrm{ACD} \\ \text { ii. } & (\mathrm{A}+\mathrm{B})(\mathrm{C}+\mathrm{D})\left(\mathrm{A}^{\prime}+\mathrm{B}+\mathrm{D}\right)\end{array}\)

\section*{UNIT-II}

3 a) Simplify the following Boolean function, using three-variable maps:
\(F(x, y, z)=\sum(0,2 \cdot 3,4,6)\)
b) Draw the circuit diagram of a 2-bit adder-subtractor and explain the function?

Or
4 a) Draw the block diagram of a full adder using two half adders and one OR gate.
b) Simplify the following Boolean expression, using three-variable maps:
\(F(x, y, z)=x y+x y^{\prime} z^{\prime}+x^{\prime} y z^{\prime}\)

\section*{UNIT-III}

5 a) Design a combinational circuit that will accomplish the multiplication of the 2-bit binary number \(X_{1} X_{0}\) by the 2-bit binary number \(\mathrm{Y}_{1} \mathrm{Y}_{0}\). Is a two-level circuit the most economical? Justify?
b) What is advantage of a PROM compared to the PLA and PALs? Explain.

\section*{Or}

6 a) Construct a 4 X16 decoder using five 2 X4 decoder modules. Explain with a neat schematic diagram.
b) What is the difference between a digital multiplexer and a digital demultiplexer?

Explain with an example?

\section*{UNIT-IV}

7 a) Define D and T flip-flop with the help of truth table? Also design the D and T flipflop using JK flip flop?
b) Design a 4-bit asynchronous decade counter and draw the timing diagram.

8 a) Draw the timing diagram of a 4-bit asynchronous counter and explain?
b) Draw and explain briefly an Asynchronous Mod-12 counter?

\section*{UNIT-V}

9 a) Design a 5 state sequential machine whose sequential states are: \(000,001,010,110\), \(111,000 \ldots\). Assume initial state is 000 .
b) Explain the design procedure of synchronous sequential circuits.

\section*{Or}

10 a) Why state reduction is necessary in sequential circuit design? What are the different methods of state reduction? Explain implication table method of state reduction with an example.
b) A synchronous counter is controlled by two input signals A and B. The counter does not operate, if \(\mathrm{A}=0\) and \(\mathrm{B}=0\). When \(\mathrm{A}=0\) and \(\mathrm{B}=1\), the counter operates as a \(\bmod\) four counter. If \(\mathrm{A}=1\) and \(\mathrm{B}=0\) the counter operates as a mod eight counter. Draw an FSM chart and design a circuit?

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL ELECTRONICS \\ (Electrical and Electronics Engineering)
}

Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

\section*{UNIT-I}

1 a) i. Subtract (12.50) \({ }_{10}\) from (18.75) \()_{10}\) in binary using 1 's complement method?
ii. Find the Gray Code number for the given 12-bit binary number 100110100111 and explain the procedure?
b) Implement the Boolean function \(F=x y+x^{\prime} y^{\prime}+y^{\prime} z\) with AND, OR and inverter gates

\section*{Or}

2 a) Express the following sum-of -Products function \(\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\Sigma(3,5,9,11,15)\) in to POS form.
b) Show that the dual of the exclusive-OR is equal to its complement?

\section*{UNIT-II}

3 a) Simplify the following Boolean expression, using any two mapping techniques.
\(F(x, y, z)=x y+x^{\prime} y^{\prime} z z^{\prime}+x^{\prime} y z '\)
b) Implement 8 -bit adder circuit using full adders as the building blocks.

\section*{Or}

4 a) Simplify the Boolean function, \(\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\sum(0,1,4,5,7,15)+\mathrm{d}(10,11,14)\). Explain the procedure?
b) Draw the logic diagram of a half subtractor using NOR gates only.

\section*{UNIT-III}

5 a) Implement the following function using a multiplexer of proper \(\operatorname{size} . \mathrm{F}(\mathrm{w}, \mathrm{x}, \mathrm{y}, \mathrm{z})=\)
\(\sum \mathrm{m}(0,1,2,3,4,9,13,14,15)\)
b) Give the logic circuit schematic to realize a BCD to decimal decoder.

\section*{Or}

6 a) Design a 4 bit comparator using PROMs?
b) What is a difference between an encoder and a decoder? Explain with an example.

\section*{UNIT-IV}

7 a) What are the differences in a Master Slave JK FF, a Positive edge triggered JK-FF and a Negative edge triggered JK-FF?
b) Draw a logic diagram of 4-bit ripple counter and explain its operation with timing diagram and sequence table. What modification is required to use as a decade counter?

Or

8 a) Write the difference between the following counters
(a) Synchronous counter and asynchronous counter
(b) Binary UP and binary DOWN counter
b) Draw the logic circuit diagram of universal shift register and explain its operation with functional table.

\section*{UNIT-V}

9 a) Write design procedure of a finite state machine.
b) Design a sequential circuit (finite state machine) for Table given below using D flipflops.Assume two inputs are A and B, outputs of the sequential circuit are outputs of Dflip-flops, present state \(=S\), Next State=S*. Consider the four states of the sequentialcircuit are \(S_{0}=00, S_{1}=01, S_{2}=10\) and \(S_{3}=11\).
\begin{tabular}{|c|c|c|c|c|}
\hline & \multicolumn{4}{|l|}{Inputs (AB)} \\
\hline \[
\begin{array}{|c|}
\hline \text { Present } \\
\text { state }(S)
\end{array}
\] & 00 & 01 & 10 & 11 \\
\hline \(S_{0}\) & \(S_{1}\) & \(S_{0}\) & \(S_{0}\) & \(S_{1}\) \\
\hline \(S_{1}\) & \(S_{2}\) & \(S_{0}\) & \(S_{0}\) & \(\mathrm{S}_{2}\) \\
\hline \(S_{2}\) & \(S_{3}\) & \(S_{0}\) & \(S_{0}\) & \(S_{3}\) \\
\hline \(S_{3}\) & \(S_{1}\) & \(S_{0}\) & \(S_{0}\) & \(S_{1}\) \\
\hline & \multicolumn{4}{|l|}{Next State ( \(S^{*}\) )} \\
\hline
\end{tabular}

\section*{Or}

10 a) Draw the state diagram and state table of a up-down counter. Design the Up-Down counter using Tflip-flops.
b) The state diagram of a sequential circuit is given in Fig. Draw the state table for Fig. Assume two inputs are A and B, output is O.


\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 DIGITAL ELECTRONICS \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

\section*{UNIT-I}

1 a) Generate a Hamming Code for the given 4-bit message word 1001 and rewrite the entire message in Hamming Code.
b) Obtain the truth table of the function, and express function in sum-of-minterms and product of max terms \(Y(x y+z)(y+x z)\). Or

2 a) For the Function \(F=x y^{\prime} z+x^{\prime} y^{\prime} z+w^{\prime} x y+w x^{\prime} y+w x y\), draw the logic diagram using original Boolean expression and also for simplified expression. Compare the total number of gates for the two.
b) Convert the given number "B2FA" to binary and Find the 2's complement of the result?

\section*{UNIT-II}

3 a) Simplify the Boolean function, using five-variable maps
\(F(A, B, C, D, E)=A^{\prime} B^{\prime} C E^{\prime}+B^{\prime} C^{\prime} D^{\prime} E^{\prime}+A^{\prime} B^{\prime} D^{\prime}+B^{\prime} C D^{\prime}+A^{\prime} C D+A^{\prime} B D\)
b) Design a full-subtractor circuit with three inputs \(\mathrm{x}, \mathrm{y}, \mathrm{B}_{\mathrm{in}}\) and two outputs Diff and \(\mathrm{B}_{\text {out }}\). Where \(\mathrm{B}_{\text {in }}\) is the input borrow, \(\mathrm{B}_{\text {out }}\) is the output borrow and Diff is the difference.

\section*{Or}

4 a) Draw a logic diagram using only two-input NOR gates to implement the following function: \(\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=(\mathrm{A} \oplus \mathrm{B})^{\prime}(\mathrm{C} \oplus \mathrm{D})\)
b) Design the Excess-3 code adder circuit.

\section*{UNIT-III}

5 a) Implement the following logic function with 2 nX 1 multiplexer, where n is the number of variables in the function. \(\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\mathrm{S}(4,5,6,7,8,13,14,15)\).
b) Why does a carry look-a-head generator give a fast adder? How much is the speed up for an 8 -stage circuit? Explain.

\section*{Or}

6 a) What is a difference between a decoder and a digital demultiplexer? Explain their truth table differences by taking an example.
b) Construct a 4 X16 decoder using two \(3 \times 8\) decoder modules and additional logic. Show the schematic diagram neatly.

\section*{UNIT-IV}

7 a) How does a SR latch differ from a gated RS latch?
b) Write the count sequence of 3-bit binary ripple counter. Design a 3-bit ripple counter using J-K flip-flops

Or

8 a) Design a 4-bit binary UP/DOWN ripple counter with a control input for UP/DOWN counting
b) Design a PIPO, which is a 4-bit buffer register with parallel in (loading) and parallel output (storing)

\section*{UNIT-V}

9 a) Write difference between Mealy and Moore machines in detail.
b) Design a sequential circuit for the state Table using D flip-flops. Assume twoinputs are A and B , output of the sequential circuit is O , present state of D flip-flops \(=\) \(\mathrm{Q}_{1} \mathrm{Q}_{0}\), Next State of D flip-flops \(=\left(\mathrm{Q}_{1}{ }^{*} \mathrm{Q}_{0}{ }^{*}\right)\).
\begin{tabular}{|c|c|c|c|c|}
\cline { 2 - 5 } \multicolumn{1}{c|}{} & \multicolumn{4}{c|}{ Inputs \((\boldsymbol{A B})\)} \\
\hline \begin{tabular}{c} 
Present \\
state \(\left(\boldsymbol{Q}_{\mathbf{1}} \boldsymbol{Q}_{\mathbf{0}}\right)\)
\end{tabular} & \(\mathbf{0 0}\) & \(\mathbf{0 1}\) & \(\mathbf{1 0}\) & \(\mathbf{1 1}\) \\
\hline 00 & \(01 / 0\) & \(00 / 0\) & \(00 / 0\) & \(01 / 0\) \\
\hline 01 & \(10 / 1\) & \(00 / 1\) & \(00 / 1\) & \(10 / 1\) \\
\hline 10 & \(11 / 0\) & \(00 / 0\) & \(00 / 0\) & \(11 / 0\) \\
\hline 11 & \(01 / 1\) & \(00 / 1\) & \(00 / 1\) & \(01 / 1\) \\
\cline { 2 - 5 } & \multicolumn{4}{c|}{ Next State \(\left(Q_{1}{ }^{*} Q_{0}{ }^{*}\right) /\) Output \((O)\)} \\
\hline
\end{tabular}

10 a) A sequential circuit has two inputs X and CLOCK and one output O . Incoming data are examined in consecutive groups of three digits and the output \(\mathrm{O}=1\) for the following three input sequences 000,010 and 111. Draw a state diagram and implement the sequential circuit using J-K flip-flops.
b) Define Finite state machine for the state table using D Flip-Flops.
\begin{tabular}{|c|c|c|c|c|}
\cline { 2 - 5 } \multicolumn{1}{c|}{} & \multicolumn{5}{c|}{ Inputs \((\boldsymbol{A B})\)} \\
\hline \begin{tabular}{c} 
Present state \\
\(\left(\boldsymbol{Q}_{1} \boldsymbol{Q}_{0}\right)\)
\end{tabular} & \(\mathbf{0 0}\) & \(\mathbf{0 1}\) & \(\mathbf{1 0}\) & \(\mathbf{1 1}\) \\
\hline 00 & 01 & 00 & 00 & 01 \\
\hline 01 & 10 & 00 & 00 & 10 \\
\hline 10 & 11 & 00 & 00 & 11 \\
\hline 11 & 01 & 00 & 00 & 01 \\
\hline \multicolumn{5}{c|}{ Next State \(\left(Q_{1}{ }^{*} Q_{0}{ }^{*}\right)\)} \\
\hline
\end{tabular}

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ MATERIAL SCIENCE \& METALLURGY \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Explain bonds in solids and crystallization of metals in detail.
b) Analyze the binary phase diagram of \(\mathrm{Cu}-\mathrm{Ni}\) with neat sketch.

\section*{Or}

2 a) Draw a neat sketch of BCC crystal structure and calculate its packing factor and effective number of atoms.
b) Explain relationship between equilibrium diagrams and properties of alloys.

\section*{UNIT-II}

3 a) Explain the structure and properties of white cast iron.
b) Analyze super alloys and its applications in detail.

\section*{Or}

4 a) Discuss the structure and properties of low alloy steels.
b) Explain the structure and properties of copper and its alloys.

\section*{UNIT-III}

5 a) Explain one important technique/method to determine the hardenability of steels.
b) Discuss the process of normalizing in detail.

\section*{Or}

6 a) Explain stages and significance of annealing process.
b) Discuss the process of tempering in detail.

\section*{UNIT-IV}

7 Analyze the milling atomization, granulation reduction and electrolytic deposition processes?

\section*{Or}

8 Explain the compacting methods used in powder metallurgy in detail.
UNIT-V
9 Analyze manufacturing methods, properties and applications of metal - matrix [14M] composites and \(\mathrm{C}-\mathrm{C}\) composites?

Or
10 Discuss manufacturing process, properties and applications of glasses and metal [14M] ceramic mixtures?

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ MATERIAL SCIENCE \& METALLURGY
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Explain the effect of grain boundaries on the properties of metals and alloys.
b) Analyze the binary phase diagram of \(\mathrm{Fe}-\mathrm{Fe}_{3} \mathrm{C}\) with neat sketch?

\section*{Or}

2 a) Draw the close packed planes and directions in Simple Cubic and FCC crystals and find out the miller indices of the planes?
b) Explain lever rule and coring miscibility gaps.

\section*{UNIT-II}

3 a) Explain the structure and properties of malleable cast iron.
b) Evaluate the classification of steels with applications?

\section*{Or}

4 a) Discuss the structure and properties of tool and die steels?
b) Explain the structure and properties of aluminium and its alloys.

\section*{UNIT-III}

5 Analyze the process of heat treatment of alloys in detail?

\section*{Or}

6 Illustrate about the surface hardening methods?

\section*{UNIT-IV}

7 Discuss the methods of manufacturing sintered parts?

\section*{Or}

Explain the factors determining the use of powder metallurgy in detail.
UNIT-V
9 Analyze manufacturing techniques, properties and applications of particle reinforced materials and fiber reinforced materials?

\section*{Or}

10 Discuss the manufacturing process, properties and applications of crystalline [14M] ceramics?

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ MATERIAL SCIENCE \& METALLURGY
}
(Mechanical Engineering)

\title{
Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks
}

\section*{UNIT-I}

1 a) Explain the necessity of alloying, intermediate alloy phases, and electron [7M] compounds.
b) Analyze the experimental methods of construction of equilibrium diagrams.

\section*{Or}

2 a) Evaluate the determination of grain size and imperfections.
b) Explain the various transformations in the solid state and phase rule.

UNIT-II
3 a) Illustrate the structure and properties of grey cast iron.
b) Discuss the structure and properties of Hadfield manganese steels.

\section*{Or}

4 a) Explain the structure and properties of alloy cast iron.
b) Discuss the structure of titanium and its alloys?

\section*{UNIT-III}

5 Draw and explain TTT diagrams in detail.

\section*{Or}

6 Explain the process of age hardening treatment in detail.

\section*{UNIT-IV}

7 Discuss the methods of producing metal powders.
Or

8 Explain the applications of powder metallurgy process in detail.
UNIT-V
9 Illustrate various methods of component manufacture of composites.
Or
10 Explain manufacturing process, properties and applications of cermets and abrasive materials.

SET - 4

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 MATERIAL SCIENCE \& METALLURGY \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

UNIT-I
1 a) Analyze Hume Rotherys rules in detail.
b) Explain equilibrium cooling and heating of alloys.

\section*{Or}

2 a) Discuss the types of solid solutions and concept of twinning.
b) Explain isomorphous alloy systems, eutectic systems, and congruent melting intermediate phases.

\section*{UNIT-II}

3 a) Illustrate the structure and properties of spheriodal graphite cast iron.
b) Discuss the structure and properties of magnesium and its alloys.

\section*{Or}

4 a) Explain the structure and properties of plain carbon steels.
b) Explain in brief about Cryogenic treatment of alloys?

UNIT-III
5 Analyze the effect of alloying elements on \(\mathrm{Fe}-\mathrm{Fe}_{3} \mathrm{C}\) system in detail.

\section*{Or}

6 Explain cryogenic treatment of alloys in detail.

\section*{UNIT-IV}

7 Discuss the basic processes involved in powder metallurgy.
Or
8 Explain the secondary operations of sintering in detail.

\section*{UNIT-V}

9 Discuss the classification of composites with examples.

\section*{Or}

10 Define nanomaterials and explain the properties and applications of nano materials.

1 of 1

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL IC DESIGN
}
(Electronics \& Communication Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit

UNIT-I
1 a) Explain the various Data Objects supported by VHDL. Give the necessary [7M] examples?
b) Define the following terms relevant to Verilog HDL
i) Parameters iii) Constants
ii) Keywords iv) identifiers

Or
2 a) Explain the difference in program structure of VHDL and any other procedural language. Give an example.
b) What is the use of library clause and use clause? Give example.

\section*{UNIT-II}

3 a) Design a 4-bit carry look ahead adder using gates and write data flow VHDL program.
b) Design a 3-bit comparator using three one bit comparators and logic gates.

\section*{Or}

4 a) What is multiplexer? Draw the logic diagram of 8 to 1 line multiplexer?
b) Design a 32 to 1 MUX using \(74 \times 151\) and \(74 \times 139\) decoders.

\section*{UNIT-III}

5 a) Design and Explain the operation of 4-bit ring counter with the help of an IC?
b) Implement the verilog HDL module of N-bit Synchronous Up/Down counter?

Or
6 a) Design and Explain a 4-bit Ripple counter with the help of an IC?
b) With suitable logic diagram explain a 4-bit bidirectional shift register? Also write the VHDL source code for the same?

UNIT-IV
7 a) Design a 3-input CMOS OR-AND-INVERTER gate. Draw the logic diagram and function table.
b) Discuss a Pseudo-NMOS logic and design XNOR gate using it?

8 a) Draw a circuit diagram, functional table, and logic symbol for a CMOS gate with two inputs \(A\) and \(B\) and an output \(Z\) where \(Z=1\) if \(A=0\) and \(B=1\), and \(Z=0\) otherwise.
b) What is a Complementary Pass-Transistor Logic (CPL)? Draw the Circuit diagram of CPL NAND2 gate and CPL NOR2 gate.

\section*{UNIT-V}

9 a) Construct a Gate-level schematic of the clocked NAND-based JK latch circuit and explain its operation with detailed truth table?
b) Design Schmitt trigger using CMOS and explain its operation?

\section*{Or}

10 a) Design CMOS SR latch circuit based on NOR2 gates and explain its operation with [7M] the help of truth table?
b) Draw different styles of D-FlipFlops using CMOS and transmission gates and [7M] explain any one?

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL IC DESIGN \\ (Electronics \& Communication Engineering)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ ~~~~~~~~~~~~~~~~~~~~~~~~ \\ UNIT-I}

1 a) Explain various architectural bodies/modeling styles in VHDL with examples.
b) Explain the various data types supported by VHDL. Give the necessary examples.

2 a) Write the differences between Verilog and VHDL? Write the Syntax of CASE INVERTOR?
b) Write a Verilog code for a 4X1 MUX using CASE statement?

\section*{UNIT-II}

3 a) Design a 2 input 4-bit multiplexer. Write the truth table and draw the logic diagram.
b) Using a process statement write a VHDL source code for 4 to 1 multiplexer.

4 a) Draw the logic diagram of \(74 \times 283\) IC and design a 24 -bit ripple adder using the same IC.
b) Write a VHDL code for four bit parallel adder/subtractor.

\section*{UNIT-III}

5 a) Draw the circuit diagram of a 4-bit binary counter and explain its working with its function table and write its Verilog code?
b) Tabulate the comparisons between synchronous sequential and asynchronous sequential circuits.

\section*{Or}

6 a) List the basic types of shift registers in terms of data movement with diagrams?
b) Write a verilog description of the 8 -bit parallel in/parallel out shift register for multiplication and division operations and write its test bench?

UNIT-IV
7 a) Draw a circuit diagram, functional table, and logic symbol for a two input depletionload NOR gate and explain its functional behavior.
b) Define threshold voltage of a MOS device and explain its significance.

Or
8 a) What is a CMOS transmission gate? Implement Ex-OR and Ex-NOR Boolean functions using transmission gate.
b) Design an area efficient layout diagram for the CMOS logic shown below
\[
\mathrm{Y}=(\mathrm{A}+\mathrm{B}+\mathrm{C})^{1}
\]

UNIT-V
9 a) Draw the Gate-level schematic and block diagram of the NAND-based SR latch and explain the operation with the help of function table.
b) List out the comparisons between latch and flip flop.

\section*{Or}

10 a) Design and Explain the operation of CMOS clocked JK flip-flop
b) List out the differences between regenerative logic circuits and non-regenerative logic circuits.

SET - 3

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL IC DESIGN}
(Electronics \& Communication Engineering)

\section*{Time: 3 hours}

Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Explain the program structure of VHDL with the help of block diagram.
b) With suitable examples explain the various data types supported by VHDL.

\section*{Or}

2 a) List out the different Operators available in Verilog HDL. Explain with example.
b) What are the various data types supported by Verilog HDL? Explain about the predefined data values used for net or variable data type?

\section*{UNIT-II}

3 a) Design the logic circuit for even parity checker and write the behavioral VHDL program?
b) What is a comparator? Explain the operation of a 2-bit comparator with a relevant diagram. Draw its logic symbol and write a VHDL code.

\section*{Or}

4 a) Design the following code converters:
i) \(\quad 5211\) to 2421
ii) 4-bit binary to excess-3
b) Design a first and second highest priority encoder circuit using 74LS148 and 74LS138?

\section*{UNIT-III}

5 a) Draw the logic diagram for n-bit left to right shift register? Write down the VHDL code for an n-bit left to right shift register?
b) List out the applications of shift register?

6 a) Discuss the logic circuit of \(74 \times 377\) register. Write a VHDL program for the same in structural style.
b) Give brief note on hazards in sequential circuits?

\section*{UNIT-IV}

7 a) Design a CMOS transistor circuit for 2-input NAND gate. With the help of function table explain the circuit.
b) With suitable example, discuss about the requirement and operation of pass transistors and design AND gate using it?

\section*{Or}

8 a) Draw the circuit diagram of two-input depletion-load NOR gate and calculate the output low and output high voltages for the same?
b) Design and Explain CMOS full-adder circuit?

UNIT-V
9 a) Draw the logic diagram and truth table of a CMOS clocked SR flip-flop and explain its operation?
b) With neat schematic explain D latch using CMOS Inverter and Transmission gate?

Or
10 a) Draw the schematic circuit of a D flip flop with negative edge triggering using NAND gates. Give its truth table and explain its operation?


\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DIGITAL IC DESIGN
}
(Electronics \& Communication Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Explain the different concurrent statements and sequential statements in VHDL?
b) Discuss about the comparison between CASE and IF statements in VHDL with examples?

\section*{Or}

2 a) Give the syntax for a net declaration? Explain the different kind of nets that belong to the net data type?
b) How the package declaration is different from entity declaration? Give the syntax for each?

\section*{UNIT-II}

3 a) Draw the logic symbol and logic diagram of 74 X 148 priority encoder. Give its truth table and write VHDL code in any one of the model.
b) Explain the design procedure for multiplexers and de-multiplexers and draw the logic diagram of a 4-to-1 line multiplexer with logic gates.

\section*{Or}

4 a) Give circuit implementation of 4 Bit Ripple adder and Ripple Adder/Subtractor using ones and twos complement method.
b) Design a Binary to Gray Code converter and write its VHDL code using data flow modeling?

\section*{UNIT-III}

5 a) List the basic types of shift registers in terms of data movement with diagrams?
b) Design \& explain 4-bit serial-In Parallel-out register and write its VHDL code?

\section*{Or}

6 a) Explain the operation of a 4 bit synchronous binary counter with the required diagram and waveforms.
b) Design a 4-bit binary synchronous counter using \(74 \times 74\) IC. Write the VHDL source code for the same.

UNIT-IV
7 a) Draw the generalized NOR structure with multiple inputs using Pseudo nMOS and explain the operation with the help of functional table?
b) Develop complementary Pass-transistor logic? Design OR operation using Passtransistor logic?

Or

8 a) Draw and explain the CMOS Half adder?
b) How does a transmission gate work? Explain four different representations of the CMOS transmission gate (TG). Design 2X1 MUX using it? UNIT-V

9 a) Explain the operation of a D-latch using CMOS through suitable timing diagram for various possibilities of input.
b) Design CMOS JK Flip flop and explain?

\section*{Or}

10 a) With the help of neat circuit diagram explain the operation of a CMOS bistable [7M] element?
b) Design D-Flip flop using CMOS Inverter and transmission gates as switches?

SET - 1

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DATABASE MANAGEMENT SYSTEMS \\ (Common to CSE,CST,CSE(CS),CSE(IOTCSIBCT),CSE(CSBS),CSE(IOT),\&CS)}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}
\(\qquad\)

\section*{UNIT-I}

1 a) Why would you choose a database system instead of simply storing data in operating system files? When would it make sense not to use a database system?
b) Draw the generic architecture of database systems and briefly explain different components in it.

\section*{OR}

2 a) How database users are classified according to their roles? Write at least 5 functions of database administrators.
b) Explain about different levels of abstractions.

UNIT-II
3 a) Define the following terms: relation schema, relational database schema, domain, attribute, attribute domain, relation instance, and relation cardinality.
b) When are integrity constraints enforced by a DBMS? What is referential integrity? Explain with examples.

\section*{OR}

4 Consider the following relational schema. An employee can work in more than one department; the pct time field of the Works relation shows the percentage of time that a given employee works in a given department.

Emp(eid: integer, ename: string, age: integer, salary: real)
Works(eid: integer, did: integer, pct time: integer)
Dept(did: integer, dname: string, budget: real, managerid: integer)
Write the following queries in SQL:
a) Print the names and ages of each employee who works in both the Hardware department and the Software department.
b) For each department with more than 20 full-time-equivalent employees (i.e., where the part-time and full-time employees add up to at least that many full-time employees), print the did together with the number of employees that work in that department.
c) Print the name of each employee whose salary exceeds the budget of all of the departments that he or she works in.
d) Find the managerids of managers who manage only departments with budgets greater than \(\$ 1\) million.
e) Find the enames of managers who manage the departments with the largest budgets.
f) If a manager manages more than one department, he or she controls the sum of all the budgets for those departments. Find the managerids of managers who control more than \(\$ 5\) million.

\section*{UNIT-III}

5 a) Define the following terms with examples: Attribute, Composite Attribute, Multi valued Attribute and derived attribute.
b) What are nested queries? What is correlation in nested queries? How would you use the operators IN, EXISTS, UNIQUE, ANY, and ALL in writing nested queries? Explain with examples.

\section*{OR}

6 Answer each of the following questions based on the below relational schema:
Emp(eid: integer, ename: string, age: integer, salary: real)
Works(eid: integer, did: integer, pcttime: integer)
Dept(did: integer, dname: string, budget: real, managerid: integer)
a) Give an example of a foreign key constraint that involves the Dept relation. What are the options for enforcing this constraint when a user attempts to delete a Dept tuple?
b) Write the SQL statements required to create the preceding relations, including appropriate versions of all primary and foreign key integrity constraints.
c) Define the Dept relation in SQL so that every department is guaranteed to have a manager.
d) Write an SQL statement to add John Doe as an employee with eid \(=101\), age \(=\) 32 and salary \(=15,000\).
e) Write an SQL statement to give every employee a 10 percent raise.
f) Write an SQL statement to delete the Toy department. Given the referential integrity constraints you chose for this schema, explain what happens when this statement is executed.

\section*{UNIT-IV}

7 a) Define and explain about redundancy and the problems that it can cause.
b) Consider the schema \(\mathrm{R}=(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D}, \mathrm{E})\) and the functional dependencies: \(\mathrm{A} \rightarrow \mathrm{BC}\), \(\mathrm{CD} \rightarrow \mathrm{E}, \mathrm{B} \rightarrow \mathrm{D}, \mathrm{E} \rightarrow \mathrm{A}\). Give a lossless join decomposition into BCNF of the schema R.

\section*{OR}

8 a) Suppose that we have the following four tuples in a relation \(S\) with three attributes \(\mathrm{ABC}:(1,2,3),(4,2,3),(5,3,3),(5,3,4)\). Which functional and multivalued dependencies hold over relation \(S\) ?
b) Explain how to preserve functional dependencies during decomposition.

\section*{UNIT-V}

9 a) Consider a database with objects X and Y and assume that there are two transactions Tl and T 2 . Transaction T 1 reads objects X and Y and then writes object X . Transaction T2 reads objects X and Y and then writes objects X and Y . Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a write-read conflict.
b) What are ACID properties? Define with examples.

\section*{OR}

10 a) What is an index? Discuss important properties of an index that affect the efficiency of searches using the index.
b) Discuss in detail about multilevel indices.

3 of 3

SET - 2

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DATABASE MANAGEMENT SYSTEMS \\ (Common to CSE, CST, CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), \& CS)}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ UNIT-I}

1 a) Draw and describe the layered architecture of a DBMS.
b) What are the drawbacks in file systems for storing enterprise data? How database systems overcome them?

\section*{OR}

2 a) Explain the difference between logical and physical data independence. Discuss their importance.
b) What is a data model? Briefly explain about different data models.

\section*{UNIT-II}

3 a) What is the difference between a candidate key and the primary key for a given relation? What is a superkey?
b) With an example for each, explain about arithmetic and logical operations in SQL.

OR
4 The following relations keep track of airline flight information:
[14M]
Flights(flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time, price: real)
Aircraft(aid: integer, aname: string, cruisingrange: integer)
Certified(eid: integer, aid: integer)
Employees(eid: integer, ename: string, salary: integer)
Note that the Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft, and only pilots are certified to fly. Write each of the following queries in SQL.
a) Find the names of aircraft such that all pilots certified to operate them have salaries more than \(\$ 80,000\).
b) For each pilot who is certified for more than three aircraft, find the eid and the maximum cruisingrange of the aircraft for which she or he is certified.
c) Find the names of pilots whose salary is less than the price of the cheapest route from Los Angeles to Honolulu.
d) For all aircraft with cruisingrange over 1000 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
e) Find the names of pilots certified for some Boeing aircraft.
f) Find the aids of all aircraft that can be used on routes from Los Angeles to Chicago.
g) Identify the routes that can be piloted by every pilot who makes more than \(\$ 100,000\).

5 a) Explain the process of identifying entities and their relationships from requirements gathered. What kind of information needs to be avoided while doing so?
b) What are binary and ternary relationships? Explain with examples. Also explain with an example, relationships that connect an entity to itself.

\section*{OR}

6 A university database contains information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; each of the following situations concerns the Teaches relationship set. For each situation, draw an ER diagram that describes it (assuming no further constraints hold).
a) Professors can teach the same course in several semesters, and each offering must be recorded.
b) Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (Assume this condition applies in all subsequent questions.)
c) Every professor must teach some course.
d) Every professor teaches exactly one course (no more, no less).
e) Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor.

UNIT-IV
7 a) Consider the instance of a relation shown below:
\begin{tabular}{|c|c|c|}
\hline X & Y & Z \\
\hline\(x 1\) & \(y l\) & \(z 1\) \\
\hline\(x 1\) & \(y l\) & \(z 2\) \\
\hline\(x 2\) & \(y l\) & \(z 1\) \\
\hline\(x 2\) & \(y l\) & \(z 3\) \\
\hline
\end{tabular}

List all the functional dependencies that this relational instance satisfies.
b) What is meant by the closure of functional dependencies? Illustrate with an example.

\section*{OR}

8 a) When is the decomposition of a relational schema R into two relational schemas X and Y said to be lossless-join decomposition? Why is this property so important? Give a necessary and sufficient condition to test whether a decomposition is lossless-join.
b) Define multivalued dependencies and join dependencies. Discuss the use of such dependencies in database design.

\section*{UNIT-V}

9 a) Write about the anomalies that can be caused by concurrent access to same data object.
b) Define the terms transaction, schedule, complete schedule, and serial schedule.

\section*{OR}

10 a) Explain the role of clustered indices and composite search keys in performance tuning.
b) Explain the difference between Hash indexes and B+ tree indexes.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DATABASE MANAGEMENT SYSTEMS \\ (Common to CSE, CST, CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), \& CS)
}

Time: 3 hours
Max. Marks: 70

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks \\ UNIT-I}

1 a) Present some popular applications of database systems and role of databases in those applications.
b) Explain the difference between external, internal, and conceptual schemas. How are these different schema layers related to the concepts of logical and physical data independence?

\section*{OR}

2 a) List the advantages and disadvantages of using database systems.
b) Explain the concept of physical data independence and its importance in database systems.

\section*{UNIT-II}

3 a) What is a foreign key constraint? Why are such constraints important? What is referential integrity?
b) Define the following terms with examples: relation schema, relational database schema, domain, and relation degree.

\section*{OR}

4 Consider the following schema:
Suppliers(sid: integer, sname: string, address: string)
Parts(pid: integer, pname: string, color: string)
Catalog(sid: integer, pid: integer, cost: real)
The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in SQL:
a) Find the pnames of parts for which there is some supplier.
b) Find the snames of suppliers who supply every part.
c) Find the snames of suppliers who supply every red part.
d) Find the pnames of parts supplied by Acme Widget Suppliers and no one else.
e) Find the sids of suppliers who charge more for some part than the average cost ofthat part (averaged over all the suppliers who supply that part).
f) For each part, find the sname of the supplier who charges the most for that part.
g) Find the sids of suppliers who supply only red parts.

\section*{UNIT-III}

5 a) Explain the main steps in database design. What is the goal of each step? In which step is the ER model mainly used? Why?
b) What is grouping in SQL? With examples explain GROUP BY\& HAVING clauses.

\section*{OR}

6 Define the following terms and give an example in ER diagram: attribute, domain, entity, relationship, entity set, relationship set, one-to-many relationship, many-tomany relationship, participation constraint, overlap constraint, covering constraint, weak entity set, aggregation, and role indicator.

\section*{UNIT-IV}

7 a) Discuss various problems that arise with redundant storage of Information?
b) Describe the desirable properties of Schema decomposition?
c) Give a set of FDs for the relation schema \(\mathrm{R}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})\) with primary key AB under which \(R\) is in 1 NF but not in 2 NF .

\section*{OR}

8 a) Explain \(1 \mathrm{NF}, 2 \mathrm{NF}\), and 3 NF with suitable examples?
b) Let \(\mathrm{R}=(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D}, \mathrm{E})\) and let M be the following set of multivalued dependencies:
\(\mathrm{A} \rightarrow \mathrm{BC}, \mathrm{B} \rightarrow \rightarrow \mathrm{CD}, \mathrm{E} \rightarrow \rightarrow \mathrm{AD}\). List the nontrivial dependencies in \(\mathrm{M}^{+}\).
UNIT-V
9 a) Compare the Ordered Indexing with Hashing.
b) Consider the following two transactions:

T13: read(A);
\(\operatorname{read}(B)\);
if \(\mathrm{A}=0\) then \(\mathrm{B}:=\mathrm{B}+1\);
write(B).
T14: \(\operatorname{read}(B)\);
\(\operatorname{read}(\mathrm{A})\);
if \(\mathrm{B}=0\) then \(\mathrm{A}:=\mathrm{A}+1\);
write(A).
Write a concurrent execution of T13 and T14 that produces a non-serializable schedule.

\section*{OR}

10 a) Construct a B+ tree of order 3 for the following set of key values: \(1,2,5,8,10,13,18,21,26,37\). Assume that the tree is initially empty and elements are entered in the given order.
b) What is a locking protocol? Describe the Strict Two-Phase Locking protocol.

\section*{II B. Tech II Semester Regular Examinations, June/July - 2022 \\ DATABASE MANAGEMENT SYSTEMS \\ (Common to CSE, CST, CSE(CS), CSE(IOTCSIBCT), CSE(CSBS), CSE(IOT), \& CS)}

Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks
UNIT-I
1 a) Explain the difference between two-tier and three-tier architectures. Which is better suited for Web applications? Why? Justify your answer with an example.
b) Differentiate between database systems and conventional file systems.

\section*{OR}

2 a) What are the responsibilities of a DBA? If we assume that the DBA is never interested in running his or her own queries, does the DBA still need to understand query optimization? Why?
b) Discuss the main benefits of using a DBMS to manage data in applications involving extensive data access.

\section*{UNIT-II}

3 a) What are integrity constraints? Define the terms primary key constraint and foreign key constraint. Give Examples.
b) Explain with examples, different DDL and DML operations in SQL.

\section*{OR}

4 Consider the following relations:
Student(snum: integer, sname: string, major: string, level: string, age: integer)
Class(name: string, meets at: string, room: string, fid: integer)
Enrolled(snum: integer, cname: string)
Faculty(fid: integer, fname: string, deptid: integer)
Write the following queries in SQL:
a) Find the names of all Juniors (level \(=\mathrm{JR}\) ) who are enrolled in a class taught by Prof. Krishna.
b) Find the age of the oldest student who is either a History major or enrolled in a course taught by Prof. Joseph.
c) Find the names of all classes that either meet in room R128 or have five or more students enrolled.
d) Find the names of all students who are enrolled in two classes that meet at the same time.
e) Find the names of faculty members who teach in every room in which some class is taught.
f) Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.
g) For each level, print the level and the average age of students for that level.

\section*{UNIT-III}

5 a) What is a view? How do views support logical data independence? How are views used for security?
b) Discuss the strengths and weaknesses of the trigger mechanism. Contrast triggers with other integrity constraints supported by SQL.

OR
6 A company database needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.
Draw an ER diagram that captures this information.
UNIT-IV
7 a) Consider the relational schema \(R(A, B, C)\), which has the FD: \(B \rightarrow C\). If \(A\) is a candidate key for R , is it possible for R to be in BCNF? If so, under what conditions? If not, explain why not.
b) Define functional dependencies. How are primary keys related to FDs? Explain with example.

\section*{OR}

8 a) When is a decomposition said to be dependency-preserving? Explain with example.
b) What is the need for normalization of schemas? Are they any demerits of normalization?

UNIT-V
9 a) On what factors techniques for indexing and hashing must be evaluated? Explain.
b) Consider the following actions taken by transaction T1 on database objects X and Y :
\[
\mathrm{R}(\mathrm{X}), \mathrm{W}(\mathrm{X}), \mathrm{R}(\mathrm{Y}), \mathrm{W}(\mathrm{Y})
\]

Give an example of another transaction T 2 , such that if run concurrently to transaction T1 without some form of concurrency control, could interfere with T1. Suggest a solution to avoid the interference.

\section*{OR}

10 a) Describe in detail about algorithms for updating single level indices.
b) Explain in detail about the B+ tree file organization.

\title{
II B. Tech II Semester Regular Examinations, June/July - 2022 GROUND WATER HYDROLOGY, WELL AND PUMPS
}
(Agricultural Engineering)
Time: 3 hours
Max. Marks: 70
Answer any FIVE Questions each Question from each unit
All Questions carry Equal Marks

\section*{UNIT-I}

1 a) Define groundwater and explain about vertical distribution of groundwater.
b) Explain about different types of aquifers.

\section*{Or}

2 a) In an unconfined aquifer extending over \(4 \mathrm{~km}^{2}\), the water table was initially at 26 m below the ground surface. After sometime an irrigation of 20 cm (full irrigation), the water table rises to a depth of 25.5 m below the ground surface. Afterward \(1.5 \times 10^{6} \mathrm{~m}^{3}\) of groundwater was withdrawn from this aquifer, which lowered the water table to 27.5 m below the ground surface. Determine: (i) specific yield of the aquifer, and (ii) soil moisture deficit (SMD) before irrigation.
b) In an area of 200 ha , the water table declines by 3.5 m . If the porosity of the aquifer material is \(30 \%\) and the specific retention is \(15 \%\), determine: (i) specific yield of the aquifer, and (ii) change in groundwater storage.

\section*{UNIT-II}

3 a) List out the functions of wells.
b) Explain about the classification of open wells.

Or
4 a) Discuss briefly about the types of subsurface groundwater exploration techniques.
b) Explain about effective size and uniformity coefficient in gravel packing.

\section*{UNIT-III}

5 a) Derive an expression to determine the aquifer characteristics from an unconfined aquifer under steady state condition.
b) A well in a confined aquifer is pumped at a constant rate of \(1200 \mathrm{~m}^{3} / \mathrm{min}\). After 600 min of continuous pumping the drawdowns in the piezometers used for the pumping test were measured. The results are as follows:
\begin{tabular}{|l|c|c|c|c|c|}
\hline \begin{tabular}{l} 
Distance of piezometer from center of \\
well \((\mathrm{m})\)
\end{tabular} & 2 & 10 & 50 & 100 & 200 \\
\hline Drawdown \((\mathrm{m})\) & 7.25 & 4.75 & 2.50 & 1.50 & 0.50 \\
\hline
\end{tabular}

Calculate the transmissibility values of different sections and average transmissibility using the Thiem Procedure I.

Or

6 a) Explain about the effect of partial penetration of wells.
b) Explain about the constant-head permeameter and Falling-head permeameter with neat sketches.

UNIT-IV
7 a) Explain the types of reciprocating pumps.
b) Explain about the solar photo voltaic pumping system.

\section*{Or}

8 a) Explain about the methods of artificial groundwater recharge.
b) What do you understand about the basic concepts of groundwater management.

\section*{UNIT-V}

9 a) A pump lifts 100,000 litres of water per hour, against a total head of 20 metres. Compute the water horse power. If the pump has an efficiency of 75 per cent, what size of prime mover is required to operate the pump? If a direct drive electric motor with an efficiency of 80 per cent is used to operate the pump, compute the cost of electrical energy in a month of 30 days. The pump is operated for 12 hours daily for 30 days. The cost of electrical energy is 20 paise per unit.
b) State affinity law. Discuss effect of change of pump speed on pump performance and on impeller diameter.

\section*{Or}

10 a) Explain about the working principle and operation of the hydraulic ram.
b) A hydraulic ram operates at a drive head of 3 m and a delivery head of 20 m . The flow through the drive pipe is \(10 \mathrm{l} / \mathrm{s}\) and the discharge at the outlet of the delivery pipe is 1.2 \(1 / \mathrm{s}\). Compute the efficiency of the ram adopting (i) D'Aubuisson's ratio and (ii) Rankine's formula.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 HYDRAULICS AND HYDRAULIC MACHINERY
} (Civil Engineering)

\author{
Time: 3 hours
}

Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit All Questions carry Equal Marks}

1 a) Derive an expression for critical depth and critical velocity of a trapezoidal channel in terms of specific energy \(E\). Assume a bottom width ' b ' and slope 1 : n .
b) In case of open channels; mention the difference between,
(i) steady and unsteady flow
(ii) uniform and non uniform flow
(iii) Laminar and turbulent flow

\section*{Or}

2 a) Determine the expression for the most economical depth of water in terms of the diameter of a channel of circular cross-section for maximum discharge.
b) A rectangular channel 6 m wide is to carry a flow of \(22.5 \mathrm{~m}^{3} / \mathrm{sec}\). Determine the slope required for depths of 3 m and 0.6 m . Also determine the Froude number and alternate depths for the specific energy conditions. Calculate the critical depth also. Take Mannings coefficient as 0.012 .
3 a) Explain about different types of slopes.
b) A trapezoidal channel with 6 m bottom and side slope 2 horizontal to 1 vertical having bed slope of 0.0016 carries \(10 \mathrm{~m}^{3} / \mathrm{sec}\) of water. The dam along the way of the channel rises the water depth by 2 m behind the dam. Decide the nature of the channel and the type of profile of the water.
Take Mannings coefficient \((\mathrm{N})=0.025\).
Or
4 a) A rectangular channel 6 meters wide discharges 1440 litres/sec of water into a 6 meters wide apron, with no slope, with a mean velocity of \(6 \mathrm{~m} / \mathrm{see}\). What is the height of the jump? How much energy absorbed in the jump.
b) Derive the dynamic equation for gradually varied flow.

5 a) A prototype sub marine moving with \(40 \mathrm{~km} / \mathrm{hr}\) in sea water is to be tested using a model of \(1 / 30\) size of prototype in a wind tunnel. Determine the speed of air required in wind tunnel and ratio of drag between the prototype and model.
b) What do you understand by similarity. Mention various similarities which are to be maintained for model testing.

Or

1 of 2

SET-1

6 a) The pressure difference \(\Delta \mathrm{p}\) in a pipe of diameter D and length L due to turbulent flow depends on the velocity V , viscosity \(\mu\), density \(\rho\) and roughness k. Using Buckingham's \(\pi\)-theorem, obtain expression for \(\Delta \mathrm{p}\).
b) What do you understand by non-dimensionless numbers and their use in model testing.
7 a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of jet.
b) A 75 mm diameter jet has a velocity of \(35 \mathrm{~m} / \mathrm{s}\). It strikes a moving curved vane in the same direction at \(20 \mathrm{~m} / \mathrm{s}\). The deflection angle of the vane is \(150^{\circ}\). Assuming no friction, Calculate no friction, calculate the X and Y components of the force exerted by the water on the vane.

\section*{Or}

8 a) Obtain an expression for the force exerted by a jet of water on an inclined fixed flat plate in the direction of the jet.
b) A jet of water, having a velocity of \(15 \mathrm{~m} / \mathrm{s}\) strikes a curved vanes which is moving with a velocity of \(6 \mathrm{~m} / \mathrm{s}\) in the same direction as that of the jet at inlet. The vane is so shaped that the jet is deflected through \(135^{\circ}\). The diameter of jet is 150 mm , assuming the vane to be smooth, find the force exerted by the jet on the vane in the direction of motion.
9 a) Define the term unit power, unit speed and unit discharge with reference to a hydraulic turbine. And also derive the expression for these terms.
b) A pelton wheel turbine is having a mean runner diameter of 1.0 m and is running at 1000 rpm . The net head is 100 m . If the side clearance is \(20^{\circ}\) and discharge is \(0.1 \mathrm{~m}^{3} / \mathrm{s}\). Find the power available at the nozzle and hydraulic efficiency of the turbine.

\section*{Or}

10 a) A single acting reciprocating pump running at 100 rpm , delivers \(0.02 \mathrm{~m}^{3} / \mathrm{s}\) of water. The diameter of the piston is 223 mm and stroke length 400 mm . Determine the theoretical discharge of the pump, coefficient of discharge and slip and the percentage slip of the pump.
b) What is the difference between single-stage and multistage pumps? Describe multistage pump with: (i) Impellers in parallel. (ii) Impellers in series.

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 KINEMATICS OF MACHINERY}

\author{
(Com to ME, AME)
}

Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Define 'kinematic pair' and 'degree of freedom'. Sketch 'Spherical pair' and state its degree of freedom.
b) Distinguish between incompletely constrained motion and successfully constrained motion, with examples.

Or
2 a) Explain with a neat sketch, the double slider crank chain mechanism and its inversions?
b) How machines are classified? Explain.

3 a) Determine the greatest permissible angle between the axes of the two shafts which are connected by a Hooke's joint if the maximum variation in the speed of the driven shaft is \(\pm 6 \%\) of the mean speed. The driving shaft is rotating at a uniform speed of 500 rpm .
b) Derive the condition for correct steering of an automobile?

\section*{Or}

4 a) What is an automobile steering gear? What are its types? Which steering gear is preferred and why?
b) Show that in Watt's straight line motion mechanism, the tracing point P on the coupler divides it in the ratio of the length of the oscillating links which are connected by it.
5 a) Assuming suitable proportions determine the velocity and acceleration of a slider in Toggle mechanism.
b) Draw the acceleration diagram of a slider crank mechanism and Explain

\section*{Or}

6 a) What is the practical significance of evaluating velocity and acceleration of members of a mechanism?
b) Determine the velocity and acceleration of the link QR and RS in a four bar mechanism in which PQRS is a four bar mechanism with fixed link PS. Crank PQ rotates uniformly and makes an angle of \(60^{\circ}\) with PS in anti-clockwise direction. The length of the links are \(\mathrm{PQ}=62.5 \mathrm{~mm}, \mathrm{QR}=175 \mathrm{~mm}, \mathrm{RS}=112.5 \mathrm{~mm}\) and \(\mathrm{PS}=\) 200 mm . Crank PQ rotates at 10 radians/ second?
7 a) Deduce expressions for the velocity and acceleration of the follower when it moves with simple harmonic motion.
b) Draw the profile of a cam to give the following motion to a flat - faced follower: velocity b) Follower to dwell for 500 of cam rotation c) Follower to return to its initial position during 900 of cam rotation with SHM d) Follower to dwell for the remaining period of cam rotation The minimum radius of cam is 50 mm . Also find the minimum width of the Follower from the cam profile diagram.

8 a) Derive relations for velocity and acceleration for a convex cam with a flatFaced follower.
b) A symmetrical circular cam operates a roller follower with a lift of 30 mm . The minimum radius of the cam is 50 mm , the roller radius is 18 mm , and the nose radius is 12 mm . The angle of lift is \(80^{\circ}\). If the speed of the cam is 210 rpm , find the main dimensions of the cam, and the acceleration of the follower at
(a) beginning of the lift, and (b) apex of the nose.

9 a) State and prove law of gearing.
b) Two spur gear wheels with 18 and 26 teeth gear together. The addendum of each wheel is equal to one module, and pressure angle is \(20^{\circ}\). Find the length of the arc of contact.

\section*{Or}

10 a) Explain reverted type gear train with sketch.
b) Describe a differential with the help of a sketch. Prove that the two rear wheels will rotate at different speeds with its help when rounding a curve.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 \\ LINEAR CONTROL SYSTEMS
}
(Electronics Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions one Question from each unit \\ All Questions carry Equal Marks}

1 a) Define the transfer function in control systems. What are the advantage and disadvantages of the open loop control systems?
b) Discuss about Moment of Inertia in rotational mechanical system.

Or
2 a) Derive the transfer function of Rotational mechanical systems.
b) Classify the feedback methods and elaborately discuss about their [7M] characteristics, advantages and disadvantages.

3 a) By using signal flow graph techniques, obtain the transfer function \(\frac{\mathrm{C}(\mathrm{S})}{\mathrm{R}(\mathrm{S})}\) for the system shown in below.

b) Drive the transfer function of DC servo motor. Explain about torque-speed characteristics.

Or
4 a) Assess the time response of second order under damped system due to unit step function
b) Draw a signal flow graph and evaluate the closed-loop transfer function of a system whose block diagram is given as follows


5 a) Determine the stability of the closed loop system whose open loop transfer is \(\frac{5(2 s+1)}{s(s+1)(1+3 s)(1+0.5 s)}\), using Routh-Hurwitz criterion.
b) What is the effect of addition of pole to a transfer function on Root Locus?

Or
6 a) Sketch the root locus plot of a unity feedback system whose open loop transfer function is \(\quad G(s)=K(s+9) / s\left(s^{2}+4 s+11\right)\)
b) Define and derive the breakaway point on the root locus.

7 a) Given the open loop transfer function of a unity feedback system
\(\mathrm{G}(\mathrm{S})=\frac{1}{S(3+S)(1+2 S)}\). Draw the Bode plot and measure from the plot the frequency at which the magnitude is 0 dB .
b) Explain the procedure to draw a polar plot.

Or
8 a) Explain about Nyquist Stability criterion with an example?
b) Sketch Bode plot and Determine Gain margin, Phase Margin, Gain cross over frequency and Phase cross over frequency
\(G(S)=\frac{10}{S(1+0.4 S)(1+0.1 S)}\).

9 a) Derive the expression for the transfer function of a lag-lead compensator.
b) Describe the State Space Analysis of Continuous Systems.

\section*{Or}

10 a) Explain the design procedure of lag compensator.
b) Design a phase lag network for a plant with the open loop transfer function \(\mathrm{G}(\mathrm{s})=\frac{5}{S(1+0.1 S)^{2}}\) to have a phase margin of \(45^{\circ}\). Verify the performance of the compensated system with the specification.

2 of 2

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 JAVA PROGRAMMING}
(Com to CSE, IT)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Discuss the applications of OOPs with an example.
b) Write a Java Program to perform various operations like addition, subtraction, and multiplication based on the number entered by the user. Display the menu also.

Or
2 a) Discuss the Features of Java with suitable examples.
b) Explain the use of break, continue, and return with an example.

3 a) Explain various constructors available in Java, with example.
b) Write a Java Program to demonstrate the significance of 'this' and 'static' keywords?

\section*{Or}

4 a) Write a JAVA program to solve towers of Haroi problem using recursive functions?
b) Write a Java Program to find smallest of three numbers using ternary operator.

5 a) How to design and implement an interface in Java? Give an example.
b) Write a JAVA program to perform matrix multiplication?

Or
6 a) Write a JAVA program to illustrate the importance of 'Super' keyword?
b) Give an example where an interface can be used to support multiple inheritances.
7 a) What are the different types of packages available in Java? Explain how to add classes to a package with a JAVA program.
b) What is exception handling? Explain an example of exception handling in the case of division by zero.

\section*{Or}

8 a) Explain the concept of Auto boxing and Auto-unboxing with a JAVA program.
b) Create a try block that will generate three types of exceptions and also create necessary catch blocks to catch these exceptions and handle these. You should also use the final statements in a block.
9 a) Explain the different ways to create threads in JAVA and mention various methods provided by jAVA for thread synchronization.
b) Discuss various methods for Searching Strings.

Or
10 a) Write a program that creates two threads. Fist thread prints the numbers from 1 to 100 and the other thread prints the numbers from 100 to 1 .
b) Explain the Inter-thread Communication with suitable example.

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 HEAT AND MASS TRANSFER}
(Agricultural Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions each Question from each unit \\ All Questions carry Equal Marks}

1 a) Derive Fourier's law of heat conduction.
b) Explain the steady state conduction of heat flow through a cylinder.

\section*{Or}

2 a) Explain the modes of heat transfer with corresponding governing laws.
b) Derive the equation for one dimensional steady state conduction through composite wall.

3 a) What is the physical basis for existence of a critical insulation radius? How do the thermal conductivity and the convection coefficient affect its value?
b) What is the overall heat transfer coefficient? How is it defined, and how is it related to the total thermal resistance? What are its units?

\section*{Or}

4 A metallic electrical wire of diameter \(\mathrm{d}=5 \mathrm{~mm}\) is to be coated with insulation of thermal conductivity \(\mathrm{k}=0.35 \mathrm{~W} / \mathrm{mK}\). It is expected that, for the typical installation, the coated wire will be exposed to conditions for which the total coefficient associated with convection and radiation is \(h=15 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\). To minimize the temperature rise of the wire due to ohmic heating, the insulation thickness is specified so that the critical insulation radius is 21 mm . During the wire coating process, however, the insulation thickness sometimes varies around the periphery of the wire, resulting in eccentricity of the wire relative to the coating. Determine the change in the thermal resistance of the insulation due to an eccentricity that is \(50 \%\) of the critical insulation thickness.
a) Write short notes on Plank's law 2) Stefan Boltzman Law.
b) Calculate the net radiant heat exchange per unit area for two parallel plates at temperatures of 4270 C and 270 C respectively. \(\varepsilon\) (hot plate) is 0.9 and \(\varepsilon\) (cold plate) is 0.6 . A polished aluminum shield is placed between them, find the percentage reduction in heat transfer. \(\varepsilon\) (Shield) is 0.4.

Or

6 a) Explain the absorption of radiation by opaque solids.
b) Discuss about the laws of black body radiation.

7 a) Explain the empirical relationships for forced convection in heat transfer.
b) Explain any two types of fins with a neat sketch.

\section*{Or}

8 a) Discuss briefly about the free and forced convection with suitable examples.
b) What is fin efficiency? And also Write the applications of fins.

9 a) Explain the working and construction of falling film evaporator and agitated film evaporators with a neat sketch.
b) Discuss about the log mean temperature difference.

\section*{Or}

10 a) Describe the Steady state molecular diffusion in fluids at rest flow.
b) Write short notes on Reynold's analogy.

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 \\ HYDRAULICS AND HYDRAULIC MACHINERY \\ (Civil Engineering)}

Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) When do you call the flows as critical, sub critical and super critical flows?
b) What are the methods of dimensional analysis?
c) Define the term Impacts of jets.
d) Define and explain hydraulic efficiency and mechanical efficiency.
e) Define slip, percentage slip and negative slip of a reciprocating pump.
f) What do you mean by mass curve?

\section*{PART -B}
2. a) Derive the condition for depth of flow of a most economical circular channel Section subject to the condition for maximum velocity
b) A Wide channel of uniform rectangular section with a slope of \(1 / 95\) has a flow rate of \(3.75 \mathrm{~m} 3 / \mathrm{s} / \mathrm{m}\). The Manning constant is 0.013 . Suddenly the slope changes to \(1 / 1420\). Determine the normal depths for each case. Show that a hydraulic jump has to occur and calculate the downstream flow height.
3. a) What do you mean by dimensional numbers? Name any four dimensional numbers. Define and explain Reynolds's number, Froude's number and Mach number. Derive expressions for any above two numbers.
b) What is meant by geometric, kinematic and dynamic similarities?
4. a) A water jet 20 mm in diameter and having a velocity of \(90 \mathrm{~m} / \mathrm{s}\) strikes series of moving blades in a wheel. The direction of the jet makes \(20^{\circ}\) with the direction of movement of the blade. The blade angle at inlet is \(35^{\circ}\). If the jet should enter the blade without striking, what should be the blade velocity? If the outlet angle of the blade is \(30^{\circ}\), determine the force on the blade. Assume that there is no friction involved in the flow over the blade.
b) Differentiate between the force exerted by a jet on a single curved moving plate and a series of curved moving plate
5. a) A double jet pelton wheel is required to generate 7500 kilowatts when the available head at the base of the nozzle is 400 m . The jet is deflected through \(165^{\circ}\) and the relative velocity of the jet is reduced by \(15 \%\) in passing over the buckets. Determine the diameter of each jet, total flow, force exerted by the jet on buckets in tangential direction. Assume generator efficiency of \(95 \%\), overall efficiency of \(80 \%\), \(\mathrm{kv}=0.97\) and \(\mathrm{ku}=0.46\)
b) Derive the expression for specific speed of a turbine.


SET-1
6. a) A centrifugal pump is to discharge \(0.118 \mathrm{~m} 3 / \mathrm{s}\) at a speed of 1450 rpm against head of 25 m . The impeller diameter is 250 mm , its width at outlet is 50 mm and manometer efficiency is \(75 \%\). Determine the vane angle at the outer periphery of the impeller.
b) What is the difference between single stage and multistage pumps?

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022
}

SWITCHING THEORY AND LOGIC DESIGN
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) Convert the number with the given radix \(5654_{7}\) to decimal.
b) What are the advantages of tabular method of minimization?
c) Distinguish between encoder and multiplexer.
d) Explain configuration and advantages of PLDs.
e) Draw the circuit of Johnson counter using JK Flip Flops.
f) What is the significance of State assignment?

\section*{PART -B}
2. a) What is an error detection code? Write about error detection codes by giving examples.
b) Implement the following Boolean function using two-level forms
i) NAND-AND ii) AND-NOR and draw the circuits \(\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\pi(5,7,9,11,12,13,14,15)\)
3. a) State and prove De-morgan theorems.
b) Minimize the following function using Karnaugh map method and draw simplified logic diagram.
\(\mathrm{F}=\sum \mathrm{m}(6,8,13,18,19,25,27,29,31)+\mathrm{d}(2,3,11,15,17,24,28)\)
4. a) Implement the following function with multiplexer \(\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\sum(0,1,3,4,8,9,15)\)
b) With neat sketch explain 4-bit digital comparator.
5. a) Design a combinational circuit using a ROM. The circuit accepts a 3 bit number and generates an output binary number equal to the square of the input number..
b) Find the minimized PLA of the following Boolean function output by a PLA minimizer. \(\mathrm{f} 1=(2,4,5,6,7,10,14,15) ; \mathrm{f} 2=(4,5,7,11,15)\)
6. a) Draw the circuit diagram of positive edge triggered JK flip-flop with NAND gates and explain its operation using truth-table .How race around condition is eliminated?
b) Explain different types of shift registers.
7. a) What is Meelay Machine? Explain with an example.
b) Convert the following Mealy machine into equivalent Moore machine.

SET - 1

\section*{II B. Tech II Semester Supplementary Examinations, June/July - 2022 THERMAL ENGINEERING-I}
(Com to ME, AME)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

PART -A
1. a) Define time and heat loss factors.
b) State the purpose of thermostat in an engine cooling system.
c) List the four stages of combustion in CI engine.
d) Define the brake power.
e) Give the expression for work done for a two-stage compression with prefect inter cooling.
f) List various advantages of centrifugal compressors over axial flow compressors.

\section*{PART -B}
2. a) Write short note on Actual and Fuel-Air Cycles of CI Engines.
b) Discuss the various factors affecting the volumetric efficiency.
3. a) Draw the sketch of a four stroke SI engine valve timing diagram and explain.
b) Explain the splash lubrication system with the help of a neat sketch.
4. a) What are different methods to control the knocking in S.I. Engine? Explain.
b) What is the difference between physical delay and chemical delay? Explain its importance.
5. a) In a test of a four-cylinder, four - stroke engine 75 mm bore and 100 mm stroke, the following results were obtained at full throttle at a particular constant speed and with fixed setting of fuel supply of \(6.0 \mathrm{~kg} / \mathrm{h}\).
B.P. with all cylinder working \(=15.6 \mathrm{~kW}\);
B.P. with cylinder no 1 cut - out \(=11.1 \mathrm{~kW}\);
B.P. with cylinder no 2 cut - out \(=11.03 \mathrm{~kW}\);
B.P. with cylinder no 3 cut - out \(=10.88 \mathrm{~kW}\);
B.P. with cylinder no 4 cut - out \(=10.66 \mathrm{~kW}\);

If the calorific value of the fuel is \(83600 \mathrm{~kJ} / \mathrm{kg}\) and clearance volume is 0.0001 \(\mathrm{m}^{3}\). Calculate: (i) Mechanical efficiency. (ii) Indicated thermal efficiency. (iii) Air standard efficiency.
b) Following observations were recorded during a single cylinder oil engine bore 300 mm , stroke 450 mm , speed 300 rpm , IMPE 6 bar, net brake load 1.5 kN , brake drum diameter 1.8 meters, brake rope diameter 2 cm . Calculate the (i) Indicated power. (ii) Brake power. (iii) Mechanical efficiency.


SET - 1
6. a) Derive the expression for work done per kg of air delivered for a single acting single cylinder reciprocating compressor considering clearance.
b) A single acting reciprocating compressor having L/D ratio \(=1.5\) has the cylinder diameter of 200 mm runs at 100 rpm . The compressor compresses air at \(1 \mathrm{bar}, 300 \mathrm{~K}\) to a pressure of 8 bar according to the law \(\mathrm{pv}^{1.25}=\) constant. Find the indicated power of the compressor, mass of air delivered, temperature of air delivered. Also calculate power required to drive the compressor if mechanical efficiency is \(80 \%\).
7. a) Explain the terms slip factor and power input factor in centrifugal compressors.
b) An axial flow compressor having eight stages and with \(50 \%\) reaction compresses air in the pressure ratio of \(4: 1\). The air enters the compressor at \(20^{\circ} \mathrm{C}\) and flows through it with a constant speed of \(90 \mathrm{~m} / \mathrm{s}\). The rotating blades of compressor rotate with a mean speed of \(180 \mathrm{~m} / \mathrm{s}\). Isentropic efficiency of the compressor may be taken as \(82 \%\). Calculate: i) Work done by the machine, ii) Blades angles.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 PULSE AND DIGITAL CIRCUITS
}
(Com to ECE, EIE, ECC)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
1. a) What are the reasons for existence of rise time and fall time in RC Circuits? 2M
b) Write the differences between clipping and clamping Circuits? 2 M
c) Define breakdown voltage in transistors? 2 M
d) Define Bistable, Monostable and astable multivibrator? 3M
e) Write the relation between slope, transmission and displacement error
equations?
f) Listout the merits and demerits of TTL? 3M

\section*{PART -B}
2. a) Estimate the response of RC high pass circuit for sine wave as input. 7 M
b) Define Attenuator? Design and explain Attenuator circuit with RC components? 7M
3. a) With the help of a neat circuit diagram explain the working of a two-level diode 7 M clipper.
b) Explain the response of the negative biase clamping circuit? 7M
4. a) Explain the switching times of a transistor with suitable diagram? 7M
b) Explain the basic working principle of a bistable multivibrator with neat diagrams? 7 M
5. a) Derive Pulse width equation of a monostable multivibrator? 7M
b) Design an astable multivibrator to generate an output pulse width is 100 mSec . 7M

The ON/ OFF time period is 50 msec . Assume required Data.
6. a) Explain why an operational integrator is used in transistorized miller sweep circuit. 7M
b) Explain the working of a transistor Bootstrap sweep circuit and derive expression 7 M for the slope sweep error.
7. a) Explain the response of AOI Logic gates with help of truth table? 7M
b) Listout the differences between Sampling gate and Logic gate? Explain Basic 7M Operating Principles of Sampling Gate?

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 JAVA PROGRAMMING
}
(Com to CSE, IT)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

PART -A
1. a) What is dynamic binding? Discuss with an example JAVA code.
b) Write JAVA code to define a class, define instance methods for setting and

Retrieving values of instance variables and instantiate its object.
c) What is the impact of declaring a method as final?
d) Which class is used to read the contents of a file as a stream of bytes? Discuss with an example JAVA code.
e) An applet can run multiple threads? Give the JAVA code.
f) Describe the Flow Layout Manager with an example JAVA code.

\section*{PART -B}
2. a) Write a JAVA program which takes two integer numbers as input and returns the minimum of these two.
b) How the JVM runs the java byte code? Discuss it with a diagram.
3. a) Create a JAVA class that lets you create a single-dimensional array of integers at runtime using command line inputs. Print the Minimum and Maximum integers in that array.
b) Create a JAVA class to read a string from the command line and extract ' \(n\) ' number of characters from the given character.(Example:- Input String: PROGRAMMING, \(n\) is 4 , a character is ' \(G\) ', and output is: GRAM)
4. a) Discuss various subclasses of the Exception class.
b) Design a JAVA package to show the dynamic polymorphism and interfaces.
5. a) Write a JAVA program to show multithreaded producers and consumer applications.
b) Create a JAVA program that reads the contents of a fileMy_Text_File and reverses each word and writes it to destination fileMy_Text_File2
6. a) Describe various methods from KeyListener interface with an example JAVA code.
b) Design an Applet displaying circle based on the user inputs for the radius and fill the circle with the given color.
7. a) Design a JAVA program that creates a \(7 \times 3\) grid and fills it in with 20 buttons, each button labeled with its index.
b) What are the various constructors of a TextArea class? Explain with an example program.

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 THEORY OF MACHINES
}
(Agricultural Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. AnswerALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B}

\section*{PART -A}
1. a) Define element and link.
b) List the types of gears.
c) Mention the belt materials.
d) State the laws of dry friction.
e) Write about power of a governor.
f) What is the significance of static balancing?

\section*{PART -B}
2. a) Explain about types of kinematic pairs with neat diagrams.
b) Discuss inversions of Four bar chain.
3. a) The number of teeth on the gear and the pinion of two spur gears in mesh are 30 and 18 respectively. Both the gears have a module of 6 mm and pressure angle of \(20^{\circ}\). If the pinion rotates at 400 rpm , what will be the sliding velocity at the moment the tip of the tooth of pinion has contact with the gear flank? Take addendum equal to one module. Also, find the maximum velocity of sliding.
b) Explain the significance of Turning moment Diagrams and Coefficient of fluctuation of speed.
4. Determine the maximum power that can be transmitted through a flat belt having the following data: Cross section of the belt \(=300 \mathrm{~mm} \times 12 \mathrm{~mm}\)

Ratio of belt tensions \(=2.2\)
Maximum permissible tension in belt \(=2 \mathrm{~N} / \mathrm{mm}^{2}\)
Mass density of the belt material \(=0.0011 \mathrm{~g} / \mathrm{mm}^{3}\).
5. a) Discuss the applications of chain drives.
b) A Single plate clutch is required to transmit 8 kw at 1000 rpm . The axial pressure is limited to \(70 \mathrm{kN} / \mathrm{m}^{2}\). The mean radius of the plate is 4.5 times the radial width of the friction surface. If both the sides of the plate are effective and the coefficient of friction is 0.25 , find the i) inner and the outer radii of the plate and the mean radius ii) width of the friction lining.
6. In a governor of the Hartnell type, the mass of each ball is 1.5 kg and the lengths of the vertical and horizontal arms of the bell crank lever are 100 mm and 50 mm respectively. The fulcrum of the bell crank lever is at a distance of 90 mm from the axis of rotation. The maximum and minimum radii of rotation of balls are 120 mm and 80 mm and the corresponding equilibrium speeds are 325 and 300 rpm . Find the Stiffness of the Spring and the equilibrium speed when the radius of rotation is 100 mm .
7. A Shaft carries four masses \(\mathrm{A}, \mathrm{B}, \mathrm{C}\) and D placed in parallel planes perpendicular to the shaft axis and in this order along the shaft. The masses of B and C are 353 N and 245 N respectively and both are assumed to be concentrated at a radius of 15 cm , while the masses in planes A and D are both at a radius of 20 cm . The angle between the radii of B and C is \(100^{\circ}\) and that between B and A is \(190^{\circ}\), both angles being measured in the same sense. The planes containing \(A\) and \(B\) are 25 cm apart and those containing B and C are 50 cm apart. If the shaft is to be in complete dynamic balance, determine (i) Masses of A and D (ii) distance between the planes containing C and D (iii) angular position of the mass D .

\title{
II B. Tech II Semester Supplementary Examinations, June/July - 2022 PROBABILITY AND STATISTICS
}
(Com. to CSE, IT, CHEM, PE, PCE)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any THREE Questions from Part-B

\section*{PART -A}
1. a) Define continuous random variable and continuous probability distribution.
b) Find Moment Generating Function for Poisson distribution.
c) A random sample of 100 is taken from a normal population whose standard deviation is 5 . What is the maximum error with 0.95 probabilities?
d) Write procedure for test concerning difference between two means for large sample.
e) Write normal equations to fit the second degree parabola.
f) If \(\bar{X}=24.5, \bar{r}=2.4\) and \(n=5\), compute the LCLs and UCLs for a 3 -sigma \(\bar{X}\) chart.

\section*{PART -B}
2. a) Two dice are thrown and X is a random variable so that \(X=\operatorname{Sum}(a, b)\). Find the probability distribution of X and hence compute its mean and standard deviation.
b) A sample of 100 dry battery cells tested to find the length of life produced the following results :
\(\bar{x}=12\) hours, \(\sigma=3\) hours.
Assuming the data to be normally distributed, what percentage of battery cells are expected to have life
(i) more than 15 hours (ii) less than 6 hours (iii) between 10 and 14 hours?
3. Define Moment Generating Functions. Find Moment Generating Function for Binomial distribution and hence find its mean and variance.
4. a) A population consists of five numbers \(2,3,6,8\) and 11 . Consider all possible samples of size 2 that can be drawn with replacement from this population. Find
a) The mean of the population.
b) The standard deviation of the population.
c) The mean of the sampling distribution of means and
d) The standard deviation of the sampling distribution of means
b) Determine a \(95 \%\) confidence interval for the mean of a normal distribution with variance \(\sigma^{2}=0.25\), using a sample of \(n=100\) values with mean \(\bar{x}=212.3\).
5. a) In a random sample of 100 tube lights produced by company A, the mean life time of tube light is 1190 hours with standard deviation of 90 hours. Also in a random sample of 75 tube lights from company B the mean life time is 1230 hours with standard deviation of 120 hours. Is there a difference between the mean lifetimes of the two brands of tube lights at a significance level of 0.01 ?
b) A test of the breaking strengths of 6 ropes manufactured by a company showed a mean breaking strength of 7750 lb and a strength deviation of 145 lb , whereas the manufacturer claimed a mean breaking strength of 8000 lb . Can we support the manufacturer's claim at a level of significance of 0.05 ?
6. a) Fit a straight line to the following data by the method of least squares,
\begin{tabular}{|l|l|l|l|l|l|l|l|l|l|l|}
\hline x & 20 & 60 & 100 & 140 & 180 & 220 & 260 & 300 & 340 & 380 \\
\hline y & 0.18 & 0.37 & 0.35 & 0.78 & 0.56 & 0.75 & 1.18 & 1.36 & 1.17 & 1.65 \\
\hline
\end{tabular}
b) The following are the numbers of minutes it took 10 mechanics to assemble a piece of machinery in the morning, x , and in the late afternoon, y :
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|}
\hline x & 11.1 & 10.3 & 12.0 & 15.1 & 13.7 & 18.5 & 17.3 & 14.2 & 14.8 & 15.3 \\
\hline y & 10.9 & 14.2 & 13.8 & 21.5 & 13.2 & 21.1 & 16.4 & 19.3 & 17.4 & 19.0 \\
\hline
\end{tabular}

Calculate the sample correlation coefficient.
7. The following data show the values of sample mean \(\bar{X}\) and the range R of 20 samples for The sample of size 4 each. Calculate the values for central line and control limits for mean-chart and range chart and determine whether the process is in control
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|}
\hline Sample No. & \(\mathbf{1}\) & \(\mathbf{2}\) & \(\mathbf{3}\) & \(\mathbf{4}\) & \(\mathbf{5}\) & \(\mathbf{6}\) & \(\mathbf{7}\) & \(\mathbf{8}\) & \(\mathbf{9}\) & \(\mathbf{1 0}\) \\
\hline \(\bar{X}\) & 1.75 & 1.32 & 1.18 & 0.18 & 2.30 & 1.25 & 1.52 & 1.78 & 1.90 & 1.72 \\
\hline R & 1.0 & 1.3 & 0.4 & 1.3 & 1.4 & 1.9 & 1.0 & 1.3 & 2.4 & 2.0 \\
\hline Sample No. & \(\mathbf{1 1}\) & \(\mathbf{1 2}\) & \(\mathbf{1 3}\) & \(\mathbf{1 4}\) & \(\mathbf{1 5}\) & \(\mathbf{1 6}\) & \(\mathbf{1 7}\) & \(\mathbf{1 8}\) & \(\mathbf{1 9}\) & \(\mathbf{2 0}\) \\
\hline \(\bar{X}\) & 2.40 & 3.20 & 2.52 & 2.05 & 1.68 & 2.00 & 1.28 & 1.92 & 1.00 & 1.35 \\
\hline R & 1.9 & 2.7 & 1.7 & 0.6 & 0.5 & 3.1 & 2.6 & 2.7 & 1.0 & 1.7 \\
\hline
\end{tabular}
( Given \(\left.n=4, A_{2}=0.729, D_{3}=0, D_{4}=2.282\right)\).

Note : - Statistical tables and Control Chart Constants are required

\title{
III B. Tech II Semester Regular Examinations, June-2022 ELECTRIC DRIVES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) An electric motor developed torque and required load torques are
expressed using the following equations:
\[
\mathrm{T}_{\mathrm{m}}=\mathrm{a} \omega+\mathrm{b}, \mathrm{~T}_{\mathrm{L}}=\mathrm{c} \omega^{2}+\mathrm{d}
\]
where \(a, b, c, d\) are positive coefficients. Deduce the relation among these coefficients to start the motor and load together and have an equilibrium operating speed. Calculate that equilibrium speed.
b) Explain about different components of electric drive.
(OR)
2. a) List out the advantages of electric drive. What is the concept of load equalization?
b) How can you differentiate active and passive load torques? Compare these two torques.

\section*{UNIT-II}
3. a) Explain the operation of a separately excited DC motor supplied from 1-phase fully controlled rectifier with necessary diagrams.
b) A \(250 \mathrm{~V}, 900 \mathrm{rpm}, 100 \mathrm{~A}\) separately excited DC motor has armature and field resistances of 0.05 and \(200 \Omega\) respectively. Load torque is given by \(T L=400-0.25 x \mathrm{~N}-\mathrm{m}\). Where ' \(x\) ' is the speed in rpm. Armature is fed from a three phase full controlled rectifier with AC source voltage (phase) of \(220 \mathrm{~V}, 50 \mathrm{~Hz}\) and field is fed from a full controlled single phase rectifier with a single phase source voltage of 220 V , 50 Hz . Drive operates in continuous conduction. Calculate the firing angles for speeds of 600 rpm and 1200 rpm .

\section*{(OR)}
4. a) Explain the operation of dual converter controlling the separately excited DC motor.
b) Draw and explain the speed-torque characteristics at different firing angles for a fully converter feeding a DC series motor. Draw the quadrant diagram also.

\section*{UNIT-III}
5. a) List the advantages offered by DC chopper drives over linecommutated converter controlled DC drives.
b) A \(230 \mathrm{~V}, 960 \mathrm{rpm}\) and 200 A separately excited DC motor has an armature resistance of \(0.02 \Omega\). The motor is fed from a chopper, which is capable of providing both motoring and braking operations. The source has a voltage of 230 V. Assuming continuous conduction:
(i) Calculate the time ratio of chopper for the motoring action at rated torque and 350 rpm .
(ii) Determine the maximum possible speed, if maximum value of time ratio is 0.95 and maximum permissible motor current is twice the rated value.
(OR)
6. a) Class-A chopper, operating in time-ratio control, is supplying the armature of the separately excited DC motor. Derive the motor speed-torque relation.
b) Derive the expressions for average motor current, \(I_{\text {max }}\) and \(I_{\text {min }}\) and average torque for chopper fed DC separately excited motor.

\section*{UNIT-IV}
7. a) What are the disadvantages of using AC voltage controllers when they are used in induction motor control?
b) A \(440 \mathrm{~V}, 3\) phase, 50 Hz 6 pole 945 rpm delta connected induction motor has the following parameters referred to the stator. \(\mathrm{R}_{\mathrm{s}}=2.0 \mathrm{~W}, \mathrm{R}_{\mathrm{r}}^{\prime}=2.0 \mathrm{~W}, \mathrm{X}_{\mathrm{s}}=3 \mathrm{~W}, \mathrm{X}_{\mathrm{r}}=4 \mathrm{~W}\). When driving a fan load at rated voltage, it runs at rated speed. The motor speed is controlled by stator voltage control. Determine motor terminal voltage, current and torque at 600 rpm .
(OR)
8. a) Explain the significance of (V/f) speed control method of an induction motor.
b) A 3 phase, 4 pole, 50 Hz squirrel cage Induction motor has the following circuit parameters: \(\mathrm{r}_{1}=0.05 \Omega, \mathrm{r}_{2}=0.09 \Omega\), \(\mathrm{X}_{1}+\mathrm{X}_{2}=0.55 \Omega\). The motor is star connected and rated voltage is 400 V . It drives a load whose torque is proportional to the speed and is given as \(\mathrm{T}_{1}=0.05 \mathrm{~N}-\mathrm{m}\). Determine the speed and torque of the motor for a firing angle of 450 of the AC Voltage Controller on a \(400 \mathrm{~V}, 50 \mathrm{~Hz}\) supply.

\section*{2 of 3}

\section*{UNIT-V}
9. a) Describe self-controlled and load-commutated inverter controlled synchronous motor drives in detail.
b) Draw the circuit diagram and explain the working of a slip power recovery system using static Scherbius system for a three phase induction motor.
(OR)
10. a) In variable frequency control of a synchronous motor why (V/f) ratio is maintained constant up to base speed and V constant above the base speed. Explain briefly with necessary waveforms.
b) A \(500 \mathrm{~kW}, 3-\mathrm{ph}, 3.3 \mathrm{kV}, 50 \mathrm{~Hz}, 0.8\) (lag) pf, 4 pole star connected synchronous motor has following parameters. \(\mathrm{X}_{\mathrm{s}}=15\) \(\Omega, R_{\mathrm{s}}=0\), rated field current is 10 A. Calculate: (i) Armature current and power factor at half the rated torque and rated field current, (ii) Field current to get unity power factor at the rated torque.

\title{
III B. Tech II Semester Regular Examinations, June-2022 ELECTRIC DRIVES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. a) Explain about the criteria to find the steady state stability of an electric drive.
b) Compare different types of electric braking methods used.
(OR)
2. a) Explain the characteristics of different loads with illustrations.
b) Explain the procedure of equalizing load on electric drive. List out the advantages of this procedure.

\section*{UNIT-II}
3. a) Explain the operation of a separately excited DC motor supplied from 1-phase half controlled rectifier with necessary diagrams.
b) Describe relative merits and demerits of four quadrant DC drives employing non-circulating and circulating dual converters.
(OR)
4. a) What is a dual converter? Explain the principle of operation of a dual converter in circulating current mode. How the same is used for speed control of DC drive?
b) A fully controlled rectifier-fed separately excited DC motor is required to operate in motoring and braking operations in the forward direction. Only one fully-controlled rectifier is available. What switching arrangement will be required? Explain.

\section*{UNIT-III}
5. a) Explain the advantages of chopper control of DC drives when compared to converter control of DC drives.
b) A \(230 \mathrm{~V}, 960 \mathrm{rpm}\) and 200 A separately excited DC motor has \(\mathrm{R}_{\mathrm{a}}=0.02 \Omega\). The motor is fed from a chopper which provides both motoring and braking operations. Assume continuous conduction. Calculate duty ratio of chopper for motoring and braking operations at rated torque and 350 rpm .

\section*{(OR)}
6. a) Describe the first quadrant chopper control of DC series motor.
b) A \(250-\mathrm{V}\) separately excited motor de has an armature resistance of \(2.5 \Omega\). When driving a load at 600 rpm with constant torque, the armature takes 20 A . This motor is controlled by a chopper circuit with a frequency of 400 Hz and an input voltage of 250 V . What should be the value of the duty ratio if one desires to reduce the speed from 600 to 400 rpm , with the load torque maintained constant?

\section*{UNIT-IV}
7. a) Draw and explain the speed-torque characteristics of the induction motor under variable frequency control.
b) Explain speed control of induction motor by AC Voltage Controllers.
8. a) Draw and explain the speed-torque curves with variable frequency control and operation at constant (v/f) ratio.
b) The rotor resistance and stand still reactance referred to stator of a 3 phase, 4 pole, 50 Hz Squirrel cage induction motor is \(0.2 \Omega\) and \(0.8 \Omega\) per phase respectively. The full load slip of the motor is 4 percent. Neglect stator resistance and leakage reactance. Determine how much stator voltage should be reduced in order to get a speed of 1200 rpm if the load torque remains constant.

\section*{UNIT-V}
9. a) Describe the open-loop and closed loop methods of speed control of a synchronous motor using VSI.
b) Explain the sub synchronous mode of operation of synchronous motor with necessary equations.

\section*{(OR)}
10. a) Draw the circuit diagram and explain the working of a slip power recovery system using Static Kramer drive for a three phase induction motor.
b) Describe separate controlled and self-controlled modes of operation of a synchronous motor drive in detail and compare them.

\title{
III B. Tech II Semester Regular Examinations, June-2022 ELECTRIC DRIVES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) Explain about the different components of load torque.
b) A \(220 \mathrm{~V}, 1200 \mathrm{rpm}, 70 \mathrm{~A}\) DC separately excited motor has an
armature resistance of \(0.055 \Omega\). It is coupled to an overhauling load with a torque of \(350 \mathrm{~N}-\mathrm{m}\). Determine the speed at which the motor can hold the load by regenerative braking.
(OR)
2. a) Explain the procedure of regenerative braking employed in electric drives with necessary illustrations.
b) Draw the steady stability characteristics and explain the electric drive operation under this state with necessary equations.

\section*{UNIT-II}
3. a) Explain the operation of a self-excited DC motor supplied from 1-phase fully controlled rectifier with necessary diagrams.
b) A 250 V separately excited DC motor has an armature resistance of \(2.5 \Omega\). When driving a load at 600 rpm with constant torque, the armature takes 40 A . This motor is controlled by a three phase full converter circuit a phase input voltage of 250 V with continuous current. What should be the value of firing angle to reduce the speed from 600 to 400 rpm , with the load torque maintained constant?
(OR)
4. a) A \(220 \mathrm{~V}, 750 \mathrm{rpm}, 200\) A separately excited motor has armature and field resistances of 0.05 and \(20 \Omega\) respectively. Load torque is given by \(\mathrm{T}_{\mathrm{L}}=500-0.2 \mathrm{~N} \mathrm{~N}-\mathrm{m}\). Where N is the speed in rpm. Armature is fed from a three phase fully controlled rectifier with AC source voltage (line) of \(200 \mathrm{~V}, 50 \mathrm{~Hz}\) and field is fed from a half controlled single phase rectifier with a single phase source voltage of \(250 \mathrm{~V}, 50 \mathrm{~Hz}\). Drive operates in continuous conduction. Calculate the firing angles for speeds of 500 rpm and 1000 rpm .
b) Explain the different speed control methods for DC motors.

\section*{UNIT-III}
5. a) Explain with circuit and waveforms of two quadrant chopper fed separately excited DC motor.
b) A \(220 \mathrm{~V}, 1000 \mathrm{rpm}\), and 150 A separately excited DC motor has an armature resistance of \(0.04 \Omega\). The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 220 V . Assuming continuous conduction, calculate duty ratios of chopper for motoring and braking operations at rated torque and 500 rpm .

\section*{(OR)}
6. a) Explain the first quadrant chopper controlled separately excited DC motor.
b) Derive the speed-torque expression of class-B chopper operating in time ratio control is supplying the armature of the separately excited DC motor. And draw speed torque characteristics.

UNIT-IV
7. a) Explain why stator voltage control is suitable for speed control of induction motors in fan and pump drives. Draw and explain speed control of 3 phase induction motor using AC Voltage Controller.
b) A \(2.8 \mathrm{~kW}, 400 \mathrm{~V}, 50 \mathrm{~Hz}, 4\)-pole, 1370 rpm , delta connected squirrel cage induction motor has the following parameters refereed to the stator.
\(\mathrm{R}_{\mathrm{s}}=2 \Omega, \mathrm{R}_{\mathrm{r}}^{\prime}=5 \Omega, \mathrm{X}_{\mathrm{s}}=\mathrm{X}_{\mathrm{r}}^{\prime}=5 \Omega, \mathrm{X}_{\mathrm{m}}=80 \Omega\). Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate: (i) Motor terminal voltage, current and torque at 1200 rpm , and (ii) Motor speed, current and torque for the terminal voltage of 300 V .
(OR)
8. a) Explain with the help torque-speed characteristics, why stator voltage control is suitable for speed control of induction motors in fan and pump dives. Draw a neat circuit diagram for speed control of scheme of 3-phase induction motor using AC voltage controller.
b) The parameters of a 3 -phase 400 Volts, \(50 \mathrm{~Hz}, 6\) pole, 960 rpm , and star connected induction motor have the following parameters per phase referred to the stator. \(\mathrm{R}_{1}=0.4 \Omega . \mathrm{R}_{2}=0.20 \Omega, \mathrm{X}_{1}=\mathrm{X}_{2}=1.5 \Omega\), \(\mathrm{X}_{\mathrm{m}}=30 \Omega\). If the motor is controlled by variable frequency control at a constant flux of rated value, determine the motor speed and the stator current at half the rated torque and 25 Hz .

\section*{UNIT-V}
9. a) Describe self-controlled and separate controlled mode of operation of a synchronous motor drive in detail and compare them.
b) Describe the open-loop and closed loop methods of speed control of a synchronous motor using VSI.
(OR)
10. a) Why is the power factor of the slip power recovery scheme of speed control of induction motor low? Give the applications of Scherbius drive.
b) Explain the operation of closed-loop speed control of LCI fed synchronous motor drive.

\title{
III B. Tech II Semester Regular Examinations, June-2022 ELECTRIC DRIVES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) Explain the operation of electric drive in four quadrants with necessary illustrations.
b) Derive the necessary equation to calculate torque developed in an electric drive from fundamentals.

\section*{(OR)}
2. a) Explain the different components used in electric drive system.
b) Explain the procedure of dynamic braking employed in electric drive system.

\section*{UNIT-II}
3. a) Explain the operation of a self-excited DC motor supplied from 1-phase half controlled rectifier with necessary diagrams.
b) Derive the relation between speed and torque and draw the corresponding characteristics of a separately excited DC motor using single phase fully controlled rectifier?
(OR)
4. a) The speed of a separately excited DC motor is controlled by means of a 1-phasefull converter from a \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) supply. The motor constants are inductance 10 mH , resistance \(0.9 \Omega\) and armature constant \(1.5 \mathrm{~V} / \mathrm{rad} / \mathrm{s}\). Calculate speed of the motor at a torque of 20 Nm when the converter is fired at \(55^{\circ}\). Neglect losses in the converter.
b) Discuss the drawbacks of using rectifier controller in DC series motors.

\section*{UNIT-III}
5. a) Explain the operation of a four quadrant chopper fed to the D.C series motor and also draw the current and voltage wave forms for continuous current operation.
b) When fed by a constant voltage source, regenerative braking below base speed can also be obtained by connecting a step-up chopper. Justify.
(OR)
6. a) A \(220 \mathrm{~V}, 24 \mathrm{~A}, 1000 \mathrm{rpm}\) separately excited dc motor having an armature resistance of \(2 \Omega\) is controlled by a chopper. The chopping frequency is 500 Hz and the input voltage is 230 V . Calculate the duty ratio for a motor torque of 1.2 times rated torque at 500 rpm .
b) Give the quadrants in which electric drive can operate using class C and class D choppers respectively. Explain with illustrations.

\section*{UNIT-IV}
7. a) Write some of the applications of stator voltage control of three phase induction motor.
b) A \(2.8 \mathrm{~kW}, 400 \mathrm{~V}, 50 \mathrm{~Hz}\), 4-pole, 1370 rpm , Y-connected induction motor has the following parameters: \(\mathrm{R}_{\mathrm{S}}=1.9 \Omega, \mathrm{R}_{\mathrm{r}}{ }^{\prime}=4.757 \Omega\), \(\mathrm{X}_{\mathrm{s}}=\mathrm{X}_{\mathrm{r}}{ }^{\prime}=3 \Omega\). Load characteristics are matched with motor such that the motor runs at 1370 rpm with full voltage across its terminals. The motor is controlled by terminal voltage control and load torque is proportional to speed. Determine motor terminal voltage and current at half rated speed.
(OR)
8. a) Draw and explain the closed loop block diagram for automatic speed control of a three phase induction motor using solid state AC voltage controller on stator side.
b) Explain in detail with speed-torque characteristics of variable voltage and variable frequency (V/F) control of induction motor drive.

\section*{UNIT-V}
9. a) Explain static Scherbius drive control for speed control of induction motor. Draw speed -torque characteristics.
b) A \(415 \mathrm{~V}, 50 \mathrm{~Hz}, 6\) pole star connected slip ring induction motor is controlled by static Kramer drive. The effective phase turns ratio from rotor to stator is 0.7 , the transformer turns ratio from \(1 . v\) side to h.v side is 0.4 . The load torque is proportional to the square of the speed and it is equal to \(250 \mathrm{~N}-\mathrm{m}\) at 870 rpm . To operate at 750 rpm calculate:
(i) rotor rectifier voltage
(ii) delay angle of the inverter
(iii) Efficiency, if the inductor resistance is \(0.02 \Omega\), stator and rotor resistances are \(0.01 \Omega\) and \(0.03 \Omega\) respectively. Assume losses in diode rectifier, inductor and transformer are negligible.
(OR)
10. a) Draw the circuit diagram and explain the operation of rotor-
resistance control of induction motor. Mention the advantages and disadvantages of the above method of control.
b) Draw the block diagram of closed loop synchronous drive fed from VSI and explain its operation?

\title{
III B. Tech II Semester Regular Examinations, June-2022 OPERATIONS RESEARCH
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. Minimize \(Z=3 a+2 b+1 c\)
s.t.
\[
\begin{aligned}
& 2 a+5 b+1 c=12 \\
& 3 a+4 b+0 c=11 \text { and }
\end{aligned}
\]
\(a\) is unrestricted and \(b\) and \(c\) are \(\geq 0\), Solve for optimal values of \(a, b\) and \(c\).
(OR)
2. A company is interested in manufacturing of two products \(A\) and \(B\). \(A\) single unit of Product \(A\) requires 2.4 minutes of punch press time and 5 minutes of assembly time. The profit for product \(A\) is Rs. 6/per unit. A single unit of product \(B\) requires 3 minutes of punch press time and 2.5 minutes of welding time. The profit per unit of product \(B\) is Rs. 7/-. The capacity of punch press department available for these products is 1,200 minutes per week. The welding department has the capacity of 600 minutes per week; the assembly department can supply 1500 minutes of capacity per week. Determine the quantity of product \(A\) and the quantity of product \(B\) to be produced so that the total profit is maximized.

\section*{UNIT-II}
3. A company has four market segments open and four salesmen are to be assigned one to each segment to maximize the expected total sales. The salesmen differ in their ability and the segments also differ in their sales potential. The details regarding the expected sales in each segment by a typical salesman under most favourable condition are given below:
Segment \(A=\) Rs. 60,000, Segment \(B=\) Rs. 50,000, Segment \(C=\) Rs. 40,000 and Segment \(D=\) Rs. 30,000. It is estimated that working under same condition, the ability of salesmen in terms of proportional yearly sales would be as below:
Salesman \(W=7\), Salesman \(X=5\), Salesman \(Y=5\) and Salesman \(Z\) \(=4\). Assign segments to salesmen for maximizing the total expected sales.

\section*{1 of 4}
4. a) Solve the traveling salesman problem by using the data given below:
\(C 12=20, C 13=4, C 14=10, C 23=5, C 34=6, C 25=10, C 35=6\), \(C 45=20\) and \(C i j=C j i\). And there is no route between cities ' \(i\) ' and ' \(j\) ' if a value for \(C i j\) is not given in the statement of the problem. ( \(i\) and \(j\) are \(=1,2, \ldots 5\) )
b) What are the assumptions made in sequencing?

\section*{UNIT-III}
5. The following mortality tables have been observed for a certain type of light bulbs:
\begin{tabular}{|l|c|c|c|c|c|c|}
\hline End of the week & 1 & 2 & 3 & 4 & 5 & 6 \\
\hline \begin{tabular}{l} 
Probability of failure due to \\
date
\end{tabular} & 0.09 & 0.25 & 0.49 & 0.85 & 0.97 & 1.00 \\
\hline
\end{tabular}

There are a large number of such bulbs, which are to be kept in working order. If a bulb fails in service, it costs Rs. 3/- to replace but if all bulbs are replaced in the same operation it can be done for only Rs. 0.70 a bulb. It is proposed to replace all bulbs at fixed intervals, whether or not they have burnt out and to continue replacing burnt out bulbs as they fail.
(i) What is the best interval between group replacements?
(ii) At what group replacement price per bulb, would a policy of strictly individual replacement become preferable to the adopted policy?

\section*{(OR)}
6. a) (i) A machine A costs Rs.9000/-. Annual operating costs are Rs. 200/- for the first year and then increases by Rs.2000/every year. Determine the best age at which the machine \(A\) is to be replaced? If the optimum replacement policy is followed, what will be the average yearly cost of owning and operating the machine? Assume machine has no resale value when replaced and that future costs are not discounted.
(ii) Machine \(B\) costs Rs. 10000/-. Annual operating costs are Rs. 400/- for the first year and then increases by Rs. 800/- every year. You have now a machine of type \(A\), which is of one year old. Should you replace it with \(B\), and if so, when?
b) Discuss the applications of replacement models.

\section*{UNIT-IV}
7. A transport company has a single unloading berth with vehicles arriving in a Poisson fashion at an average rate of three per day. The unloading time distribution for a vehicle with " \(n\) " unloading workers is found to be exponentially with an average unloading time \((1 / 2) \times \mathrm{n}\) days. The company has a large labour supply without regular working hours, and to avoid long waiting lines, the company has a policy of using as many unloading group of workers in a vehicle as there are vehicles waiting in line or being unloaded. Under these conditions find (i) What will be the average number of unloading group of workers working at any time?, (ii) What is the probability that more than 4 groups of workers are needed?
(OR)
8. Two players \(P\) and \(Q\) play the game. Each of them has to choose one of the three colours: White \((W)\), Black \((B)\) and Red \((R)\) independently of the other. Thereafter the colours are compared. If both \(P\) and \(Q\) have chosen white ( \(W, W\) ), neither wins anything. If player \(P\) selects white and Player \(Q\) black ( \(W, B\) ), player \(P\) loses Rs.2/- or player \(Q\) wins the same amount and so on. The complete payoff table is shown below. Find the optimum strategies for \(P\) and \(Q\) and the value of the game.
\begin{tabular}{|c|c|c|c|c|}
\hline \multirow{4}{*}{P} & \multicolumn{4}{|c|}{Q} \\
\cline { 2 - 5 } & W & W & B & R \\
\cline { 2 - 5 } & W & 0 & -2 & 7 \\
\cline { 2 - 5 } & B & 2 & 5 & 6 \\
\cline { 2 - 5 } & R & 3 & -3 & 8 \\
\hline
\end{tabular}

UNIT-V
9. A project consists of 4 activities. Their logical relationship and time taken is given along with crash time and cost details. If the indirect cost is Rs. 2000/- per week, find the optimal duration and optimal cost.
\begin{tabular}{|l|l|l|l|l|l|}
\hline Activity & Predecessor & \multicolumn{2}{|l|}{ Normal } & \multicolumn{1}{c|}{ Crash } \\
\hline \multirow{2}{*}{ A } & & \begin{tabular}{c} 
Time in \\
days
\end{tabular} & \begin{tabular}{c} 
Cost \\
(Rs.)
\end{tabular} & \begin{tabular}{c} 
Time in \\
days
\end{tabular} & \begin{tabular}{c} 
Cost \\
(Rs.)
\end{tabular} \\
\cline { 3 - 6 } & 4 & 4000 & 2 & 12000 \\
\hline B & A & 5 & 3000 & 2 & 7500 \\
\hline C & A & 7 & 3600 & 5 & 6000 \\
\hline D & C & 4 & 5000 & 2 & 10000 \\
\hline \multicolumn{5}{|c|}{\(\mathbf{3}\) of \(\mathbf{4}\)}
\end{tabular}

\section*{(OR)}
10. A small project has 7 activities and the time in days for each [15M] activity is given below:
\begin{tabular}{|c|c|}
\hline Activity & Duration in days \\
\hline\(A\) & 6 \\
\hline\(B\) & 8 \\
\hline\(C\) & 3 \\
\hline\(D\) & 4 \\
\hline\(E\) & 6 \\
\hline\(F\) & 10 \\
\hline\(G\) & 3 \\
\hline
\end{tabular}

Given that activities \(A\) and \(B\) can start at the beginning of the project. When \(A\) is completed \(C\) and \(D\) can start. \(E\) can start only when \(B\) and \(D\) are finished. \(F\) can start when \(B, C\) and \(D\) are completed and is the final activity. \(G\) can start when \(E\) is finished and is the final activity. Draw the network and find the project completion time.

\title{
III B. Tech II Semester Regular Examinations, June-2022 OPERATIONS RESEARCH
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. You wish to export three products \(A, B\), and \(C\). The amount available is Rs. 4,00,000/-. Product \(A\) costs Rs. \(8000 /-\) per unit and occupies after packing 30 cubic meters. Product \(B\) costs Rs. \(13,000 /-\) per unit and occupies after packing 60 cubic meters and product C costs Rs. 15,000/-per unit and occupies 60 cubic meters after packing. The profit per unit of \(A\) is Rs. 1000/-, of B is Rs. 1500/- and of C is Rs. 2000/-. The shipping company can accept a maximum of 30 packages and has storage space of 1500 cubic meters. How many of each product should be bought and shipped to maximize profit? The export potential for each product is unlimited. Show that this problem has two basic optimum solutions and find them. Which of the two solutions do you prefer? Give reasons.
(OR)
2. \(\quad\) Minimize \(Z=2 x+9 y+1 z\)
s.t
\(1 x+4 y+2 z \geq 5\)
\(3 x+1 y+2 z \geq 4\) and \(x, y, z\) all are \(\geq 0\), Solve for optimal solution. Also obtain the solution for the dual.

\section*{UNIT-II}
3. A tourist organization is planning to arrange a tour to 5 historical places. Starting from the head office at \(A\) then going round \(B, C, D\) and \(E\) and then come back to \(A\). Their objective is to minimize the total distance covered. Help them in sequencing the cities. \(A, B, C, D\) and E as the shown in the Fig. 1.
The numbers on the arrows show the distances in Km .

Fig. 1


1 of 4

\section*{(OR)}
4. a) There are 5 jobs each of which is to be processed on three machines \(A, B\), and \(C\) in the order \(A C B\). The time required to process in hours is given in the matrix below. Find the optimal sequence.
\begin{tabular}{|l|l|l|l|l|l|}
\hline Job & 1 & 2 & 3 & 4 & 5 \\
\hline Machine A & 3 & 8 & 7 & 5 & 4 \\
\hline Machine B & 7 & 9 & 5 & 6 & 10 \\
\hline Machine C & 4 & 5 & 1 & 2 & 3 \\
\hline
\end{tabular}
b) Write the LP formulation of an assignment problem.

\section*{UNIT-III}
5. a) A taxi owner estimates from his past records that the costs per year for operating taxi whose purchase price when new is Rs.60000/- are as given below:
\begin{tabular}{|l|l|l|l|l|l|}
\hline Age (Year) & 1 & 2 & 3 & 4 & 5 \\
\hline Operating cost in Rs. & 10000 & 12000 & 15000 & 18000 & 20000 \\
\hline
\end{tabular}

After 5 years, the operating cost is Rs. \(6000 \times k\) Where \(k=6,7\), \(8,9,10\), i.e. ' \(k\) ' denotes years. If the resale value decreases by \(10 \%\) of purchase price each year, what is the best replacement policy? Cost of money is zero.
b) What is time value of money? Explain.
(OR)
6. Value of the money is assumed to be \(10 \%\) per year and suppose that machine \(A\) is replaced after every three years whereas machine \(B\) is replaced every 6 years. Their yearly costs are given as under:
\begin{tabular}{|l|l|l|l|l|l|l|}
\hline Year & 1 & 2 & 3 & 4 & 5 & 6 \\
\hline Machine A (Rs.) & 1000 & 200 & 400 & 1000 & 200 & 400 \\
\hline Machine B (Rs.) & 1700 & 100 & 200 & 300 & 400 & 500 \\
\hline
\end{tabular}

Find which machine is to be purchased?

\section*{UNIT-IV}
7. a) In a railway marshalling yard, goods train arrives at the rate of 30 trains per day. Assume that the inter arrival time follows an exponential distribution and the service time is also to be assumed as exponential with a mean of 36 minutes. Calculate: (i) The probability that the yard is empty, (ii) The average length assuming that the line capacity of the yard is 9 trains.
b) Solve the game by method of sub games whose payoff matrix is:
\begin{tabular}{|c|c|c|c|}
\hline & \multicolumn{3}{|c|}{ B } \\
\cline { 2 - 4 } & & & I \\
A II \\
\cline { 2 - 4 } & I & 6 & 5 \\
\cline { 2 - 4 } & II & 3 & 6 \\
\cline { 2 - 4 } & III & 8 & 4 \\
\hline
\end{tabular}
(OR)
8. a) \(A\) and \(B\) play a game in which each has three coins, a 5 paise, 10 paise and 20 paise coins. Each player selects a coin without the knowledge of the other's choice. If the sum of the coins is an odd amount, \(A\) wins \(B\) 's coins. If the sum is even, \(B\) wins \(A\) 's coins. Find the optimal strategies for the players and the value of the game.
b) A product manufacturing plant at a city distributes its products by trucks, loaded at the factory warehouse. It has its own fleet of trucks plus trucks of a private transport company. This transport company has complained that sometimes its trucks have to wait in line and thus the company loses money paid for a truck and driver of waiting truck. The company has asked the plant manager either to go in for a second warehouse or discount prices equivalent to the waiting time. The data available is:
Average arrival rate of all trucks \(=3\) per hour.
Average service rate is \(=4\) per hour.
The transport company has provided \(40 \%\) of the total number of trucks. Assuming that these rates are random according to Poisson distribution, Determine:
(i) The probability that a truck has to wait
(ii) The waiting time of a truck that has to wait
(iii) The expected waiting time of company trucks per day.

\section*{UNIT-V}
9. a) A maintenance project has following estimates of times in hours and cost in rupees for jobs. Assuming that jobs can be done either at normal or at fast pace, but not any pace in between. Plot the relationship between project completion time and minimum project cost.
b) Assuring a relationship between job duration and job cost and with overhead cost of Rs. 25/- per hour, plot the cost - time relationship.
\begin{tabular}{|l|l|l|l|l|l|}
\hline Activity & Predecessor & \multicolumn{2}{|c|}{ Normal } & \multicolumn{2}{c|}{ Crash } \\
\hline \multirow{3}{*}{ A } & \multirow{6}{|c|}{\begin{tabular}{l} 
Time in \\
days
\end{tabular}} & \begin{tabular}{l} 
Cost \\
(Rs.)
\end{tabular} & \begin{tabular}{l} 
Time in \\
days
\end{tabular} & \begin{tabular}{l} 
Cost \\
(Rs.)
\end{tabular} \\
\cline { 3 - 6 } & - & 8 & 80 & 6 & 100 \\
\hline B & A & 7 & 40 & 4 & 94 \\
\hline C & A & 12 & 100 & 5 & 184 \\
\hline D & A & 9 & 70 & 5 & 102 \\
\hline E & B,C,D & 6 & 50 & 6 & 50 \\
\hline
\end{tabular}
(OR)
10. The following table gives the activities in a construction project and the time duration of each activity:
\begin{tabular}{|l|l|l|}
\hline Activity & Preceding Activity & \begin{tabular}{l} 
Normal time \\
(days )
\end{tabular} \\
\hline A & - & 16 \\
\hline B & - & 20 \\
\hline C & A & 8 \\
\hline D & A & 10 \\
\hline E & B,C & 6 \\
\hline F & D,E & 12 \\
\hline
\end{tabular}
(i) Draw the activity network of the project.
(ii) Find critical path.
(iii) Find the total float and free-float for each activity.

\section*{SET - 3}

\title{
III B. Tech II Semester Regular Examinations, June-2022 OPERATIONS RESEARCH
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. \(\quad 10\) grams of Alloy A contains 2 grams of copper, 1 gram of zinc and 1 gram of lead. 10 grams of Alloy \(B\) contains 1 gram of copper, 1 gram of zinc and 1 gram of lead. It is required to produce a mixture of these alloys, which contains at least 10 grams of copper, 8 grams of zinc, and 12 grams of lead. Alloy B costs 1.5 times as much per Kg as alloy A. Find the amounts of alloys \(A\) and \(B\), which must be mixed in order to satisfy these conditions in the cheapest way. Use the Simplex method.
(OR)
2. Minimize \(Z=1 a-2 b-3 c\)
s.t.
\(-2 a+1 b+3 c=2\)
\(2 a+3 b+4 c=1\) and all \(a, b\), and \(c\) are \(\geq 0\).
Also write the dual of the above and give the answer of dual from the answer of the primal.

\section*{UNIT-II}
3. The demand pattern for a product at for consumer centers, \(A, B\), \(C\) and \(D\) are 5000 units, 7000 units, 4000 units and 2000 units respectively. The supply for these centers is from three factories \(X, Y\) and \(Z\). The capacities for the factories are 3000 units, 6000 units and 9000 units respectively. The unit transportation cost in rupees from a factory to consumer center is given below in the matrix. Develop an optimal transportation schedule and find the optimal cost.
\begin{tabular}{|l|l|l|l|l|}
\hline From & \multicolumn{4}{|c|}{ To } \\
\hline & A & B & C & D \\
\hline X & 8 & 9 & 12 & 8 \\
\hline Y & 3 & 4 & 3 & 2 \\
\hline\(Z\) & 5 & 3 & 7 & 4 \\
\hline
\end{tabular}

\section*{(OR)}
4. a) The productivity of operators \(A, B, C, D\), and \(E\) on different machines \(P, Q, R, S\), and \(T\) are given in the matrix below. Assign machines to operators for maximum productivity.
\begin{tabular}{|l|l|l|l|l|l|}
\hline Operators & P & Q & R & S & T \\
\hline A & 9 & 14 & 10 & 7 & 12 \\
\hline B & 8 & 11 & 12 & -- & 13 \\
\hline C & 10 & 10 & 8 & 11 & -- \\
\hline D & 12 & 14 & 11 & 10 & 7 \\
\hline E & 13 & 10 & 12 & 13 & -- \\
\hline
\end{tabular}
b) Find the optimal sequence and total elapsed time for processing two jobs on 5 machines:
\begin{tabular}{|l|l|l|l|l|l|l|}
\hline \multirow{2}{*}{ Job 1 } & Time in hours & 2 & 3 & 4 & 6 & 2 \\
\cline { 2 - 7 } & Order of Machining & A & B & C & D & E \\
\hline \multirow{2}{*}{ Job 2 } & Time in hours & 4 & 5 & 3 & 2 & 6 \\
\cline { 2 - 7 } & Order of Machining & B & C & A & D \\
\hline
\end{tabular}

\section*{UNIT-III}
5. A company is considering purchasing a new grinder, which will cost Rs. 10000/-. The economic life of the machine is expected to be 6 years. The salvage value of the machine will be Rs. 2000/-. The average operating and maintenance costs are estimated to be Rs. 5000/- per annum.
a) Assuming an interest rate of \(10 \%\), determine the present value of future cost of the proposed grinder.
b) Compare this grinder with the presently owned grinder that has an annual operating cost of Rs. 4000/- per annum and expected maintenance cost of Rs. 2000/-in the second year with an annual increase of Rs. 1000/thereafter.

\section*{(OR)}
6. a) A machine costs Rs.500/-. Operation and maintenance costs are zero for the first year and increase by Rs. 100/-every year. If money is worth \(5 \%\) every year, determine the best age at which the machine should be replaced. The resale value of the machine is negligibly small. What is the weighted average cost of owning and operating the machine?
b) What is time value of money? Explain.

\section*{UNIT-IV}
7. a) In a railway station only one train is handled at a time. The railway yard is sufficient for two trains to wait while other is given signal to leave the station. Trains arrive at a station at an average rate of 6 per hour and the railway station can handle them on an average rate of 12 per hour. Assuming Poisson arrivals and exponential service distribution, find the steady state probabilities of the various number of trains in the system. Also find the average number of trains in the system.
b) Solve the following \(2 \times \mathrm{n}\) sub game:
\begin{tabular}{|c|l|l|l|}
\hline \multicolumn{4}{|l|}{ B } \\
\hline \multirow{3}{|l|}{ A } & I & II \\
\cline { 2 - 4 } & I & 1 & 8 \\
\cline { 2 - 4 } & II & 3 & 5 \\
\cline { 2 - 4 } & III & 11 & 2 \\
\hline
\end{tabular}
(OR)
8. a) In a game of matching coins, player A wins Rs.2/-, if there are two heads, wins nothing if there are two tails and loses Re.1/when there are one head and one tail. Determine the pay off matrix and best strategies and value of the game.
b) A repairman is to be hired to repair machines, which break down at an average rate of 3 per hour. The breakdown follows Poisson distribution. Non - productive time of a machine is considered to cost Rs.16/- per hour. Two repairmen have been interviewed. One is slow but cheap while the other is fast but expensive. The slow worker charges Rs. 8/- per hour and the services breakdown machines at the rate of 4 per hour. The fast repairman demands Rs. 10/- per hour and services at an average rate of 6 per hour. Which repairman is to be hired?

\section*{UNIT-V}
9. a) What are the differences between CPM and PERT? Explain.
b) How do you perform project crashing? Explain.

\section*{(OR)}
10. The following table gives data on normal time and cost and crash time and cost for a project.
(i) Draw the network and identify the critical path.
(ii) What is the normal project duration and associated cost?
(iii) Find out total float for each activity.
(iv) Crash the relevant activities systematically and determine the optimum project time and cost.
\begin{tabular}{|l|l|l|l|l|}
\hline Activity & \multicolumn{2}{|c|}{ Normal } & \multicolumn{2}{c|}{ Crash } \\
\hline & Time (week) & Cost ( Rs.) & Time (week) & Cost (Rs.) \\
\hline \(1-2\) & 3 & 300 & 2 & 400 \\
\hline \(2-3\) & 3 & 30 & 3 & 30 \\
\hline \(2-4\) & 7 & 420 & 5 & 580 \\
\hline \(2-5\) & 9 & 720 & 7 & 810 \\
\hline \(3-5\) & 5 & 250 & 4 & 300 \\
\hline \(4-5\) & 0 & 0 & 0 & 0 \\
\hline \(5-6\) & 6 & 320 & 4 & 410 \\
\hline \(6-7\) & 4 & 400 & 3 & 470 \\
\hline \(6-8\) & 13 & 780 & 10 & 900 \\
\hline \(7-8\) & 10 & 1000 & 9 & 1200 \\
\hline
\end{tabular}

Indirect costs are Rs. 50 per week.

\title{
III B. Tech II Semester Regular Examinations, June-2022 OPERATIONS RESEARCH
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. \(\quad\) Minimize \(Z=1 a+1 b+1 c\)
s.t
\(1 a-3 b+4 c=5\)
\(1 a-2 b \leq 3\)
\(2 a-1 c \geq 4\) and
\(a\) and \(b\) are \(\geq 0\) and \(c\) is unrestricted.
(OR)
2. A company manufactures two products \(A\) and \(B\). These are machined on machines \(X\) and \(Y\). A takes one hour on machine \(X\) and one hour on Machine \(Y\). Similarly product \(B\) takes 4 hours on Machine \(X\) and 2 hours on Machine \(Y\). Machine \(X\) and \(Y\) have 8 hours and 4 hours as idle capacity. The planning manager wants to avail the idle time to manufacture \(A\) and \(B\). The profit contribution of \(A\) is Rs. 3/- per unit and that of \(B\) is Rs.9/- per unit. Find the optimal product mix using the Simplex method.

UNIT-II
3. a) Given the set up costs below, show how to sequence the production so as to minimize the total setup cost per cycle:
\begin{tabular}{|l|l|l|l|l|l|}
\hline Jobs & A & B & C & D & E \\
\hline A & - & 2 & 5 & 7 & 1 \\
\hline B & 6 & - & 3 & 8 & 2 \\
\hline C & 8 & 7 & - & 4 & 7 \\
\hline D & 12 & 4 & 6 & - & 5 \\
\hline E & 1 & 3 & 2 & 8 & - \\
\hline
\end{tabular}
b) Write the LP formulation of a transportation problem.

Find the optimal sequence for the given two jobs, which are to be processed on four machines in the given technological order:
\begin{tabular}{|l|l|l|l|l|l|}
\hline Job1 & Order & A & B & C & D \\
\cline { 2 - 6 } & Time in hours & 2 & 3 & 3 & 4 \\
\hline Job2 & Order & D & C & B & A \\
\cline { 2 - 6 } & Time in hours & 2 & 3 & 3 & 4 \\
\hline
\end{tabular}

\section*{UNIT-III}
5. a) A manufacturer is offered two machines \(A\) and \(B\). \(A\) has the cost price of Rs. 2,500/- its running cost is Rs. 400 for each of the first 5 years and increase by Rs.100/- every subsequent year. Machine B having the same capacity as A. and costs Rs. 1250/-, has running cost of Rs.600/- for first 6 years, increasing thereby Rs. 100/- per year. Which machine should be purchased? Scrap value of both machines is negligible. Money value is \(10 \%\) per year.
b) Explain the model for group replacement of items.
(OR)
6. A unit of electrical equipment is subjected to failure. The probability of distribution of the age at failure is as follows:
\begin{tabular}{|l|l|l|l|l|}
\hline Age at failure (weeks) & 2 & 3 & 4 & 5 \\
\hline Probability & 0.2 & 0.3 & 0.4 & 0.1 \\
\hline
\end{tabular}

Initially 10000 new units are installed and a new unit replaces any unit, which fails, at the end of the week in which it fails.
(i) Calculate the expected number of units to be replaced in each of weeks 1 to 7 . What rate of failure can be expected in the long run?
(ii) Among the 10000 installed units at the start of week 8, how many can be expected to be aged zero week, 1 week, 2 weeks, 3 weeks or 4 weeks? Compare this with the expected frequency distribution in long run.
(iii) Replacement of individual units on failure costs Rs. 0.05 each. An alternative policy is to replace all units after a fixed number of weeks at a cost of Rs. 300/- and to replace any unit failing before the replacement week at the individual cost of 5 paise each. Would this preventive policy be adopted? If so, after how many weeks should all units be replaced?

\section*{UNIT-IV}
7. a) Solve the game given in the pay off matrix below:
\begin{tabular}{|c|c|c|c|l|}
\hline \multirow{4}{*}{A} & \multicolumn{4}{|c|}{\(B\)} \\
\cline { 2 - 5 } & & 1 & 2 & 3 \\
\cline { 2 - 5 } & 1 & 3 & -4 & 2 \\
\cline { 2 - 5 } & 2 & 1 & -3 & -7 \\
\cline { 2 - 5 } & 3 & -2 & 4 & 7 \\
\hline
\end{tabular}
b) A car park contains 5 cars. The arrival of cars is Poisson at a mean rate of 10 per hour. The length of time each car spends in the car park is exponential distribution with a mean of 5 hours. How many cars are in the car park on an average?

\section*{(OR)}
8. a) Two armies are at war. Army \(A\) has two air bases, one of which is thrice as valuable as the other. Army \(B\) can destroy an undefended air base, but it can destroy only one of them. Army \(A\) can also defend only one of them. Find the strategy for \(A\) to minimize the losses.
b) Trains arrive at the yard every 15 minutes and the service time is 33 minutes. If the line capacity of the yard is limited to 4 trains, find (i) the probability that the yard is empty and (ii) The average number of trains in the system.

\section*{UNIT-V}
9. Madras Construction Company is bidding on a contract to install a line of microwave towers. It has identified the following activities, along with their expected time, predecessor restrictions, and worker requirements:
\begin{tabular}{|l|l|l|l|}
\hline Activity & Duration ( Weeks) & Predecessor & \begin{tabular}{c} 
Crew Size \\
(Workers)
\end{tabular} \\
\hline A & 4 & - & 4 \\
\hline B & 7 & - & 2 \\
\hline C & 3 & A & 2 \\
\hline D & 3 & A & 4 \\
\hline E & 2 & B & 3 \\
\hline F & 2 & B & 3 \\
\hline G & 2 & D,E & 3 \\
\hline H & 3 & F,G & 4 \\
\hline
\end{tabular}

The contract specifies that the project must be completed in 14 weeks. This company will assign a fixed number of workers to the project for its entire duration, and so it would like to ensure that the minimum number of workers is assigned and that the project will be completed in 14 weeks. Find a schedule which will do this.
(OR)
10. Illustrate with an example how you perform resource leveling.

III B. Tech II Semester Regular Examinations, June-2022
WIRED AND WIRELESS TRANSMISSION DEVICES
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Derive the wave equation for a TE wave and mention dominant mode.
b) Explain the losses of micro strip lines.
(OR)
2. a) A rectangular wave-guide has a cross section of \(1.5 \mathrm{~cm} \times 0.8 \mathrm{~cm}\), \(\sigma=0, \mu=\mu_{0}\) and \(\epsilon=4 \epsilon_{0}\). The magnetic field component is given as
\[
H_{x}=2 \sin \left(\frac{\pi x}{a}\right) \cos \left(\frac{3 \pi y}{b}\right) \sin \left(\pi \times 10^{11} t-\beta z\right) A / m
\]

Determine:
(i) The mode of operation
(ii) The cut off frequency
(iii) The phase constant
(iv) The propagation constant
(v) The wave impedance.
b) Obtain the relation between phase velocity and group velocity.

\section*{UNIT-II}
3. a) Define the half-power beam width and directivity of an antenna.

And derive the relation between them.
b) An antenna has a radiation resistance of \(72 \Omega\), a loss resistance of \(8 \Omega\) and a power gain of 12 dB . Determine the antenna efficiency and its directivity.
4. a) Draw the current distribution of an antenna with different lengths.
b) Distinguish between directive gain and power gain.

\section*{UNIT-III}
5. a) Derive the field components and radiation resistance of a half wave dipole.
b) Find the radiation resistance of a loop antenna of diameter 0.5 m operating at a frequency of 1 MHz .
(OR)
6. a) What is linear array? Compare Broad side array and End fire array.
b) What is binomial array antenna? What its basic principle of working? Mention the advantages and disadvantages.

\section*{1 of 2}

\section*{UNIT-IV}
7. a) Sketch and explain the constructional modes of a helical antenna.
b) Distinguish between resonant and non-resonant antennas.
(OR)
8. a) Explain about electromagnetic horn antenna. What are the [8M] various types of horn and their practical applications?
b) Explain the various feeding mechanisms used in parabolic reflector antennas.

\section*{UNIT-V}
9. a) Classify the wave propagation based on frequency range.
b) Draw the block diagram of basic antenna measurement setup. Explain each part.

\section*{(OR)}
10. a) Derive the basic equation of free space propagation.
b) Explain how the E-H radiation patterns are measured.

III B. Tech II Semester Regular Examinations, June-2022
WIRED AND WIRELESS TRANSMISSION DEVICES
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Analyze the wave equation for a TE wave and all the field components in a rectangular wave guide.
b) Distinguish between the properties of TEM mode of propagation and that of TE and TM type of propagation.
(OR)
2. a) An air filled rectangular wave guide has dimensions of 0.9 " \(\times\) 0.4 " and is supporting \(\mathrm{T} \mathrm{E}_{10}\) mode at a frequency of 9800 MHz . Calculate the wave guide impedance. Calculate the percentage change in this impedance for a \(10 \%\) increase in the operating frequency.
b) Derive the Characteristic impedance of a micro strip lines.

\section*{UNIT-II}
3. a) What is meant by the effective area of an antenna? How is it related to the gain?
b) Explain the working principle of a 2-wire antenna?

\section*{(OR)}
4. a) Explain the following:
(i) Beam area
(ii) Radiation intensity
(iii) Beam efficiency
(iv) Directivity.
b) Explain briefly radiation mechanism in single wire antenna.

\section*{UNIT-III}
5. a) Discuss about loop antenna. What are the disadvantages of loop antenna? What are applications loop antennas?
b) Calculate the power gain of a half wave dipole whose ohmic losses and directive gain are 7 ohms and 1.64 respectively.

\section*{(OR)}
6. a) What is uniform linear array? Discuss the application of linear array and also explain the advantages and disadvantage of linear array?
b) Explain the Half-Wavelength Folded Dipole.

\section*{R19}

SET - 2

\section*{UNIT-IV}
7. a) Derive the construction and basic principles of operation of a helical antenna under
i) normal mode of operation
ii) axial mode of operation
b) Describe the working of microstrip antenna. List the advantages of microstrip antenna.
(OR)
8. a) What is optimum horn? Explain its important features with equations.
b) Explain the principle of working of lens antenna.

\section*{UNIT-V}
9. a) Describe the troposphere and explain how ducts can be used for microwave propagation.
b) Briefly explain the terms: (i) LOS and Radio Horizon (ii) Effective Earth's radius.
(OR)
10. a) Discuss the basic characteristics of ground wave propagation.
b) What are the factors that affect the propagation of radio waves?

\section*{2 of 2}

\title{
III B. Tech II Semester Regular Examinations, June-2022 WIRED AND WIRELESS TRANSMISSION DEVICES
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. a) Derive the expressions for cut off frequency, phase constant, group velocity, and phase velocity and wave impedance in rectangular waveguide, for TE modes.
b) Explain about dominant and degenerate modes. Draw the sketches of TE and TM mode analysis

\section*{(OR)}
2. a) Describe the method of designating the modes of transmission in rectangular waveguides. Why is transmission in the dominant mode most often used in waveguides?
b) Show that the \(\mathrm{TEM}, \mathrm{TM}_{01}\) and \(\mathrm{TM}_{10}\) modes does not exist in a rectangular waveguide.

\section*{UNIT-II}
3. a) Derive the relation between directivity and effective aperture of an antenna.
b) The radiation resistance of an antenna is \(72 \Omega\) and loss resistance is \(8 \Omega\). What is the directivity in db if the power gain is 16 ?

\section*{(OR)}
4. a) Explain the following terms:
(i) Beam width
(ii) Omni directional pattern
(iii) Side lobe level
(iv) Field pattern of antenna
b) Explain the radiation from two-wire antenna.

\section*{UNIT-III}
5. a) What is the radiation resistance of antenna? Derive the expression for radiation resistance of half wave length dipole antenna.
b) Compare far fields of small loop antenna and short dipole [7M] antenna.
(OR)
6. a) Design Yagi-Uda antenna of 6 elements to provide gain of 12 dB if the operating frequency is 200 MHz .
b) Explain the principal of pattern multiplication with an example.

\section*{UNIT-IV}
7. a) Discuss advantages of microstrip antennas. Draw the radiation characteristics of rectangular microstrip antenna.
b) Sketch and explain the construction, operation of a helical antenna.
(OR)
8. a) Illustrate the geometrical features of parabolic reflectors. List out the advantages.
b) Explain the radiation characteristics of a pyramidal horn antenna with neat diagrams. How is it different from other horn antennas?

\section*{UNIT-V}
9. a) Deduce an expression for the critical frequency of an ionized region in terms of its maximum ionization density.
b) At what frequency a wave must propagate for the D-region to have an index of refraction 0.5 ? Given \(\mathrm{N}=400\) electron/c.c. for D-region.
(OR)
10. a) Define Wave tilt of Ground Wave. Draw the equivalent circuit of a ground.
b) Explain the 3-antenna method of measurement of the gain of a horn antenna with necessary relations.

III B. Tech II Semester Regular Examinations, June-2022 WIRED AND WIRELESS TRANSMISSION DEVICES
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Derive the wave equations for TM mode in Rectangular Wave [8M] guide.
b) Starting with the equation for the propagation constant of a mode in a rectangular wave guide, Derive the expression \(\lambda=\frac{\lambda_{g} \lambda_{c}}{\lambda_{g}^{2}+\lambda_{c}^{2}}\), where \(\lambda_{\mathrm{g}}\) is the guide wave length and \(\lambda_{\mathrm{c}}\) is the cutoff wave length.

\section*{(OR)}
2. a) Determine the group velocity and phase velocity for a dominant mode propagating through a waveguide of breadth 10 cm at frequency 2.5 GHz .
b) Explain the importance of Q-factor estimation in microstrip lines.

\section*{UNIT-II}
3. a) What are principle planes? How the antenna beam width is defined in such planes?
b) An antenna has a loss resistance 10 ohms, power gain of 20 and directivity 22 , calculate its radiation resistance.
(OR)
4. a) Define the terms:
(i) Bandwidth
(ii) Polarization
(iii) Effective aperture area.
b) Draw the equivalent circuit of an antenna. How the EM fields are detached from an antenna? Explain.

UNIT-III
5. a) Derive the expression for far field components of a small loop antenna.
b) Derive the expression for effective area and effective height of dipole antenna.

\section*{(OR)}
6. a) Derive the expression for array factor of a linear broadside array [8M]
of N isotropic elements.
b) Find the array factor and plot the normalized radiation pattern [7M] of a broadside array of 5 isotropic radiators of spacing \(\lambda / 2\).

\section*{UNIT-IV}
7. a) Discuss various feeding techniques of microstrip antenna. Also list any five applications of patch antennas.
b) Write short notes on travelling wave antenna. Explain various types of travelling wave antennas.
(OR)
8. a) Explain the characteristics of \(90^{\circ}\) corner reflector with the help of image principle.
b) Write short notes on lens antenna. Discuss different types of lens antennas with neat sketches.

\section*{UNIT-V}
9. a) Derive the LOS distance equation in space wave propagation.
b) Explain about directivity measurement procedure of a given test antenna.
(OR)
10. a) Derive the field strength equation at receiving antenna in space wave propagation technique.
b) List different sources of errors in antenna measurements.

\title{
III B. Tech II Semester Regular Examinations, June-2022 WEB TECHNOLOGIES
}
(Common to Computer Science and Engineering, Information Technology)

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ UNIT-I}
1. a) Write HTML code to display your class time table.
b) What is a suitable procedure to integrate different style sheets into website? Explain.
(OR)
2. a) Define CSS. Explain inline, internal style sheets with examples.
b) What is web application? Differentiate between client side scripting and server side scripting.

\section*{UNIT-II}
3. a) Write a JavaScript code to validate a user by considering username as "ABC" and password as "XYZ". Assume username and password is getting from the form element.
b) Write a java script to find factorial of a given number.
(OR)
4. a) Explain primitive data types in Java script.
b) Explain how events are handled in JavaScript.

\section*{UNIT-III}
5. a) Define an Array. Explain about the types of Arrays in PHP with an example.
b) Show how SAX is an alternative method for parsing XML documents. Write its advantages.
(OR)
6. a) How does an XSLT processor use an XSLT style sheet with an XML document?
b) What are the advantages and disadvantages of Ajax?

\section*{UNIT-IV}
7. a) What are Cookies? How to create cookies in PHP?
b) How the result set of Mysql is handled in PHP?
(OR)
8. a) Explain user defined functions in PHP with an example.
b) Write a PHP code to validate the form consisting of a username, password and email fields.

\section*{UNIT-V}
9. a) Define init and destroy methods in servlets.
b) How does a symbol differ from a string in Ruby language?
10. Write about Pattern Matching in Ruby.

\title{
III B. Tech II Semester Regular Examinations, June-2022 WEB TECHNOLOGIES
}
(Common to Computer Science and Engineering, Information Technology)
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Discuss the creation of HTML document with frames.
b) Write about different methods for implementing cascading style sheets?

\section*{(OR)}
2. a) Show how group and alignment of tables, rows and columns is achieved using HTML?
b) Write CSS code that defines five classes of paragraph with different background, color, margins, padding and border style.

\section*{UNIT-II}
3. a) List out the different ways an HTML element can be accessed in a JavaScript code.
b) Write a JavaScript code to test whether the given number is Armstrong number or not.
(OR)
4. a) What are the ways to define a variable in JavaScript?
b) Write a Java Script code to generate the current date in words format "Day, Month Date, Year".
(Hint: Friday, December 18, 2015).

\section*{UNIT-III}
5. a) What is XML Element? Explain various rules while writing XML.
b) Explain in brief about XSLT.

\section*{(OR)}
6. a) Briefly explain the purpose of XML processor.
b) Discuss the important features of XML which make it more suitable than HTML for creating web related services.

\section*{UNIT-IV}
7. a) Discuss different types of Conditional statements in PHP.
b) Write a PHP script to open, close, read and write into a file.
(OR)
8. a) Describe briefly the integration of PHP and AJAX.
b) Write a PHP program to demonstrate the passing a variable by

\section*{UNIT-V}
9. a) Write a Ruby program that uses iterator to find out the length of a string.
b) Name different methods for IO console in Ruby and explain them.
(OR)
10. a) Explain about arrays creation, manipulation functions that [8M] support by RUBY with examples.
b) Explain Hashes and Methods in Ruby with examples.

Code No: R1932051

\title{
III B. Tech II Semester Regular Examinations, June-2022 WEB TECHNOLOGIES
}
(Common to Computer Science and Engineering, Information Technology)

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Create a HTML form with five basic features.
b) Explain how basic and nested tables are created using HTML.
(OR)
2. a) Explain frames in HTML with an example?
b) With the neat block diagram explain the CSS Box Model.

\section*{UNIT-II}
3. a) Explain control structures in Java script.
b) Write a script that inputs several lines of text and a search character to determine the number of occurrences of the character in the text.
(OR)
4. a) List some advantages of JavaScript.
b) Write about the various Objects used in Java script.

\section*{UNIT-III}
5. a) Define XML. What are the basic rules to write XML document? Explain with syntax.
b) Explain DTD. Differentiate between DTD and Schema.
(OR)
6. a) Explain working mechanism of AJAX with suitable example.
b) Create a DTD for your daily schedule.

\section*{UNIT-IV}
7. a) What is the scope of variable? Explain scope of a local variable and super Global variable in PHP with example.
b) Explain the predefined functions in PHP with an example.
(OR)
8. a) Employee (id, name, address, designation, salary). Write an Ajax program to accept name and salary of employee and increase employee salary by \(10 \%\) in the database.
b) What is PHP session, how session is created and destroyed.

\section*{UNIT-V}
9. a) Explain life cycle of a servlet.
b) Explain how to declare and use a constructor in Ruby.
b) Define class. Explain how to create a class and its objects in Ruby.

\section*{III B. Tech II Semester Regular Examinations, June-2022 WEB TECHNOLOGIES}
(Common to Computer Science and Engineering, Information Technology)

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Explain the classification of HTML tags with examples.
b) Explain different form elements available in HTML.
2. a) Write the structure of HTML Program and explain with an example.
b) Explain external and embedded style sheets with examples.

\section*{UNIT-II}
3. a) 'Javascript is referred to as Object based programming language'. Justify with an example.
b) Explain variables and operators in Java script.
4. a) Write a script that reads an integer and determines whether it isPRIME Number or Not.
b) Describe the scoping rules for the Java script.

\section*{UNIT-III}
5. a) Explain the various types of XML schema data types.
b) Explain the importance of XML in web applications.
(OR)
6. a) Explain the creation of namespaces in XML.
b) Explain in brief about DOM.

\section*{UNIT-IV}
7. a) What is \$_SESSION in PHP? Explain by writing a program.
b) Discuss various types of control statements in PHP.
(OR)
8. a) Explain with examples using of variables and constants in PHP.
b) How can you incorporate one PHP file within another? Explain with example.

\section*{UNIT-V}
9. a) What is a Servlet? What are the advantages of servlets?
b) With an example, explain code blocks and iterators in Ruby.

\section*{(OR)}
10. a) Explain the implementation of Inheritance in Ruby.
b) Write Ruby program which uses Math module to find area of a triangle.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 POWER ELECTRONIC CONTROLLERS AND DRIVES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
(14 Marks)
1. a) How do you define active and passive load torques?
b) Explain the merits and demerits of four quadrant dc drives employing circulating current dual converter?
c) With Chopper control regenerative braking of series can be obtained. Justify?
d) Variable frequency control of IM yields high torque to current ratio during starting. Explain?
e) Why is the power factor of the slip power recovery scheme of speed control of IM is low?
f) When started on no-load, a salient pole synchronous motor pulls into synchronism even before dc excitation is applied. Why?

\section*{PART - B}
(56 Marks)
2. a) Explain the four-quadrant operation of a drive with the help of hoist load?
b) The Fig. 1 shows the plots of Speed Vs Motor and load torques. Comment on the stability of the operating points \(\mathrm{A}, \mathrm{B}, \mathrm{C}\) and D .

Fig. 1

3. a) Explain the operation of a separately excited dc motor using single phase halfcontrolled rectifier? Derive the relation between speed and torque and draw the corresponding characteristics?
b) A \(220 \mathrm{~V}, 875 \mathrm{rpm}, 150 \mathrm{~A}\) separately excited dc motor has an armature resistance of \(0.06 \Omega\). It is fed from a single phase fully controlled rectifier with an ac source voltage of \(220 \mathrm{~V}, 50 \mathrm{~Hz}\). Assuming continuous conduction, Calculate:
(i) Firing angle for rated motor torque and 750 rpm
(ii) Motor speed for \(\alpha=160^{\circ}\) and rated torque

SET-1
4. a) Explain the operation of two quadrant chopper fed separately excited DC motor which gives forward motoring and forward braking operation and draw current and voltage waveforms for continuous current operation?
b) A \(230 \mathrm{~V}, 20 \mathrm{~A}, 1000 \mathrm{rpm}\) separately excited dc motor having an armature resistance of \(2 \Omega\) is controlled by a chopper. The chopping frequency is 500 Hz , and the input voltage is 240 V . Calculate the duty ratio for a motor torque of 2 times rated torque at 500 rpm .
5. a) Why stator voltage control is suitable for speed control of Induction motor in fan and pump drives?
b) A \(440 \mathrm{~V}, 3\) phase, 50 Hz 6 pole 945 rpm Star connected Induction Motor has the following parameter referred to the stator. \(\mathrm{R}_{\mathrm{S}}=2.0 \Omega, \mathrm{R}^{\prime}{ }_{\mathrm{r}}=2.0 \Omega, \mathrm{X}_{\mathrm{S}}=\) \(3 \Omega, \mathrm{X}^{\prime}{ }_{\mathrm{r}}=4 \Omega\).When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine motor speed, current and torque for the terminal voltage of 280 V .
6. a) Explain the principle of Slip power recovery scheme used for speed control of IM.
b) A \(400 \mathrm{~V}, 3\) phase, \(50 \mathrm{~Hz}, 10 \mathrm{~kW}, 6\) pole, 960 RPM Star connected Induction Motor has the following parameter referred to the stator. \(\mathrm{R}_{\mathrm{S}}=0.4 \Omega\), \(\mathrm{R}^{\prime}{ }_{\mathrm{r}}=0.6 \Omega, \mathrm{X}_{\mathrm{S}}=\mathrm{X}^{\prime}{ }_{\mathrm{r}}=1.4 \Omega\). The motor drives a fan load at 960 rpm . The stator to rotor turns ratio is 2 . What resistance must be connected in each phase of the rotor circuit to reduce the speed to 800 rpm .
7. Describe self-controlled and load-commutated inverter controlled synchronous motor drives in detail and compare them.

Code No: R1632031

SET-1

\section*{III B. Tech II Semester Supplementary Examinations, June-2022 \\ METROLOGY}
(Mechanical Engineering)
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
PART -A
(14 Marks)
1. a) What is the need for tolerance?
b) Explain the various standards of linear measurement.
c) Write any four applications of tool makers microscope.
d) What are the uses of comparators?
e) Define pitch, effective diameter and flank angle of thread?
f) List few alignment tests on lathe.

\section*{PART - B}
2. a) What is a fit? Explain the types of fits with neat sketches.
b) Determine the dimensions and tolerances of the shaft and hole having the size of \(25 \mathrm{H} 7 / \mathrm{f} 8.25 \mathrm{~mm}\) falls in diameter steps of 18-30. Also indicate the type of fit and show the tolerances with sketch. Assume the following data:
The fundamental deviation for shaft ' f ' is \(-5.5 \mathrm{D}^{0.41}\). The standard tolerance unit \(\mathrm{i}=0.45 \mathrm{D}^{1 / 3}+0.001 \mathrm{D}\), where D is the geometric mean of the lower and upper limits of diameter step in which the diameter consideration lies, D is in mm . The standard tolerance for \(\mathrm{IT} 7=16 \mathrm{i}\) and \(\mathrm{IT} 8=25 \mathrm{i}\)
3. a) Select the sizes of angle gauges needed to build the following angles: \(22^{\circ}, 11^{0}\) \(20^{\prime}, 29^{\circ} 54^{\prime}, 31^{0} 49^{\prime} 24^{\prime \prime}\).
b) Explain Taylor's principle as applicable to limit gauging with sketches.
4. a) What is an optical flat? Explain the use of optical flat for measuring the flatness of any surface.
b) Explain the working of Michelson's interferometer with a neat sketch.
5. a) The heights of peaks and valleys of 20 successive points on a surface are 35, \(25,40,22,37,19,41,21,42,18,42,24,44,25,40,18,40,18,39\), and 21 microns respectively, measured over a length 20 mm . Determine CLA and RMS values of roughness surface.
b) Explain any one type of optical comparator with a neat sketch.
6. a) With neat sketches explain the working of a Rolling gear tester.
b) With a neat sketch explain how the simple effective diameter of a screw thread may be checked using the two wire method.
7. a) With a neat sketch, explain the principle of auto collimator for measuring surface flatness.
b) With neat sketches describe the following tests on the lathe: (i) spindle center run-out, (ii) spindle taper bore run-out, (iii) cross slide run-out and (iv) chuck run-out.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ MICROPROCESSORS AND MICROCONTROLLERS \\ (Common to ECE, EIE, E.COM.E)
}

Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
(14 Marks)
1. a) Difference between Maximum and Minimum modes of 8086 Microprocessor.
[2M]
b) Write any Two addressing modes of 8086 Microprocessor. [2M]
c) Write the silent features of 8259 . [2M]
d) What is Segmentation in 80386? [3M]
e) What is need of Interrupt service routine? [3M]
f) List out PIC microcontroller families.

\section*{PART - B}
(56 Marks)
2. a) Explain the Maximum mode operation of 8086 with the help of timing diagram.
b) What is Memory segmentation? List out its advantages.
3. a) Write an ALP for 8086 to transfer 10 bytes of data from one location to another location.
b) Define the String manipulation instructions with examples.
4. a) How to interface \(\mathrm{A} / \mathrm{D}\) converter with 8086 microprocessors illustrate with an example.
b) Explain different control word formats of 8255 PPI .
5. a) Explain the Paging mechanism in 80386 Microprocessor.
b) Discuss the Register organization of 80386 Microprocessor.
6. a) Explain about the architecture of 8051 microcontroller in detail.
b) Describe the different modes of operation of timers/counters in 8051.
7. a) Discuss memory organization of PIC microcontroller.
b) Draw and explain different timers present in the PIC microcontroller.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 COMPUTER NETWORKS \\ (Common to CSE and IT)
}

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) Explain about MAN.
[2M]
b) Define bandwidth. [2M]
c) What is Piggybacking? Explain the advantage of it. [2M]
d) What is slotted ALOHA? Mention its advantages. [3M]
e) Explain polling and token passing. [3M]
f) Explain the structure of TCP Header format. [2M]

\section*{PART - B}
(56 Marks)
2. a) Explain the different topologies of the network.
b) Explain in detail about OSI/ISO reference model.
3. a) Explain in detail about Time Division Multiplexing and Code Division [7M]
Multiplexing.
b) Explain Error Correcting and Error Detecting codes.
4. a) Explain in detail about the sliding window protocol using Selective Repeat.
b) Explain simplex stop and wait protocol in detail.
5. a) Explain 802.11 physical layer and protocol stack.
b) Explain the working of Multiple Access Protocols.
6. a) How is the Connectionless Service implemented? Explain.
b) Explain in detail about Congestion Control Algorithms.
7. a) Compare and Contrast the UDP header and the TCP header.
b) How DNS service maps domain names to IP addresses.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ MICROPROCESSORS AND MICROCONTROLLERS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answering the question in Part-A is compulsory \\ 3. Answer any THREE Questions from Part-B \\ *****
}

\section*{PART -A}
(22 Marks)
1. a) Write the basic difference between 8085 and 8086 processor.
b) Explain the following instructions of 8086 with examples:
(i) ROR
(ii) DAA
(iii) INC
(iv) DIV
c) Write an ALP to generate a square wave with a period of 1 second.
d) List various I/O devices which can be interfaced with a microprocessor.
e) Draw the pin diagram of 8051 microcontroller.
f) List out the applications of 8051 microcontroller.

\section*{PART -B}
(48 Marks)
2. a) Draw the register organization of 8086 microprocessor and explain the [8M] operation of each register in detail.
b) Describe the structure and various fields of 80386 segment descriptor.
3. a) Draw the minimum mode pin diagram of 8086 microprocessor and explain the function of each pin in detail.
b) Explain the string manipulation instruction set of 8086 microprocessor.
4. a) Identify an example of IF-THEN-ELSE statement of Assembly Language [8M] Programming of 8086.
b) Explain the Addressing modes of 8051 microcontroller with an example each.
5. a) Draw the Block diagram of 8255 Programmable Peripheral Interface and [8M] explain.
b) Describe the interfacing of 8279 with 8086 microprocessor.
6. a) Explain the Memory Organization of 8051 microcontroller.
b) Explain the Timer mode operation in 8051 microcontroller.
7. a) Explain interfacing of 8051 microcontroller with LED's.
b) Write a short note on 'interface keyboard with 8051 '.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ MICROPROCESSORS AND MICROCONTROLLERS
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70

\title{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answering the question in Part-A is compulsory \\ 3. Answer any THREE Questions from Part-B \\ *****
}

\section*{PART -A}
(22 Marks)
1. a) Write short notes on flag register of 8086 .
b) Explain the following assembler directives of 8086 microprocessor:
(i) ASSUME
(ii) SEGMENT
(iii) EQU
(iv) DB
c) Draw and discuss the mode set register of 8257 .
d) Differentiate real and protected modes of 80386 .
e) Discuss the following SFRs in 8051: (i) SCON (ii) TCON
f) Explain Load instructions of ARM7 with one example.

\section*{PART -B}
(48 Marks)
2. a) What do you mean by addressing modes? What are the different addressing [8M] modes supported by 8086 ?
b) Draw the complete block diagram of 8086 architecture. Explain the functions of BIU and EU.
3. a) Draw and discuss the interrupt vector table of 8086 microprocessor.
b) Write an 8086 program to convert a BCD byte into a binary number.
4. a) Explain interfacing I/O subsystem using an 8255 with one example.
b) Draw the interfacing diagram of 8259 PIC to 8086 microprocessor.
5. a) List out the salient features of 80386 DX also give the major architectural advancements in 80386 over 8086 .
b) Discuss the register set of 80386 and explain the typical function of each of the registers in brief.
6. a) Draw and discuss the formats and bit definitions of the following SFRs in 8051 microcontroller.
b) Write code to push R0, R1 and R3 of bank 0 into the stack and pop them back into R5, R6 and R7 of bank 3 of 8051.
7. a) Explain about the memory organization of PIC microcontroller.
b) Draw a neat block diagram and pin out diagram of ARM7, and explain each pin.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ POWER SYSTEM ANALYSIS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Develop the relation between bus admittance matrix, bus incidence matrix and primitive admittance matrix.
b) For the transmission system with the following line specifications, compute the bus admittance matrix:
\begin{tabular}{|l|l|l|}
\hline Bus code & \begin{tabular}{l} 
Line \\
Impedance \\
(p.u)
\end{tabular} & \begin{tabular}{l} 
Half Line \\
charging \\
admittance \\
(p.u)
\end{tabular} \\
\hline \(1-2\) & \(0.08+\mathrm{j} \mathrm{0.32}\) & j 0.04 \\
\hline \(1-3\) & \(0.04+\mathrm{j} 0.16\) & j 0.03 \\
\hline \(2-3\) & \(0.02+\mathrm{j} 0.08\) & j 0.01 \\
\hline
\end{tabular}
(OR)
2. Three phase generators \(\mathrm{G}_{1}\) and \(\mathrm{G}_{2}\) supply motor loads \(\mathrm{M}_{1}, \mathrm{M}_{2}\) and \(\mathrm{M}_{3}\), as shown in Fig.1. Transformers \(\mathrm{T}_{1}\) and \(\mathrm{T}_{2}\) are rated at 100 MVA and \(33 / 10 \mathrm{kV}\), each has a reactance of 0.08 p.u. Assume 100 MVA and 33 kV are used as base values, obtain all the reactance's as per unit values and draw p.u reactance diagram.


Fig. 1

\section*{UNIT-II}
3. a) Explain the necessity of power flow studies.
b) Write an algorithm for computational procedure for load flow solution using Gauss-Seidal method when the system contains all types of buses.

\section*{(OR)}
4. a) Explain the polar coordinates method of Newton-Raphson load flow solution.
b) Compare the Newton-Raphson method, decoupled method and fast decoupled method.

\section*{UNIT-III}
5. Form the bus impedance matrix for the network shown, in Fig.2, using building algorithm.


Fig. 2

\section*{(OR)}
6. a) What do you understand by short circuit MVA? Explain.
b) A power plant has three generating units each rated at 7500 kVA with \(15 \%\) reactance. The plant is protected by a tie line system. With reactance's rated at 7500 MVA and \(6 \%\), determine the fault kVA when a short circuit occurs on one of the sections of bus bars. If the reactors were not present what would be the fault kVA?

\section*{UNIT-IV}
7. a) What are symmetrical components? Explain.
b) A positive, negative and zero sequence components of line currents are \(20 \angle 10^{\circ} \mathrm{A}, 6 \angle 60^{\circ} \mathrm{A}\) and \(3 \angle 30^{\circ} \mathrm{A}\) respectively. Determine the three line currents, assume (i) phase sequence abc and (ii) phase sequence acb.

\section*{(OR)}
8. a) Draw the sequence network connection for a double line to ground
fault at any point in a power system and from that obtain an expression for the fault current.
b) A three phase, \(6.9 \mathrm{kVA}, 10 \mathrm{MVA}\) alternator has \(\mathrm{X} "=\mathrm{X}_{2}=15 \%\) and \(X_{0}=5 \%\). The neutral is grounded through a reactor of 0.381 Ohms. Find the sub transient current in the faulted phase, when a single line to ground fault takes place.

\section*{UNIT-V}
9. a) Derive swing equation for a single machine connected to infinite bus system. State the assumptions if any and state the usefulness of this equation.
b) Two synchronous machines of equal rating have internal voltages of ( \(1.1+\mathrm{j} 0.5\) ) and ( \(0.8-\mathrm{j} 0.4\) ) p.u, respectively. The machines are connected by a line of 50 km length having only reactance and the second machine receives power of 0.9 p.u. Determine the reactance of the line per km length. Assume that there is no internal reactance for simplification.

\section*{(OR)}
10. a) Describe the recent methods to improve the transient stability.
b) A generator is supplying 0.8 p.u power to infinite bus system through a reactive transmission network. The maximum power which can be delivered is 2 p.u. A three phase fault occurs on the system and hence the maximum power which can be delivered by the generator, reduces to 0.5 p.u. In the post fault condition, the maximum power which the generator can deliver is 1.5 p.u. Compute critical clearing angle by applying equal area criterion.

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER SYSTEM ANALYSIS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) What is meant by a primitive network? Give the representation of a network component in admittance form.
b) For the transmission system with the following line specifications, form the bus admittance matrix by direct inspection method.
\begin{tabular}{|l|l|l|}
\hline Bus code p-q & \begin{tabular}{l} 
Impedance, \\
p.u \\
\(\left(Z_{\mathrm{p}-\mathrm{q})}\right.\)
\end{tabular} & \begin{tabular}{l} 
Half Line charging \\
admittance, p.u \\
\(\left(\frac{Y_{P Q}^{\prime}}{2}\right)\)
\end{tabular} \\
\hline \(1-2\) & \(0.02+\mathrm{j} 0.04\) & j 0.02 \\
\hline \(2-3\) & \(0.04+\mathrm{j} 0.2\) & j 0.02 \\
\hline \(3-5\) & \(0.15+\mathrm{j} 0.4\) & j 0.025 \\
\hline \(3-4\) & \(0.02+\mathrm{j} 0.06\) & j 0.01 \\
\hline \(4-5\) & \(0.02+\mathrm{j} 0.04\) & j 0.01 \\
\hline \(1-5\) & \(0.08+\mathrm{j} 0.2\) & j 0.02 \\
\hline \multicolumn{3}{|c|}{ (OR) } \\
\hline \multicolumn{3}{|c|}{}
\end{tabular}
2. Draw a per unit reactance diagram for the system shown in [15M] Fig. 1.


Fig. 1

\section*{UNIT-II}
3. a) Derive the static load flow equations of a power system.
b) Discuss the various types of buses and their significance in [9M] details.

(OR)
4. The following data are given for a three bus power system:

Bus 1 slack bus \(V\) specified \(=1.05 \angle 0^{\circ}\)
Bus 2 PV bus \(|V|\) specified \(=1.02\) p.u, \(\mathrm{P}_{\mathrm{G}}=3 \mathrm{p} . \mathrm{u}\)
Bus 3 PQ bus \(P_{L}=4\) p.u, \(Q_{L}=2\) p.u
Line reactance in p.u are given below:
\begin{tabular}{|l|l|}
\hline Bus code & Impedance \\
\hline \(1-2\) & j 0.5 \\
\hline \(2-3\) & j 0.5 \\
\hline \(3-1\) & j 0.5 \\
\hline
\end{tabular}

Carry out one iteration of load flow solution using Gauss-Seidal method. Take Q limits of generator 2 as \(0 \leq \mathrm{Q} \leq 4\).

\section*{UNIT-III}
5. For the system shown in Fig.2, form the bus impedance matrix using building algorithm.


Fig. 2

\section*{(OR)}
6. a) Explain the three phase short circuit currents on unloaded synchronous generator with neat diagrams.
b) A three phase, \(25 \mathrm{MVA}, 11 \mathrm{kV}\) alternator has internal reactance of \(6 \%\). Find the external reactance per phase to be connected in series with the alternator so that steady state short circuit current does not exceed six times the full load current.

\section*{UNIT-IV}
7. a) Derive an expression for power in a 3-phase circuit in terms of symmetrical components.
b) Obtain the expression for fault current of LLL fault occur at terminals of unloaded alternator and draw its equivalent circuit.
(OR)
8. a) Derive an expression for the fault current for a double line fault as an unloaded generator and draw its equivalent diagram.
b) A generator of negligible resistance having 1.0 p.u voltage behind transient reactance is subjected to different types of faults. The p.u values of the magnitudes of the fault currents are 3 phase fault-3.33 p.u., line to line fault-2.23 p.u and line to ground fault-3.01 p.u. Find the percentage values of sequence reactance's.

\section*{UNIT-V}
9. a) State the bad effects of instability. Distinguish between steady state and transient stabilities.
b) A \(50 \mathrm{~Hz}, 4\) pole turbo alternator rated \(100 \mathrm{MVA}, 11 \mathrm{kV}\) has an inertia constant of \(8 \mathrm{MJ} / \mathrm{MVA}\). Find (i) the energy stored in the rotor at synchronous speed and (ii) the rotor acceleration, if the mechanical input is suddenly raised to 80 MW for an electric load of 50 MW . (Neglect mechanical and electrical losses).

\section*{(OR)}
10. a) State and explain equal area criterion.
b) Discuss the methods by which the transient stability can be improved.

\section*{3 of 3}

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER SYSTEM ANALYSIS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

UNIT-I
1. a) Using the graph theory concepts, explain the following matrices:
(i) Element node incidence matrix and (ii) bus incidence matrix.
b) Form the \(\mathrm{Y}_{\text {bus }}\) by inspection for a 4 bus system, if the line series impedances are as given below:
\begin{tabular}{|l|l|}
\hline \begin{tabular}{l} 
Line (bus to \\
bus)
\end{tabular} & \begin{tabular}{l} 
Impedance \\
\((\mathrm{p} . \mathrm{u})\)
\end{tabular} \\
\hline \(1-2\) & \(0.15+\mathrm{j} 0.6\) \\
\hline \(1-3\) & \(0.1+\mathrm{j} 0.4\) \\
\hline \(1-4\) & \(0.15+\mathrm{j} 0.6\) \\
\hline \(2-3\) & \(0.05+\mathrm{j} 0.2\) \\
\hline \(3-4\) & \(0.05+\mathrm{j} 0.2\) \\
\hline
\end{tabular}
(OR)
2. Draw an impedance diagram for the system shown in Fig.1, [15M] expressing all values as per unit values.

Fig. 1


\section*{UNIT-II}
3. a) Compare Gauss-Seidal method and Newton-Raphson method in detail.
b) Derive the basic equations for load flow study using Gauss-Seidal method.
4. The following data, given in Fig.2, pertains to a simple three bus power system. Compute the three bus voltages at the end of first iteration using fast decoupled method. The line impedances shown are in p.u. The bus data is as follows (all data in p.u):
\begin{tabular}{|l|c|c|c|c|c|}
\hline \multicolumn{1}{|c|}{ Bus } & \(P_{G}\) & \(Q_{G}\) & \(P_{L}\) & \(Q_{L}\) & \(\left|V_{S P}\right|\) \\
\hline 1 (Slack) & - & - & - & - & 1.0 \\
\hline 2 (PV) & 5.3217 & - & - & - & 1.1 \\
\hline 3 (PQ) & - & - & 3.6392 & 0.5339 & - \\
\hline
\end{tabular}


Fig. 2
UNIT-III
5. Determine \(Z_{\text {bus }}\) for the networks shown, in Fig.3, using building algorithm.

\section*{Fig. 3}

(OR)
6. a) Explain the reactance's of synchronous machine under three phase short circuit occurs at its terminals.
b) There are two generators at bus bar A each rated at 12000 kVA , 12 \% reactance or another bus B, two more generators rated at 10000 kVA with 10 \% reactance are connected. The two bus bars are connected through a reactor rated at 5000 kVA with \(10 \%\) reactance. If the dead short circuit occurs between all the phases on bus bar B, what is the short circuit MVA fed into the fault?

\section*{2 of 3}

\section*{UNIT-IV}
7. a) What are sequence impedances? Obtain expression for sequence impedances in a balanced static 3-phase circuit.
b) Determine the symmetrical components for the three phase currents.
\[
\mathrm{I}_{\mathrm{R}}=15 \angle 0^{\circ} \mathrm{A}, \mathrm{I}_{\mathrm{Y}}=15 \angle 230^{\circ} \mathrm{A} \text { and } \mathrm{I}_{\mathrm{B}}=15 \angle 130^{\circ} \mathrm{A}
\]
(OR)
8. a) Derive an expression for the fault current for a double line fault as an unloaded generator and draw its equivalent diagram.
b) A \(20 \mathrm{MVA}, 6.6 \mathrm{kV}\) star connected generator has positive, negative and zero sequence reactance's of \(30 \%, 25 \%\) and \(7 \%\) respectively. A reactor with \(5 \%\) reactance based on the rating of the generator is placed in the neutral to ground connection. A line to ground fault occurs at the terminals of the generator when it is operating at rated voltage. Find the initial symmetrical line to ground rms fault current. Also find the line to line voltages.

\section*{UNIT-V}
9. a) Explain the steady-state stability with necessary expressions.
b) Describe the methods to improve steady-state stability.

\section*{(OR)}
10. a) Derive an expression for the critical clearing angle for a power system consisting of a single machine supplying to an infinite bus, for a sudden load increment.
b) Find the steady state power limit of a system consisting of a generator with a synchronous reactance of 0.4 p.u connected to an infinite bus through a series reactance of 1.0 p.u. The terminal voltage is held at \(1.0 \mathrm{p} . \mathrm{u}\) and the infinite bus voltage is 1.0 p.u.

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER SYSTEM ANALYSIS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. a) By using transformation of primitive admittance matrix \(y\), prove that bus admittance matrix, \(Y_{B U S}=A^{T}[y] A\).
b) For the transmission system with the following line specifications, determine the bus admittance matrix.
\begin{tabular}{|c|c|c|c|}
\hline \[
\begin{aligned}
& \text { Bus code } \\
& \text { p-q }
\end{aligned}
\] & Impedance
\[
Z_{p-q}, p . u
\] & Bus code & Half Line charging admittance, \(\left(\frac{Y_{P Q}^{\prime}}{2}\right)\) p.u \\
\hline 1-2 & \[
\begin{array}{ll}
0.06+ & j \\
0.18 & \\
\hline
\end{array}
\] & 1 & j 0.05 \\
\hline 1-3 & \[
\begin{array}{ll}
\hline 0.02+ & j \\
0.06 & \\
\hline
\end{array}
\] & 2 & j 0.06 \\
\hline 2-3 & \[
\begin{array}{ll}
0.04+ & j \\
0.12 & \\
\hline
\end{array}
\] & 3 & j 0.05 \\
\hline
\end{tabular}
(OR)
2. Draw an impedance diagram for the system, shown in Fig.1, expressing all values as per unit values.


Fig. 1

\section*{UNIT-II}
3. Carry out one iteration of load flow analysis of the system given below by Gauss-Seidal method.
\begin{tabular}{|l|l|l|l|l|l|l|}
\hline Bus No. & \multirow{2}{*}{ Bus Type } & \multirow{2}{*}{\(V \mid\) p.u } & \multicolumn{2}{|c|}{ p.u. generation } & \multicolumn{2}{|c|}{ p.u load } \\
\cline { 4 - 7 } & & & P & Q & P & Q \\
\hline 1 & Slack & 1.02 & - & - & - & - \\
\hline 2 & P-V & 1.0 & 0.8 & - & - & - \\
\hline 3 & P-Q & -- & - & - & 1.0 & 0.4 \\
\hline
\end{tabular}

Line reactance's in p.u are given below:
\begin{tabular}{|l|l|}
\hline Bus code & Reactance \\
\hline \(1-2\) & j 0.5 \\
\hline \(2-3\) & j 0.5 \\
\hline \(3-1\) & j 0.5 \\
\hline
\end{tabular}
(OR)
4. a) Derive the basic equations for load flow study using decoupled method.
b) Write an algorithm for computational procedure for load flow solution using Newton-Raphson polar coordinates form method when the system contains all types of buses.

\section*{UNIT-III}
5. Using the method of building algorithm find the bus impedance matrix for the network shown in Fig.2.


Fig. 2
2 of 3

\section*{(OR)}
6. a) Draw the oscillogram of short circuit current, when an unloaded generator is subjected to symmetrical fault, clearly marking sub-transient, transient and steady state regions. Discuss them.
b) A synchronous generator rated at \(500 \mathrm{kVA}, 440 \mathrm{~V}, 0.1 \mathrm{p} . \mathrm{u}\) sub transient reactance is supplying a passive load of 400 kW at 0.8 p.f lagging. Calculate the initial symmetrical RMS current for a 3 -phase fault at the generator terminals.

\section*{UNIT-IV}
7. a) Explain the sequence networks for an synchronous generator.
b) The line voltages across a three phase, wye-connected load, consisting of a 10 ohm resistance in each phase are unbalanced such that \(\mathrm{V}_{\mathrm{ab}}=1 \angle 132^{\circ} \mathrm{V}, \mathrm{V}_{\mathrm{bc}}=252 \angle 0^{\circ} \mathrm{V}\) and \(\mathrm{V}_{\mathrm{ca}}=195 \angle 122^{\circ} \mathrm{V}\). Determine the sequence phase voltages. Then find the voltages across the 10 Ohm resistances and calculate line currents.
(OR)
8. a) Derive an expression for the fault current for a single line to ground fault as an unloaded generator and draw its equivalent diagram.
b) A 125 MVA, 22 kV turbo generator having \(\mathrm{X}_{\mathrm{d}}\) " \(=\mathrm{X}_{1}=\mathrm{X}_{2}=22 \%\) and \(\mathrm{X}_{0}=6 \%\) has a current limiting reactor of 0.16 Ohm in the neutral, while it is operating on no-load at rated voltage a double line to ground fault occurs on two phases. Find the initial symmetrical rms fault current to the ground.

\section*{UNIT-V}
9. a) Discuss the various methods of improving steady state stability
b) Generator rated 75 MVA is delivering 0.8 p.u power to a motor through a transmission line of reactance j0.2 p.u. The terminal voltage of the generator is 1.0 p.u and that of the motor is also 1.0 p.u. Determine the generated e.m.f. behind transient reactance. Fins also the maximum power that can be transferred.
(OR)
10. a) A double circuit line feeds an infinite bus from a power station. If a fault occurs on one of the lines and the line is switched off, derive an expression for the critical clearing angle.
b) Describe the methods of improving the transient stability limit of a power system.

\section*{3 of 3}

\section*{SET - 1}

\section*{III B. Tech II Semester Regular Examinations, June-2022 HEAT TRANSFER}
(Common to Mechanical Engineering, Automobile Engineering) Time: 3 hours

Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ (Heat Transfer Data Book Allowed) \\ *****
}

\section*{UNIT-I}
1. a) Write the Fourier rate equation for heat transfer by conduction. Give the units and physical significance of each term appearing in the equation.
b) An electric current of 34000 Amperes flows along a steel plate 1.25 cm thick and 10 cm wide. The temperature of one surface of the plate is at \(80^{\circ} \mathrm{C}\) and that of the other is at \(95^{\circ} \mathrm{C}\). Find the temperature distribution across the plate and the value, position of maximum temperature. Also calculate the total amount of heat generated per meter length of the plate and flow of heat from each surface of the plate. Take resistivity, \(\rho\) of steel \(12 \mu \Omega-\mathrm{cm}\) and \(\mathrm{k}=54 \mathrm{~W} / \mathrm{m} \mathrm{K}\).
2. a) State and explain the different types of boundary conditions [7M] applied to heat conduction problems.
b) A steel pipe with 50 mm outside diameter is covered with a 6.4 mm asbestos insulation ( \(\mathrm{k}=0.166 \mathrm{~W} / \mathrm{m} . \mathrm{K}\) ) followed by a 25 mm layer of fiber-glass insulation ( \(\mathrm{k}=0.0485 \mathrm{~W} / \mathrm{m} . \mathrm{K}\) ). The pipe wall temperature is 393 K and the outside insulation temperature is 311 K . Calculate the interface temperature between the asbestos and fiber-glass. [kThermal Conductivity].

\section*{UNIT-II}
3. a) Consider the two cases: in one case, a hot solid body is cooled in a pool of water in a large container. In another case, an identical hot solid body is cooled in air at the same temperature as that of water. In which case is the lumped-heat-capacity-system analysis more applicable and why?
b) A 25 mm diameter and 100 mm long glass rod (Thermal Conductivity, \(\mathrm{k}=0.8 \mathrm{~W} / \mathrm{m} . \mathrm{K}\) ) protrudes from a wall whose temperature is \(150^{\circ} \mathrm{C}\) and is exposed to air at \(30^{\circ} \mathrm{C}\) and having a convective heat transfer coefficient of \(10 \mathrm{~W} / \mathrm{m}^{20} \mathrm{C}\). Determine:
(i) temperature at the tip of the rod and
(ii) the heat loss by the rod.

\section*{(OR)}
4. a) Show that in Newtonian cooling, the temperature variation of a body is a function of Biot number and Fourier number.
b) A 120 mm diameter apple (Density, \(\rho=990 \mathrm{~kg} / \mathrm{m}^{3}\), Specific heat, \(\mathrm{C}=4170 \mathrm{~J} / \mathrm{kg} \quad{ }^{\circ} \mathrm{C}\), Thermal Conductivity, \(\left.\mathrm{k}=0.58 \mathrm{~W} / \mathrm{m}{ }^{\circ} \mathrm{C}\right)\), approximately spherical in shape is taken from a \(25^{\circ} \mathrm{C}\) environment and placed in a refrigerator where temperature is \(6^{\circ} \mathrm{C}\) and average convective heat transfer coefficient over the apple surface is \(12.8 \mathrm{~W} / \mathrm{m}^{2}{ }^{\circ} \mathrm{C}\). Determine the temperature at the centre of the apple after a period of 2 hours.

\section*{UNIT-III}
5. a) Define and explain the significance of:
(i) Reynolds number
(ii) Prandtl number
b) Air enters at a temperature of \(60^{\circ} \mathrm{C}\) and flows through a 2.5 cm diameter tube with a velocity of \(0.8 \mathrm{~m} / \mathrm{s}\). It can be heated either by
(i) condensing steam on its outer surface or
(ii) by electrical resistance heating. Calculate the value of heat transfer coefficient in both cases. Assume fully developed flow.

\section*{(OR)}
6. a) Explain the procedure to form dimensionless groups by [6M] Buckingham \(\pi\)-theorem.
b) Air at a pressure of 101 kPa and \(20^{\circ} \mathrm{C}\) flows with a velocity of \(5 \mathrm{~m} / \mathrm{s}\) over a \(1 \mathrm{~m} \times 5 \mathrm{~m}\) flat plate whose temperature is kept constant at \(140^{\circ} \mathrm{C}\). Determine the rate of heat transfer from the plate if the air flows parallel to the (i) 5 m long side, (ii) the 1 m side. The properties of the air at the film temperature of \(80^{\circ} \mathrm{C}\) are as follows: Kinematic viscosity, \(9=2 \times 10^{-5} \mathrm{~m}^{2} / \mathrm{s}\), Thermal conductivity, \(\mathrm{k}=0.03 \mathrm{~W} / \mathrm{m} \mathrm{K}\), Prandtl number, \(\mathrm{Pr}=0.706\).

\section*{UNIT-IV}
7. a) Will a hot horizontal plate whose bottom surface is insulated cool faster or slower when it's hot surface is facing down instead of up?
b) In a double pipe, counter flow heat exchanger, water flows at the rate of \(0.45 \mathrm{~kg} / \mathrm{s}\) and is heated from \(20^{\circ} \mathrm{C}\) to \(35^{\circ} \mathrm{C}\) by an oil having specific heat of \(1.5 \mathrm{~kJ} / \mathrm{kg}\). \({ }^{\circ} \mathrm{C}\). The oil enters the exchanger at \(95^{\circ} \mathrm{C}\) and exists at \(60^{\circ} \mathrm{C}\). Determine the heat exchanger area for an overall heat transfer coefficient of \(\mathrm{U}=290 \mathrm{~W} / \mathrm{m}^{2} .{ }^{\circ} \mathrm{C}\). The specific heat of water is \(4.18 \mathrm{~kJ} / \mathrm{kg} .{ }^{\circ} \mathrm{C}\).

\section*{(OR)}
8. a) Consider two heat exchangers. One has a parallel flow arrangement, and another has a counter flow arrangement. For the same inlet and outlet temperatures for the two exchangers, which one will have the higher value of LMTD?
b) A vertical cylinder 1.5 m high and 180 mm in diameter is maintained at \(100^{\circ} \mathrm{C}\) in an atmospheric environment of \(20^{\circ} \mathrm{C}\). Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean temperature as, Density, \(\rho=1.06 \mathrm{~kg} / \mathrm{m}^{3}\), Kinematic viscosity, \(\vartheta=18.97 \times 10^{-6} \mathrm{~m}^{2} / \mathrm{s}\), Specific heat, \(\mathrm{C}_{\mathrm{p}}=1.004 \mathrm{~kJ} / \mathrm{kg}{ }^{\circ} \mathrm{C}\) and Thermal conductivity, \(\mathrm{k}=0.1042 \mathrm{~kJ} / \mathrm{mh}^{0} \mathrm{C}\).

\section*{UNIT-V}
9. a) Explain different regimes of pool boiling heat transfer from a heated electrical wire.
b) Two large parallel planes having emissivities, 0.3 and 0.4 are maintained at a temperature \(800^{\circ} \mathrm{C}\) and \(500^{\circ} \mathrm{C}\) respectively. A radiation shield of emissivity 0.05 on both sides is placed in between. Determine the
(i) Rate of heat transfer per unit area if shield is not there,
(ii) Heat transfer with the shield,
(iii) The temperature of the shield.
(OR)
10. a) What is meant by reciprocity theorem? Derive the expression for shape factor between two black bodies.
b) Water is boiled at the rate of \(25 \mathrm{~kg} / \mathrm{h}\) in a polished copper pan, 280 mm in diameter, at atmospheric pressure. Assuming nucleate boiling conditions, calculate the temperature of the bottom surface of the pan.

\title{
III B. Tech II Semester Regular Examinations, June-2022 HEAT TRANSFER
}
(Common to Mechanical Engineering, Automobile Engineering) Time: 3 hours

Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ (Heat Transfer Data Book Allowed) \\ *****
}

\section*{UNIT-I}
1. a) Define overall heat transfer coefficients and state their importance in composite system.
b) A chemical reaction at constant pressure takes place in a bed between two coaxial cylinders with radii 1 cm and 3 cm . The inner surface is insulated and is at a temperature of \(500^{\circ} \mathrm{C}\). The rate of release of heat from the bed due to reaction is \(600 \mathrm{~kW} / \mathrm{m}^{3}\). Estimate the outer surface of bed taking \(\mathrm{k}=0.5 \mathrm{~W} / \mathrm{m} \mathrm{K}\).
(OR)
2. a) Explain the electrical analogy of heat transfer. Illustrate the concept of electrical analogy considering a multi-layer composite wall.
b) An exterior wall of a house may be approximated by a 0.1 m layer of common brick ( \(\mathrm{k}=0.7 \mathrm{~W} / \mathrm{m}{ }^{0} \mathrm{C}\) ) followed by a 0.04 m layer of gypsum plaster ( \(\mathrm{k}=0.48 \mathrm{~W} / \mathrm{m}^{0} \mathrm{C}\) ). What thickness of loosely packed rock wool insulation ( \(\mathrm{k}=0.065 \mathrm{~W} / \mathrm{m}^{\circ} \mathrm{C}\) ) should be added to reduce the heat loss or gain through the wall by \(80 \%\) ? \([\mathrm{k}-\) Thermal Conductivity].

\section*{UNIT-II}
3. a) Two fins are identical except diameter of one is twice that of the other. Compare their efficiencies and effectiveness.
b) A straight rectangular fin has a length of 20 mm and a thickness of 1.5 mm . The thermal conductivity is \(60 \mathrm{~W} / \mathrm{m} . \mathrm{K}\), and it is exposed to a convection environment at \(20^{\circ} \mathrm{C}\) and heat transfer coefficient, \(\mathrm{h}=500 \mathrm{~W} / \mathrm{m}^{2} . \mathrm{K}\). Calculate the maximum possible heat loss per meter of fin depth for a base temperature of \(200^{\circ} \mathrm{C}\). What is the actual heat loss?

\section*{(OR)}
4. a) Derive the expression for temperature distribution and heat transfer for a uniform cross-sectional area fin with its end insulated.
b) A chrome-nickel wire of 2 mm diameter, initially at \(25^{\circ} \mathrm{C}\), is suddenly exposed to hot gases at \(725^{\circ} \mathrm{C}\). If the convection heat transfer coefficient is \(10 \mathrm{~W} / \mathrm{m}^{2} . \mathrm{K}\), calculate the time constant of the wire as a lumped-capacity system. Take thermal conductivity, \(\mathrm{k}=20 \mathrm{~W} / \mathrm{m} . \mathrm{K}\), Density, \(\rho=7800 \mathrm{~kg} / \mathrm{m}^{3}\), Specific heat, \(\mathrm{C}_{\mathrm{p}}=0.46 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\).

\section*{UNIT-III}
5. a) Using dimensional analysis show that in forced convection Nusselt number is a function of Reynolds number and Prandtl number.
b) Water at \(30^{\circ} \mathrm{C}\) flowing at the rate of \(0.01 \mathrm{~kg} / \mathrm{s}\) enters a 2.5 cm diameter tube which is maintained at \(100^{\circ} \mathrm{C}\). Assuming the flow is fully developed determine the length of the tube required to heat the water up to \(65^{\circ} \mathrm{C}\). Considering the entry length region determine the average heat transfer coefficient.

\section*{(OR)}
6. a) Define and explain the significance of :
(i) Grashoff number
(ii) Stanton number
b) Engine oil at \(40^{\circ} \mathrm{C}\) flows with a free stream velocity of \(1 \mathrm{~m} / \mathrm{s}\) over a 2 m long flat plate whose surface is maintained at a uniform temperature of \(90^{\circ} \mathrm{C}\). Determine: (i) the local heat transfer coefficient at the edge of the plate ( \(L=2 \mathrm{~m}\) ), (ii) the average heat transfer coefficient over the 2 m length of the plate, (iii) the rate of heat transfer from the plate.

\section*{UNIT-IV}
7. a) Consider laminar free convection from a vertical hot plate. Will the heat flux be higher at the top or will it be higher at the bottom of the plate? Discuss the situation when the plate is cold and the ambient air is hot.
b) A counter flow heat exchanger has an overall heat transfer coefficient of \(225 \mathrm{~W} / \mathrm{m}^{2} \cdot \mathrm{~K}\) and a surface area of \(33 \mathrm{~m}^{2}\). The hot fluid ( \(\mathrm{C}_{\mathrm{p}}=3.56 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\) ) enters at \(94^{\circ} \mathrm{C}\) and flows at the rate of \(2.52 \mathrm{~kg} / \mathrm{s}\). The cold fluid ( \(\mathrm{C}_{\mathrm{p}}=1.67 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\) ) enters at \(16^{\circ} \mathrm{C}\) and flows at the rate of \(2.27 \mathrm{~kg} / \mathrm{s}\). Determine the rate of heat transfer.

\section*{(OR)}
8. a) If the length of a counter flow heat exchanger is increased, what will happen to the effectiveness of the exchanger-will it increase or decrease?
b) A hot metal plate maintained at \(160^{\circ} \mathrm{C}\) is kept in vertical position in surrounding air at \(30^{\circ} \mathrm{C}\). Calculate the heat loss from one of its faces per unit width if height of the plate is 0.5 m .

\section*{UNIT-V}
9. a) State and explain Lambert's Cosine Law.
b) A 2.5 cm diameter pipe whose surface is maintained at 1000 K having emissivity 0.1 is enclosed inside a large pipe of diameter 7.5 cm maintained at 350 K . Determine the heat loss from the inner pipe to outer pipe per meter length if the emissivity of the outer pipe is 0.3 .
(OR)
10. a) What is the difference between nucleate and film boiling? Why does nucleate boiling induce higher heat flux?
b) Show that during laminar film condensation over a vertical plate,

Average Heat Transfer Coefficient is \(4 / 3\) times the local heat transfer coefficient at the end of the plate.

\title{
III B. Tech II Semester Regular Examinations, June-2022 HEAT TRANSFER
}
(Common to Mechanical Engineering, Automobile Engineering) Time: 3 hours

Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ (Heat Transfer Data Book Allowed)
}

\section*{UNIT-I}
1. a) Define and explain briefly the various modes of heat transfer.
b) A long cylinder rod of radius 50 cm with thermal conductivity of \(10 \mathrm{~W} / \mathrm{m} . \mathrm{K}\) contains radioactive material, which generates heat uniformly within the cylinder at rate of \(3 \times 10^{5} \mathrm{~W} / \mathrm{m}^{3}\). The rod is cooled by convection from its cylindrical surface into the ambient air at \(\mathrm{T}_{\mathrm{a}}=50^{\circ} \mathrm{C}\) with a heat transfer coefficient of \(60 \mathrm{~W} / \mathrm{m}^{2} . \mathrm{K}\). Determine the temperature at the centre and at the outer surface of the cylindrical rod.
(OR)
2. a) What is meant by steady state heat conduction through a [6M] medium? Explain the situation physically in the case of medium
(i) without generation of thermal energy and
(ii) with the generation of thermal energy.
b) A mild steel tank of wall thickness 12 mm contains water at \(95^{\circ} \mathrm{C}\). The thermal conductivity of mild steel is \(50 \mathrm{~W} / \mathrm{m}^{\circ} \mathrm{C}\) and the heat transfer coefficients for the inside and outside the tank are 2850 and \(10 \mathrm{~W} / \mathrm{m}^{2} .{ }^{\circ} \mathrm{C}\), respectively. If the atmospheric temperature is \(15^{\circ} \mathrm{C}\), calculate:
(i) The rate of heat loss per \(\mathrm{m}^{2}\) of the tank surface area.
(ii) The temperature of the outside surface of the tank.

\section*{UNIT-II}
3. a) A long is more effective and a short fin is more efficient. Explain.
b) An egg with mean diameter of 40 mm and initially at \(20^{\circ} \mathrm{C}\) is placed in a boiling water pan for 4 minutes and found to be boiled to the consumer`s taste. For how long a similar egg for same consumer should be boiled when taken from a refrigerator at \(5^{\circ} \mathrm{C}\). Take the following properties for egg: Density, \(\rho=1200 \mathrm{~kg} / \mathrm{m}^{3}\), Specific heat, \(\mathrm{C}=2 \mathrm{~kJ} / \mathrm{kg} .{ }^{\circ} \mathrm{C}\), Thermal conductivity, \(\mathrm{k}=10 \mathrm{~W} / \mathrm{m} .{ }^{\circ} \mathrm{C}\) and Heat transfer coefficient, \(\mathrm{h}=100 \mathrm{~W} / \mathrm{m}^{2} .{ }^{\circ} \mathrm{C}\). Use lump theory.

\section*{1 of 3}
4. a) What is the importance of Heisler charts? And under what conditions can we use them.
b) A straight rectangular fin 20 mm thick and 150 mm long is constructed of steel and placed on the outside of a wall maintained at \(200^{\circ} \mathrm{C}\). The environment temperature is \(15^{\circ} \mathrm{C}\), and the heat transfer coefficient for convection is \(20 \mathrm{~W} / \mathrm{m}^{2} . \mathrm{K}\). Calculate the heat lost from the fin per unit depth. Take thermal conductivity of steel as \(60 \mathrm{~W} / \mathrm{m} \mathrm{K}\).

\section*{UNIT-III}
5. a) Explain the development of hydrodynamic and thermal boundary layer in a circular tube.
b) Castor oil at \(36^{\circ} \mathrm{C}\) flows over a 6 m long and 1 m wide heated plate at \(0.06 \mathrm{~m} / \mathrm{s}\). For a surface temperature of \(96^{\circ} \mathrm{C}\), determine (i) the thermal boundary layer thickness at the end of the plate, (ii) the local heat transfer coefficient at the end of the plate, (iii) the rate of heat transfer from the entire plate. Assume the following properties of castor oil at the film temperature of \(66^{\circ} \mathrm{C}\) :
Thermal diffusivity, \(\mathrm{a}=7.22 \times 10^{-8} \mathrm{~m}^{2} / \mathrm{sec}\), Kinematic viscosity, \(\vartheta=6.0 \times 10^{-5} \mathrm{~m}^{2} / \mathrm{s}\), Thermal conductivity, \(\mathrm{k}=0.21 \mathrm{~W} / \mathrm{m} . \mathrm{K}\).
(OR)
6. a) Using dimensional analysis, show that in natural convection, Nusselt number is a function of Grashoff number and Prandtl number.
b) Water enters a 2.5 cm diameter tube \(@ 0.015 \mathrm{~kg} / \mathrm{s}\), at \(20^{\circ} \mathrm{C}\) and the surface of which is maintained at \(60^{\circ} \mathrm{C}\). Find (i) thermal entry length, (ii) friction factor and pressure drop, (iii) assuming fully developed flow, rate of heat transfer and the length of the tube required to heat the water to \(50^{\circ} \mathrm{C}\).

\section*{UNIT-IV}
7. a) Consider two fluids, one with large coefficient of volume expansion and the other with a small one. In which fluid will a hot surface produce a stronger free convection flow?
b) Find the convective heat loss from a radiator 0.6 m wide and 1.2 m high maintained at a temperature of \(90^{\circ} \mathrm{C}\) in a room at \(14^{\circ} \mathrm{C}\). Consider the radiator as a vertical plate.

2 of 3

\section*{(OR)}
8. a) Consider a heat exchanger in which both fluids have the same specific heats but different mass flow rates. Which fluid will experience a larger temperature change- the one with the lower or the higher mass flow rate?
b) A cross flow heat exchanger with both fluids unmixed is used to heat water (Specific heat, \(\mathrm{C}_{\mathrm{p}}=4.18 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\) ) from \(50^{\circ} \mathrm{C}\) to \(90^{\circ} \mathrm{C}\), flowing at the rate of \(1.0 \mathrm{~kg} / \mathrm{s}\). Determine the overall heat transfer coefficient if the hot engine oil ( \(\mathrm{C}_{\mathrm{p}}=1.9 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\) ) flowing at the rate of \(3 \mathrm{~kg} / \mathrm{s}\) enters at \(100^{\circ} \mathrm{C}\). The heat transfer area is \(20 \mathrm{~m}^{2}\).

\section*{UNIT-V}
9. a) State and explain Wein's displacement law.
b) A vertical cooling fin, approximating a flat plate 0.4 m high, is exposed to saturated steam at atmospheric pressure. The fin is maintained at \(90^{\circ} \mathrm{C}\) by cooling water. Determine the rate of heat transfer per unit width of the fin and the total rate of condensation. (Assume the condensate film to be laminar).
(OR)
10. a) What are the assumptions made in Nusselt theory of film condensation?
b) Derive the expression for surface resistance and shape resistance using electrical analogy.

Code No: R1932032

\title{
III B. Tech II Semester Regular Examinations, June-2022 HEAT TRANSFER
}
(Common to Mechanical Engineering, Automobile Engineering)

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ (Heat Transfer Data Book Allowed) \\ \\ *****
} \\ \\ *****
}

\section*{UNIT-I}
1. a) Enumerate the basic laws which govern the heat transfer.
b) A cold storage room has walls made of 220 mm of brick on the outside, 90 mm of plastic foam, and finally 16 mm of wood on the inside. The outside and inside air temperatures are \(25^{\circ} \mathrm{C}\) and \(-3^{\circ} \mathrm{C}\) respectively. If the inside and outside heat transfer coefficients are 30 and \(11 \mathrm{~W} / \mathrm{m}^{2} .{ }^{\circ} \mathrm{C}\) respectively, and the thermal conductivities of brick, foam and wood are 0.99, 0.022 and \(0.17 \mathrm{~W} / \mathrm{m} .{ }^{\circ} \mathrm{C}\) respectively, determine: (i) the rate of heat removal by refrigeration, if the total wall area is \(85 \mathrm{~m}^{2}\) and, (ii) the temperature of the inside surface of the brick.
(OR)
2. a) Derive expressions for temperature distribution, under one dimensional steady state heat conduction, for the hollow Cylinder.
b) An electric resistance wire of radius 0.001 m with thermal conductivity of \(25 \mathrm{~W} / \mathrm{m} . \mathrm{K}\) is heated by a passage of electric current which generates heat within the wire at a constant rate of \(2 \times 10^{7} \mathrm{~W} / \mathrm{m}^{3}\). Determine the centerline temperature rise above the surface temperature of the wire, if the surface is maintained at constant temperature.

\section*{UNIT-II}
3. a) Distinguish between fin efficiency and fin effectiveness.
b) An aluminum sphere of 0.1 m diameter and at a uniform temperature of \(500^{\circ} \mathrm{C}\) is suddenly exposed to an environment at \(20^{\circ} \mathrm{C}\), with convection heat transfer coefficient \(30 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\). Calculate the temperature of the sphere (i) 100 s , (ii) 300 s and (iii) 500 s after it is exposed to the environment. Justify any method you use for the analysis; Take, for aluminum, Thermal conductivity, \(\mathrm{k}=200 \mathrm{~W} / \mathrm{m} . \mathrm{K}\), Density, \(\rho=2700 \mathrm{~kg} / \mathrm{m}^{3}\) and Specific heat, \(\mathrm{C}_{\mathrm{p}}=0.9 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\).

\section*{(OR)}
4. a) Consider a hot boiled egg on a plate. The temperature of the egg is observed to drop by \(5^{\circ} \mathrm{C}\) during the first minute. Will the temperature drop during the second minute be less than, equal to or more than \(5^{\circ} \mathrm{C}\) ? Explain your answer with reasons.
b) A Cu fin (Thermal conductivity, \(k=300 \mathrm{~W} / \mathrm{m} \mathrm{K}\) ) of thickness 3 mm , width 15 mm and length 45 mm is attached to a surface maintained at \(200^{\circ} \mathrm{C}\). If the environment is at \(40^{\circ} \mathrm{C}\) with heat transfer coefficient, \(\mathrm{h}=20 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\), calculate heat transfer by the fin assuming it as (i) infinite long fin, (ii) assuming its end is insulated, and (iii) compare it using general solution.

\section*{UNIT-III}
5. a) What is the effect of Prandtl number on thermal and hydrodynamic boundary layers? Explain.
b) Air at 1 atm and \(30^{\circ} \mathrm{C}\) flows through a 5 cm diameter, 2 m long tube with a velocity \(25 \mathrm{~m} / \mathrm{s}\). Flow is hydro-dynamically developed and is thermally developing. Determine the average heat transfer coefficient over the entire length of the tube.
(OR)
6. a) Distinguish between natural and forced convective heat [6M] transfers.
b) Air at a pressure of 1 atm and a temperature of \(60^{\circ} \mathrm{C}\) flows past the top surface of a flat plate. The flat plate is kept at a constant temperature of \(140^{\circ} \mathrm{C}\) throughout its length of 0.2 m (in the direction of flow). The width of the plate is 0.1 m . The Reynolds number based on the flat plate length is 20,000 . What is the rate of heat transfer from the plate to the air? If the free stream velocity of the air is doubled and the pressure is increased to 5 atm , what is the rate of heat transfer?

\section*{UNIT-IV}
7. a) In laminar natural convection over a vertical plate which one, constant wall temperature or constant heat flux, will exhibit high heat transfer coefficient? Explain.
b) Water enters a counter flow double-pipe heat exchanger at \(35^{\circ} \mathrm{C}\) flowing at the rate of \(0.8 \mathrm{~kg} / \mathrm{s}\). It is heated by oil (Specific heat, \(\mathrm{C}_{\mathrm{p}}=1.88 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\) ) flowing at the rate of \(1.5 \mathrm{~kg} / \mathrm{s}\) from an inlet temperature of \(120^{\circ} \mathrm{C}\). For an area of \(15 \mathrm{~m}^{2}\), and an overall heat transfer coefficient of \(350 \mathrm{~W} / \mathrm{m}^{2} . \mathrm{K}\), determine the total heat transfer rate. Take the specific heat of water as \(4.18 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}\).

\section*{2 of 3}

\section*{(OR)}
8. a) How does the log mean temperature difference for a heat exchanger differ from the arithmetic mean temperature difference? For specified inlet and outlet temperatures, which one of these two quantities is larger?
b) A vertical plate of an iron base considered as a rectangle of height 0.2 m and width 0.15 m dissipates heat from its face at the rate of \(700 \mathrm{~W} / \mathrm{m}^{2}\) by free convection into air at \(30^{\circ} \mathrm{C}\). Determine the surface temperature of the plate.

\section*{UNIT-V}
9. a) State Planck's distribution law and describe how monochromatic emissive power varies with wavelength.
b) Steam at \(100^{\circ} \mathrm{C}\) is being condensed on the outer surface of a horizontal tube of 3 m length and 50 mm outer diameter, while the tube surface is maintained at \(90^{\circ} \mathrm{C}\). Determine the average heat transfer coefficient and the total rate of condensation over the tube surface.
(OR)
10. a) What is the difference between drop-wise condensation and film condensation? Which of the two is the more effective way of condensation and why?
b) Show that by using electrical analogy the radiation heat exchange with N shields is equal to \(1 / \mathrm{N}+1\) times without shield. State the assumptions made.

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}

\section*{3 of 3}

\title{
III B. Tech II Semester Regular Examinations, June-2022 VLSI DESIGN
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) Derive an expression for transconductance of an n-channel enhancement MOSFET operating in active region.
b) Derive \(\mathrm{I}_{\mathrm{d}}-\mathrm{V}_{\mathrm{ds}}\) relationship of MOS in Resistive region.
(OR)
2. a) Draw the VLSI design flow diagram and explain.
b) Explain about \(2 \mu \mathrm{~m}\) CMOS design rules and discuss with layout examples.

\section*{UNIT-II}
3. a) Design a 2 -input Ex-OR using CMOS Transmission gate.
b) Describe about methods for driving large capacitive loads.
(OR)
4. a) Describe the following:
(i) Pseudo NMOS logic
(ii) Domino CMOS Logic
b) Discuss about choice of fan-in and fan-out selection in gate level design.

UNIT-III
5. a) What is current mirror? Explain the general properties of current mirror with block diagram.
b) Explain the operation of single stage amplifier with resistive load.
(OR)
6. a) What is the common-drain amplifier? How do you find the voltage gain of a common-drain amplifier?
b) Elaborate the principle of operation of an \(n\)-channel enhancement MOSFET and discuss the conditions for different regions of operation of MOSFET.

\section*{UNIT-IV}
7. a) Write a short notes on:
(i) Ratioed Circuits
(ii) Dynamic Circuits
b) Describe pass transistor briefly with example.

\section*{(OR)}
8. a) Explain the following:
(i) Static power dissipation (ii) Dynamic power dissipation
b) Briefly discuss about Master-Slave based edge triggered register with a neat diagram.

UNIT-V
9. Illustrate with a neat architecture diagram about various [15M] functional blocks of FPGAs.
(OR)
10. a) Draw the FPGA design flow and explain.
b) Explain about FinFET technology.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ VLSI DESIGN
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Draw and Explain about BiCOMS inverter.
b) Draw the schematic diagram, stick diagram and layout of 2 -input CMOS NAND gate.

\section*{(OR)}
2. a) Determine the pull up to pull down ratio for NMOS inverter driven by another NMOS inverter.
b) Analyze CMOS inverter with its transfer characteristics.

\section*{UNIT-II}
3. a) Describe the following:
(i) Dynamic CMOS logic
(ii) np CMOS Logic
b) Explain following:
(i) Fan-in
(ii) Fan-out
(iii) Choice of layers
(OR)
4. a) What are the alternate gate circuits available? Explain any one of them with suitable sketch by taking NAND gate as an example.
b) Explain different wiring capacitances used in gate level design with an example.

\section*{UNIT-III}
5. a) Write a short note on Current sources and sinks.
b) Explain the operation of single stage amplifier with diode connected load.

\section*{(OR)}
6. a) Derive the expressions for input impedance, voltage gain and output impedance of common source amplifier with source resistor.
b) Explain about body bias effect.

\section*{UNIT-IV}
7. a) Write and explain about the sources of power dissipation in VLSI design.
b) How switch logic can be implemented using pass transistors? Explain?

\section*{(OR)}
8. a) Explain about deep submicron processes with suitable [8M] schematic diagrams.
b) Explain about Master-Slave Edge-Triggered Register.

\section*{UNIT-V}
9. a) List out the different families of FPGAs. Explain how they are differing.
b) Explain in detail about TFET technology.
(OR)
10. a) Explain about High - k metal technology.
b) Draw the FPGA design flow and explain.

\title{
III B. Tech II Semester Regular Examinations, June-2022 VLSI DESIGN
}
(Electronics and Communication Engineering)
Time: 3 hours

\author{
Max. Marks: 75
}

Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) What are the steps involved in CMOS n -Well Fabrication?

Explain with neat sketches.
b) Explain design rules for layouts.
(OR)

\begin{abstract}
2. Determine the pull up to pull down ratio for NMOS inverter driven by one or more pass transistor inverter.

\section*{UNIT-II}
\end{abstract}
3. a) What is meant by sheet resistance Rs? Explain the concept of Rs applied to MOS transistors.
b) Design a 2-input Multiplexer using CMOS Transmission gate.

\section*{(OR)}
4. a) Implement Ex-OR logic gate using CMOS logic.
b) Explain the concept of delay estimation and sizing of MOSFET.

\section*{UNIT-III}
5. a) Draw a standard Cascode current sink circuit and explain its operation and output characteristics.
b) Write a short note on following:
(i) Body bias effect
(ii) Source degeneration of common source amplifier.
(OR)
6. a) Derive the expressions for input impedance, voltage gain and [10M] output impedance of common drain amplifier.
b) Explain about modelling of a transistor.

\section*{UNIT-IV}
7. a) With the help of a diagram, explain SR Master-Slave register.
b) Explain importance of Set up and hold time in the analysis of CMOS circuit.
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                                    1 of 2
```
(OR)
8. a) Design a NOR gate using pass transistor logic.
b) Define and explain the concept of Metastability.
9. a) What is FPGA? Draw its structure and also write its advantages.
b) With a neat sketch explain the CLB, IOB and programmable interconnects of an FPGA design.
(OR)
10. a) Write a short note on Giga scale dilemma.
b) Explain about High-k metal technology.

\title{
III B. Tech II Semester Regular Examinations, June-2022 VLSI DESIGN
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Draw the circuit diagram for CMOS inverter and explain the transfer characteristics using necessary equations, and the different regions in the characteristics.
b) What is meant by latch up? How can it be eliminated?

\section*{(OR)}
2. a) Explain \(\lambda\) based design rules in VLSI circuit.
b) Draw the stick diagram for 3 input NAND gate.

\section*{UNIT-II}
3. a) Calculate ON resistance of an inverter from VDD to GND. If n - channel sheet resistance \(\mathrm{R}_{\mathrm{sn}}=104 \Omega\) per square and P-channel sheet resistance \(R_{s p}=3.5 \times 104 \Omega\) per square. \(\left(Z_{p u}=4: 4\right.\) and \(\left.Z_{p d}=2: 2\right)\).
b) Draw circuits using CMOS, pseudo NMOS and DCVS for the given function \(O U T=\overline{D+A \bullet(B+C)}\).
(OR)
4. a) Classify different types of MOS scaling. Derive their effects on various parameters of MOSFET.
b) Design a 2 -input Ex-NOR using CMOS Transmission gate.

\section*{UNIT-III}
5. a) Derive the expressions for input impedance, voltage gain and output impedance of common source amplifier.
b) Write a short note on current sources and sinks.

\section*{(OR)}
6. a) Why do we use common-drain amplifier? How do you calculate voltage gain and current gain of common-drain amplifier?
b) Tabulate the differences between common-source amplifier and common-drain amplifier.

UNIT-IV
7. a) Explain the concept of pipelining used to optimize sequential circuits.
b) Explain about Mux based Latches with an example.

\section*{(OR)}
8. a) Explain about Master slave register.
b) With neat diagrams, explain cross coupled NAND and NOR [7M] gates.

\section*{UNIT-V}
9. a) Explain the step-by-step approach of the FPGA design process in the Xilinx environment.
b) Write a short note on Giga scale dilemma.
(OR)
10. a) Explain about TFET technology.
b) Write notes on short channel effects.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DISTRIBUTED SYSTEMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Define distributed computers. Explain their characteristic features and relate them to the components of the computer systems.
b) Differentiate the scalar time and vector time, and their [7M] properties in detail.

\section*{(OR)}
2. a) Identify some distributed applications in the scientific and commercial application areas. For each application, determine the motivating factors of distributed computing.
b) What is global state of distributed systems? With time-space [7M] diagram of a distributed execution, explain in detail.

\section*{UNIT-II}
3. a) Explain the steps of the algorithm which optimally implements the causal ordering of messages in detail.
b) Explain the properties of recorded global state. And explain the steps of snapshot algorithms used for FIFO channels.
(OR)
4. a) What is total order? Illustrate the three-phase total ordering [8M] algorithm step-by-step.
b) Describe the concept of Rendezvous. Write the algorithmic steps to enforce synchronous order in Rendezvous.

\section*{UNIT-III}
5. a) Present Maekawa's algorithm to execute requesting, executing and releasing the critical section and prove that it achieves mutual exclusion.
b) Explain the hierarchy of deadlock detection algorithms based on the complexity of the resource requests they permit.

\section*{(OR)}
6. a) Write about four classes of distributed deadlock detection algorithms: path-pushing, edge-chasing, diffusion computation, and global state detection.
b) Explain the system model of mutual exclusion in distributed systems and discuss the requirements and performance metrics in detail.

\section*{UNIT-IV}
7. a) What is communication induced check pointing? Explain the two types of communication-induced check pointing. Relate with mini-process non blocking check pointing.
b) Write the Byzantine generals algorithm with recursive [7M] formulation.
(OR)
8. a) Explain the concepts of local check point, consistent system [8M] states, interaction with outside world, different types of messages and issues in failure recovery.
b) Describe the problem of consensus and agreement. Discuss [7M] various issues to be addressed by it.

\section*{UNIT-V}
9. a) Explain the implementation of processor consistency and causal consistency in detail.
b) What is a content addressable network? Explain its working [7M] principle and phases.

\section*{(OR)}
10. a) How to enforce shared memory mutual exclusion? Explain [8M] Lamport's n-process bakery algorithm for shared memory mutual exclusion.
b) Describe the applications of Chord. Explain its operations in P2P [7M] networks in detail.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DISTRIBUTED SYSTEMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Describe the motivational issues of distributed systems and relate them with parallel multiprocessor and multicomputer systems.
b) How the set of events in the distributed computation classified into a Past and a Future with cut? Explain past and future cones of an event.

\section*{(OR)}
2. a) Explain synchronous versus asynchronous executions? How to emulate them on failure free systems? Elaborate.
b) Define the system of logic clocks and its implementation in [7M] distributed systems.

\section*{UNIT-II}
3. a) Present the three phases of the distributed algorithm that [8M]
enforces total and causal order for closed groups.
b) Explain the concept of executions realizable with synchronous communication in asynchronous execution.
(OR)
4. a) Explain the hierarchy of message ordering paradigms. How it [8M] represents a trade-off between concurrency, ease of use and implementation? Discuss.
b) Describe the concept of causal order? Explain its necessary and sufficient conditions for causal ordering.

\section*{UNIT-III}
5. a) Present and prove the correctness of Lamport algorithm. Discuss its performance optimization in terms of number of messages required to execute the critical section.
b) Explain the single resource model, the AND model, the OR model and the AND-OR model of deadlocks in distributed systems.
(OR)
6. a) Discuss the role of Request and Reply messages and FIFO [8M] channels in Ricart-Agrawala algorithm.
b) Discuss the deadlock handling strategies and design issues in [7M] distributed systems.

1 of 2

\section*{UNIT-IV}
7. a) Explain the phases, correctness and optimization of the check [8M] pointing algorithm and the rollback recovery algorithm.
b) What is Byzantine agreement problem? Explain Consensus [7M] algorithms for Byzantine failures in synchronous system.
(OR)
8. a) Relate and explain deterministic and non deterministic events with pessimistic logging, optimistic logging, and causal logging protocols.
b) Describe consensus problem and explain overview of the results and lower bounds on solving the consensus problem under different assumptions.

\section*{UNIT-V}
9. a) Explain the concepts of P2P systems and desirable [8M] characteristics and performance features of P2P systems.
b) Explain the working principle of strict consistency model/ [7M] atomic consistency model.
(OR)
10. a) Explain the concepts of overlay and routing in Tapestry in detail. [8M]
b) Write the algorithm and explain the implementation of [7M] sequential consistency memory model.

2 of 2

\title{
III B. Tech II Semester Regular Examinations, June-2022 DISTRIBUTED SYSTEMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) In detail explain the taxonomy of Flynn's and write about the [8M] concepts of coupling, parallelism, concurrency and granularity.
b) What is global state? Illustrate the cuts of a distributed [7M] computation with space-time diagram.

\section*{(OR)}
2. a) Discuss the primary challenges/ issues in designing distributed [8M] systems from a system building perspective.
b) List and explain the problems solved with the knowledge of [7M] causal precedence relation among events in a distributed system

\section*{UNIT-II}
3. a) Explain the following message ordering paradigms: (i) non-FIFO,
(ii) FIFO, (iii) causal order, and (iv) synchronous order.
b) What is causal order? Explain the use of causal order in [7M] updating replicas of a data item in the system.
(OR)
4. a) Explain the three phase distributed algorithm described from the viewpoint of the sender, and then from the viewpoint of the receiver.
b) Write the importance of group communication? How it is related with message ordering in distributed systems? Explain in detail.

\section*{UNIT-III}
5. a) Present Recart-Agrawala's algorithm to execute requesting, executing and releasing the critical section and prove that it achieves mutual exclusion.
b) Explain deadlock handling through Knapp's classification of [7M] distributed deadlock detection algorithms.
(OR)
6. a) Describe the design issues of Suzuki-Kasami's broadcast [8M] algorithm with pseudo code and prove the correctness algorithm is based on a token.
b) Write the basic idea and algorithm for Chandy-Misra-Haas's OR [7M] model for distributed deadlock detection.

\section*{UNIT-IV}
7. a) Explain the role of consistent set of checkpoints in coordinated check pointing and recovery technique to avoid the domino effect and live lock problems during the recovery.
b) Illustrate the Byzantine agreement problem and explain [7M] Agreement in a failure-free system with synchronous or asynchronous.

\section*{(OR)}
8. a) Explain three types of Log-based rollback-recovery protocols in [8M] detail.
b) Write the Byzantine generals algorithm with iterative [7M] formulation.

\section*{UNIT-V}
9. a) Write about popular P2P system Napster and application layer [8M] overlays and distributed indexing mechanism.
b) Discuss the abstraction and advantages of distributed shared [7M] memory in detail.

\section*{(OR)}
10. a) Describe the working of CAN initialization, CAN routing, [8M] maintenance, Optimization and complexity.
b) Present and explain the implementation of linearizability (LIN) [7M] using total order broadcasts in memory consistency.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DISTRIBUTED SYSTEMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Explain the given primitives for distributed communication like blocking/non-blocking and synchronous/asynchronous.
b) How to model distributed executions with internal, message send and message receive events? Explain the role of Causal precedence relation in it.

\section*{(OR)}
2. a) Briefly summarize the key algorithmic challenges in distributed computing.
b) Explain the Physical clock synchronization with Network Time Protocol. Elaborate the concepts of motivation, terminology and clock inaccuracies.

\section*{UNIT-II}
3. a) Present and explain the algorithm of Chandy-Lamport snapshot algorithm for FIFO channels.
b) Write the importance of non determinism on Synchronous program order on an asynchronous system. Explain various concepts of it with respect to group communication.
(OR)
4. a) What is binary Rendezvous? Explain its algorithmic constraints and features for the simplified implementation of synchronous order.
b) Define global state and consistent global state and discuss the issues which have to be addressed to compute consistent distributed snapshot.

\section*{UNIT-III}
5. a) Explain the token based approaches for implementing [8M] distributed mutual exclusion.
b) Describe steps of Chandy-Misra-Haas's distributed deadlock detection algorithm for the AND model based on edge-chasing.

\section*{(OR)}
6. a) Explain distributed mutual exclusion algorithm developed by [8M] Lamport.
b) Describe the system model of deadlocks in distributed systems. Explain the preliminaries and role of Wait-For-Graph with an example.

\section*{UNIT-IV}
7. a) Write about asynchronous check pointing. Explain the basic [8M] idea of the recovery algorithm and present the algorithm.
b) Define the problem of consensus and agreement protocols and state some assumptions underlying the study of agreement algorithms.

\section*{(OR)}
8. a) Write the implementation coordinated check pointing and [8M] Uncoordinated check pointing in detail.
b) Explain the phase king algorithm steps for consensus in [7M] synchronous systems and message patterns used in it.

\section*{UNIT-V}
9. a) Describe the object publication and search in Tapster.
b) Explain various types of memory consistency models in detail.
(OR)
10. a) How to map objects to their locations in the network using [8M] content-addressable network (CAN)? Explain in detail.
b) Write a note on distributed shared memory working principle.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 POWER SYSTEM ANALYSIS \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70


PART -A
(14 Marks)
1. a) Define the bus incidence matrix.
b) What is the need for a slack bus?
c) What are the steps needed for developing \(\mathrm{Z}_{\text {bus }}\) algorithm?
d) How do you select reactors for protection of system?
e) Give the definition of symmetrical components.
f) What the possible methods are to improve the transient stability?

\section*{PART - B}
(56 Marks)
2. a) What are the advantages of the per unit system for analysis of power system.
b) Derive the bus admittance matrix by singular transformation.
3. a) Compare the load flow solution methods.
b) Write the computational procedure for load flow solution using N-R polar coordinate method when the system contains all types of buses.
4. Develop \(Z_{\text {bus }}\) matrix for the network shown in Fig.1.


Fig. 1
5. a) Explain the 3-phase short circuit currents and reactances of synchronous machine.
b) There are two generating stations each with an estimated short circuit kVA of 500 MVA and 600 MVA . Power is generated at 11 kV . If these two stations are interconnected through a reactor with a reactance of \(0.3 \Omega\), determine the short circuit MVA at each station.
6. a) Explain the sequence networks for an unloaded synchronous generator.
b) A dead earth fault occurs on one conductor of a 3-phase cable supplied by a 5000 kVA , 3-phase generator with earthed neutral. The sequence impedances of the alternator are given by
\[
\mathrm{Z}_{1}=(0.4+\mathrm{j} 4) \Omega, \mathrm{Z}_{2}=(0.3+\mathrm{j} 0.6) \Omega \text { and } \mathrm{Z}_{0}=(\mathrm{j} 0.45) \Omega \text { per phase. }
\]

The sequence impedance of the line up to the fault are \((0.2+j 0.3) \Omega\), \((0.2+\mathrm{j} 0.3) \Omega\) and \((3+\mathrm{j} 1) \Omega\). Find the fault current and the sequence components of the fault current. Also find the line to earth voltages on the infaulted lines. The generator line voltage is 6.6 kV .
7. a) Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect (i) steady state stability and (ii) transient state stability.
b) A generator rated 75 MVA is delivering 0.8 p.u power to a motor through a transmission line of reactance j 0.2 p.u. The terminal voltage of the generator is 1.0 p.u and that of the motor is also 1.0 p.u. Determine the generator e.m.f behind transient reactance. Also find the maximum power that can be transferred.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 INSTRUMENTATION \& CONTROL SYSTEMS
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
(14 Marks)
1. a) What are the uses of measuring instruments?
b) What is meant by temperature indicator?
c) Explain the working of turbine flow meter?
d) What is the working principle of strain gauge?
e) Explain the purpose of torsion meters?
f) What are the advantages and disadvantages of open control systems?

\section*{PART -B}
(56 Marks)
2. a) What are the dynamic performance characteristics of instruments? And discuss
[7M] the photo electric transducer principle.
b) How do you measure displacement? Also explain calibration procedure to [7M] measure displacement.
3. a) Explain the purpose, significance and working of cryogenic fuel level [7M] indicators.
b) Explain the working principle of laser dropper anemometer with a suitable diagram.
4. a) Discuss the working principle and mathematical interpretations involved in resistance strain gauge. Also mention their advantages and disadvantages.
b) Write a short notes on the following:
i) Measuring torque
ii) Gauge factor
iii) Compressive and Tensile strain
5. a) Explain the purpose and working of Torsion meter with suitable diagram.
b) Discuss the elastic force meters and load cells. Also write their advantage and [7M] disadvantage.
6. a) Explain the various parts of servo motor and its mechanism with a suitable diagram.
b) Discuss the following terms:
i) Speed and position control system
ii) Closed control system
7. a) Explain the working mechanism of pyrometer and thermocouple. Also mention
[7M] their advantages.
b) Discuss the following terms:
i) Thermal conductivity gauge
(ii) Bourdon pressure gauge

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ MICROWAVE ENGINEERING
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
\(\sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim \sim ~\)

\section*{PART -A}
(14 Marks)
1. a) List out the various bands in microwave frequency.
b) Write the characteristic impedance equation of a microstrip line.
c) Write the characteristics of two cavity klystron amplifier.
d) What are the major differences between TWT and klystron?
e) Write short notes on Isolator.
f) Write the performance characteristics of IMPATT diode.

\section*{PART - B}
2. a) What are the different types of losses in rectangular waveguide? Explain them.
b) What is TM mode in a waveguide? Write the TM mode characteristic equations in a rectangular waveguide.
3. a) Briefly explain about TM modes in circular waveguide.
b) What is cavity resonator? Explain the working principle of rectangular cavity resonator.
4. a) Write the limitations of conventional tubes at microwave frequencies and briefly explain them.
b) Draw the schematic diagram of a reflex klystron and explain its operation.
b) Discuss about output power and efficiency of a magnetron.
6. a) Derive the S-Matrix of a directional coupler.
\[
\begin{aligned}
& \text { b) What is circulator? Explain its working principles and write the applications of it. }[7 \mathrm{M}]
\end{aligned}
\]
7. a) Explain the principles of RWH theory.
b) Discuss the procedure for attenuation measurement.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 DATA WAREHOUSING AND DATA MINING
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

PART -A
(14 Marks)
1. a) Define the concepts of Median and Mode.
b) What is the advantage of Pearson's product moment coefficient?
c) How do you group ordinal attributes?
d) List the characteristics of Nearest Neighbor Classifiers.
e) Define the Association rule mining problem.
f) List the strengths and weaknesses of the DBSCAN algorithm.

\section*{PART -B}
(56 Marks)
2. a) List and explain different types of data with examples.
b) Discuss various methods to visualize higher dimension datasets.
3. a) Illustrate the forms of data preprocessing with a neat sketch.
b) Explain the steps to deal with Noisy data using Binning.
4. a) Discuss the measures for selecting the Best Split.
b) Explain the step-by-step process of implementing the Decision tree induction algorithm.
5. a) Discuss various ways to estimate the conditional probabilities for continuous attributes.
b) Predict the class label of a test record \(\mathrm{X}=\) (Home owner \(=\) Yes, Marital Status \(=\) Married, Income \(=\$ 120 \mathrm{~K}\) ). (See the following Table-1)

\section*{Table-1}
\begin{tabular}{|l|l|l|l|l|}
\hline Tid & \begin{tabular}{l} 
Home \\
Owner
\end{tabular} & \begin{tabular}{l} 
Marital \\
Status
\end{tabular} & \begin{tabular}{l} 
Annual \\
Income
\end{tabular} & \begin{tabular}{l} 
Defaulted \\
Borrower
\end{tabular} \\
\hline 1 & Yes & Single & 125 K & No \\
2 & No & Married & 100 K & No \\
3 & No & Single & 70 K & No \\
4 & Yes & Married & 120 K & No \\
5 & No & Divorced & 95 K & Yes \\
6 & No & Married & 60 K & No \\
7 & Yes & Divorced & 220 K & No \\
8 & No & Single & 85 K & Yes \\
9 & No & Married & 75 K & No \\
10 & No & Single & 90 K & Yes \\
\hline
\end{tabular}
6. a) Explain the methods of Frequent Itemset Generation and Rule ..... [7M]
 Generation.

b) Trace the candidate elimination and pruning methods with an
 example.
7. a) Trace the K-means algorithm with a case study.
b) Compare K-means with DBSCAN clustering algorithm.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ DATA STRUCTURES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
a) What is an Abstract Data Type? Write ADT for stacks and explain in detail.
b) How to calculate time complexity of a program? Explain time complexity calculation for matrix addition program.
(OR)
a) What is a multi-dimensional array? How is it different from regular array? What are the advantages of multi-dimensional array? Explain in detail.
b) What are the applications of stacks? Explain postfix evaluation with an example.

\section*{UNIT-II}
a) What is a Pointer? Explain about pointer arrays with examples.
b) What are the advantages and disadvantages of Arrays? Why do we choose linked lists over Arrays?
(OR)
4
a) Write an algorithm to insert a node at the beginning of a linked list. Explain with an example as well.
b) Write an algorithm to implement Queue as a linked list.

\section*{UNIT-III}
5. a) What is the difference between binary tree and binary search tree? Construct a binary search tree with the following elements and illustrate the same step-by-step:
\[
45,26,27,58,42,56,77,16,90
\]
b) What are the different traversal techniques implemented in tree data structure? Explain each of them with example.
(OR)
6 a) Construct a full binary tree using the following preorder and postorder traversal of a given tree:

Preorder traversal : \(\{1,2,4,5,3,6,8,9,7\}\)
Postorder traversal: \(\{4,5,2,8,9,6,7,3,1\}\)
b) What are the operations that can be performed on a binary search tree? Explain with an example.

\section*{UNIT-IV}
a) What is the terminology used in Graph Theory? Explain about shortest path routing algorithm with example.
b) Differentiate DFS versus BFS algorithm in graph traversals.

\section*{(OR)}
a) Illustrate Matrix representation for the following graph in Fig. 1.


Fig. 1
Undirected Graph
(i) adjacency Matrix representation
(ii) Cut-set Matrix representation
b) What is a minimum cost spanning tree? Write a suitable algorithm to calculate minimum cost spanning tree for a given graph. Explain with a neat diagram.

UNIT-V
a) Write Algorithm for Linear Search.

Illustrate search criteria in the given list of elements:
\(1392511 \quad 38 \quad 644220\)
(i) Search for 38 (ii) Search for 69
b) What is Hashing? What are the different techniques used in hashing? Explain.
(OR)
10 a) Illustrate Quick sort for the following elements step by step and explain: \(23,56,14,34,58,97,72,69,36\).
b) Compare shell sort and heap sort with a suitable example.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ DATA STRUCTURES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}

3 a) Define pointer. Differentiate pointer arrays and array of pointers. Explain each of them with an example.
b) What are the operations that can be performed on a linked-list?
(OR)
4
a) What is a circular linked-list? Explain with an example.
b) Write pseudo code for deleting an element from the linked list in the middle.

\section*{UNIT-III}
5. a) Define Tree data structure. What is a binary Tree? Explain about terminology used in tree data structure?
b) What is meant by threaded binary tree? Explain the impact of such a representation on the tree traversal procedure.
(OR)
a) What is a Height-balanced tree? Explain LL rotation and RR rotation in AVL trees.
b) Construct binary tree given the pre-order traversal and in-order traversal as follows:

Pre-order traversal: G B Q A C K F P D E R H In-order traversal: Q B K C F A G P E D H R

\section*{1 of 2}

\section*{UNIT-IV}

Fig. 1
a) Write an algorithm to traverse the graph using depth first search (DFS) with a suitable example.
b) Find the minimum cost spanning tree using prims algorithm for the following graph in Fig. 1.

(OR)

8 a) Illustrate the BFS traversal for the given graph in, Fig.2, using Queues.


Fig. 2
b) Write and explain about Dijkstra's algorithm to find the shortest path of a given graph.

\section*{UNIT-V}
a) Write Algorithm for Binary Search.

Illustrate search criteria in the given list of elements:
\(\begin{array}{lllllllll}13 & 19 & 25 & 31 & 38 & 42 & 51 & 65 & 77 \\ 95\end{array}\)
(i) Search for 77 (ii) Search for 12
b) Explain about Double Hashing and Quadratic Hashing with an example.
a) Write algorithm for Insertion sort. Perform Insertion sort for the following elements:
\[
23,56,14,34,58,97,72,69,36
\]
b) Explain about Recursive merge sort with suitable example.

Code No: R1932023
R19

\section*{SET - 3}

\title{
III B. Tech II Semester Regular Examinations, June-2022 DATA STRUCTURES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}

1 a) Write an algorithm for implementing stacks using Arrays Explain with an example.
b) Explain the concept of priority queues with an example. What are the advantages of priority queues?

\section*{(OR)}

2 a) illustrate the following postfix expression evaluation step by step using stack data structure: \(56+74\) - *
b) How is a double-ended Queues different from regular queues? Explain with an example.

\section*{UNIT-II}
a) Explain the procedure of searching an element in the linked-list. Explain with an example.
b) What are the advantages and disadvantages of a single linked list? Why do we use doubly linked-lists?
(OR)
a) Write an algorithm to insert a node at a specified position in the middle of the linked-list. Explain with an example.
b) What is the difference between implementation of stack using arrays and implementation of stacks using linked-list? Explain in detail.

\section*{UNIT-III}
5. a) With the help of the diagrams construct a binary search tree (BST) with the following keys: 86,12,42,69,38,57,74,6,49,71. Also delete 42 from the constructed BST.
b) Explain about the procedure for deleting a node having 2 subtrees ; in Binary search tree with an example.
(OR)
a) How does the height balance condition managed in AVL tree while inserting a node? Explain with an example.
b) Illustrate about insertion and deletion operation in Max-heap with suitable examples.

\section*{UNIT-IV}

7 a) Write an algorithm to traverse the graph using Breadth first search (BFS) with a suitable example.
b) Draw a complete undirected graph having five nodes. Explain [7M] the adjacency matrix representation of the same graph.
(OR)
a) Find the minimum spanning tree for the given graph, in Fig.1, using Kruskal's algorithm.


Fig. 1
b) What is transitive clouser of a directed graph? How to determine the transitive clouser of a graph using Warshall's Algorithm? Explain with an example.

\section*{UNIT-V}
a) Write algorithm for Selection sort. Perform Selection sort for the following elements:
\[
23,56,14,34,58,97,72,69,36 .
\]
b) Explain about iterative merge sort with a suitable example.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DATA STRUCTURES
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}

1 a) What is space complexity? How to calculate the space complexity of a program for finding factorial of a number using recursion?
b) Explain about String as an ADT. What are the different operations that can be performed on strings?
(OR)
a) Convert the following infix expression to post-fix expression using Stack data structure: A + B - C*D + (P^Q) * R/S/T * X + Y
b) What are the operations that can be performed on a stack? Explain with examples.

\section*{UNIT-II}

3 a) Write an algorithm for inserting a node in the middle of the Doubly linked-list.
b) How to search for an element in the single linked list? Explain with example.
(OR)
4 a) Write pseudo code for deleting an element from the circular linked-list.
b) What are the applications of Linked-lists? How to implement sparse matrix using linked-lists. Explain.

\section*{UNIT-III}
5. a) What is the difference between Max-heap and Min-Heap? Explain with an example.
b) Explain about B-Trees insertion operation with an example.

6 a) Explain about RL rotation in AVL trees by illustrating an example.
b) Write about m-way search trees and operations on it in brief.

\section*{1 of 2}

\section*{UNIT-IV}
a) Write the Kruskal's algorithm for finding minimum cost spanning tree or a given graph. Explain with an example.
b) Explain about DFS traversal for the given graph, in Fig.1, using stacks.

(OR)
8 a) What are the different ways available for representing graphs?
Give all the representations for the given graph in Fig.2.


Fig. 2
b) Write and explain about All-pairs shortest path algorithm with an example.

\section*{UNIT-V}
a) Compare and illustrate Linear search, Binary search and Fibonacci search algorithms with an example.
b) What is hashing? Explain about Double hashing and rehashing with suitable examples.
(OR)
a) Write algorithm for Bubble sort. Perform bubble sort for the following elements:
\(23,56,14,34,58,97,72,69,36\)
b) Write algorithm for Quick sort and explain with an example.

\title{
III B. Tech II Semester Regular Examinations, June-2022 CAD/CAM \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
UNIT-I
1. a) What is the basic hardware structure of digital computer?
b) Explain the various graphic transformations required for manipulating the geometric information.
(OR)
2. a) Describe briefly about the techniques used in current computer graphics terminals for generating the image on the CRT screen.
b) Explain the concept of obtaining a rotation about an arbitrary point in xy-plane.

\section*{UNIT-II}
3. a) Show by example that a planar coons bicubic surface results when the position, tangent and twist vectors lie in the same plane.
b) Describe the importance of surface modeling in computer aided graphics and design.
(OR)
4. a) Why the sweep representations are useful in creating solid models of 2D objects and explain what are the desirable properties of any solid modeling scheme.
b) Explain the various surface entities that are needed to construct a surface model.

\section*{UNIT-III}
5. a) What do you understand by NC part programming? List out the advantages of manual part programming.
b) Write briefly about fixed sequential format and word address format.
(OR)

1 of 2
6. a) Describe any five Preparatory (G) codes.
b) Write a CNC program for the profile shown, in Fig.1, assuming the required parameters. All dimensions are in mm.


Fig. 1

\section*{UNIT-IV}
7. a) What are the production conditions under which group technology and cellular manufacturing are most applicable?
b) Explain about OPITZ parts classification and coding system.
8. a) Apply the rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters and machines are identified numerically.
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline \multirow{2}{*}{ Machines } & \multicolumn{7}{|c|}{ Parts } \\
\cline { 2 - 7 } & A & B & C & D & E & F \\
\hline 1 & 1 & & & & 1 & \\
\hline 2 & & & & 1 & & 1 \\
\hline 3 & 1 & 1 & & & & \\
\hline 4 & & & 1 & 1 & & \\
\hline 5 & & 1 & & & 1 & \\
\hline 6 & & & 1 & 1 & & 1 \\
\hline
\end{tabular}
b) What is the importance of computer aided process planning in manufacturing? Describe in your own words.

\section*{UNIT-V}
9. a) Write any eight benefits of CIM.
b) What is the significance of quality control in CIM?
10. a) What is inspection and what are the different types of inspection?
b) Write briefly about the methods of operating and controlling CMM?

\title{
III B. Tech II Semester Regular Examinations, June-2022 CAD/CAM \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Describe about product cycle using computers.
b) Describe the importance of 2D and 3D transformations in any CAD system.
(OR)
2. a) What is meant be raster scanning? Why is it preferred to the storage tube in the display of graphics information?
b) Prove that any two successive 3D rotations about a given rotation axis is commutative.

\section*{UNIT-II}
3. a) What is solid modeling? Compare Bezier representation with CSG representation scheme.
b) Describe the parametric equation of a composite surface.
(OR)
4. a) Differentiate between solid modeling and surface modeling methods.
b) Describe the modeling guidelines to be followed by the user while constructing a surface model on a CADCAM system.

\section*{UNIT-III}
5. a) What is the purpose of a part program? Explain the function of punched tape in an NC machine tool?
b) Enumerate the differences between incremental and absolute programming.
(OR)
6. a) Write a CNC program for the profile shown, in Fig.1, assuming [10M] the required parameters. All dimensions are in mm .


Fig. 1
b) Describe any five Miscellaneous codes.

\section*{UNIT-IV}
7. a) What are three capabilities that a manufacturing system must possess in order to be flexible? Explain.
b) Explain about MICLASS coding system.

\section*{(OR)}
8. a) Apply the rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters and machines are identified numerically.
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|}
\hline \multirow{2}{*}{ Machines } & \multicolumn{10}{|c|}{ Parts } \\
\hline & A & B & C & D & E & F & G & H & I \\
\hline 1 & 1 & & & & & & & & 1 \\
\hline 2 & & 1 & & & & & 1 & & \\
\hline 3 & & & 1 & & 1 & & & 1 & \\
\hline 4 & & 1 & & & & 1 & 1 & & \\
\hline 5 & & & 1 & & & & & 1 & \\
\hline 6 & & & & & & 1 & 1 & & \\
\hline 7 & 1 & & & 1 & & & & & \\
\hline 8 & & & 1 & & 1 & & & & \\
\hline
\end{tabular}
b) Explain about retrieval CAPP system.

\section*{UNIT-V}
9. a) Explain the aspects that one should consider in implementing CIM.
b) Explain the steps used in implementing lean manufacturing.

\section*{(OR)}
10. a) Describe any four types of CMM?
b) Describe the steps that are followed in a typical inspection of an item.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ CAD/CAM \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Describe important functions of a design work station.
b) Explain shear transformations.
2. a) For a position vector \(\mathrm{P}_{1}[11], \mathrm{P}_{2}[31], \mathrm{P}_{3}[43], \mathrm{P}_{4}[23]\) that define a 2D polygon, develop a signal transformation matrix that reflects about the line \(\mathrm{x}=0\); Translates by ' -1 ' in both x and y directions; Rotates about the origin by \(180^{\circ}\). Using this transformation, derive the transformed position vectors. Plot both original and transformed polygon on the same graph.
b) Describe various hardware components of a stand-alone CAD system.

\section*{UNIT-II}
3. a) Derive the equation for a cubic Bezier surface.
b) With the help of neat sketches, describe the most commonly used solid entities.

\section*{(OR)}
4. a) A cubic Bezier curve is defined by four control points as \((30,30),(50,80),(100,100),(150,30)\). Find the equation of the curve and its midpoint.
b) What do you mean by blending function? Explain reparameterization of a surface.

UNIT-III
5. a) Describe various geometric statements used in APT programming.
b) Write the advantages of computer assisted part programming.
6. a) Write a CNC program for the profile shown, in Fig.1, assuming [10M] the required parameters. All dimensions are in mm .


Fig. 1
b) Explain the importance of canned cycle in CNC programming.

\section*{UNIT-IV}
7. a) Explain about DCLASS coding system.
b) Apply the rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters and machines are identified numerically.
\begin{tabular}{|c|c|c|c|c|c|}
\hline \multirow{2}{*}{ Machines } & \multicolumn{5}{|c|}{ Parts } \\
\hline & A & B & C & D & E \\
\hline 1 & 1 & & & & \\
\hline 2 & & 1 & & & 1 \\
\hline 3 & 1 & & 1 & 1 & \\
\hline 4 & & 1 & & & \\
\hline 5 & & & & 1 & \\
\hline \multicolumn{5}{|c|}{ (OR) }
\end{tabular}
8. a) What are the three basic components of FMS? Describe them.
b) Explain the reasons for using a coding scheme in manufacturing? Also describe briefly about the three structures used in classification and coding system.

\section*{UNIT-V}
9. a) Differentiate between lean and agile manufacturing.
b) Define total quality management and explain its relevance to CIM.
(OR)
10. a) What are the basic components of a CMM? Explain them with a neat diagram.
b) Explain about machine vision with a neat sketch.

\section*{*****}

\title{
III B. Tech II Semester Regular Examinations, June-2022 CAD/CAM
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

UNIT-I
1. a) What are the ground rules that should be considered in designing graphics software?
b) Explain the method to derive the transformation matrix for rotating an object about any arbitrary axis that does not coincide with the coordinate axis \(\mathrm{x}, \mathrm{y}\) and z .
(OR)
2. a) A line is defined by its end points \((0,0)\) and \((2,3)\) in a 2D graphics system. Express the line in matrix notation and perform the following transformations on the line.
i) Scale the line by a factor of 2.0;
ii) Scale the original line by a factor 3.0 in x direction and 2.0 in y direction;
iii) Translate the original line by 2.0 units in x direction and 2.0 units in y direction;
iv) Rotate the original triangle by \(45^{\circ}\) about the origin.
b) Differentiate between stroke writing and raster scan techniques.

\section*{UNIT-II}
3. a) Derive the equation for a cubic B-spline surface.
b) Distinguish between CSG and B-rep models.
(OR)
4. a) Explain how a Bezier curve is superior to a cubic spline curve from the designer point of view.
b) Write the mathematical representation, application and limitations of the spherical surface and composite surface.

\section*{UNIT-III}
5. a) Describe about various motion command statements used in APT program.
b) Illustrate the procedure of APT programming using MACRO statement.
6. a) Write a CNC program for the profile shown, in Fig.1, assuming the required parameters. All dimensions are in mm.

Fig. 1

b) Describe the role of a CNC part programmer.

\section*{UNIT-IV}
7. a) Write the differences between hierarchical structure and a chain type structure in a classification and coding system.
b) Explain the four tests of flexibility that a manufacturing system must satisfy in order to be classified as flexible.
(OR)
8. a) Name the seven functions performed by human resources in an FMS.
b) What are the typical objectives when implementing cellular manufacturing?

\section*{UNIT-V}
9. a) Explain the computerized business functions of CIM.
b) Explain the applications of computer integrated manufacturing systems.
(OR)
10. a) Briefly describe about noncontact nonoptical inspection techniques.
b) What are the advantages of using CMMs over manual inspection method?

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ DIGITAL SIGNAL PROCESSING
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Define periodic signal. Determine periodicity of the following signals:
(i) \(x(n)=\cos ^{2}\left(\frac{\pi}{8} n\right)\)
(ii) \(x(n)=\cos \left(\frac{\pi}{3} n\right)+3 \sin \left(\frac{\pi}{4} n\right)\)
b) Find the step response of a discrete-time LTI system whose difference equation is given by
\[
y(n)=y(n-1)+0.5 y(n-2)+x(n)+x(n-1)
\]
(OR)
2. a) Define and explain the following systems with an example:
(i) Causal and non-causal
(ii) Time-invariant and time-variant
b) Find the magnitude and phase response of the LTI system with
\[
\begin{gathered}
h(n)=\delta(n)-\delta(n-1) \\
\text { UNIT-II }
\end{gathered}
\]
3. a) Determine the discrete Fourier series coefficients of the periodic signal \(x(n)=\left(\operatorname{Cos} \frac{2 \pi}{3} n\right)\left(\operatorname{Sin} \frac{2 \pi}{5} n\right)\). Also, sketch its magnitude spectrum.
b) How FFT algorithm improves the speed of computation? Explain with an example.
(OR)
4. a) State and prove any two properties of DFT.
b) Find the 4 -point DFT of the sequence \(x(n)=\{2,1,4,3\}\) by using

DIF FFT algorithm? Also, plot its magnitude and phase spectra.
UNIT-III
5. a) Obtain the \(4^{\text {th }}\) order transfer function of normalized Butterworth low pass filter.
b) Draw the parallel form realization of a system with system function
\[
H(z)=\frac{\left(1-z^{-1}\right)^{3}}{\left(1-\frac{1}{2} z^{-1}\right)\left(1-\frac{1}{8} z^{-1}\right)}
\]

\section*{R19}
(OR)
6. a) Design a digital Butterworth band pass filter using bilinear [10M] transformation for the following specifications:
Lower stop band edge \(=25 \mathrm{~Hz}\); Lower pass band edge \(=100 \mathrm{~Hz}\);
Upper pass band edge \(=150 \mathrm{~Hz}\); Upper stop band edge \(=225 \mathrm{~Hz}\); Stop band attenuation \(=18 \mathrm{~dB}\); Pass band ripple \(=3 \mathrm{~dB}\); Sampling frequency \(=500 \mathrm{~Hz}\).
b) List out the requirements for conversion of stable analog filter into stable digital filter.

\section*{UNIT-IV}
7. a) Determine the frequency response of FIR filter with \(N\) is odd and symmetric impulse response.
b) Explain the concept of Gibbs phenomenon in FIR filters.
8. a) The desired frequency response of a high pass filter is
\[
H_{d}\left(e^{j \omega}\right)=\left\{\begin{array}{l}
0, \quad \text { for } 0 \leq|\omega| \leq \frac{3 \pi}{4} \\
e^{-j 3 \omega}, \text { for } \frac{3 \pi}{4} \leq|\omega| \leq \pi
\end{array}\right.
\]

Determine the filter coefficients for \(N=7\) using Hamming window.
b) Distinguish between FIR and IIR filters.

\section*{UNIT-V}
9. a) Write a short notes on the following:
(i) Multiple access memory
(ii) Multiported memory
b) Explain the instruction set of Cortex-M processors.

\section*{(OR)}
10. a) Explain the short direct addressing and circular addressing modes in programmable DSP's.
b) Discuss the processor type in ARM Cortex-M processors.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DIGITAL SIGNAL PROCESSING
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Determine the causality and stability of following systems with impulse responses:
(i) \(h(n)=3^{n} u(-n)\)
(ii) \(h(n)=e^{2 n} u(n-1)\)
b) Define and explain the following discrete-time signals with [7M] necessary mathematical expressions:
(i) Periodic and Aperiodic
(ii) Energy and power
(OR)
2. a) State and prove the frequency shifting property of DTFT.
b) Determine the response of the following system described by a difference equation
\[
y(n)=x(n)+\frac{5}{6} y(n-1)-\frac{1}{6} y(n-2)
\]
for the input \(x(n)=\left\{\begin{array}{c}3^{n} \text { for } n \geq 0 \\ 0 \text { for } n<0\end{array}\right.\).

\section*{UNIT-II}
3. a) The \(\operatorname{IDFT}[X(k)]=x(n)=\{1,2,1,0\}\), find the following by use of DFT properties:
(i) \(\operatorname{IDFT}[X(k-1)]\)
(ii) \(\operatorname{IDFT}\left[X^{2}(k)\right]\)
b) Explain the procedure to compute 8-point DFT using DIT FFT algorithm.

\section*{(OR)}
4. a) Distinguish between linear convolution and circular convolution.
b) Find the 4 -point IDFT of \(X(k)=\{10,-2+j 2,-2,-2-j 2\}\) using DIF FFT algorithm.

\section*{UNIT-III}
5. a) Find \(H(z)\), for a \(3^{\text {rd }}\) order Butterworth digital filter using impulse invariant transformation method. Assume \(T=1 \mathrm{sec}\).
b) Obtain the cascade and parallel form realization of IIR filter with system function
\[
H(z)=\frac{1}{1+2 z^{-1}-z^{-2}}
\]

1 of 2

\section*{(OR)}
6. a) Design a digital band stop Butterworth filter using bilinear [10M] transformation for the following specifications.
Lower pass band edge \(=25 \mathrm{~Hz}\); Lower stop band edge \(=100 \mathrm{~Hz}\); Upper stop band edge \(=150 \mathrm{~Hz}\); Upper pass band edge \(=225 \mathrm{~Hz}\); Stop band attenuation \(=18 \mathrm{~dB}\); Pass band ripple \(=3 \mathrm{~dB}\); Sampling frequency \(=500 \mathrm{~Hz}\).
b) What is meant by canonic and non-canonic structures? Give an example.

\section*{UNIT-IV}
7. a) Obtain the frequency domain characteristics of rectangular window function.
b) The desired frequency response of a low pass filter is
\[
H_{d}\left(e^{j \omega}\right)=\left\{\begin{aligned}
e^{-j 3 \omega}, & \text { for }-\frac{3 \pi}{4} \leq|\omega| \leq \frac{3 \pi}{4} \\
0, & \text { for } \frac{3 \pi}{4} \leq|\omega| \leq \pi
\end{aligned}\right.
\]

Design an FIR filter using Hamming window of length \(\mathrm{N}=7\).
(OR)
8. a) List out the steps involved in design of FIR filter using frequency sampling method.
b) Sketch the direct form realization of linear phase FIR filter with
\[
h(n)=\{1,2,3,4,3,2,1\}
\]

\section*{UNIT-V}
9. a) How convolution operation is performed using a single MAC unit? Explain.
b) Explain the processor architecture of Cortex-M3 processor.
10. a) List out the on-chip peripherals in programmable DSP's and explain any two of them in detail.
b) What are the advantages of Cortex-M processor?

\title{
III B. Tech II Semester Regular Examinations, June-2022 DIGITAL SIGNAL PROCESSING
}
(Electronics and Communication Engineering)
Time: 3 hours Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Define time invariant system. Determine the following systems [8M] are time invariant or not:
(i) \(y(n)=x(n)+n x(n+1)\)
(ii) \(y(n)=x(3 n)\)
b) How to solve the linear constant coefficient difference equation using Z-transforms approach? Explain.

\section*{(OR)}
2. a) Find the discrete time Fourier transform of a signal given by
\[
x(n)=\left(\frac{1}{2}\right)^{|n-1|}
\]
b) Determine the frequency response and impulse response of the discrete-time system represented by the difference equation
\[
y(n)-y(n-1)+\frac{3}{16} y(n-2)=x(n)-\frac{1}{2} x(n-1)
\]

\section*{UNIT-II}
3. a) State and prove the time-shifting and symmetry properties of [8M] discrete Fourier series.
b) Find N-point DFT of a sequence
\[
x(n)=\operatorname{Cos}\left(\frac{2 \pi r n}{N}\right), 0 \leq n \leq(N-1) \text { and } 0 \leq r \leq(N-1)
\]
(OR)
4. a) The \(\operatorname{DFT}[x(n)]=X(k)=\{4,-j 2,0, j 2\}\), compute the following by use of DFT properties:
(i) \(\operatorname{DFT}[x(n-2)]\)
(ii) \(\operatorname{DFT}\left[x^{*}(n)\right]\)
b) Develop a radix-2 DIT FFT algorithm for evaluating 4-point DFT. Also draw its flow diagram.

\section*{UNIT-III}
5. a) Design a digital Chebyshev low pass filter to satisfy the following [8M] constraints:
\[
\begin{array}{r}
0.8 \leq\left|H\left(e^{j \omega}\right)\right| \leq 1, \quad 0 \leq \omega \leq 0.2 \pi \\
\left|H\left(e^{j \omega}\right)\right| \leq 0.2, \quad 0.6 \pi \leq \omega \leq \pi
\end{array}
\]
using impulse invariant transformation and assume \(T=1 \mathrm{sec}\).
b) Explain the concept of frequency transformation in analog [7M] domain with necessary mathematical expressions.

\section*{(OR)}
6. a) Obtain the bilinear transformation formula for designing IIR [8M] digital filter?
b) Draw the direct form I and direct form II structures of the [7M] system with difference equation
\[
y(n)=-\frac{3}{8} y(n-1)+\frac{3}{32} y(n-2)+\frac{1}{64} y(n-3)+x(n)+3 x(n-1)
\]

\section*{UNIT-IV}
7. a) Design a high pass FIR filter using Hamming window with a [8M] cutoff frequency of 1.2 rad and \(\mathrm{N}=9\).
b) Obtain the ideal impulse response of a high pass FIR filter.

\section*{(OR)}
8. a) Derive the necessary and sufficient condition for linear phase
[ 8 M\(]\) characteristic in FIR filter.
b) Explain the procedure for designing of an FIR filter using [7M] frequency sampling method.

\section*{UNIT-V}
9. a) Draw the block diagram of VLIW architecture and explain.
b) Explain the memory system related to Cortex-M3 and M4 [7M] processors.

\section*{(OR)}
10. a) Explain the memory mapped addressing modes and bit reversed addressing modes in programmable DSP's.
b) Write a short note on the instruction set of Cortex-M processors. [7M]

\section*{*****}

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\title{
III B. Tech II Semester Regular Examinations, June-2022 DIGITAL SIGNAL PROCESSING
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. a) What is meant by BIBO stable system? Derive its necessary and sufficient condition.
b) Solve the following difference equation using Z-transform
\[
y(n)+2 y(n-1)=x(n)
\]
with \(x(n)=(1 / 3)^{n} u(n)\) and the initial condition \(y(-1)=1\).
(OR)
2. a) Check whether the following systems are linear or not.
(i) \(y(n)=|x(n)|\)
(ii) \(y(n)=\sum_{k=0}^{N-1} x(n-k)\)
b) A unit sample response of a discrete time system is given by
\[
h(n)=\frac{1}{2} \delta(n)+\delta(n-1)+\frac{1}{2} \delta(n-2)
\]

Determine the frequency response of a system and also sketch its magnitude and phase spectra.

\section*{UNIT-II}
3. a) Determine and sketch the magnitude and phase spectra of the periodic signal, \(x(n)=\{1,1,0,0\}\) with period \(\mathrm{N}=4\).
b) State and prove the periodicity and circular time shifting properties of DFT.

\section*{(OR)}
4. a) Find the circular convolution of given two sequences using DFT and IDFT. \(x_{1}(n)=\{1,2,3,4\}\) and \(x_{2}(n)=\{1,1,2,2\}\).
b) What is the importance of FFT? Explain with an example.

\section*{UNIT-III}
5. a) Design a digital Chebyshev low pass filter using bilinear transformation with the following specifications:
3 dB ripple in the pass band \(0 \leq \omega \leq 0.2 \pi\);
25 dB attenuation in the stop band \(0.45 \pi \leq \omega \leq \pi\);
Assume \(T=1 \mathrm{sec}\).
b) Explain the transposed form structures with an example.

\section*{(OR)}
6. a) Distinguish between Butterworth and Chebyshev filters.
b) What are the advantages of parallel form realization? Implement the IIR filter with difference equation
\[
y(n)=-0.1 y(n-1)+0.72 y(n-2)+0.7 x(n)-0.252 x(n-2)
\]
in parallel form.

\section*{UNIT-IV}
7. a) Design an FIR digital filter to approximate an ideal low pass filter with pass band gain of unity, cut-off frequency of 850 Hz and sampling frequency of 5000 Hz . The length of impulse response should be 5 . Use rectangular window.
b) Obtain the direct form realization of linear phase FIR filter with system function
\[
H(z)=\frac{1}{2}+\frac{1}{3} z^{-1}+z^{-2}+\frac{1}{4} z^{-3}+z^{-4}+\frac{1}{3} z^{-5}+\frac{1}{2} z^{-6}
\]
(OR)
8. a) Explain the frequency domain characteristics of various window functions used in FIR filter design.
b) The desired frequency response of a low pass filter is
\[
H_{d}\left(e^{j \omega}\right)=\left\{\begin{array}{cl}
e^{-j 8 \omega}, & \text { for } 0 \leq|\omega| \leq \frac{\pi}{2} \\
0, & \text { for } \frac{\pi}{2} \leq|\omega| \leq \pi
\end{array}\right.
\]

Design an FIR filter with \(\mathrm{N}=17\) using frequency sampling method.

\section*{UNIT-V}
9. a) What is meant by instruction pipelining? Explain with an example.
b) Explain the differences between Von Neumann and Harvard architectures. Which architecture is preferred for DSP applications?
(OR)
10. Draw the block diagram of Cotex-M3 and Cortex-M4 processor? Explain.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DESIGN AND ANALYSIS OF ALGORITHMS
}

> (Computer Science and Engineering)

Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Define an algorithm. Describe the characteristics of an algorithm.
b) Prove that:
(i) \(\quad \mathrm{f}(\mathrm{n})+\mathrm{g}(\mathrm{n})=\mathrm{O}\left(\mathrm{n}^{2}\right)\) where \(\mathrm{f}(\mathrm{n})=3 \mathrm{n}^{2}-\mathrm{n}+4\) and \(\mathrm{g}(\mathrm{n})=\mathrm{n} \log \mathrm{n}+5\)
(ii) \(\quad \mathrm{f}(\mathrm{n})=4 \mathrm{n}^{2}-64 \mathrm{n}+288=\Omega\left(\mathrm{n}^{2}\right)\).
(OR)
2. a) What are bi-connected components? Relate with suitable examples.
b) Define Articulation point. For the following graph, in Fig.1, identify the articulation points and draw the bi-connected components.


Fig. 1

\section*{UNIT-II}
3. a) Write algorithm for abstract Divide and Conquer strategy. Relate the method to real-time applications.
b) Trace the quick sort algorithm to sort the list C, O, L, L, E, G, E in alphabetical order.
(OR)
4. a) Explain in the control abstraction for greedy method. List out the advantages.
b) Prove that, if \(\mathrm{p} 1 / \mathrm{w} 1 \geq, \mathrm{p} 2 / \mathrm{w} 2 \geq, \ldots \ldots \geq \mathrm{pn} / \mathrm{wn}\), then Greedy Knapsack generates an optimal solution to the given instance of the Knapsack problem.

\section*{UNIT-III}
5. a) Define and describe Dynamic Programming. Give its
applications.
b) How the reliability of a system is determined using dynamic programming? Explain.

\section*{(OR)}
6. a) Explain 0/1 Knapsack problem solution using Dynamic
programming.
b) Solve the following instance of 0/1 Knapsack problem using Dynamic programming \(\mathrm{n}=3\); (W1, W2, W3) \(=(3,5,7)\); ( \(\mathrm{P} 1, \mathrm{P} 2\), \(\mathrm{P} 3)=(3,7,12) ; \mathrm{M}=4\).

\section*{UNIT-IV}
7. a) Give the solution to the 8 -queens problem using backtracking. Draw the state space tree.
b) Describe the algorithm for Hamiltonian cycles and determine the order of magnitude of the worst-case computing time for the backtracking procedure that finds all Hamiltonian cycles.
(OR)
8. a) Describe about Control Abstractions for LC-search.
b) Explain the principles of
(i) FIFO branch and Bound, and (ii) LC Branch and Bound

\section*{UNIT-V}
9. a) Explain the satisfiability problem.
b) How are P and NP problems related? Give the relation between

NP-hard and NP problems.
(OR)
10. a) What is String Matching? Give its applications.
b) Write about Naïve String Matching Algorithm.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DESIGN AND ANALYSIS OF ALGORITHMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Write the non-recursive algorithm for finding the Fibonacci sequence and derive its time complexity.
b) Express the following function in Big Oh, Omega and theta notations: (i) \(10 n^{2}+5 n\) and (ii) 10logn+6.
(OR)
2. a) Present an algorithm for depth first search traversal. Explain with an example.
b) Consider the set of all trees of height \(h\) that can be constructed by a sequence of "union-by-height" operations. How many such trees are there?

\section*{UNIT-II}
3. a) Write the Binary search algorithm and explain.
b) Compare Merge sort and Quick sort complexities for the given data set: \(\{10,30,15,45,25,30,35,20,30,40,50\}\).

\section*{(OR)}
4. a) Explain the control abstraction for greedy method.
b) Explain the Job sequencing with dead line algorithm and also find the solution for the instance \(\mathrm{n}=7\), ( \(\mathrm{P} 1, \mathrm{P} 2, \ldots, \mathrm{P} 7\) ) \(=(3,5,20,18,1,6,30)\) and (D1,D2, \(\ldots\). D7) \(=(1,3,4,3,2,1,2)\).

\section*{UNIT-III}
5. a) Explain Optimal Binary Search tree problem with an example.
b) Design an algorithm to find solution for Optimal binary search tree.
(OR)
6. a) Write an algorithm of all pairs shortest path problem using dynamic programming.
b) Find the shortest path between all pairs of nodes in the following Graph in Fig. 1.


Fig. 1

\section*{UNIT-IV}
7. a) Explain the basic principle of backtracking and list the applications of backtracking.
b) Explain how backtracking is used for solving n-queen's problem. Show the state space tree.
(OR)
8. a) What is branch and bound? Explain the role of bounding function in it using LC - search.
b) Generate FIFO branch and bound solution for the given knapsack problem. \(\mathrm{m}=15, \mathrm{n}=3\). (P1 P2 P3) \(=(10,6,8)\), ( w 1 w 2 w 3 ) \(=(10\), 12, 3).

\section*{UNIT-V}
9. a) Write short notes on Cook's theorem.
b) Explain non deterministic algorithms. Give some examples.
10. a) Write a short note on why KMP algorithm is most efficient algorithm for string matching.
b) What are tries? Explain the algorithm for their formation.

\section*{2 of 2}

\title{
III B. Tech II Semester Regular Examinations, June-2022 DESIGN AND ANALYSIS OF ALGORITHMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. a) Describe the Performance analysis in detail.
b) Solve the following recurrence relation using substitution method:
\[
\begin{gathered}
\mathrm{T}(\mathrm{n})=1, \mathrm{n} \leq 4 \\
2 \mathrm{~T}(\mathrm{n})+\log \mathrm{n}, \mathrm{n}>4
\end{gathered}
\]
(OR)
2. a) What are the disjoint sets? Discuss about various disjoint set operations.
b) Write short notes on Randomized algorithm.

\section*{UNIT-II}
3. a) Give an algorithm for Merge sort. Derive it's time complexity.
b) Perform merge sort on the array of elements \(\mathrm{a}[1: 10]=\{310,285\), \(179,652,351,423,861,254,450,520\}\). Represent tree of calls for merge sort.
(OR)
4. a) Write Kruskal's algorithm to find the maximum spanning tree.
b) Compute a minimum cost spanning tree for the following graph, shown in Fig. 1, using Kruskal's Algorithm:


Fig. 1

\section*{UNIT-III}
5. a) Define and describe Dynamic Programming. Give its [7M] applications.
b) Describe the problem of single-source shortest path and give a solution using dynamic programming.

\section*{(OR)}
6. a) Write an Algorithm for 0/1 Knapsack problem using Dynamic programming.
b) Describe the Matrix multiplication chains problem. Apply the recursive solution of dynamic programming to determine optimal sequence of pair wise matrix multiplications.

\section*{UNIT-IV}
7. a) State and explain the subset sum problem with an example.
b) Consider the following Sum of Subsets problem instance: \(\mathrm{n}=6\), \(\mathrm{m}=30\), and \(\mathrm{w}[1: 6]=\{5,10,12,13,15,18\}\). Find all possible subsets of \(w\) that sum to \(m\). Draw the portion of the state space tree that is generated.
(OR)
8. a) State the concept of branch and bound method and also list its applications.
b) Write short notes on FIFO and LC branch and bound.

\section*{UNIT-V}
9. a) What are differences between NP-Hard and NP-Complete classes? Explain with examples.
b) Explain any two problems of polynomial time algorithms.

\section*{(OR)}
10. a) Explain the Rabin-Karp algorithm. What is its complexity?
b) What are suffix trees? What are the applications of suffix trees?

\title{
III B. Tech II Semester Regular Examinations, June-2022 DESIGN AND ANALYSIS OF ALGORITHMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) What are the various Asymptotic notations? Bring out the importance of the same with suitable examples.
b) What is the time complexity of following function fun ()? Explain intfun(int n)
\{
for (inti \(=1 ; \mathrm{i}<=\mathrm{n} ; \mathrm{i}++\) )
\{
for (int \(\mathrm{j}=1 ; \mathrm{j}<\mathrm{n} ; \mathrm{j}+=\mathrm{i}\) )
\{
Sum \(=\) Sum \(+\mathrm{i}^{*}\) j;
\}
\}
return(Sum);
\}

\section*{(OR)}
2. a) With the help of an algorithm explain the importance of weighted rule for Union operation? Represent a suitable tree for the same for an example.
b) Write about Collapsing rule for Find operation. Give suitable example.

\section*{UNIT-II}
3. a) Write the General method of Divide-and-Conquer approach.
b) Explain the problem of finding minimum and maximum, and try to apply 'divide and conquer' strategy to solve it. Give a general algorithm for doing the same.
(OR)
4. a) Write Prim's algorithm to find the maximum spanning tree.
b) Compute a minimum cost spanning tree for the following graph, in Fig. 1, using Prim's Algorithm:


Fig. 1

\section*{UNIT-III}
5. a) Explain the methodology of dynamic programming. List the [8M] applications of dynamic programming.
b) How the reliability of a system is determined using dynamic programming? Explain.
(OR)
6. a) What is Travelling Sales Person problem? And what are its [7M] applications?
b) Find the shortest tour of a TSP for following instance using Dynamic programming:
\begin{tabular}{ccccc} 
& A & B & C & D \\
A & 0 & 10 & 15 & 20 \\
B & 5 & 0 & 9 & 10 \\
C & 6 & 13 & 0 & 12 \\
D & 8 & 8 & 9 & 0
\end{tabular}

\section*{UNIT-IV}
7. a) Define the method of backtracking with suitable example.
b) What is graph coloring? Present an algorithm which finds all mcolorings of a graph.

\section*{(OR)}
8. a) State the concept of branch and bound method and also list its [8M]
applications.
b) Solve the Travelling Salesman problem using branch and bound algorithms.

\section*{UNIT-V}
9. a) With a neat diagram, explain the relevance of NP-hard and NPcomplete problems.
b) Write about the theory of NP-Completeness.

\section*{(OR)}
10. a) What are tries? Explain the algorithm for their formation.
b) What are suffix trees? What are the applications of suffix trees?

\title{
III B. Tech II Semester Supplementary Examinations, June - 2022 MICROPROCESSORS AND MICROCONTROLLERS
}
(Electrical and Electronics Engineering)
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

\section*{PART -A}
(14 Marks)
1. a) Explain the PSW register of 8086 microprocessor.
b) Differentiate between maximum and minimum modes of operation of 8086 microprocessor.
c) List out the salient features of 8259 .
d) Distinguish between Microprocessor and Microcontroller.
e) Enumerate the various features of PIC18.
f) Write any two data types of C for PIC18.

\section*{PART - B}
(56 Marks)
2. a) Draw and explain the functional block diagram of 8086 architecture.
b) Draw the register organization of 8086 microprocessor and explain the operation of each register in detail.
3. a) List the string manipulation instructions of 8086 and explain it with examples.
b) Describe briefly the addressing modes of 8086 with one example each.
4. a) Draw and explain the architecture of 8279 .
b) Explain different control word formats of 8255 PPI .
5. a) Draw and explain in detail the block diagram of 8051 microcontroller.
b) Discuss the internal memory organization of 8051 microcontroller.
6. a) Compare in detail the various family members of PIC18.
b) Explain the I/O Ports of PIC18.
7. a) Illustrate the I/O programming in C with examples.
[7M ]
b) Discuss the usage of logical operators of C for PIC 18.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 REFRIGERATION \& AIR CONDITIONING
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART - A}
(14 Marks)
1. a) Why aircraft use air refrigeration?
b) What are subcooling and super heating in vapour compression refrigeration cycle?
c) What is the primary function of an expansion valve in a refrigeration system? [2M]
d) Where do we prefer vapour absorption system?
e) Define human comfort and effective temperature.
f) Explain the function of a register.

PART - B
(56 Marks)
2. a) Discuss about open and dense air refrigeration systems.
b) In simple air refrigeration system the regenerative cooling reduces the temperature of air from the heat exchanger by \(20^{\circ} \mathrm{C}\) before it expands through the cooling turbine. The air leaves the cabin at \(27^{\circ} \mathrm{C}\) and the ram air temperature is \(15^{0} \mathrm{C}\). Obtain the amount of air bled from the refrigeration and COP. If 0.5 \(\mathrm{Kg} / \mathrm{s}\) of air from the main compressor is used for the air conditioning. Calculate the power requirement and tonnage of the system. Take \(\mathrm{P}_{\mathrm{amb}}=0.8\) bar, \(\mathrm{P}_{\mathrm{ram}}=1\) bar, efficiency of compressor \(=0.8\), efficiency of turbine \(=0.8\), heat exchanger effectiveness is 0.75 . The cool air leaves the regenerative heat exchanger at \(27^{0} \mathrm{C}\).
3. a) 28 tonnes of ice formed from and at \(0^{0} \mathrm{C}\) is produced per day in an ammonia refrigeration plant. The temperature range in the compressor is \(25^{\circ} \mathrm{C}\) to \(-15^{\circ} \mathrm{C}\). The vapour is dry and saturated at the end of compression and an expansion valve is used. There is no liquid sub cooling. Assume actual COP is \(62 \%\) of theoretical COP. Calculate the power required to drive the compressor. The properties of ammonia are
\begin{tabular}{|l|l|l|l|l|}
\hline \multirow{2}{*}{\begin{tabular}{l} 
Temp \\
\(\left({ }^{0} \mathrm{C}\right)\)
\end{tabular}} & \multicolumn{2}{|l|}{ Enthalpy (kJ/kg) } & \multicolumn{2}{l|}{ Entropy (kJ/kg-k) } \\
\cline { 2 - 5 } & Liquid \(\left(\mathrm{h}_{\mathrm{f}}\right)\) & Sat. vapour & Liquid & Sat. vapour \\
\hline-15 & 112.34 & 1426.54 & 0.4527 & 5.5490 \\
\hline 25 & 298.9 & 1465.84 & 1.1242 & 5.0391 \\
\hline
\end{tabular}
b) What are the essential components of simple vapour compression refrigeration system? Explain the function of each component. advantages and limitations.
5. a) Explain the working of simple vapour absorption system and derive the
[7M]
expression for its COP.
bxplain the working of thermoelectric refrigeration system.
6. a) Explain the requirements of industrial air conditioning.
b) \(\quad 100 \mathrm{~m}^{3}\) of air per minute at \(30^{\circ} \mathrm{C}\) DBT and \(60 \% \mathrm{RH}\) is cooled to \(20^{\circ} \mathrm{C}\) DBT by passing through a coil. Find, (i) Capacity of cooling coil in tons of refrigeration. (ii) Relative humidity of coming out air and its wet bulb temperature. Take atmospheric pressure as 1.033 bar.
7. a) Explain the working of winter air conditioning system.
b) With a neat sketch explain the working of a forced evaporation humidifier

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ VLSI DESIGN
}
(Common to ECE, EIE, E.COM.E)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) What is Body effect?
b) What is Layout Diagram? What are the uses of Layout diagram?
c) Derive the scaling factor for gate capacitance \(\mathrm{C}_{\mathrm{g}}\) ?
d) What is ESD protection?
e) Define LUT.
f) How static power dissipation is different from dynamic power dissipation?

\section*{PART - B}
(56 Marks)
2. a) Derive the CMOS inverter DC characteristics and obtain the relationship for output voltage at different region in the transfer characteristics.
b) What is Moore's law? Explain its relevance with respect to evolution of technology?
3. Explain the following
(i) Double metal MOS process rules
(ii) Design rules for p -well CMOS process
4. a) How the capacitive load effects the operation of the amplifier circuits? Explain.
b) Describe three sources of wiring capacitances. Explain the effect of wiring capacitance on the performance of a VLSI circuits.
5. a) Why testing is needed and explain the categories for testing.
b) What are the issues to be considered while implementing BIST? Explain.
6. a) Explain the step-by-step procedure to implement half adder circuit using FPGA.
b) What is the purpose of 'constraints' in synthesis process? Explain.
7. a) With a neat sketch, explain about deep submicron digital IC design.
b) Briefly discuss about scaling limitation for low voltage, low power design.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 DESIGN AND ANALYSIS OF ALGORITHMS
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 70

\title{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answer ALL the question in Part-A \\ 3. Answer any FOUR Questions from Part-B
}

PART -A
(14 Marks)
1. a) What is Space Complexity? Give an example. [2M]
b) Describe the Algorithm Analysis of Binary Search.
c) Define a Greedy strategy.
d) List the applications of Dynamic Programming.
e) Define: (i) Answer node (ii) E-Node and (iii) Dead Node.
f) Write about fixed-tuple sized state space tree organization.

\section*{PART -B}
(56 Marks)
2. a) What is an algorithm? Explain its characteristics in detail.
b) Explain the following Asymptotic Notations:
(i) Big oh notation (ii) Omega notation (iii) Theta notation.
3. a) Define internal and external nodes of binary decision tree. Draw the binary decision tree for binary search with \(n=14\).
b) Discuss the working strategy of merge sort and illustrate the process of merge sort algorithm for the given data: \(43,32,22,78,63,57,91\) and 13.
4. a) What is the time complexity of single source shortest path? Explain.
b) What is optimal merge pattern? Find optimal merge pattern for ten files whose record lengths are \(28,32,12,5,84,53,91,35,3\), and 11 .
5. a) What is reliability design problem in DAA? How is time complexity calculated in dynamic programming?
b) Solve the following instance of \(0 / 1\) KNAPSACK problem using dynamic programming \(\mathrm{n}=3\), \((\mathrm{W} 1, \mathrm{~W} 2, \mathrm{~W} 3)=(2,3,4),(\mathrm{P} 1, \mathrm{P} 2, \mathrm{P} 3)=(1,2,5)\), and \(\mathrm{m}=6\).
6. a) What is a backtracking? Give the explicit and implicit constraints in 8 queen's problem.
b) What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm.
7. a) Explain FIFO Branch and Bound solution.
b) Which algorithm is best for knapsack problem? What is the use of knapsack algorithm?

\title{
III B. Tech II Semester Supplementary Examinations, June-2022
}

UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answering the question in Part-A is compulsory \\ 3. Answer any THREE Questions from Part-B \\ *****
}

PART-A
(22 Marks)
1. a) Write a short note on load equalization and mention its effect.
b) List out the advantage of resistance heating in view of utilization of input energy? Also compare the AC and DC welding.
c) Define the luminous intensity. Present its importance in the illumination process.
d) How the light control can be obtained-discuss?
e) What are the features of traction motor? Write about the significance of any one.
f) Put a short on limitations of braking-Justify with suitable traction drive.

\section*{PART -B}
(48 Marks)
2. a) Illustrate the starting and running characteristics DC motor and describe the importance.
b) Mention the reasons of temperature rise in electric drives and also provide a remark related to AC and DC motors.
3. a) What does meant by Induction heating? Discuss the role of currents induced by the electro-magnetic action in Induction heating.
b) Outline the indirect resistance heating and write about the operation with neat diagram.
4. a) State about (i) MHCP, (ii) MSCP, (iii) MHSCP and (iv) Laws of illumination.
b) Demonstrate the concept of polar curves used for illumination engineering.
5. a) Give the detained operation of tungsten filament lamps and fluorescent tubes.
b) Mention the suitable source of lighting for "flood lighting"-Describe in detail.
6. a) List out various systems of traction are commonly used. Discuss any two systems in detail.
b) Draw and present a concept of trapezoidal and quadrilateral speed time curves.
7. a) Illustrate the effect of varying acceleration with suitable example.
b) Define the adhesive weight and coefficient of adhesion. Also discuss about principles of energy efficient motors used in electric traction.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DIGITAL CONTROL SYSTEMS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) State sampling theorem. Explain how an analog signal can be reconstructed.
b) Mention various advantages and disadvantages of digital control systems.
(OR)
2. a) What is the significance of sample and hold circuit? Explain the following parameters for sample and hold:
(i) Acquisition time
(ii) Aperture time
(iii) Settling time
(iv) Hold-mode droop
b) Describe frequency-domain characteristics of a zero-order hold.

\section*{UNIT-II}
3. a) State and prove the following theorems of \(z\)-transforms:
(i) Shifting theorem
(ii) Initial-value theorem
b) Obtain the inverse \(z\)-transform of the following:
(i) \(X(z)=\frac{z^{-3}}{\left(1-z^{-1}\right)\left(1-0.2 z^{-1}\right)}\)
(ii) \(X(z)=\frac{z^{-1}\left(1-z^{-2}\right)}{\left(1+z^{-2}\right)^{2}}\)
(OR)
4. a) The input and output of a sampled data system is given by the difference equation
\[
y(k+2)+3 y(k+1)+4 y(k)=r(k)
\]

Determine the pulse transfer function. The initial conditions are \(\mathrm{y}(0)=0, \mathrm{y}(1)=1\).
b) State and prove differentiation in z-domain property of z-transform.

\section*{UNIT-III}
5. a) Explain any one method of evaluation of state transition matrix.
b) What is the importance of eigenvalues and state transition matrix? Explain.

1 of 2

\section*{(OR)}
6. a) Investigate the controllability and observability of the following system:
\[
\begin{gathered}
{\left[\begin{array}{l}
x_{1}(k+1) \\
x_{2}(k+1)
\end{array}\right]=\left[\begin{array}{cc}
0 & 1 \\
-4 & -4
\end{array}\right]\left[\begin{array}{l}
x_{1}(k) \\
x_{2}(k)
\end{array}\right]+\left[\begin{array}{l}
1 \\
0
\end{array}\right] \mathrm{u}(\mathrm{k})} \\
{\left[\begin{array}{l}
y_{1}(k) \\
y_{2}(k)
\end{array}\right]=\left[\begin{array}{ll}
1 & 0 \\
0 & 1
\end{array}\right]\left[\begin{array}{l}
x_{1}(k) \\
x_{2}(k)
\end{array}\right]}
\end{gathered}
\]
b) Explain the discretization of continuous-time state equations.

\section*{UNIT-IV}
7. a) Using Jury's stability criterion, determine the stability of the following discrete-time systems:
(i) \(z^{3}+3.3 z^{2}+4 z+0.8=0\)
(ii) \(z^{3}-1.1 z^{2}-0.1 z+0.2=0\)
b) Describe the primary strips and complementary strips.
(OR)
8. a) Use the Routh-Hurwitz criterion to find the stable range of \(K\) for the closed-loop unity feedback system with loop gain
\[
F(z)=\frac{K(z-1)}{(z-0.1)(z-0.8)}
\]
b) Explain the mapping between s-plane and \(z\)-plane.

\section*{UNIT-V}
9. a) The closed loop transfer function for the digital control system is given as \(\frac{C(z)}{R(z)}=\frac{z+0.5}{3\left(z^{2}-z+0.5\right)}\). Find the steady state errors and error constants due to step input.
b) Write the design procedure of lag compensator in \(w\)-plane.

\section*{(OR)}
10. a) The open loop transfer function of a unity feedback digital control system is given as \(G(z)=\frac{K(z+0.5)(z+0.2)}{(z-1)\left(z^{2}-z+0.5\right)}\)
Sketch the root loci of the system for \(0<K<\infty\). Indicate all important information on the root loci.
b) List out the steady state specifications. And explain them briefly.

\section*{2 of 2}

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ DIGITAL CONTROL SYSTEMS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Explain digital control systems with proper block diagrams.
b) Distinguish continuous-time and discrete-time signals with examples.
c) Specify various advantages of digital control systems.
(OR)
2. a) What is the necessity of sample and hold? Sketch the block diagram of sample and hold, and explain its principle of operation.
b) Explain the conditions to be satisfied for reconstruction of a continuous-time signal from sampled signal.

\section*{UNIT-II}
3. a) State and prove any two theorems of \(z\)-transforms.
b) Obtain the inverse \(z\)-transform of the following in the closed form:
(i) \(F_{1}=\frac{0.368 z^{2}+0.478 z+0.154}{z^{2}(z-1)}\)
(ii) \(F_{2}=\frac{z+2}{z^{2}(z-2)}\)
(OR)
4. a) Given the \(z\)-transform \(\mathrm{X}(\mathrm{z})=\frac{\left(1-e^{-a T}\right)}{(z-1)\left(z-e^{-a T}\right)}\), where " \(a\) " is constant and " \(T\) " is sampling period, determine inverse \(z\) transform \(x(k T)\) by the use partial fraction expansion method.
b) Obtain the relationship between \(z\) - and \(s\)-domain.

\section*{UNIT-III}
5. a) Obtain the state space representation of discrete time systems using Jordan canonical form.
b) Consider the discrete control system represented by the following transfer function: \(G(z)=\frac{1+0.8 z^{-1}}{1-z^{-1}+0.5 z^{-2}}\).
Obtain the state representation of the system in the observable canonical form. Also find its state transition matrix.

Code No: R1932024

\section*{R19}

SET - 2
(OR)
6. a) Describe the design of reduced order state observer with a neat block diagram.
b) Explain the necessary and sufficient conditions for pole placement.

\section*{UNIT-IV}
7. a) Discuss the stability analysis of discrete control system using modified Routh stability.
b) Explain in detail about primary and complementary strips.
(OR)
8. a) Construct the Jury stability table for the following characteristic equation \(\mathrm{P}(z)=a_{0} z^{4}+a_{1} z^{3}+a_{2} z^{2}+a_{3} z+a_{4}\) where \(\mathrm{a}_{0}>0\). Write the stability conditions.
b) Describe the mapping between s-plane and z-plane.

\section*{UNIT-V}
9. a) The open loop transfer function of a unity-feedback digital control system is given as \(\mathrm{F}(z)=\frac{K\left(z^{2}+0.8 z+0.5\right)}{(z-1)\left(z^{2}-z+0.2\right)}\). Sketch the root loci of the system for \(0<K<\infty\). Indicate all important information on the root loci.
b) List out the transient response specifications and explain in brief.

\section*{(OR)}
10. a) Derive the transfer function of lead compensator.
b) Write the expressions for static position error constant and steady state error in response to a unit step input in discrete time systems.

\title{
III B. Tech II Semester Regular Examinations, June-2022
}

DIGITAL CONTROL SYSTEMS
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Distinguish analog and digital control systems.
b) Illustrate the step motor control discrete data control system.
(OR)
2. a) Explain frequency domain characteristics of zero order hold circuit.
b) Explain how sampling theorem can be used for data [7M] reconstruction.

\section*{UNIT-II}
3. a) Explain how inverse z-transform can be obtained using partial fraction expansion method.
b) Obtain the \(z\)-transform of \(\mathrm{x}(\mathrm{t})=t^{2} e^{-a t}\), where ' \(a\) ' is a constant.
4. a) Explain the procedure for obtaining the pulse transfer function of a closed loop transfer function.
b) Consider the following pulse transfer function system:
\[
\frac{Y(z)}{U(z)}=\frac{z^{-1}\left(1+0.8 z^{-1}\right)}{1+1.3 z^{-1}+0.4 z^{-2}}
\]

Test the state controllability and observability.

\section*{UNIT-III}
5. a) Obtain the state equations of discrete data systems with sample and hold.
b) A discrete-time system has state equation
\[
x(k+1)=\left[\begin{array}{cc}
0 & -1 \\
-5 & -3
\end{array}\right] x(k)
\]

Use Cayley-Hamilton approach to find out its state transition matrix.

\section*{R19}

SET - 3

\section*{(OR)}
6. a) Investigate the controllability and observability of the following system.
\[
\begin{gathered}
{\left[\begin{array}{l}
x_{1}(k+1) \\
x_{2}(k+1)
\end{array}\right]=\left[\begin{array}{cc}
1 & -1 \\
2 & 2
\end{array}\right]\left[\begin{array}{l}
x_{1}(k) \\
x_{2}(k)
\end{array}\right]+\left[\begin{array}{l}
1 \\
0
\end{array}\right] \mathrm{u}(\mathrm{k})} \\
{\left[\begin{array}{l}
y_{1}(k) \\
y_{2}(k)
\end{array}\right]=\left[\begin{array}{cc}
1 & 0 \\
0 & 1
\end{array}\right]\left[\begin{array}{l}
x_{1}(k) \\
x_{2}(k)
\end{array}\right]}
\end{gathered}
\]
b) State and prove the properties of state transition matrix.

\section*{UNIT-IV}
7. a) Determine the stability of characteristic equation by using Jury's stability tests
\[
z^{4}-1.2 z^{3}+0.07 z^{2}+0.3 z-0.08=0
\]
b) Explain the primary strips and complementary strips?
(OR)
8. a) Explain in detail about modified Routh's stability criterion.
b) Use the Routh-Hurwitz criterion to find the stable range of \(K\) for the closed loop unity feedback system with loop gain \(F(z)=\frac{K(z-1)}{(z-0.1)(z-0.8)}\).

\section*{UNIT-V}
9. a) Draw lag and lead compensators. Obtain their transfer function.
b) Recall design procedure of lead compensator in the \(w\)-plane.
(OR)
10. a) Write the expressions for static position error constant and steady state error in response to a unit step input in discrete time systems.
b) The open loop transfer function of a unity-feedback digital control system is given as \(\mathrm{F}(z)=\frac{K\left(z^{2}+0.8 z+0.5\right)}{(z-1)\left(z^{2}-z+0.2\right)}\). Sketch the root loci of the system for \(0<K<\infty\). Indicate all important information on the root loci.

\title{
III B. Tech II Semester Regular Examinations, June-2022 DIGITAL CONTROL SYSTEMS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Explain in detail the process of sampling and reconstruction of signals.
b) Explain frequency-domain characteristics of zero order hold circuit.
(OR)
2. a) Explain in detail the advantages of digital systems.
b) Explain the digital controller for a turbine and generator discrete data control systems.

\section*{UNIT-II}
3. a) Explain different methods of finding inverse \(z\)-transform.
b) Illustrate the procedure for obtaining the pulse transfer function of a closed-loop system with a neat block diagram.

\section*{(OR)}
4. a) Given the \(z\)-transform \(\mathrm{X}(\mathrm{z})=\frac{\left(1-e^{-a T}\right)}{(z-1)\left(z-e^{-a T}\right)}\), where " \(a\) " is constant and " \(T\) " is sampling period, determine inverse \(z\)-transform \(x(k T)\) by the use partial fraction expansion method.
b) Obtain the inverse \(z\)-transform of the following:
(i) \(X(z)=\frac{z^{-3}}{\left(1-z^{-1}\right)\left(1-0.2 z^{-1}\right)}\) and
(ii) \(X(z)=\frac{z^{-1}\left(1-z^{-2}\right)}{\left(1+z^{-2}\right)^{2}}\)

\section*{UNIT-III}
5. a) Explain concepts of controllability and observability.
b) Describe necessary and sufficient conditions of pole placement method.
(OR)
6. a) What is the necessity of state transition matrix and specify its properties.
b) Explain the design of full order state observer with a neat block diagram.

\section*{UNIT-IV}
7. a) Explain the mapping between s-plane and z-plane.
b) Determine the stability of characteristics equation by using Jury's stability tests \(z^{3}-0.2 z^{2}-0.25 z+0.05=0\).
(OR)
8. a) Elaborate on modified Routh's stability criterion.
b) Write difference between primary strips and complementary strips.

UNIT-V
9. a) Draw the circuit diagram for lag compensator. Obtain its transfer function.
b) Explain the design procedure of lead compensator using root locus technique in the \(z\)-plane.
(OR)
10. a) The closed loop transfer function for the digital control system is given as \(\frac{C(z)}{R(z)}=\frac{z+0.5}{3\left(z^{2}-z+0.5\right)}\).
Find the steady state errors and error constants due to step input.
b) Derive the transfer function of lead compensator.

Code No: R1932044

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ INTERNET OF THINGS \\ (Electronics and Communication Engineering)
}

Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Define IoT. Explain the role of things and internet in IoT.
b) What are the major layers in IoT Architecture?
(OR)
2. a) Explain the advantages and disadvantages of an IoT.
b) Explain the role of cloud in IoT.

\section*{UNIT-II}
3. a) Explain Arduino. What are the things need to be considered fordeveloping on the Arduino?
b) What are the Advantages of the ARM Cortex-M0 Processor?
(OR)
4. a) Give a detailed overview of the ARM Processor families.
b) What is the difference between x 86 , ARM and Intel processors?

\section*{UNIT-III}
5. a) Explain the benefits of using Python programming language in IoT.
b) Explain the role of UDP and MAC Address in IOT.
6. a) Explain the constraint application protocol (CoAP).
b) Draw and explain Bluetooth Low Energy architecture.

\section*{UNIT-IV}
7. a) What is device integration? Explain its implementation.
b) Write key points about unstructured data storage on cloud.
8. a) Why is device authentication necessary for the IoT?
b) Explain about authorization of devices.

\section*{UNIT-V}
9. a) What are the elements of a home automation system?
b) Define how the IoT technology can be implemented in smart [7M] lightening.

\section*{(OR)}
10. a) Implement Remote medical assistance.
b) Define how the IoT technology can be implemented in fire \([7 \mathrm{M}]\) detection.

> *****

\section*{1 of 1}

\title{
III B. Tech II Semester Regular Examinations, June-2022 INTERNET OF THINGS
}
(Electronics and Communication Engineering)
Time: 3 hours Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) What is internet of things? Describe the characteristics of IoT.
b) Explain working of IoT gateways.
(OR)
2. a) State and explain M2M communication with example.
b) Explain in detail about XaaS (Everything as a Service).

\section*{UNIT-II}
3. a) Describe the procedure of building IoT with Raspberri Pi.
b) Why we need various types of processors?
(OR)
4. Draw the functional block diagram of ARM Cortex-M0 processor [15M] and explain each block.

\section*{UNIT-III}
5. a) List and explain some python packages of interest for IoT.
b) Give the brief introduction about Internet Protocol (IP), TCP.
6. a) What is ZigBee? Explain.
b) List Bluetooth key versions. What are the difficulties associated with them.

\section*{UNIT-IV}
7. a) What do you mean by data storage? What are the different schemas for a data store?
b) Discuss data acquiring and storage.
8. a) Explain the usage of cloud platforms for IoT applications and services.
b) Why is device authentication necessary for the IoT?

\section*{UNIT-V}
9. a) Define how the IoT technology can be implemented in intrusion detection system.
b) Define how the IoT technology can be implemented in industrial automation with any example.

\section*{(OR)}
10. a) Implement the smart irrigation system.
b) Determine the IoT levels for designing structural health [7M] monitoring system.

\section*{SET - 3}

\title{
III B. Tech II Semester Regular Examinations, June-2022 INTERNET OF THINGS \\ (Electronics and Communication Engineering)
}

Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
UNIT-I
1. a) What are the design principles of IoT? Explain.
b) What are examples of IoT devices? Explain.
(OR)
2. a) With the help of neat diagram, describe the levels of IoT with an example each.
b) Explain various Business Model Patterns in the IoT.

\section*{UNIT-II}
3. a) What are the things need to be considered for developing on the Raspberri Pi?
b) What is Special About the ARM Ecosystem?
(OR)
4. Give an overview of ARM Cortex-M Processor family.

\section*{UNIT-III}
5. a) Give the brief introduction about Internet Protocol (IP), TCP.
b) Why the python is the first choice for the Raspberry Pi language ..... [7M]
 than C or \(\mathrm{C}++\) ?
(OR)
6. a) Explain with example MQTT protocol. What is the role of MQTT protocol in IoT?
b) Which protocol is used to link all the devices in IoT? Explain in detail.

\section*{UNIT-IV}
7. a) Discuss data acquiring and storage.
b) Write key points about unstructured data storage on cloud.

\section*{(OR)}
8. a) How authentication and authorization of devices is achieved?

\section*{UNIT-V}
9. a) Define how the IoT technology can be implemented in industrial automation with any example.
b) Explain the implementation of Heart Monitors with Reporting.
(OR)
10. a) Explain service specification and information model for Home
b) Explain the implementation of IoT technology in smart parking.

Code No: R1932044

\title{
III B. Tech II Semester Regular Examinations, June-2022 INTERNET OF THINGS
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Mention the applications of IoT.
b) Explain the role of things in IoT.
2. a) Define IoT and M2M. Illustrate the differences between IoT and M2M.
b) What are the major privacy and security issues in case of IoT?

\section*{UNIT-II}
3. a) Explain in detail about ARM Cortex-A class processor.
b) Give the difference between Arduino and Raspberry Pi.
(OR)
4. a) What are the key characteristics of the ARM Cortex-M0?
b) Explain Cortex-M0 Processor Instruction Set.

\section*{UNIT-III}
5. a) What are the advantages and disadvantages of Bluetooth?
b) Explain TCP/IP protocol suite with diagram.
6. a) Write a short note on: MQTT, CoAP, ZigBee.
b) Write a Python program for blinking an LED.

\section*{UNIT-IV}
7. a) What do you mean by data storage? What are the different
[8M]
b) Write key points about unstructured data storage on cloud.
(OR)
8. a) How authentication and authorization of devices is achieved.

\section*{UNIT-V}
9. a) Implement the smart irrigation system.
b) Design process specification and domain for home intrusion detection system using IoT design methodology.
(OR)
10. a) Explain the implementation of IoT technology in Structural health monitoring.
b) Discuss about case study on IoT system for industrial [7M] automation.

III B. Tech II Semester Regular Examinations, June-2022 MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY
(Common to Computer Science and Engineering, Information Technology) Time: 3 hours Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Discuss the nature and scope of Managerial Economics.
b) Narrate the law of demand and its exceptions.

\section*{(OR)}
2. a) Define and elucidate the scope of Managerial Economics.
b) Describe the various factors involved in Demand forecasting of a product.

\section*{UNIT-II}
3. a) Explain briefly Cobb-Douglas Production function.
b) Analyze the Internal and External economies of large scale [7M] production.
(OR)
4. a) Write the characteristics of Isocosts and Isoquants.
b) Define and explain the managerial uses of Break Even Analysis. [7M]

\section*{UNIT-III}
5. a) What are the differences between monopoly and perfect [8M] competition with examples?
b) Define and elucidate the pros and cons of Joint Stock Company. [7M]
(OR)
6. a) Write the meaning and features of Business cycle phases.
[8M]
b) Explain the objectives of the pricing.

\section*{UNIT-IV}
7. a) What do you understand by Double Entry System of book- [8M] keeping? Explain with an example.
b) What do you understand by the analysis and interpretation of [7M] financial statements?

\section*{(OR)}
8. a) Explain various accounting concepts and conventions which are [8M] widely accepted.
b) Discuss the significance of funds flow statement as a tool of [7M] financial analysis.

\section*{1 of 2}

\section*{UNIT-V}
9. a) Compare merits and demerits of Net Present Value Method and Internal Rate of Return Methods.
b) How do you estimate cash flow? Compare merits and demerits of traditional methods and DCF methods.
(OR)
10. a) What is the payback period method of evaluating capital [8M] investment proposals? What are the advantages and disadvantages of this method?
b) Calculate the net present value of a project which requires an initial investment of \(\$ 243,000\) and it is expected to generate a cash inflow of \(\$ 60,000\) each month for 12 months. Assume that the salvage value of the project is \(\$ 1500\). The target rate of return is \(12 \%\) per annum.

III B. Tech II Semester Regular Examinations, June-2022 MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY
(Common to Computer Science and Engineering, Information Technology)

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) What do you understand by Managerial Economics and its [8M] scope?
b) What are the different factors involved in demand forecasting?
2. a) Explain the nature and scope of Managerial Economics.
b) Define demand forecasting and explain various forecasting [7M] methods.

\section*{UNIT-II}
3. a) Explain Law of Variable Proportions.
b) What are the differences between Break Even Analysis and CVP analysis?
(OR)
4. a) Explain various theories of Production Function.
b) The ABC Brick Company manufactures a standard stone block for the building industry. The production capacity for the year is 120,000 standard blocks. The selling price per block is Rs.18/-, variable costs are Rs.6/- per brick and fixed costs are Rs.6,00,000/- per annum. Determine the break-even point in terms of sales revenue and production output.

\section*{UNIT-III}
5. a) What are Monopolistic and Oligopoly competition? State their [8M]
features.
b) Examine critically the merits and limitations of a Sole Trader [7M] and Partnership organizations.
(OR)
6. a) Describe the features, merits and demerits of perfect [8M] competition.
b) Discuss the changing business environment in post [7M] Liberalization.

\section*{UNIT-IV}
7. a) Identify the Ratios that are used to find the soundness and [8M] strength of long-term financial position of a firm.
b) Explain classification of accounts and rules of debit and credit.

\section*{(OR)}
8. a) How ratios are classified for the purpose of financial analysis? Illustrate any two types of ratios.
b) Explain about cash flow statement.

\section*{UNIT-V}
9. a) What are the different Methods of evaluating capital budgeting [8M]
projects?
b) Compare merits and demerits of Pay Back Period and [7M] Accounting Rate of Return Methods.
(OR)
10. a) What are the sources of raising capital? Explain.
b) Determine the average rate of return for a period for a project which requires Cash-outlay of Rs.10,000 and generates cash inflows of Rs.2,000, Rs.4,000, Rs.3,000 and Rs.2, 000 in the first, second, third, and fourth year respectively.

III B. Tech II Semester Regular Examinations, June-2022 MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY
(Common to Computer Science and Engineering, Information Technology)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) What is the importance and uses of Managerial Economics to

Engineers? How can use these concepts to Civil Engineering?
b) What is elasticity of demand? Explain the various types of [7M] elasticity.

\section*{(OR)}
2. a) Define Managerial Economics and explain its relationship with [8M] other subjects.
b) Describe the qualitative methods of demand forecasting.

\section*{UNIT-II}
3. a) Explain the production function and what are the assumptions in it?
b) Explain, compare and contrast incremental cost versus sunk cost.

\section*{(OR)}
4. a) State and explain the theory of law of variable proportions.
b) Determine BEP, P/V Ratio and Sales level for a profit of Rs. 25.00 Lakhs, if Fixed Cost is Rs.35.00 Lakhs, Sales is Rs.185.00 Lakhs and Variable Cost is Rs.180.00 Lakhs.

\section*{UNIT-III}
5. a) Explain the Marris managerial theory of a firm.
b) State the conditions under which Penetration and Skimming Pricing strategies can be followed.
(OR)
6. a) What do you understand by pricing? What are the important objectives of pricing?
b) What is a joint stock company? What are the advantages and disadvantages of this form?

\section*{UNIT-IV}
7. a) Describe the advantages and disadvantages of double entry book keeping.
b) What is a Trial Balance and explain the procedure adopted while finalizing accounts of a business unit with the help of a valid trial balance?

\section*{(OR)}
8. a) Distinguish between funds flow and cash flow statements.
b) Explain classification of accounts and rules of debit and credit.

\section*{UNIT-V}
9. a) Compare merits and demerits of Net Present Value Method \& Internal Rate of Return Methods.
b) How do you estimate cash flow? Compare merits and demerits of traditional methods and DCF methods.

\section*{(OR)}
10. a) Outline the significance of capital budgeting.
b) The initial cash outlay of a project is Rs.50, 000 and it generates cash inflows of Rs.20, 000, Rs.15, 000, Rs. 25, 000 and Rs.10, 000 in four years. Using profitability index method, appraise profitability of the proposed investment assuming \(10 \%\) rate of discount.

\title{
III B. Tech II Semester Regular Examinations, June-2022 MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY
}
(Common to Computer Science and Engineering, Information Technology)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Explain the scope of Managerial Economics and its uses.
b) Write and explain the types of demand.
(OR)
2. a) Define Managerial Economics and its relevance to Civil [8M] Engineering applications.
b) Explain the concept of Supply and Law of Supply.

\section*{UNIT-II}
3. a) List different internal and external economies of scale forconstruction companies like L\&T and MEIL.
b) What is Cost-Volume-Profit analysis and explain its features.
(OR)
4. a) Describe the features of Isocosts, Isoquants and choice of least cost factor.
b) Explain various cost concepts with suitable examples.

\section*{UNIT-III}
5. a) Differentiate the features of Monopolistic and Oligopolistic Markets.
b) What are Public Enterprises? Explain its features.

\section*{(OR)}
6. a) What is Business Cycle? Explain the phases with the help of a diagram.
b) Enumerate the various methods of pricing.

UNIT-IV
7. a) What are the different types of ledger accounts? Give at least two examples for each.
b) Identify the Ratios that are used to find the soundness and strength of long-term financial position of a firm.
(OR)
8. a) Distinguish Funds Flow Statement and Cash Flow Statement.
b) Explain the meaning, importance and objectives of funds flow statement.

\section*{UNIT-V}
9. a) What are the different methods of evaluating capital budgeting projects?
b) How is capital classified? Explain in detail various sources of mobiliship, total capital needed by an organization.
(OR)

\title{
10. a) What are the sources of raising long-term capital for a business enterprise? \\ b) What is NPV? How it calculates and explains the acceptance rule of NPV?
}

\section*{*****}

\section*{2 of 2}

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ DATA STRUCTURES \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) List out the disadvantages of an Array.
b) What are the applications of stacks in real time?
c) Define Pointer Array. Give an Example?
d) Outline the Properties of a Binary Tree.
e) Distinguish between BFS and DFS.
f) Differentiate Internal Sorting Techniques with External Sorting Techniques.

\section*{PART -B}
(56 Marks)
2. a) What are the different string functions? Write an algorithm to concatenate two strings. Example: "Hello", "World"
b) Write a program to perform matrix multiplication using two dimensional Arrays.
3. a) What are the disadvantages of Regular Queues? How can we overcome those problems using Circular Queues?
b) Define a Dequeue. Discuss about various operations performed on Dequeues.
4. a) Write an algorithm to insert and delete an element into the Single Linked List.
b) Explain about Doubly Linked List Operations with an example.
5. a) Construct a Binary Tree using Inorder and Postorder traversals:

Inorder: 203035404550556070
Postorder: \(2035 \quad 30454055706050\)
b) Explain about Threaded Binary Trees.
6. a) Discuss about Various Graph Representations with examples.
b) Elaborate Prim's Algorithms to determine a minimum cost spanning tree with an example.
7. a) Apply Quick sort techniques for the following elements:
b) Write an algorithm for Merge sort. Discuss about the time complexity for [6M] Average, Best and Worst cases.

III B. Tech II Semester Supplementary Examinations, June-2022
HEAT TRANSFER
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
(Heat Transfer Data Book Allowed)
PART -A
(14 Marks)
1. a) Write the Fourier rate equation for heat transfer by conduction. Give the [2M] physical significance of each term
b) What is the function of fin?
c) What are the advantages of dimensional analysis?
d) What is meant by a hydrodynamic boundary layer? Explain the formation of hydrodynamic boundary layer over a flat plate.
e) Differentiate between film condensation and drop wise condensation.
f) Define irradiation.

\section*{PART - B}
(56 Marks)
2. a) What are the modes of heat transfer? Explain.
b) Derive the heat conduction equation in Spherical coordinates.
3. a) Which fins are best for heat transfer? Explain how is heat transferred from cylinder fins to the air.
b) A longitudinal copper fin \((\mathrm{k}=3.5 \mathrm{~W} / \mathrm{m}-\mathrm{K}), 6 \mathrm{~cm}\) long and 5 mm in diameter is exposed to air stream at \(20^{\circ} \mathrm{C}\). The connective heat transfer coefficient is \(20 \mathrm{w} / \mathrm{m}^{2}-\mathrm{K}\). If the fin has the base temperature of \(150^{\circ} \mathrm{C}\), calculate the heat transfer by the fin and fin efficiency.
4. a) Discuss the detailed classification of convective heat transfer.
b) Show by dimensional analysis that data for forced convection may be correlated by an equation of the form \(\mathrm{Nu}=\mathrm{f}(\mathrm{Re}, \operatorname{Pr})\).
5. a) Differentiate between mechanisms of heat transfer by free and forced convection. Mention some of the areas where these mechanisms are predominant.
b) A flat plate having dimensions \(50 \mathrm{~cm} \times 20 \mathrm{~cm}\) and at a uniform temperature of
(i) parallel to 50 cm
(ii) parallel to 20 cm side. The Nusselt number for laminar and turbulent flows are given as \(\mathrm{Nu}=0.664 \mathrm{Pr}^{1 / 3} \mathrm{Re}^{1 / 2}\) and \(\mathrm{Nu}=0.037\) \(\operatorname{Re} 0.8 \operatorname{Pr}^{1 / 3}\).
6. a) Derive an expression for effectiveness of a counter flow heat exchanger using NTU method.
b) Explain the film boiling. Why is it avoided in practice?
7. a) Assuming the sun to be a black body having a surface temperature of 5800 K . Calculate:
(i) the total emissive power
(ii) the wave length at which the maximum spectral intensity occurs,
(iii) the maximum value of Eb and
(iv) the total amount of radiant energy emitted by the sun per unit time if its diameter can be assumed to be \(1.391 \times 10^{9} \mathrm{~m}\).
b) State and prove Kirchhoff's law of radiation.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ DIGITAL SIGNAL PROCESSING \\ (Electronics and Communication Engineering)
}

Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
PART -A
(14 Marks)
1. a) What is meant by an invertible system?
[2M]
b) Find the discrete Fourier series (DFS) of the periodic signal, \(x(n)=\{1,1,0,0\} \quad[3 \mathrm{M}]\) with time period, \(\mathrm{N}=4\).
c) What is transposed structure?
d) Distinguish between FIR and IIR filters.
e) Verify whether up-sampler system is time-invariant or not.
f) List out the on chip peripherals of TMS320C5X processor.

\section*{PART -B}
(56 Marks)
2. a) Define BIBO stable system. Mention the necessary and sufficient conditions [3M] for BIBO stable system.
b) Find the Fourier transform of the signal, \(x(n)=\left(\frac{1}{4}\right)^{n-1} u(n-1)\).
c) Find the unit step response of the system whose difference equation is
\[
y(n)-0.7 y(n-1)+0.12 y(n-2)=x(n-1)+x(n-2)
\]

Use z -transform method and assume \(y(-1)=y(-2)=0\).
3. a) State and prove the circular time-shifting property of DFT.
b) What is the importance of FFT algorithm? Determine 8 -point DFT of the sequence \(x(n)=\{1,1,1,1,1,0,0,0\}\) using radix-2 DIFFFT algorithm.
4. a) Explain quantitatively about the design of IIR filter using Bilinear transformation method.
b) Obtain the direct form I and direct form II structures for the system described by the difference equation
\[
y(n)=-0.1 y(n-1)+0.72 y(n-2)+0.7 x(n)-0.252 x(n-2)
\]
5. a) Design a high pass FIR filter using Hamming window with a cutoff frequency of 1.2 rad and \(\mathrm{N}=9\).
b) Explain the design procedure of FIR filters using frequency sampling method.
6. a) Obtain the expression for frequency-domain representation of interpolator.

Also discuss the importance of anti-imaging filter.
b) With a neat diagram, explain the concept of sub-band coding.
7. a) Draw the block diagram of VLIW architecture and explain.
b) Explain about the on-chip memory of TMS320C5X DSP processor.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 SOFTWARE TESTING METHODOLOGIES
}
(Common to CSE, IT)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) Define traversal marker.
b) Give an example of data flow anomaly state graph.
c) What is closure compatibility?
[2M]
d) Explain about delimiter errors in detail. [3M]
e) What are principles of state testing? Explain.
f) Define the scope of automation.

\section*{PART - B}
(56 Marks)
2. a) How bugs affect us? Explain about nightmare list and when to stop testing.
b) Distinguish the following: (i) Structure vs Function (ii) Testing vs Debugging.
3. a) Describe implementation of transaction flow testing with an example.
b) Explain application, tools and effectiveness of data flow testing.
4. a) Discuss about testing 1-D and 2-D domains with examples.
b) Give an example of mean processing time of a routine and approximate minimum number of paths.
5. a) Explain in detail about BNF notation with examples.
b) Describe specifications of logic-based testing.
6. a) How to convert a specification into a state graph and how contradictions can come about? Explain with an example.
b) Define relation. What are properties of relations? Explain.
7. a) Explain about JMeter testing tool.
b) Discuss about concepts of test automation in detail.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 POWER SYSTEM ANALYSIS \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answering the question in Part-A is compulsory
3. Answer any THREE Questions from Part-B
*****

PART-A
(22 Marks)
1. a) Discuss the formation of element bus incidence matrix.
b) Explain the significance of static power flow equations.
c) Explicate the expressions of \(\mathrm{Z}_{\text {bus }}\) matrix for addition of element between an old bus to reference bus.
d) Discuss the different reactances of synchronous machine.
e) Elucidate the zero sequence networks of transformer.
f) Illustrate the swing curve of a single machine connected to infinite bus.

\section*{PART -B}
2. a) Develop the expressions of \(Y_{\text {bus }}\) matrix by direct inspection method.
b) Develop the PU reactance diagram for the system shown in Fig.1.


Fig. 1
Generator: 40MVA, 25 kV , X" \(=20 \%\)
Transformers: T1-40MVA, \(33 / 220 \mathrm{kV}, \mathrm{X}=15 \%\)
T2 - 35MVA, \(220 / 11 \mathrm{kV}, \mathrm{X}=18 \%\)
Transmission line: \(50 \Omega / \mathrm{ph}\) Motor: \(50 \mathrm{MVA}, 11 \mathrm{kV}, \mathrm{X} "=30 \%\)
3. a) Explain the algorithmic steps for solving the load flow equations using

Decoupled method.
b) What are the advantages of Newton-Raphson power flow method over Gauss-

Seidel power flow method?
4. Obtain \(\mathrm{Z}_{\text {bus }}\) for the given network connections.
\begin{tabular}{|l|l|l|}
\hline Element & Bus code & \begin{tabular}{c} 
Impedance \\
\((\mathrm{pu})\)
\end{tabular} \\
\hline 1 & \(1-2\) & 0.1 \\
\hline 2 & \(1-3\) & 0.15 \\
\hline 3 & \(2-3\) & 0.2 \\
\hline
\end{tabular}

1 of 2
5. a) How do you analyze symmetrical faults? Explain.
b) A three-phase balanced fault occurs at the receiving end of the transmission line for the system shown in Fig.2. Determine short circuit MVA.


Fig. 2
6. a) What is fault current in power system? What of fault occurring in the power system is LL fault? Explain in detail.
b) A three phase 11 kV , 25 MVA alternator has \(\mathrm{X}_{1}=\mathrm{X}_{2}=0.2 \mathrm{pu}\) and \(\mathrm{X}_{0}=0.05 \mathrm{pu}\). The neutral is grounded through a reactance of 0.3 ohm . Find the sub transient current in the faulted phase for a single line to ground fault.
7. a) What is critical clearing angle and transfer reactance? On what factor does the critical clearing angle depend? Explain.
b) A 2-pole, \(50 \mathrm{~Hz}, 11 \mathrm{kV}\) turbo alternator has a rating of 100 MW , power factor 0.85 lagging. The rotor has a moment of inertia of \(10000 \mathrm{Kg}-\mathrm{m}^{2}\). Calculate H and M .

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ MICROWAVE ENGINEERING
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answering the question in Part-A is compulsory
3. Answer any THREE Questions from Part-B
*****

PART -A
(22 Marks)
1. a) List out the microwave frequency bands.
b) Write short notes on characteristic impedance of microstrip lines
c) Write short notes on Gyrator.
d) What is transit angle? How it influence the performance of conventional tubes at higher frequencies?
e) What is meant by crossed-field tube? Explain.
f) Write the performance characteristics of IMPATT diode.

\section*{PART - B}
(48 Marks)
2. a) Explain about power losses in rectangular waveguide.
b) Discuss about cutoff wave number, phase constant and wave impedance in a \([8 \mathrm{M}]\) rectangular waveguide.
3. a) What is cavity resonator? Discuss the fundamentals of circular cavity
[8M] resonator.
b) Derive the expression for Q -factor of a cavity resonator.
4. a) Draw the H-plane Tee and derive the scattering matrix of it.
b) What is circulator? Explain its operation and write the applications.
5. a) Explain bunching process in two cavity klystron amplifier.
b) Draw the schematic diagram of reflex klystron and explain its operation.
6. a) Draw the diagram of helix travelling wave tube and explain its operation.
[8M]
b) Derive the Hull cutoff voltage equation in a cylindrical magnetron.
7. a) Explain the operation of TRAPATT diode with necessary waveforms.
b) Define VSWR and explain the procedure for measurement of it.

\title{
III B. Tech II Semester Regular Examinations, June-2022 COMPUTER NETWORKS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) With an example explain the flow control using sliding window protocol.
b) What are the different categories of networks? Explain.
(OR)
2. a) Briefly discuss about data link layer design issues.
b) Distinguish between TDM and FDM.

\section*{UNIT-II}
3. a) Explain about the elementary data link protocols.
b) Discuss about simplex stop and wait protocol for a noisy [7M] channel.

\section*{(OR)}
4. a) With examples explain error detection using longitudinal redundancy check (LRC) and cyclic redundancy check (CRC).
b) Discuss about (i) GO BACK NARQ and (ii) Selective repeat ARQ.

\section*{UNIT-III}
5. a) Explain the functioning of wireless LAN in detail.
b) Distinguish between Static and Dynamic Channel allocation.
(OR)
6. a) What is CSMA? List the protocols used with CSMA.
b) Discuss about the 802.11 MAC sub layer protocol.

\section*{UNIT-IV}
7. a) Define Switching and briefly explain the datagram approach in
b) Compare connection oriented and connectionless service.

\section*{(OR)}
8. a) What is congestion? How is it caused? What are the factors that contribute to congestion? Describe any one congestion control method with its advantages and disadvantages.
b) What is Traffic Throttling? Explain.

\section*{R19}

\section*{UNIT-V}
9. a) Describe the role of a DNS on a computer network with reference to its components.
b) Discuss about Message transfer and Final Delivery.
10. a) Explain the design issues of transport layer.
b) Briefly explain the internet transport protocols.

\section*{*****}

\section*{2 of 2}

\title{
III B. Tech II Semester Regular Examinations, June-2022
} UNCONVENTIONAL MACHINING PROCESSES
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Discuss the factors that influence the selection of [8M] unconventional machining over conventional machining.
b) Explain the function of a transducer and different types of transducers that are used in USM process.
(OR)
2. a) Discuss in detail about the economic considerations of Ultrasonic machining process.
b) Explain the characteristics of Non-traditional machining methods and its advantages.

\section*{UNIT-II}
3. a) Briefly discuss the effect of various process parameters on the machining characteristics of AJM process.
b) Discuss the advantages and disadvantages of AWJM.
(OR)
4. a) Explain the material removal process in AWJM with neat sketch.
b) Discuss the working process of water jet machining system.

\section*{UNIT-III}
5. a) Explain the main functions of electrolyte used in ECM process and list the commonly used electrolytes.
b) What are the advantages and disadvantages of Electro chemical grinding?

\section*{(OR)}
6. a) Estimate the MRR and electrode feed rate when Iron (density = electrode and sodium chloride solution (specific resistance \(=\) 5.0 ohm cm ). Consider power supply voltage 18 V D.C, current is 5000 amp , tool-work gap is 0.5 mm (constant).
b) Discuss the applications and limitations of ECM process.

\section*{UNIT-IV}
7. a) Explain about the selection of different types of electrode materials used in EDM process.
b) Illustrate the capabilities and applications of wire EDM [7M] process.

\section*{(OR)}
8. a) Describe the working principle of wire EDM process.
b) Discuss any three power circuits used for EDM process.

\section*{UNIT-V}
9. a) Discuss why the EBM process is carried out in vacuum. And also write its applications.
b) Enlist the various process parameters and their effect in LBM process.
(OR)
10. a) With a neat sketch explain the working principle of laser beam machine.
b) Discuss the metal removal mechanism in Plasma Machining.

\section*{*****}

\title{
III B. Tech II Semester Regular Examinations, June-2022 UNCONVENTIONAL MACHINING PROCESSES
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Compare non-traditional machining and traditional machining methods.
b) List the various process parameters and explain their effect on MRR and surface finish obtained in USM process.
(OR)
2. a) Explain the function of major components of USM equipment with neat sketch.
b) What is the need for non-traditional machining methods? And also write its applications.

\section*{UNIT-II}
3. a) Describe briefly the working of abrasive flow finishing process.
b) Discuss the applications and process capabilities of AJM process.
(OR)
4. a) Explain the effect of process parameters in WJM process.
b) With a neat sketch explain the working process of AWJM.

\section*{UNIT-III}
5. a) In an electrochemical machining process a square hole of 5 mm dimension was drilled in a copper block. If the current used is 5000 A. Atomic weight of copper is 63 and valance of dissolution is 1 . Calculate the MRR in gm/s. And also estimate the machining time if the depth of the hole is 6 mm .
b) Explain the working process of electro chemical grinding.

\section*{(OR)}
6. a) Explain the material removal mechanism in ECM process.
b) Discuss about economic aspects of ECM process.

UNIT-IV
7. a) Explain the functions and desirable properties of dielectric fluid used in EDM process.
b) Discuss the applications and disadvantages of EDM process.

\section*{(OR)}
8. a) Illustrate the characteristics of EDM process.
b) Explain about the electric discharge grinding process.

\section*{UNIT-V}
9. a) Differentiate electron beam machining and laser beam [8M] machining processes.
b) Discuss the characteristics of laser beam machining process.
(OR)
10. a) Explain the mechanism of material removal in EBM process. What are its applications?
b) Discuss about the accuracy and surface finish obtained in PAM.

\title{
III B. Tech II Semester Regular Examinations, June-2022 UNCONVENTIONAL MACHINING PROCESSES
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Classify the unconventional machining process and list the considerations of process selection.
b) Discuss the applications, advantages and disadvantages of USM process.
(OR)
2. a) With a neat sketch explain the mechanism of material removal in Ultra Sonic Machining.
b) Discuss the drawbacks of conventional machining methods and how they overcome by unconventional machining.

\section*{UNIT-II}
3. a) Explain the working principle of AJM process with a neat sketch.
b) Write the differences between Water Jet Machining and Abrasive Water Jet Machining.

\section*{(OR)}
4. a) Explain the effect of process variables of AJM that influences MRR.
b) Discuss the advantages and disadvantages of WJM.

\section*{UNIT-III}
5. a) Discuss the factors to be considered while choosing an electrolyte in ECM process and also list the various electrolytes used in ECM process.
b) Discuss the advantages and limitations of ECM process.

\section*{(OR)}
6. a) Estimate the MRR and electrode feed rate when Iron (density = \(7.87 \mathrm{gm} / \mathrm{cm}^{3}\) ) is electrochemically machined, using copper electrode and sodium chloride solution (specific resistance \(=5.0\) ohm cm ). Consider power supply voltage 18 V D.C, current is 5000 amp , tool-work gap is 0.5 mm (constant).
b) Discuss about the Electro chemical deburring process.

\section*{UNIT-IV}
7. a) Discuss about the dielectric medium and electrodes that are used in EDM process.
b) Distinguish wire cut EDM and conventional EDM processes
(OR)
8. a) Illustrate the function of electrode feed control system used in EDM process.
b) Explain the working process of electric discharge grinding with neat sketch.

\section*{UNIT-V}
9. a) Distinguish between transferred and non-transferred arc type used in PAM process.
b) Explain the effect of various process parameters in EBM process.
(OR)
10. a) Discuss about the main elements and their functions used in LBM process.
b) List the process parameters and explain their effect on accuracy and surface finish obtained in PAM process.

\title{
III B. Tech II Semester Regular Examinations, June-2022 UNCONVENTIONAL MACHINING PROCESSES
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Discuss the advantages, disadvantages and applications of nontraditional machining methods.
b) Write about the different types of abrasives used in USM process.
(OR)
2. a) With a neat sketch explain the working process of ultrasonic machining method.
b) Discuss the limitations of conventional machining process that can be achieved by unconventional machining methods.

\section*{UNIT-II}
3. a) Discuss about the materials of abrasives, nozzles and carrier gas used in AJM process.
b) Distinguish WJM and AWJM processes.

\section*{(OR)}
4. a) Explain the mechanism of material removal in WJM and AWJM processes.
b) Discuss the advantages and limitations of Abrasive Jet Machining.

\section*{UNIT-III}
5. a) Describe the working principle of ECM process.
b) Explain how the machining voltage, feed rate and temperature of electrode will affect the accuracy of surface produced in ECM process.
(OR)
6. a) In an electrochemical machining process a square hole of 5 mm dimension was drilled in a copper block. If the current used is 5000 A. Atomic weight of copper is 63 and valance of dissolution is 1. Calculate the MRR in \(\mathrm{gm} / \mathrm{s}\). And also estimate the machining time if the depth of the hole is 6 mm .
b) Discuss about the working process of Electro chemical honing process.

1 of 2

\section*{UNIT-IV}
7. a) Explain the basic requirements of tool material used in EDM process and list some of tool materials.
b) Illustrate the capabilities and applications of wire EDM process.
8. a) List and explain the effect of various process parameters in the EDM process.
b) What is flushing in EDM process? Discuss about the various flushing techniques.

\section*{UNIT-V}
9. a) Explain the principle and operation of plasma machining, and its applications.
b) Illustrate the advantages and disadvantages of LBM process.
(OR)
10. a) Discuss about the commonly used lasers in LBM process? And write the advantages of LBM process.
b) With neat sketch explain the working principle of EBM process.

\title{
III B. Tech II Semester Regular Examinations, June-2022 CELLULAR \& MOBILE COMMUNICATION
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Explain the different components of a cellular system.
b) Explain the need for cell splitting. Also explain two kinds of cell splitting techniques.
(OR)
2. a) Explain the significance of delay spread and coherence bandwidth in mobile radio environment due to multipath reflection phenomenon.
b) If an average calling time is 1.76 min and maximum calls per hour in one cell be 3000, find the offered load in erlangs.

\section*{UNIT-II}
3. a) Define co-channel Interference. Explain about co-channel interference reduction factor. b) Discuss the design of an omni directional antenna system in
\(\mathrm{k}=7\) cell pattern when the mobile unit is at the cell boundary.
(OR)
4. a) Diversity scheme applied at the receiving end of the antenna is an effective technique for reducing interference. Justify.
b) What are different types of non-co-channel interference in a cellular system?

\section*{UNIT-III}
5. a) Explain about paging channels.
b) Discuss the effects of human made structures on cell coverage.
6. a) Explain the methods of channel assignment to the mobile units in detail.
b) In a mobile radio environment, the average cell-site antenna height is about 50 m , the mobile antenna height is about 3 m , and the communication path length is 5 km . Find
(i) Incident angle
(ii) Elevation angle at the antenna of the mobile unit

\section*{UNIT-IV}
7. a) Explain in detail the need for hand off and determine the probability of requirement of hand off.
b) Write short notes on
(i) Mobile assisted handoff
\(\begin{array}{ll}\text { (i) Mobile assisted hand } \\ \text { (ii) } & \text { Intersystem handoff }\end{array}\)

\section*{(OR)}
8. a) Explain soft and hard handoffs.
b) What is meant by a dropped call? Explain the factors that influence the dropped call rate.

\section*{UNIT-V}
9. a) With suitable block diagram explain the GSM system.
b) Discuss the salient features of FDMA and TDMA techniques.

\section*{(OR)}
10. a) What is TDMA? Explain TDMA architecture with neat diagram.
b) Explain the capabilities and applications of 5G communications.

\title{
III B. Tech II Semester Regular Examinations, June-2022 CELLULAR \& MOBILE COMMUNICATION
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) Why the shape of a cell is represented with hexagon? Explain with an example.
b) Explain the significance of frequency reuse in cellular systems.
(OR)
2. a) Illustrate the modeling of transmission medium in mobile radio environment.
b) During a busy hour, the number of calls per hour for each of 10 cells is 2000,1500, 3000, 500,1000, 1200, 1800, 2500, 2800, 900. Assume that 60 percent of the car phones will be used during this period and that one call is made per car phone, Calculate the total allowed subscriber traffic in the system.

\section*{UNIT-II}
3. a) Describe how to find the cochannel interference area from a mobile receiver.
b) Explain the occurrence of near end far end interference in the following cases:
(i) One cell
(ii) Cells of two systems
(OR)
4. a) Discuss the method of finding C/I ratio in a directional antenna
system for 3 -sector case in 7 -cell reuse pattern.
b) Derive \(\mathrm{C} / \mathrm{I}\) from a normal case in a omnidirectional antenna system.

\section*{UNIT-III}
5. a) Explain the process of selecting a voice channel for:
(i) Mobile originating calls
(ii) Paging calls
b) Explain the concept of overlaid cells with neat diagrams.
6. a) Explain the process of numbering and grouping the channels.
b) Explain the concept of point-to-point model and its merits.

\section*{UNIT-IV}
7. a) How can handoff be initiated at the boundary of two cells, based upon threshold point considering signal at two base stations.
b) Explain about intersystem and intra system handoffs.
(OR)
8. a) Queuing of handoffs is more effective than two threshold level handoffs. Justify.
b) Explain various vehicle locating methods.
9. a) What are the channel types of GSM system? Explain
b) What problems does OFDMA solve? How does OFDMA work?
10. a) Explain services and features of TDMA.
b) Explain the key differences between GSM, CDMA and LTE.

\title{
III B. Tech II Semester Regular Examinations, June-2022 CELLULAR \& MOBILE COMMUNICATION
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Describe the performance criteria of Cellular mobile systems.
b) Explain the concept of cell sectoring.
(OR)
2. a) Propagation path loss increases not only with frequency but also with distance. Justify.
b) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses: (i) 4-cell reuse (ii) 7 -cell reuse (iii) 12-cell reuse

\section*{UNIT-II}
3. a) Describe how to find the cochannel interference area which affects a cell site.
b) Write a short note on adjacent channel interference.
(OR)
4. a) Outline the two frequency reuse schemes and explain N -Cell reuse pattern in detail for four and seven cell reuse with illustrative diagrams.
b) Discuss the method of finding C/I ratio in a directional antenna system for 6 -sector case in 7 -cell reuse pattern.

\section*{UNIT-III}
5. a) Describe the fixed channel assignment schemes in detail.
b) Derive the phase difference between direct and reflected paths.

\section*{(OR)}
6. a) Explain the concept of channel sharing and borrowing.
b) Derive the general formula for mobile radio propagation.

\section*{UNIT-IV}
7. a) Explain how the handoffs implemented based on signal strength. [8M]
b) How the dropped call rate is related to the capacity and voice [7M] quality.

\section*{(OR)}
8. a) What are the various methods of delaying the handoff? Explain
[ 8 M\(]\) briefly.
b) What is meant by handoff initiation? Explain the different [7M] methods of handoff initiation with suitable diagrams.

\section*{UNIT-V}
9. a) Why CDMA is needed and explain it with an example?
b) List the difference between TDMA/FDMA/CDMA.

\section*{(OR)}
10. a) Explain GSM architecture in detail.
b) Write a short note on TDMA structure frame length and frame offset.
*****

\title{
III B. Tech II Semester Regular Examinations, June-2022 CELLULAR \& MOBILE COMMUNICATION
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) What are the limitations of conventional mobile telephone system?
b) Compare macro, micro, femto and picoradio coverage cells in cellular networks.
(OR)
2. a) Describe the operation of the cellular mobile system.
b) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses 7 -cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell.

\section*{UNIT-II}
3. a) Describe the real-time cochannel interference measurement at mobile radio transceivers.
b) Explain how the interference is reduced by means of directional antennas.
(OR)
4. a) Discuss the three cases where lowering the antenna height may or may not help reduce the interference.
b) Define the co-channel interference reduction factor and derive the expression for it.

\section*{UNIT-III}
5. a) Compare fixed and non-fixed channel assignment methods.
b) Discuss the propagation of mobile radio signals over water between two fixed stations.

\section*{(OR)}
6. a) Describe about setup channels and access channels.
b) Obtain path-loss from a point-to-point prediction model.

\section*{UNIT-IV}
7. a) What are the different types of handoffs? Explain how to [8M] implement them?
b) Compare soft and hard handoffs.
(OR)
8. a) Explain two-hand-off-level algorithms.
b) What is mobile assisted handoff? Explain.
9. a) What is WiMax? Explain the standard features of WiMax.
b) With suitable block diagram explain the GSM system.
(OR)
10. a) List out the key differences between 3G and 4G communications. [8M]
b) What is GPRS? Explain the features and benefits of GPRS.

\title{
III B. Tech II Semester Regular Examinations, June-2022 INFORMATION RETRIEVAL SYSTEM
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Discuss the text normalization process with a neat sketch.
b) Explain about public and private index files.

\section*{(OR)}
2. a) What problems does multimedia information retrieval introduce?

What solutions would you recommend to resolve the problems?
b) Explain about the browse capabilities.

\section*{UNIT-II}
3. a) Discuss the automatic indexing.
b) What are the problems with Luhn's concept of "resolving power"?

\section*{(OR)}
4. a) Describe how a bigram data structure would be used to search for the search term "computer science". What are the possible sources of errors that could cause non-relevant items to be retrieved?
b) Explain about N-Gram Data Structure.

\section*{UNIT-III}
5. a) Explain about the data flow in information processing system.
b) Write short notes on simple term frequency algorithm.

\section*{(OR)}
6. a) Discuss the agglomerative and divisive clustering.
b) Write short notes on item clustering.

7. a) What are some potential ambiguities in use of relevance
 feedback on hypertext documents?
b) List out the different examples for query binding.
(OR)
8. a) Write short notes on information visualization.
b) Describe how other senses could be used in displaying results from searches.

\section*{UNIT-V}
9. a) Explain the functions supported by the fast data finder.
b) Discuss about hardware text search systems.

\section*{(OR)}
10. a) What elements in video can be used to index the content?
b) Discuss about graph retrieval.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ INFORMATION RETRIEVAL SYSTEM
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks \\ *****}

\section*{UNIT-I}
1. a) Discuss the total Information retrieval systems with a neat sketch.
b) What is the impact on precision and recall in the use of Stop Lists and Stop Algorithms?
(OR)
2. a) What are the similarities and differences between use of fuzzy searches and term masking? What are the potentials for each to introduce errors?
b) Ranking is one of the most important concepts in Information Retrieval Systems. What are the difficulties in applying ranking when Boolean queries are used?

UNIT-II
3. a) What are the objectives of Indexing?
b) How does the process of information extraction differ from the process of document indexing?
(OR)
4. a) Write short notes on dictionary look-up stemmers.
b) Discuss the PAT Data Structure and draw a PAT Binary Tree for input "100110001101".

\section*{UNIT-III}
5. a) List out the problem with weighting schemes.
b) Explain about the concept indexing.
(OR)
6. a) What is the effect of clustering techniques on reducing the user overhead of finding relevant items.
b) Discuss the impact of merging the domains into a single cluster for both term clustering and item clustering.

\section*{UNIT-IV}
7. a) Discuss about ranking algorithms.
b) Is the use of positive feedback always better than using negative feedback to improve a query? Explain.

\section*{(OR)}

\title{
8. a) Describe the need for information visualization. Under what circumstances is information visualization not useful?
}
b) Discuss the limits associated with use of preattentive processes, configural aspects, and spatial frequency as a basis for information visualization.

\section*{UNIT-V}
\(\begin{array}{ll}\text { 9. a) Explain the Fast data finder architecture with a neat sketch. } & {[8 \mathrm{M}]} \\ \text { b) Discuss the elements of finite automata with a neat sketch. } & {[7 \mathrm{M}]}\end{array}\)
10. a) Write short notes on Multimedia Information Retrieval.
b) What kind of features in audio can be used to index the content?

\title{
III B. Tech II Semester Regular Examinations, June-2022 INFORMATION RETRIEVAL SYSTEM
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Describe the relationship between Information Retrieval [8M] Systems and Database Management Systems.
b) Outline the role of Digital Libraries and Data warehouses in the context of information retrieval.
(OR)
2. a) Write short notes on canned query and WAIS standards.
b) Which would users prefer, Boolean queries or Natural Language queries? Why?

\section*{UNIT-II}
3. a) Discuss the indexing by term.
b) Explain about information extraction.
(OR)
4. a) Explain about the porter stemming algorithm.
b) Discuss Symbol tree and Draw a Symbol Tree for terms bag, barn, bring, box, bottle and both.

\section*{UNIT-III}
5. a) What are the tradeoffs in use of Zoning as part of the indexing process?
b) Under what conditions would the Bayesian and the Vector approach be the same? Explain.
(OR)
6. a) Discuss the steps involved in the process of clustering.
b) Write short notes on automatic term clustering.

\section*{UNIT-IV}
7. a) List out the different examples for query binding.
b) How would you define an item on the Internet with respect to a search statement and similarity function?
(OR)
8. a) Discuss the difficulties of a user being able to correlate his search to the Hit file. What approach would you use to overcome these problems?
b) Write short notes on aspects of the visualization process.

UNIT-V
9. a) Explain KMP technique with an example.
b) Discuss the Text Array processor with a neat sketch.

\section*{(OR)}
10. a) Write short notes on Non-speech audio retrieval.
b) What new media do you believe will appear in the future and benefit from content based retrieval?

Code No: R193205B

\title{
III B. Tech II Semester Regular Examinations, June-2022 INFORMATION RETRIEVAL SYSTEM
}
(Computer Science and Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Discuss about the objectives of Information Retrieval System.
b) Outline the major functional processes of Information Retrieval System.
(OR)
2. a) Describe the rationale why use of proximity will improve precision versus use of just the Boolean functions. Discuss its effect on improvement of recall.
b) Why should researchers in information retrieval care about standards?

\section*{UNIT-II}
3. a) Discuss the indexing by concept.
b) Describe about indexing process.
4. a) Describe the similarities and differences between term stemming algorithms and n-grams. Describe how they affect precision and recall.
b) Explain about the inverted file structure.

\section*{UNIT-III}
5. a) Explain the different techniques for length normalization of an item.
b) What are the benefits of a weighted index system over a Binary index system? Are there benefits that the binary system can provide over a weighted system?
(OR)
6. a) Write short notes on hierarchal clustering.
b) Will the clustering process always come to the same final set of clusters no matter what the starting clusters? Explain.

\section*{UNIT-IV}
7. a) Discuss the similarity measures.
b) List out the key characteristics of intelligent agents.

\section*{(OR)}
8. a) Describe the need for information visualization. Under what
[8M]
circumstances is information visualization not useful?
b) Write short notes on information visualization technologies.

UNIT-V
9. a) Discuss about the text streaming architecture.
b) Explain the Boyer-Moore technique with an example.
10. a) Discuss the spoken language audio retrieval.
b) What new application areas do you envision being enabled by content based multimedia retrieval?

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ NEURAL NETWORKS AND FUZZY LOGIC
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B
PART -A
(14 Marks)
1. a) What is meant by McCulloch-Pitts Model?
b) What is the difference between activation and synaptic connections in the neural dynamics?
c) State Kolmogorov Theorem?
d) What is meant by fuzziness in the university of discourse?
e) What is called de-fuzzification? Mention its types.
f) How the process identification is made for the design of the controller.

\section*{PART - B}
(56 Marks)
2. a) Compare the organization of biological neuron with artificial neuron.
b) Describe the development of neuron models: (i) Spiking neuron model (ii)
Hodgkin-Huxely neuron model
3. a) Clearly discuss different architectures of artificial neural networks?
b) Illustrate the learning algorithm of artificial neural network with suitable example?
4. a) What are the salient features the Kohonen's self-organizing learning algorithm?
b) What is bidirectional associative memory and give the architecture of BAM.
5. a) Two resistors \(R_{1}\) and \(R_{2}\) are connected in series. The resistors \(R_{1}\) and \(R_{2}\) described as two fuzzy sets expressed in ohms. Find the equivalent resistance when the membership functions of the two resistors are
\[
R_{1}=\left\{\frac{0.5}{3}+\frac{0.8}{4}+\frac{0.6}{5}\right\} \quad \text { and } \quad R_{2}=\left\{\frac{0.3}{8}+\frac{1.0}{9}+\frac{0.4}{10}\right\}
\]
b) Write the fuzzy sets properties, operations and relations?
6. a) Illustrate how fuzzy rules are generated from fuzzy based classifier with suitable example?
b) Briefly describe aggregation of fuzzy rules and explain about determination of aggregation strategy.
7. a) Briefly describe the application of neural network in short term load [7M] forecasting.
b) Discuss the application of fuzzy logic in the load frequency control problem.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 GREEN ENGINEERING SYSTEMS \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) Write about the instruments used for measuring solar radiation.
b) Identify four critical solar energy applications to overcome the feature energy crisis.
c) Identify the pros and cons of geothermal energy.
d) Name the applications of fuel cells.
e) Identify the practices that impact environment due to current manufacturing.
f) List the environmental friendly building materials.

\section*{PART - B}
(56 Marks)
2. a) Discuss the environmental impact of solar power?
b) Illustrate the working of flat plate collector in detail.
3. a) What is a PV cell? Explain the working of PV cell with neat sketch.
b) Classification of Wind-mills and discuss its Main Components.
4. a) Identify the utilization of biogas along with advantages and disadvantages.
b) Explain the types of electricity conversion systems in ocean thermal energy [7M] conversion.
5. a) Explain the controls for HVAC in detail.
b) Write a short note on energy-efficient compressors and pumps.
6. a) Write about the selection of recyclable and environment-friendly materials in [7M] manufacturing.
b) Explain the importance of zero waste manufacturing.
7. a) What is a Green Building? Discuss its objectives and fundamental principles.
b) Explain the benefits of green buildings in detail

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 \\ BIO-MEDICAL ENGINEERING
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) What is Envoked Responses?
b) List the three basic types of Bioptential Electrodes.
c) Write the characteristics of blood flow.
d) What is Fibrillation? And write the solution for it.
e) What do you understand by the term "non-invasive methods"? Explain.
f) What is the difference between electrical macroshock and microshock?

\section*{PART -B}
(56 Marks)
2. a) With a neat block diagram explain Man-Instrument system.
b) Explain the history and development of Biomedical Instrumentation.
3. a) List and discuss briefly the various types of transducers used for Biomedical applications.
b) Explain how the pulse pressure can be measured by various transducers.
4. a) Discuss briefly about ECG Amplifier and Leads to Electro-Cardiography.
b) Explain different respiratory therapy equipment normally used.
5. a) Explain Tonometer for eye pressure measurement.
b) Discuss instrumentation and methods for rapid diagnosis and repair of instrumentation in an intensive-care unit.
6. a) What is the difference between X-ray and radioisotope methods for diagnosis?
b) Explain the working principle of CT Scan with neat block diagram.
7. a) Discuss any two types of recorders with the help of suitable diagrams.
b) What are the physiological effects of electrical current? Discuss various methods of accident prevention.

\title{
III B. Tech II Semester Supplementary Examinations, June-2022 ARTIFICIAL INTELLIGENCE
}
(Common to CSE, IT)
Time: 3 hours
Max. Marks: 70
Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

\section*{PART -A}
(14 Marks)
1. a) Differentiate between human intelligence and machine intelligence.
b) List the steps involved in solving general problem in AI.
c) List the limitations of proportional logic.
d) Write the applications of cyc theory.
e) Write the advantages and disadvantages of expert systems.
f) Define membership functions.

\section*{PART - B}
2. a) Discuss about rules and implementations of tic-tac-toe game in AI.
b) Write a note on History of Artificial intelligence along with Milestones in the history of AI.
3. a) Define uniformed search? What is best first search Illustrate with an example?
b) Write a pseudo code and working of Alpha beta pruning.
4. a) What is propositional logic in artificial intelligence? How it is different from predicate logic?
b) Explain in detail about natural deduction system.
5. a) What are the different types of semantic network? What do you understand by extension of semantic network?
b) Write a brief introduction to the technical standards of the semantic web.
6. a) With neat sketch explain the architecture of expert system.
b) Explain in detail about the shells and tools of expert system.
7. a) Give a detailed view for fuzzy set and its operations.
b) Explain briefly about the Dempster Shafer theory.

SET - 1

\section*{III B. Tech II Semester Supplementary Examinations, June-2022 \\ HEAT TRANSFER \\ (Mechanical Engineering)}

Time: 3 hours
Max. Marks: 70

\section*{Note: 1. Question Paper consists of two parts (Part-A and Part-B) \\ 2. Answering the question in Part-A is compulsory \\ 3. Answer any THREE Questions from Part-B \\ (Heat transfer data book allowed) \\  \\ PART -A}
(22 Marks)
1. a) State and derive the Fourier law of heat conduction.
b) What are the different types of fins and its applications?
c) What is meant by a hydrodynamically well-developed flow in a pipeline?
d) What is the Prandtl number? Show that it is dimensionless quantity?
e) Write a brief note on heat transfer during boiling and condensation.
f) Define radiation intensity?

\section*{PART - B}
(48 Marks)
2. a) Derive general equation for heat conduction in three dimensions in spherical
coordinate system.
b) Derive an expression for one dimensional heat conduction equation through a plane wall.
3. a) Determine the thermal conductivity of rod material, a long solid rod of 2.5 cm in diameter. Its base is placed in a furnace with large portion of it projecting into the room air at \(22^{\circ} \mathrm{C}\). After steady state conditions prevail, the temperature at two points, 10 cm apart, are found to be \(110^{\circ} \mathrm{C}\) and \(85^{\circ} \mathrm{C}\) respectively. The convective heat transfer coefficient between the rod surface and the surrounding air is \(28.4 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\).
b) The temperature distribution across a large concrete slab 50 cm thick heated from one side as measured by thermocouples approximates to the following relation: \(T=60-50 x+12 x^{2}+20 x^{3}-15 x^{4}\) where T is in \({ }^{0} \mathrm{C}\) and \(x\) is in meters. Considering an area of \(5 \mathrm{~m}^{2}\), compute
(i) The heat entering and leaving the slab in unit time.
(ii) The heat energy stored in unit time
(iii) The rate of temperature change at both sides of the slab
(iv) The point where the rate of heating or cooling is maximum.

Take the following data for concrete: \(k=1.2 \mathrm{~W} / \mathrm{mK}, \alpha=1.77 \times 10^{-3} \mathrm{~m}^{2} / \mathrm{h}\).
4. a) Explain the concept of thermal boundary layer development in a circular pipe?
b) Explain in detail about the dimensionless numbers and their physical significance.
5. a) A vertical pipe of 20 cm outer diameter, at a surface temperature of \(100^{\circ} \mathrm{C}\) is in a room where the air is at \(20^{\circ} \mathrm{C}\). The pipe is 3 cm long. What is the rate of heat loss per meter length of the pipe?
b) An air stream at \(0^{\circ} \mathrm{C}\) is flowing along a heated plate at \(90^{\circ} \mathrm{C}\) at a speed of \(75 \mathrm{~m} / \mathrm{s}\). the plate is 45 cm long and 60 cm wide. Assuming the transition of boundary layer to take place at \(R e_{x, c}=5 \times 10^{5}\). Calculate the average values of friction coefficient and heat transfer coefficient for the full length of the plate. Hence calculate the rate of energy dissipation from the plate.
6. a) Dry stream at \(100^{\circ} \mathrm{C}\) condenses on the outside surface of a horizontal pipe of outer diameter is 2.5 cm . the pipe surface is maintained at \(84^{\circ} \mathrm{C}\) by circulating water through it. Determine the rate of formation of condensate per meter length of the pipe.
b) Hot oil with rate of \(2500 \mathrm{~W} / \mathrm{K}\) flows through a double pipe heat exchanger. It enters at \(360^{\circ} \mathrm{C}\) and leaves at \(300^{\circ} \mathrm{C}\). Cold fluid enters at \(30^{\circ} \mathrm{C}\) and leaves at \(200^{\circ} \mathrm{C}\). If the overall heat transfer coefficient is \(800 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\), determine the heat exchanger area required for (i) parallel flow and (ii) counter flow.
7. a) What is Stefan Boltzman law and prove Stefan Boltzman constant \(5.67 \times 10^{-8}\) \(\mathrm{W} / \mathrm{m}^{2} \mathrm{~K}\) ?
b) The intensity of the radiation emitted by the Sun is maximum at a wavelength of \(0.5 \mu\). Assuming the sun to be a black body, estimate its surface temperature, emissive power of black body.
c) Write short note on Wien's displacement law?

\title{
III B. Tech II Semester Regular Examinations, June-2022 AUTOMOBILE ENGINEERING
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Classify different types of automobile bodies and explain them in brief with suitable examples.
b) Outline various types of automobile engines and give their applications.
(OR)
2. a) Compare and contrast front wheel drive with rear wheel drive.
b) Illustrate crankcase ventilation? Explain it with a line sketch.

\section*{UNIT-II}
3. a) Demonstrate the function of a carburetor? With a neat sketch explain the working of a simple carburetor.
b) Summarize the working of mechanical fuel pump used in petrol engines.
(OR)
4. a) Interpret the construction and working of fuel injector used in CI engines.
b) Elaborate different testing methods on diesel engine fuel pumps.

\section*{UNIT-III}
5. a) Classify engine cooling systems and explain working of forced circulation water cooling system.
b) Differentiate Magneto and Coil ignition systems.

\section*{(OR)}
6. a) Compare and contrast different types of radiators with line sketches.
b) Differentiate spark advance and spark retard methods.

\section*{UNIT-IV}
7. a) Choose any one Bendix drive mechanism and explain with neat sketch.
b) Identify the purpose of different lights used in automobiles and explain with neat layout.

\section*{1 of 2}

\section*{(OR)}
8. a) Indicate different instruments used on instrument panel and explain working of any one instrument.
b) Draw a neat sketch of wiper mechanism and explain its working.

\section*{UNIT-V}
9. a) What are the different types of shock absorbers available? Extend working of any one with neat sketch.
b) Organize layout of steering system used in heavy vehicles and explain functions of different components.
(OR)
10. a) Identify the type of brake systems used in cars and explain with neat sketch.
b) Differentiate independent and rigid axle suspension systems.

\section*{Code No: R193203H}

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ AUTOMOBILE ENGINEERING
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit \\ All Questions Carry Equal Marks \\ *****
}

\section*{UNIT-I}
1. a) Explain automobile anatomy with neat sketch.
b) Distinguish two wheel drive and four wheel drive systems.
(OR)
2. a) Illustrate the lubrication system used in multi-cylinder engines with neat sketch.
b) Elaborate re-boring of cylinder and nitriding of crankshaft.

\section*{UNIT-II}
3. a) Demonstrate petrol injection system with a neat layout.
b) Explain working of electrical fuel pump used in petrol engines.
(OR)
4. a) Compare different fuel injection systems used in CI engines and explain them in brief.
b) Show working of CAV fuel pump with neat sketch.

\section*{UNIT-III}
5. a) Outline different engine cooling methods and explain any one with neat sketch.
b) How spark advance is achieved is SI engines?
(OR)
6. a) Which type of ignition system is used in bikes? Explain with neat sketch.
b) Summarize evaporative cooling system? Explain in brief.

\section*{UNIT-IV}
7. a) Demonstrate working of cut-out relay with a neat sketch.
b) Identify the gear box used in busses and explain it with neat a sketch.
(OR)
8. a) Interpret the working of the following accessories in [8M] automobiles: (i) Pressure gauge and (ii) Fuel gauge.
b) (i) Differentiate single-plate and multi-plate clutches.
(ii) Give merits and de-merits of fluid fly wheel.

\section*{UNIT-V}
9. a) Illustrate working of an independent wheel suspension system and explain.
b) Build construction of rack and pinion steering system, and explain its working.

\section*{(OR)}
10. a) Where telescopic shock absorbers are used? Explain working of it with neat sketch.
b) Compare and contrast various types of springs used in [7M] suspension system.

\section*{*****}

2 of 2

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ AUTOMOBILE ENGINEERING
}
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Construct the layout of a generalized automobile and give the functions of different elements in it.
b) Outline different lubrication oil pumps used in automobile engines and explain any one of them with neat sketch.
(OR)
2. a) Classify automobile bodies and explain them in brief with applications.
b) Summarize different engine components and give their purpose.

\section*{UNIT-II}
3. a) Elaborate different types of air filters used in automobiles and explain any one with neat sketch.
b) Illustrate the layout of diesel engine fuel system and explain functions of various components in it.
(OR)
4. a) With a neat sketch explain working of electric fuel pump.
b) How the fuel pump of diesel engine is tested?

\section*{UNIT-III}
5. a) Which type of ignition system is used in petrol cars? Explain with neat sketch.
b) Explain working of coolant pump with neat sketch?

\section*{(OR)}
6. a) Interpret the working of ignition advance and retard [8M] mechanisms.
b) What is the necessity of antifreeze solutions used in water cooling system? Give some examples of antifreeze solutions.

\section*{UNIT-IV}
7. a) List out different types of gear boxes and explain working of manual gear box used in busses.
b) Differentiate hotch kiss drive and torque tube drive.

\section*{1 of 2}

\section*{(OR)}
8. a) Outline working of multi-plate clutch with neat sketch.
b) Explain working of synchronizing unit.

\section*{UNIT-V}
9. a) Demonstrate the construction and working of tandem master cylinder with a neat sketch.
b) Identify different parameters to be considered while wheel alignment and explain any three of them with neat sketches.
(OR)
10. a) Classify suspension systems and explain any one type of [8M] independent suspension system.
b) (i) Summarize the objectives of suspension system.
(ii) What is a torsion bar?

\title{
III B. Tech II Semester Regular Examinations, June-2022
}

AUTOMOBILE ENGINEERING
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Illustrate the layout of a 2 -wheeler and give the functions of various transmission and control elements in it.
b) Summarize different engine components and give material with which they made and also give their method of manufacturing.
(OR)
2. a) Identify different sources of pollution in automobiles. Enumerate different pollution controlling methods in automobiles.
b) Elaborate on crankcase ventilation.

\section*{UNIT-II}
3. a) Outline the layout of SI engine fuel supply system and briefly explain various components in it.
b) Summarize the functions of carburetor and explain working of simple carburetor with neat sketch.
(OR)
4. a) Demonstrate the construction and working of CAV fuel pump with neat sketch.
b) Show the layout of petrol engine fuel system and explain functions of different components in it.

UNIT-III
5. a) Illustrate a neat sketch of battery ignition system and explain functions of each component.
b) What is the necessity of thermostat valve in water cooling system? Explain in brief with neat sketch.
(OR)
6. a) Draw a neat sketch of water cooling system and explain its working.
b) What is pressure sealed cap? Explain how it is beneficial in water cooling system.

\section*{UNIT-IV}
7. a) Which type of clutch widely used in four wheel automobiles and explain its working?
b) Outline different types of wheels with respect to their construction. Discuss their advantages and disadvantages.
(OR)
8. a) Explain working of Differential and necessity of differential lock.
b) Sketch a cross sectional view of radial ply tyre and explain. Also give its merits and demerits.

\section*{UNIT-V}
9. a) Classify different types of brakes according to actuating mechanisms and explain most widely used brakes in trucks.
b) Differentiate Ackerman and Davis steering mechanisms.
(OR)
10. a) List out different types of steering gear mechanisms and explain any two of them.
b) Elaborate the working of Mac Pherson strut type suspension with simple sketch.

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER ELECTRONICS
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\section*{Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks}

\section*{UNIT-I}
1. a) Draw and explain the switching characteristics of power MOSFET and IGBT and compare them.
b) Draw the gate characteristics of a SCR and explain its importance in the design of gate drive circuit.
(OR)
2. a) Discuss the switching characteristics of SCR. Explain the turn ON and turn OFF times from the switching characteristics.
b) What are the requirements of good gate driver circuits of power MOSFET and IGBT? Explain in brief.

\section*{UNIT-II}
3. a) Explain the single-phase fully controlled bridge rectifier with RL load under continuous conduction mode (CCM) of operation with neat circuit diagrams and waveforms.
b) A single phase fully controlled bridge converter is connected to RL load with \(\mathrm{R}=10 \Omega\) and \(\mathrm{L}=6 \mathrm{mH}\). The converter is supplied from \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) AC supply.
(i) Determine average and RMS load current;
(ii) If one SCR of the bridge configuration is open circuited due to fault, what will be the average and RMS load current at this condition?
(OR)
4. a) Explain the single-phase fully controlled bridge rectifier with RLE Load under continuous conduction mode of operation with neat circuit diagrams and waveforms.
b) A single phase semi converter is supplied from \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) source. The load consists of \(\mathrm{R}=10 \Omega\) and \(\mathrm{E}=100 \mathrm{~V}\) and a large inductor so as to maintain the load current constant. For a firing angle of \(45^{\circ}\), find (i) average output voltage; (ii) average output current; (iii) average and RMS values of thyristor currents; (iv) input power factor.

\section*{UNIT-III}
5. a) Describe the operation of three phase full converter with RL load? Draw the waveforms by choosing firing angle such that output voltage has negative part.
b) A three phase semi converter is connected to a RL load with \(\mathrm{R}=10 \Omega\). If the firing angle of SCR is \(\mathrm{a}=60^{\circ}\) and it feeds 4 kW power to a resistive load determine the amplitude of maximum per phase input voltage.
(OR)
6. a) Draw the output voltage waveforms and derive the average and RMS voltage expressions of three phase semi converter with RL load on discontinuous conduction mode.
b) A three phase full converter is fed by \(230 \mathrm{~V}, 50 \mathrm{~Hz}\), three phase supply, the average load current is 25 A and the load is highly inductive. For firing angle of \(60^{\circ}\) find average, RMS and peak current through the SCRs.

\section*{UNIT-IV}
7. a) Explain the operation of boost converter with relevant waveforms in the continuous conduction mode and obtain the expression for amplitude of ripple current.
b) A buck-boost converter has the input voltage of 24 V and it operates at 30 kHz , when the duty cycle is \(0.25, \mathrm{~L}=300 \mu \mathrm{H}\), \(\mathrm{C}=150 \mu \mathrm{~F}\) and the average load current is 1.5 A . Determine average output voltage, peak to peak ripple current through the inductor, peak to peak ripple voltage and critical values of \(L\) and C.
(OR)
8. a) Explain the operation of buck converter in the discontinuous conduction mode and obtain the expression for amplitude of ripple current.
b) A buck converter has the input voltage of 220 V and it operates at 1 kHz , when the average load current is 50 A , the load resistance is \(3 \Omega\). Determine the value of inductance to limit the maximum peak to peak ripple current through inductor to \(10 \%\) and find the value of inductance for maximum ripple current?

\section*{UNIT-V}
9. a) How do you use PWM to inverters? Explain operation of single full bridge inverter with quasi-square wave pulse width modulation.
b) Explain the working of a current source inverter with a neat circuit diagram and waveforms.

\section*{(OR)}
10. a) Explain the working of single phase full bridge inverter with RL load and draw the waveforms, also derive the expression for RMS value of output voltage.
b) Explain the working of a three phase inverter with \(120^{\circ}\) mode of conduction with three phase delta connected resistive load.

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER ELECTRONICS
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Describe the switching characteristics of power MOSFET and what are the requirements of gate drive to get less turn OFF and turn ON times?
b) Explain the design of snubber circuit used for a SCR, Discuss how it provides different voltage protections?
(OR)
2. a) What is power MOSFET? What are the types of power MOSFET? Write the difference between general purpose MOSFET and power MOSFET?
b) Describe the basic behavior of thyristor using a two-transistor model.

\section*{UNIT-II}
3. a) Explain the single-phase fully controlled bridge rectifier with R Load under continuous conduction mode of operation with neat circuit diagrams and waveforms.
b) A single phase fully controlled bridge converter is supplied from \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) ac supply and it is fed to load consisting of \(\mathrm{R}=10 \Omega\) and large inductance such that load current is constant. When the firing angle is \(45^{\circ}\), (i) calculate average and RMS current (ii) if the source inductance of 1.5 mH is connected find the average voltage and overlap angle at the same firing angle.
(OR)
4. a) Explain the single-phase semi controlled bridge rectifier with RL load under continuous conduction mode of operation with neat circuit diagrams and waveforms.
b) A single phase full converter is used to deliver a constant load current, it is operated such that overlap angle is \(15^{\circ}\) for a firing angle, \(\alpha=0^{\circ}\). Determine the overlap angles for firing angles \(\alpha=30^{\circ}\), \(a=45^{\circ}\) and \(a=60^{\circ}\).

\section*{UNIT-III}
5. a) Explain the working of three phase semi converter with relevant waveforms with highly inductive load for firing angle of \(30^{\circ}\).
b) Explain the operation of a three phase dual converter in the noncirculating current mode with the help of relevant waveforms.
6. a) Describe the operation of three phase full converter feeding an \(R\) load and draw the waveforms for any firing angle which is more than the \(90^{\circ}\).
b) A three phase fully controlled bridge converter is connected to a supply voltage of 230 V per phase and frequency of 50 Hz . The source inductance is 3 mH . The load current on dc side is constant at 15 A . If load consists of a dc source voltage of 400 V having an internal resistance of \(1 \Omega\). Find the firing angle and overlap angle.

\section*{UNIT-IV}
7. a) Explain the operation of buck-boost converter in the continuous conduction mode and obtain the expression for amplitude of ripple current.
b) A boost regulator has an input voltage of \(\mathrm{V}_{\mathrm{s}}=5 \mathrm{~V}\). The average output voltage \(\mathrm{V}_{\mathrm{a}}=15 \mathrm{~V}\) and the average load current \(\mathrm{I}_{\mathrm{a}}=0.5 \mathrm{~A}\). The switching frequency is 25 kHz . If \(\mathrm{L}=150 \mu \mathrm{H}\) and \(\mathrm{C}=220 \mu \mathrm{~F}\), determine (i) the duty cycle, (ii) the ripple current of inductor \(\Delta \mathrm{I}\), (iii) the critical values of \(L\) and \(C\).
(OR)
8. a) Explain the principle of operation and working of buck converter with relevant waveforms in continuous conduction mode.
b) A buck-boost converter has the input voltage of 12 V and it operates at 20 kHz , when the average output voltage is 24 V , the average load current is 1.2 A , it is having \(\mathrm{L}=300 \mu \mathrm{H}, \mathrm{C}=150 \mu \mathrm{~F}\). Find duty cycle, ripple current through the inductor, ripple voltage and critical values of \(L\) and \(C\).

\section*{UNIT-V}
9. a) Draw a neat circuit diagram for single phase full bridge inverter feeding inductive load. What is the function of feedback diodes?
b) A single phase ac voltage controller is connected with a load of \(R=10 \Omega\) with input voltage of \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) supply. If the firing angle of SCR is \(90^{\circ}\) calculate, RMS value of output voltage, power delivered to load, average value of thyristor current and input power factor?
10. a) Explain the working of a three phase inverter with \(180^{\circ}\) mode ofconduction with three phase delta connected resistive load.
b) Describe the operation of single phase AC-AC regulator feeding resistive load. Derive the expression for output voltage.

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER ELECTRONICS
}
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Draw the V-I characteristics of a power MOSFET and explain different operating regions.
b) Draw the V-I characteristics of SCR and explain it briefly?
(OR)
2. a) Draw the switching characteristics of power MOSFETs. Define turn-ON delay time, rise time, turn-ON time, turn-OFF delay time, fall time and turn-OFF time.
b) What are the different turning-ON methods of a thyristor? Explain each method.

\section*{UNIT-II}
3. a) Explain the single-phase semi controlled bridge rectifier with RLE Load under continuous conduction mode of operation with neat circuit diagrams and waveforms.
b) A single phase semi converter is delivering power to RLE load with \(\mathrm{R}=5 \Omega, \mathrm{~L}=10 \mathrm{mH}\) and \(\mathrm{E}=80 \mathrm{~V}\). The ac source voltage is 230 V, 50 Hz . For continuous conduction, find the average value of output current for a firing angle of \(50^{\circ}\). If one of the SCR is damaged and open circuited find the new value of average output current on the assumption to continuous conduction. Also sketch the output voltage and current waveforms?
(OR)
4. a) Explain the single-phase semi controlled bridge rectifier with R Load under continuous conduction mode of operation with neat circuit diagrams and waveforms.
b) A single phase fully controlled bridge converter with RL load is supplied from \(220 \mathrm{~V}, 50 \mathrm{~Hz} \mathrm{AC}\) supply. If the firing angle is \(45^{\circ}\), determine (i) average output voltage, (ii) output current (iii) input power factor.

\section*{UNIT-III}
5. a) A three-phase full converter is connected to a load resistance of \(5 \Omega\) and it is supplied from a \(220 \mathrm{~V}, 50 \mathrm{~Hz}\) ac supply, If the firing angle of thyristor is \(\alpha=30^{\circ}\), Draw the relevant waveforms.
b) For the above converter configuration determine (i) average output voltage, (ii) average output current, (iii) RMS output voltage and (iv) RMS output current.

(OR)
6. a) Draw the circuit diagram of a three phase bridge converter with RL load. Discuss its working principle. Draw the voltage and current waveforms.
b) Determine the following parameters of a three phase bridge converter: (i) dc output voltage (ii) average dc load current (iii) RMS output voltage (iv) RMS load current.

\section*{UNIT-IV}
7. a) Explain the operation of boost converter with relevant waveforms in the Discontinuous conduction mode.
b) A boost converter has the input voltage of 24 V and it operates at 20 kHz , when the average output voltage is 12 V , the average load current is 1.2 A , it is having \(\mathrm{L}=300 \mu \mathrm{H}, \mathrm{C}=150 \mu \mathrm{~F}\). Find duty cycle, ripple current through the inductor, ripple voltage and critical values of \(L\) and \(C\).
(OR)
8. a) Discuss the Principle of operation of forward and fly back converters in continuous conduction mode.
b) The buck regulator has an input voltage of \(\mathrm{Vs}=15 \mathrm{~V}\). The required average output voltage is \(\mathrm{Va}=5 \mathrm{~V}\) at \(\mathrm{R}=400 \Omega\) and the peak-to-peak output ripple voltage is 10 mV . The switching frequency is 20 kHz . If the peak-to-peak ripple current of inductor is limited to 0.6 A , determine: (i) the duty cycle (ii) the filter inductance \(L\), (iii) the filter capacitor C .

\section*{UNIT-V}
9. a) Explain the working of single phase half bridge inverter with RL load and draw the waveforms, also derive the expression for RMS value of output voltage.
b) Single phase half bridge inverter has a resistive load of \(\mathrm{R}=3 \Omega\) and DC input voltage of 50 V . Calculate: (i) RMS output voltage at fundamental frequency, (ii) output power, (iii) Average and peak current of each thyristors.
(OR)
10. a) Explain the operation of unipolar switching in full bridge inverter.
b) Explain the operation of a single phase AC voltage controller with a neat circuit diagram and output wave forms with respect to source voltage waveforms at \(\mathrm{a}=60^{\circ}\) degrees for R -load.

\title{
III B. Tech II Semester Regular Examinations, June-2022 POWER ELECTRONICS
}
(Electronics and Communication Engineering)
Time: 3 hours Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
*****

\section*{UNIT-I}
1. a) Describe the switching characteristics of power IGBT and what are the requirements of gate drive to get less turn OFF and turn ON times?
b) Explain the static characteristics of thyristor with neat diagrams.
(OR)
2. a) Explain about snubber circuit and derive the condition for \(\mathrm{R}_{\mathrm{s}}\) ?
b) Draw output and transfer characteristics of power MOSFET and explain the terms (i) pinch off voltage (ii) threshold voltage and (iii) transconductance.

\section*{UNIT-II}
3. a) Explain the operation of single phase semi-converter feeding RLE load with neat circuit diagram and waveforms also deduce the rms output voltage.
b) A single phase full converter, connected from \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) source, is feeding a load \(R=25 \Omega\) in series with a large inductance that makes the load current ripple free. For a firing angle \(30^{\circ}\), calculate the input and output performance parameters of this converter.
(OR)
4. a) A single phase full converter delivers a constant load current \(I_{o}\). Express its source current in Fourier series.
b) For the single phase full converter delivers a constant load current \(I_{o}\). Derive expressions for the following performance parameters: (i) Displacement factor (ii) Power factor (iii) THD (iv) Current distortion factor.

\section*{UNIT-III}
5. a) Draw the circuit diagram of a three phase bridge converter with RLE load. Discuss its working principle. Draw the voltage and current waveforms.
b) Design a three phase dual converter to achieve at four quadrant
operation for \(I_{d}=10 \mathrm{~A}\) at 200 V . The converter is supplied from three phase \(400 \mathrm{~V}, 50 \mathrm{~Hz}\) supply. \(I_{\text {ripple }}=2 \mathrm{~A}\).

(OR)
6. a) Sketch output wave form for a 3-phase full converter for a firing angle delay of \(45^{\circ}\). Indicate the conduction of various elements and discuss whether freewheeling diode comes in to place on the assumption of continuous load current. Hence obtain an expression for an average output voltage.
b) A three phase dual converter operating in circulating current mode has the following details. Source voltage is 3 -phase 220 V, 50 Hz and the load resistance is \(\mathrm{R}=10 \Omega\).The circulating inductance is 5 mH and the delay angles are \(\mathrm{a} 1=60^{\circ}\) and \(\mathrm{a} 2=120^{\circ}\). Calculate the peak circulating current and peak current of the converters.

\section*{UNIT-IV}
7. a) Explain the operation of Buck-Boost converter with relevant waveforms and derive the expression for average output voltage.
b) A buck-boost converter has an input voltage of 15 V , the duty cycle is 0.3 and it operates at 20 kHz when \(\mathrm{L}=300 \mu \mathrm{H}, \mathrm{C}=250 \mu \mathrm{~F}\) and average load current is 1.5 A . Determine (i) average output voltage (ii) peak to peak output voltage ripple and (iii) peak to peak ripple current through the inductor and (iv) critical value of L and C .

\section*{(OR)}
8. a) Explain the operation of Boost converter with relevant waveforms and derive the expression for average output voltage.
b) A buck converter has an input voltage of 15 V and the required output voltage is 6 V at \(\mathrm{R}=200 \Omega\) and the peak to peak output ripple voltage is 20 mV . If it is operating at 20 kHz and peak to peak ripple current of inductor is 0.8 A , determine (i) duty cycle ratio (ii) filter inductance and capacitance (iii) critical values of L\&C.

\section*{UNIT-V}
9. a) Explain the working of a single-phase half bridge inverter. Discuss how the output power in single-phase full bridge inverter becomes four times the power handled by a single phase half-bridge inverter.
b) Describe the operation of single phase AC-AC regulator feeding RL load. Derive the expression for output voltage.
(OR)
10. a) Explain the operation of three phase bridge inverter for \(120^{\circ}\) mode of operation with the help of relevant phase and line voltage waveforms.
b) Explain single phase CSI with ideal switches with neat circuit diagram and waveforms.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ PRINCIPLES OF COMMUNICATION
}
(Common to EEE, CSE, IT)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks
UNIT-I
1. a) Prove that a coherent detector can reconstruct the original signal in the demodulation of double sideband suppressed carrier amplitude modulation (DSBSC -AM) signal.
b) A single tone message signal is given as \(m(t)=4 \cos \left(4 \pi 10^{3} t\right)\). Give the expression for single sideband suppressed carrier amplitude modulation for given carrier \(c(t)=10 \cos \left(2 \pi 10^{6} t\right)\) and estimate the power required.

\section*{(OR)}
2. a) An AM signal is represented as

Determine the following.
(i) Message and Carrier signal frequencies
(ii) Bandwidth Required
(iii) Total power transmitted
b) With a neat sketch, explain the generation of DSBSC-AM signal using Ring modulator.

\section*{UNIT-II}
3. a) Explain about direct method of FM generation.
b) Obtain the following:
(i) Carrier Amplitude
(ii) Message signal Amplitude
(iii) Carrier Frequency,
for the given FM signal \(s(t)=10 \cos \left(4 \pi 10^{6} t+0.5 \sin 4000 \pi t\right)\) when the value of frequency sensitivity is \(10 \mathrm{kHz} /\) volt.
(OR)
4. a) Differentiate between Narrowband FM and Wideband FM.
b) Discuss about linear and non linear model of phase locked loop (PLL).

\section*{UNIT-III}
5. a) State and prove the properties of autocorrelation.
b) A discrete random variable X takes values from 1 to 5 with \([7 \mathrm{M}]\) probabilities \(\mathrm{P}(\mathrm{X})\) as given below.
\begin{tabular}{|l|l|l|l|l|l|}
\hline X & 1 & 2 & 3 & 4 & 5 \\
\hline \(\mathrm{P}(\mathrm{X})\) & 0.1 & 0.2 & 0.4 & 0.2 & 0.1 \\
\hline
\end{tabular}

Compute the mean and variance of the random variable X .

\section*{(OR)}
6. a) Discuss the important properties of cross correlation.
b) Differentiate between white noise, shot noise and thermal noise.

\section*{UNIT-IV}
7. a) Examine the statement that figure of merit for DSBSC-AM is unity.
b) Identify the significance and importance of Pre-emphasis in analog communication.

\section*{(OR)}
8. a) Discuss the Noise in AM receivers and Obtain the expression for signal-to-noise ratio at the input of an AM receiver.
b) Illustrate the importance of FM threshold effect.

\section*{UNIT-V}
9. a) What do you understand from the word multiplexing? Differentiate between time domain multiplexing and frequency domain multiplexing.
b) Classify pulse modulation techniques with their input and output waveforms.
(OR)
10. a) Define sampling and quantization. With a neat sketch, explain how analog signal is converted to digital signal.
b) Obtain the Nyquist rate and Nyquist interval for the given message signal
\[
m(t)=5 \cos 6000 \pi t+2.5 \cos 1000 \pi t \cos 4000 \pi t
\]

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ PRINCIPLES OF COMMUNICATION
}
(Common to EEE, CSE, IT)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Show that phase discrimination method can be used to generate single sideband suppressed carrier amplitude modulated (SSBSC- AM) signal.
b) Obtain the following for the given amplitude modulated (AM) signal \(s(t)=10 \cos 2 \pi 10^{6} t\left(1+3 \cos 2 \pi 10^{3} t\right)\) :
(i) Total power as well as power of sidebands.
(ii) Frequency domain representation.
(OR)
2. a) Illustrate the significance and importance of Frequency [8M] translation in Analog communication.
b) Show how to generate DSBSC-AM signal using Ring Modulator.

\section*{UNIT-II}
3. a) Summarize the process involved in the generation of narrow band frequency modulation (NBFM) with necessary block diagram.
b) Explain the balanced slope detector method for FM demodulation.
(OR)
4. a) Obtain the expression for an FM signal with a carrier \(c(t)=4 \cos \left(2 \pi 10^{6} t\right)\) and message signal \(m(t)=8 \cos \left(2 \pi 10^{3} t\right)\). Determine the power of the FM signal when the frequency sensitivity is 1 kHz /Volt.
b) Elaborate on the working of Foster Seeley discriminator for FM demodulation.

\section*{UNIT-III}
5. a) With necessary equations list the properties of cross correlation.
b) A random variable \(X\) has \(\bar{X}=-3, \overline{X^{2}}=11\) and \(\sigma_{X}^{2}=2\). For a new random variable \(Y=2 X-3\), find (i) \(\bar{Y}\), (ii) \(\overline{Y^{2}}\) and (iii) \(\sigma_{Y}^{2}\).
(OR)
6. a) List all the properties of probability distribution function.
b) Define the terms white noise and Noise figure. Draw the spectrum of white noise with \(\sigma_{N}^{2}=10\).

\section*{UNIT-IV}
7. a) Explain the receiver model for analysis of noise in analog [8M] communication.
b) Derive the figure of merit for noise in AM receiver.
(OR)
8. a) Analyze the effect of noise in FM receiver and obtain input and output SNRs.
b) Illustrate the importance of threshold effect in noise analysis.

\section*{UNIT-V}
9. a) Define Nyquist rate. Explain why Nyquist rate is important in sampling of an analog signal.
b) With a neat sketch, explain the working of PCM transmitter and receiver.

\section*{(OR)}
10. a) Elaborate on the steps involved in demodulation of PPM with required waveforms.
b) Distinguish between ideal, natural and flat top sampling.

\title{
III B. Tech II Semester Regular Examinations, June-2022 \\ PRINCIPLES OF COMMUNICATION
}
(Common to EEE, CSE, IT)
Time: 3 hours
Max. Marks: 75
Answer any FIVE Questions ONE Question from Each unit
All Questions Carry Equal Marks

\section*{UNIT-I}
1. a) Define Amplitude modulation and explain the time-domain and frequency-domain representation of AM signal.
b) Discuss about the generation of vestigial sideband suppressed carrier amplitude modulated (VSBSC-AM) signal.
(OR)
2. a) Discriminate between single sideband suppressed carrier amplitude modulation (SSBSC-AM) and vestigial side band suppressed carrier amplitude modulation (VSBSC-AM).
b) Estimate the power in the sidebands as well as the transmission efficiency of an amplitude modulated wave given by
\[
s(t)=5 \cos 2 \pi 10^{6} t\left(1+\cos 2 \pi 10^{3} t\right)
\]

\section*{UNIT-II}
3. a) Illustrate the importance of phase locked loop (PLL).
b) Obtain the (i) Bandwidth (ii) Power required, for the given FM signal \(s(t)=10 \cos \left(4 \pi 10^{6} t+5 \sin 4000 \pi t\right)\).
4. a) With a neat block diagram, elaborate on the generation of frequency modulation (FM) using indirect method.
b) Estimate the total power as well as bandwidth of an FM signal \(s(t)=5 \cos \left(4 \pi 10^{6} t+4 \sin 2500 \pi t\right)\). Also obtain the message and carrier frequencies.

\section*{UNIT-III}
5. a) Two statistically independent random variables \(X\) and \(Y\) with \(\bar{X}=2, \overline{X^{2}}=8, \bar{Y}=4, \overline{Y^{2}}=25\). For another random variable given as \(W=3 X-Y\), calculate the variance.
b) List and prove the properties of probability density function.
6. a) With relevant expressions explain the calculation of mean, correlation and covariance.
b) Differentiate between shot noise and thermal noise.

1 of 2

\section*{UNIT-IV}
7. a) Recall the importance of de-emphasis in analog communication.
b) Analyze the effect of noise in FM receivers and also obtain the equations for output signal to noise ratio and figure of merit.
(OR)
8. a) Illustrate the importance of capture effect.
b) Derive the figure of merit for DSB-SC receivers.

\section*{UNIT-V}
9. a) List out the advantages of converting analog signal to digital signal.
b) With neat sketch explain the generation of pulse coded modulation signal.
10. a) Explain the importance of multiplexing. Discuss different types of multiplexing used in analog communication.
b) Differentiate the terms sampling, quantization and encoding.

\title{
III B. Tech II Semester Regular Examinations, June-2022 PRINCIPLES OF COMMUNICATION
}
(Common to EEE, CSE, IT)
Time: 3 hours
Max. Marks: 75

\title{
Answer any FIVE Questions ONE Question from Each unit All Questions Carry Equal Marks
}

\section*{UNIT-I}
1. a) Outline the process of demodulating the double side band suppressed carrier amplitude modulation (DSBSC-AM) using coherent detection.
b) Evaluate the total power of an AM transmitter that radiates 9 kW of power when unmodulated and later modulated by two sine waves with modulation indices 0.5 and 0.6 respectively.
(OR)
2. a) Compare SSB, DSB and VSB modulation techniques from the view point of generation, bandwidth requirement, power distribution and area of application.
b) With a neat block diagram, summarize filter method of generating single sideband suppressed carrier amplitude modulated (SSBSC-AM) signal.

\section*{UNIT-II}
3. a) Discuss about Armstrong method for generation of frequency modulated (FM) signal generation.
b) Obtain the
(i) Carrier Amplitude
(ii) Message signal Amplitude
(iii) Carrier Frequency
(iv) Message signal frequency
for the given FM signal \(s(t)=5 \cos \left(2 \pi 10^{6} t+0.5 \sin 6000 \pi t\right)\). Assume frequency sensitivity as \(10 \mathrm{kHz} / \mathrm{V}\).
(OR)
4. a) Explain the important elements of superheterodyne receiver.
b) A high frequency carrier signal \(c(t)=2 \cos \left(2 \pi 10^{6} t\right)\) is frequency modulated by a message signal
\[
m(t)=4 \cos \left(8 \pi 10^{3} t\right)+8 \cos \left(6 \pi 10^{3} t\right)
\]

Obtain the time-domain representation of FM signal. Also calculate the individual modulation indices and maximum frequency deviation.

\section*{UNIT-III}
5. a) With an example, explain about conditional probability.
b) List and prove the properties of probability distribution function.

\section*{(OR)}
6. a) A random variable has a probability density
\[
f_{X}(x)= \begin{cases}\frac{5}{4}\left(1-x^{4}\right), & 0<x \leq 1 \\ 0, & \text { elsewhere }\end{cases}
\]

Calculate (i) \(E[X]\) (ii) \(E[4 X+2]\) (iii) \(E\left[X^{2}\right]\).
b) Discuss about noise equivalent bandwidth and noise figure.

\section*{UNIT-IV}
7. a) Illustrate the importance of capture effect.
b) Discuss the noise in AM receivers and obtain the expression for signal to noise ratio at the input of an AM receiver.
(OR)
8. a) Identify the significance and importance of pre-emphasis in
[8M] analog communication.
b) Derive the figure of merit for DSB-SC receivers.

\section*{UNIT-V}
9. a) Mention the role of a holding circuit in the demodulation of pulse amplitude modulated (PAM) signal with neat block diagram.
b) Differentiate between PAM, PWM and PPM.
(OR)
10. a) Illustrate the importance of sampling theorem and Nyquist rate.
b) Justify the statement that a pulse position modulated (PPM) signal can be generated from a pulse width modulated (PWM) signal.

\section*{Set No. 1}

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
DIGITAL CONTROL SYSTEMS
(Electrical and Electronics Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) What are the merits of the digital control system?
b) Define Z- Transform theorems.
c) Write down the properties of state transition matrix.
d) Write about the mapping of left half of the s-plane into z-plane.
e) What is the need of lag-lead compensators?
f) What are the necessary conditions for state feedback controller.

\section*{PART-B(4x14 = 56 Marks)}
2. a) Derive the expression for transfer function of zero order hold.
b) With suitable timing diagram explain the following characteristics of a sample and hold device. (i) Acquisition time (ii) Aperture time (iii) Settling time
3. a) Find the z transform of the sequence \(f(k)=\left(\frac{1}{2}\right)^{k}\) for \(\mathrm{k}=0,1,2\),
b) Obtain the Pulse transfer function of the given closed loop system

4. a) Derive the expression for state transition matrix \(\phi(\mathrm{k})\) using z -transform method.
b) Investigate the controllability and observability of the system given below after forming the controllability and observability matrix.
\[
x(k+1)=\left[\begin{array}{cc}
-1 & 1 \\
0 & -1
\end{array}\right] x(k)+\left[\begin{array}{l}
0 \\
1
\end{array}\right] u(k) ; y(k)=\left[\begin{array}{cc}
1 & 0
\end{array}\right] x(k)
\]
5. a) Describe the stability analysis of digital control system using Routh Hurwitz criterion
b) Consider the following characteristic equation
\(F(z)=z^{3}-1.2 z^{2}-0.05 z+0.2=0\), verify whether or not any of the roots of the characteristic equation lie outside the unit circle in the z-plane. Use modified Routh's stability criterion.

\section*{Set No. 1}
6. The open loop transfer function of a unity - feedback digital control system is given as \(\mathrm{F}(\mathrm{z})=\frac{k z}{(z-1)(z-3)}\) Sketch the root loci of the system \(0<\mathrm{K}<\infty\). Indicate all important information on the root loci.
7. a) Explain in detail the procedure for state regulator design using pole placement method for a digital control system
b) Prove Ackermann's formula for the determination of the state feedback gain matrix K.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
DIGITAL CONTROL SYSTEMS
(Electrical and Electronics Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A(14 Marks)
1. a) What is a sample and hold circuit?
b) What is the property of linearity of z-transforms?
c) What are the different ways of state space representation?
d) Write the discrete time state equations of a pulse function.
e) Write about primary and complimentary strips.
f) What are the necessary and sufficient conditions in design via pole placement?

\section*{PART-B \(\mathbf{4 x} 14=56\) Marks)}
2. a) With suitable diagrams explain how data reconstruction is done in zero order [7] hold and first order hold. Derive transfer functions for each.
b) With a block diagram, discuss the basic elements of a discrete -data control system.
3. a) Determine the in usage \(Z\) transform of i) \(\frac{2 Z}{(Z-2)^{2}}\) and (ii) \(\frac{Z}{Z^{2}-Z-3}\)
b) Solve the difference equation \(\mathrm{y}(\mathrm{k}+2)+0.4 \mathrm{y}(\mathrm{k}+1)+0.1 \mathrm{y}(\mathrm{k})=\mathrm{u}(\mathrm{k})\) using Z transform. Given \(y(0)=0 ; y(1)=0\).
4. a) Determine the discrete time state equation and output equation for the continuous
time system given: (when \(\mathrm{T}=1 \mathrm{sec}) G(s)=\frac{Y(S)}{U(S)}=\frac{1}{s(s+2)}\)
b) Explain the Concepts of Controllability and observability.
5. a) Determine the stability of the system using Jury's stability test for the
characteristic equation \(\mathrm{P}(\mathrm{z})=\mathrm{z}^{4}-12 \mathrm{z}^{3}+0.07 \mathrm{z}^{2}+0.3 \mathrm{z}-0.08=0\)
b) Explain mapping between the s-Plane and the \(z\)-Plane
6. a) Explain the design procedure in the w-plane of lag compensator
b) List out the transient response specifications and explain in brief.
7. a) Explain the concept of pole placement by state feedback.
b) Consider the system is given by
\(\mathrm{X}(\mathrm{k}+1)=\left(\begin{array}{ll}0 & 1 \\ -0.2 & -1\end{array}\right) \mathrm{X}(\mathrm{k})+\binom{0}{1} \mathrm{u}(\mathrm{k})\)
Determine the state feedback gains ' K ' to place the eigen values at \(0.2,0.3\) using Ackermann's formula

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
DIGITAL CONTROL SYSTEMS
(Electrical and Electronics Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A(14 Marks)
1. a) What is a discrete data control system?
b) Determine the z-transform of \(\sin \omega t\) ?
c) Define the concept of controllability
d) Give comment on the stability of \(\mathrm{F}(\mathrm{z})=\mathrm{z}^{2}-0.2=0\) by using Jury's stability [2] criterion?
e) Derive an expression for steady state error for ramp input.
f) Define the pole placement method.

\section*{PART-B(4x14 = 56 Marks)}
2. a) With suitable block diagram, explain the sample and hold circuit.
b) Describe the sampling theorem and data reconstruction.
3. a) Find the z -transform of \(\mathrm{x}(\mathrm{t})\) shown in figure. Assume sampling period \(\mathrm{T}=1 \mathrm{~s}\)

b) Find the inverse Z transform of \(x(z)=\frac{z^{2}}{(z-1)(z-0.5)^{2}}\)
4. a) Write the state space representation of a linear time invariant discrete time control system. Explain various matrices in the representation.
b) Consider the \(\operatorname{system} \frac{Y(z)}{U(z)}=\frac{z+2}{z^{2}-2 z+3}\). Determine (i) Controllable canonical form
(ii) Observable canonical form (iii) Diagonal form.
5. a) State and explain jury's stability test
b) Using Rouths stability criterion determine the range of K , for which the [7] characteristic equation \(\mathrm{z}^{3}+\mathrm{kz}^{2}+1.5 \mathrm{kz}-(\mathrm{k}+2)=0\) is closed loop stable.
6. a) A unity feedback system is characterized by the open loop transfer function
\(G_{h 0} G(z)=\frac{0.5(z+0.5)}{(z-1)(z-0.3)}\). The sampling period \(\mathrm{T}=0.1 \mathrm{sec}\), Find steady state errors for following (i) Unit Step (ii) Unit ramp (iii) Unit Parabolic.
b) State the rules for the construction of root loci of a sampled data control system
7. a) Explain the concept of state feedback controllers?
b) Consider the system is given by \(x(k+1)=\left(\begin{array}{cc}0 & 1 \\ -1 & -2\end{array}\right) x(k)+\binom{0}{1} u(k)\)

Obtain the state feedback gains ' K ' to place the Eigen values at \(0.1,0.2\) using Ackermann's formula

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
DIGITAL CONTROL SYSTEMS
(Electrical and Electronics Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) What are the advantages of digital system.
b) What is the z-transform of \(t e^{-a t}\) ?
c) Explain the concept of observability
d) Investigate the mapping from s-plane to z-plane of the constant frequency loci with neat sketch
e) Derive an expression for steady state error for step input.
f) What is meant by deadbeat response?

\section*{PART-B \((4 x 14=56\) Marks)}
2. a) Explain Mathematical modeling of the sampling process.
b) Describe the frequency domain characteristics of ZOH.
3. a) Determine the pulse transfer function of the closed loop system given below for a sampling time of 1 s and open loop gain \(\mathrm{K}=1\)

b) For the analog system \(G(s)=\frac{10(s+2)}{s(s+5)}\) with a sampling period of 0.05 sec , Determine the impulse response of the system with sampled output and analog input.

4 a) Obtain the Jordan canonical form realization for the following transfer function
\[
\begin{equation*}
G(z)=\frac{3 z^{2}-4 z+6}{\left(z-\frac{1}{3}\right)^{3}} \tag{7}
\end{equation*}
\]
b) What are the various methods of evaluation of state transition matrix? Explain any one method.

5 a) Discuss the stability analysis of discrete control system using modified Routh stability
b) Use the Routh-Hurwitz criterion to find the stable range of k for the closed loop unity feedback system with loop gain
\[
\begin{equation*}
F(z)=\frac{k(z-1)}{(z-0.1)(z-0.8)} \tag{7}
\end{equation*}
\]
6. a) Write about the general rules for constructing Root Loci in the z-Plane
b) Explain the relation between the bilinear transformation and the \(w\) plane?
7. a) Describe the Necessary and Sufficient conditions for state feedback controllers.
b) Derive sufficient condition for the design of state feedback controller through pole placement.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
PRODUCTION PLANNING AND CONTROL (Common to Mechanical Engineering and Mining Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A (14 Marks)}
1. a) Define production and production planning.
b) Describe the importance of forecasting.
c) What are the assumptions made in EOQ model?
d) Define Routing.
e) Explain the following terms used in line balancing.
(i) Balance delay (ii) Work element table
f) Write any two differences between dispatching and expediting.
\[
\begin{equation*}
\text { PART-B }(4 x 14=56 \text { Marks }) \tag{2}
\end{equation*}
\]
2. a) List and discuss different phases of PPC.
b) Differentiate between job shop production and batch production.
3. a) Write any seven differences between forecasting and prediction.
b) Fit the linear regression model for the following data and forecast the demand for the period 9 .
\begin{tabular}{|l|l|l|l|l|l|l|l|l|}
\hline Period & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\hline Demand & 800 & 870 & 890 & 870 & 890 & 805 & 835 & 800 \\
\hline
\end{tabular}
4. a) Derive the formula for EOQ model.
b) A product is manufacture with the following details.

Annual demand \(=50000\) units; Production rate \(=100000\) per setup;
Set up cost \(=300 /\) setup; Carrying cost \(=30 /\) unit/year. Find (i) EOQ and
(ii) Cycle time.
c) Write the differences between Q-system and P-system.
5. a) What are the objectives and functions of routing?
b) Explain the routing procedure.
6. a) What are the objectives of scheduling? Explain.
b) What are the guidelines for aggregate planning? Explain.
7. a) Define dispatching in manufacturing and explain its functions in detail.
b) Explain how a computer can be used to prepare a schedule chart.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 \\ PRODUCTION PLANNING AND CONTROL (Common to Mechanical Engineering and Mining Engineering)
}

Time: 3 hours
Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A (14 Marks)
1. a) Write any three characteristics of continuous production system.
b) Write a short note on short term forecasting.
c) Define Economic Order Quantity.
d) Explain the term "Job order" with respect to routing.
e) Draw the precedence diagram from the following data.
\begin{tabular}{|l|l|l|l|l|l|l|l|l|l|l|l|l|}
\hline \begin{tabular}{l} 
Element \\
No
\end{tabular} & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 \\
\hline \begin{tabular}{l} 
Predecessor \\
Element
\end{tabular} & - & 1 & 2 & 1 & 4 & 3,5 & 6 & 7 & 6 & 6 & 10 & \(8,9,11\) \\
\hline Time (S) & 6 & 4 & 5 & 4 & 7 & 6 & 3 & 7 & 2 & 5 & 5 & 8 \\
\hline
\end{tabular}
f) Write any two differences between follow up and expediting.

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) What are the important characteristics of effective PPC.
b) Differentiate between intermittent production system and continuous production system.
3. a) What are the general principles of forecasting techniques?
b) The demand for seven consecutive periods for a product is as follows. 155,158,162,166,170,180,200.
(i) Establish the linear forecaster. (ii) Determine the forecast demand for \(12^{\text {th }}\) period.
4. a) What are the applications of Fixed order quantity?
b) Discuss MRP with its assumptions and objectives.
5. a) "Routing establishes the operations, their path, sequence, proper class of machines and personnel". Explain.
b) Write any seven advantages of routing.
6. Explain the scheduling rules with their relative merits and demerits.
7. a) Enumerate the duties of dispatcher?
b) Explain the use of computers in inventory.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 PRODUCTION PLANNING AND CONTROL (Common to Mechanical Engineering and Mining Engineering)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A (14 Marks)
1. a) Write any three objectives of PPC.
b) Write a short note on long term forecasting.
c) Define (i) Order point (ii) Lead time (iii) Reorder level.
d) Explain the term " Move order" with respect to routing.
e) List out the inputs of Aggregate plan.
f) Write a short note on follow-up of raw materials.

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) What are the various functions of PPC.
b) Explain the main factors to determine the place of PPC in an organization.
3. a) List and explain the following qualitative methods of forecasting along with merits and demerits.
(i) Executive opinion method (ii) Delphi method.
b) Forecast the production for next two years when the production quality for last ten years as follows. Use exponential smoothing for \(\alpha=0.3\) and \(\alpha=0.7\)
\(250,275,285,290,305,310,315,325,320,321\)
4. a) Explain various components of MRP system.
b) Define ERP. What are the salient features of ERP system? Explain.
5. a) Describe in detail the following functions of routing.
(i) Interpretation of detailed drawing (ii) Methods analysis.
b) What is a route sheet? What does it contain? Explain in detail by an example.
6. a) Define capacity. Write in detail about the determination and factors influencing it.
b) Explain about expediting.
7. a) What are the applications of computers in production control?
b) Differentiate between centralized and decentralized dispatching.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 PRODUCTION PLANNING AND CONTROL (Common to Mechanical Engineering and Mining Engineering)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A (14 Marks)
1. a) Explain about the action phase in PPC.
b) Write any two differences between dependent demand and independent demand.
c) Define (i) Safety stock (ii) Service level
d) Explain the term "Tool order" with respect to routing.
e) Explain the following terms used in line balancing.
(i) Cycle time (ii) Life efficiency.
f) Write a short note on follow up of work-in-progress.

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) What are the different types of production systems? Discuss the characteristics of each system in detail.
b) Explain various activities of PPC.
3. a) What are the merits and demerits of moving average method.
b) Calculate the trend values by using least square method for the data given below and estimate the sales of bikes for the year 2025.
\begin{tabular}{|l|l|l|l|l|l|l|l|l|l|}
\hline Year & 2012 & 2013 & 2014 & 2015 & 2016 & 2017 & 2018 & 2019 & 2020 \\
\hline \begin{tabular}{l} 
Sales \\
(thousands)
\end{tabular} & 90 & 94 & 100 & 102 & 105 & 110 & 112 & 11 & 120 \\
\hline
\end{tabular}
4. a) Write any seven differences between MRP I and MRP II.
b) What are the elements of JIT system? Explain its significance.
5. a) Discuss the importance of following functions of routing.
(i) Selection of machining parameters (ii) Specification of surface roughness.
b) Write any seven differences between route sheet and route card.
6. a) What is chase strategy? What are the different ways by which demand can be chased?
b) Discuss the importance of Gantt chart in scheduling? Explain the different symbols used in drawing a Gantt chart.
7. a) Discuss in detail the sequential steps involved in dispatching?
b) Explain the role of computers in PPC?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 CELLULAR AND MOBILE COMMUNICATIONS
}
(Electronics and Communication Engineering)

\author{
Time: \(\mathbf{3}\) hours
}

\title{
Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A(14 Marks)}
1. a) What is Cell splitting and explain
b) What is co-channel interference?
c) What is borrowing channel allocation in mobile communication?
d) List out the types of antennas used at cell site
e) Explain the concept of intersystem handoff
f) Write the features of CDMA

\section*{PART-B(4x14 = 56 Marks)}
2. a) Explain the basic cellular system with neat diagram
b) The 2G GSM has 125 channels in the uplink and 125 channels in the down link. Each channel has a bandwidth of 200 kHz . What is the total bandwidth occupied in both uplink and down link
3. a) Describe about desired C/I from a normal case in an omni-directional antenna system
b) What are the different types of non-co-channel interference? Explain
4. a) Compare fixed channel assignment and non-fixed channel assignment?
b) What are the various techniques used by cellular communication system to improve coverage and capacity in cellular systems?
5. a) How interference can be reduced by using the directional antennas at cell site.
b) Write the short notes on spaced diversity antennas.
6. a) What are the various handoff strategies based on algorithms of handoff? Explain in detail.
b) What are the different vehicle locating methods? Explain in detail
7. a) What are the different types of channels for GSM? Explain.
b) Explain the basic architecture of 3G cellular system with a neat sketch

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 CELLULAR AND MOBILE COMMUNICATIONS \\ (Electronics and Communication Engineering)
}

\title{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A(14 Marks)
1. a) Write the differences between macro and micro cellular structures?
b) Write the different types of non-co-channel interference.
c) What is the importance of frequency management chart?
d) Write the features of umbrella pattern antennas
e) Define the dropped call rate
f) List out few comparisons of TDMA and CDMA
\[
\underline{\text { PART-B }}(4 x 14=56 \text { Marks })
\]
2. a) Explain the performance of cellular mobile system
b) Write short notes on mobile fading characteristics.
3. a) Explain how co-channel interference is measured in real time mobile radio [7] transceivers
b) What is the purpose of cell sectoring? Explain how co-channel interference in a cellular system may be reduced?
4. a) Explain the phase difference between a direct path and a ground-reflected path.
b) Briefly explain the effects due to human made structures.
5. a) Explain space diversity antennas used at cell site
b) Describe the effects of cell site antenna heights and signal coverage cells
6. a) What are the different types of handoffs? Explain how to implement them
b) Plot the signal strength for a two level handoff scheme and explain it.
7. a) Explain in detail the architecture of 3 G cellular systems with neat diagram.
b) Describe the basic principle and advantages of TDMA.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 CELLULAR AND MOBILE COMMUNICATIONS \\ (Electronics and Communication Engineering)
}

Time: 3 hours

\author{
Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A(14 Marks)}
1. a) List the main features of 3 G cellular systems
b) Define co-channel interference reduction factor
c) Describe the concept of overlaid cell
d) Write the features of Omni directional antennas?
e) Define the dropped call rate.
f) Compare the basic technological differences between GSM and CDMA

\section*{PART-B \((4 x 14=56\) Marks)}
2. a) Describe the analog and digital cellular systems and limitations of AMPS [7] standard
b) Why does the mobile phone cell, the basic geographic unit of cellular system, have a hexagonal shape? Explain
3. a) Define co-channel interference. How is it measured at the mobile unit and cell site?
b) Write a brief note on designing directional antenna system considering the effect of interference
4. a) Describe the effect of antenna height in near and long distance mobile propagation.
b) Explain the mobile radio propagation over water and flat open area and write the general expression
5. a) Explain the construction \& Working principal of broadband umbrella pattern antennas in cellular systems
b) Explain omni directional antenna in detail with neat diagram.
6. a) With a neat diagram explain intersystem handoff in detail
b) Explain the difference between soft handoff and hard handoff
7. a) What are the advantages of digital cellular systems over analog?
b) Describe the principle, advantages and disadvantages of CDMA technique

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 CELLULAR AND MOBILE COMMUNICATIONS
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A(14 Marks)
1. a) Explain the concept of Cell sectoring.
b) What are the types of interferences in cellular system?
c) Explain the concept of paging channels in detail.
d) List out the types of antennas used at cell site.
e) List out the different vehicle locating methods.
f) Write the features of OFDMA.

\section*{PART-B \((4 x 14=56\) Marks \()\)}
2. a) Explain the concept of frequency reuse channels and frequency reuse distance.
b) Why do all cells not have uniform size in a practical cellular network? Explain.
3. a) What is Interference and determine the real time co-channel interference in cellular systems.
b) What is titling antenna? How can these antenna patterns reduce the co-channel interference?
4. a) Describe the form of a point-to-point model and explain its types
b) Explain the mobile signal propagation over water and flat area.
5. a) What are the different types of antennas used at cell site? Explain them in detail.
b) Define space diversity technique and explain horizontally and vertically oriented space diversity antennas
6. a) What is meant by handoff? Describe the classification of handoff processes.
b) What is meant by handoff initiation? Explain the different methods of handoff initiation with suitable diagrams.
7. a) Elaborate the concept of GSM channels in digital cellular networks.
b) Draw the TDMA frame structure and explain the significance of each slot.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 DISTRIBUTED SYSTEMS
(Common to Computer Science and Engineering and Information Technology) Time: \(\mathbf{3}\) hours

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Define Ubiquitous Computing.
b) Define the Remote Object Reference.
c) How are unused remote objects handled by java garbage handling?
d) Define Page fault.
e) Define Server Caching.
f) What do you mean by Flat Transaction?
\[
\underline{\text { PART-B }(4 x 14=56 ~ M a r k s) ~}
\]
2. a) Explain about Heterogeneity challenge in Distributed systems.
b) Describe Interaction model and Security model in Distributed systems.
3. a) List and explain the characteristics of Inter Process Communication.
b) Discuss in detail about Java API for UDP datagram.
4. a) How Remote Procedure Calls are handled in Java? Illustrate with a sample code. [7]
b) Explain in detail Distributed Object Model.
5. a) Discuss in detail the architecture and principles of Monolithic kernel and Micro kernel.
b) How Process and Thread are implemented in UNIX operating system.
6. a) Discuss various Storage systems and their properties.
b) How mutual exclusion is handled in distributed environment? Explain with a neat diagram.
7. a) Explain in detail various operations for Two-phase commit protocol.
b) Write in detailed note on optimistic Concurrency control.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 DISTRIBUTED SYSTEMS
(Common to Computer Science and Engineering and Information Technology)

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Define Intranet.
b) List the uses of TCP.
c) Define Distributed Objects.
d) Compare Process and Thread.
e) Give the significance of lseek.
f) What do you mean by nested transaction?

\section*{\(\underline{\text { PART-B ( } 4 x 14=56 \text { Marks) }) ~}\)}
2. a) What are the factors which lead to define an "unreliable" network? Explain.
b) List and explain design requirements for distributed systems.
3. a) List and explain the characteristics of the network hidden by the TCP [7] Abstraction.
b) Discuss in detail about Java API for TCP datagram.
4. a) Explain the various design issues of RMI
b) Discuss the role of proxy and skeleton in remote method Invocation
5. a) With neat sketch explain the Operating System Layer.
b) List the advantages and disadvantages of kernel level process and user level process.
6. a) Explain the requirements of Distributed File System.
b) Draw and explain File Service Architecture.
7. a) Describe in detail Distributed Deadlocks.
b) Compare and contrast active replication with passive replication.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 DISTRIBUTED SYSTEMS
(Common to Computer Science and Engineering and Information Technology)

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Does a system fail if any one QoS factor is not available? Substantiate our [3] answer.
b) What is marshalling?
c) Give the significance of Interface Definition Language.
d) What do you mean by Thread Synchronization?
e) Define Mutual Exclusion.
f) What do you mean by Time stamp ordering?

\section*{PART-B ( \(4 \times 14=56 \mathrm{Marks}\) )}
2. a) Write in detail about Intranet and Internet.
b) Discuss about Failure Model in Distributed Systems. How is it different from other fundamental models?
3. a) What is Inter process communication? How does TCP communication differ from UDP communication?
b) How does IPMulticast used in implementation of group communication?
4. a) Describe in detail Distributed Garbage Collection.
b) Explain in detail participants in distributed event notification.
5. a) Explain in detail light weight Remote Procedure call.
b) Describe the role of Micro Kernel.
6. a) Write in detailed note on Distributed Mutual Exclusion.
b) Explain ring based Election algorithm with neat sketch.
7. a) Describe the recovery of the Two Phase Commit protocols.
b) Explain in detail about Fault tolerant services in Distributed Systems.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
DISTRIBUTED SYSTEMS
(Common to Computer Science and Engineering and Information Technology)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Define Proxy Servers.
b) List the advantages of UDP.
c) What do you mean by RMI registry?
d) Compare a process with a thread.
e) Define Throughput.
f) What do you mean by Passive replication?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Discuss in detail about Resource Sharing and World Wide Web
b) Explain the problems occur while designing distributed systems.
3. a) Compare group communication with client/server communication.
b) Implement the Request - Reply protocol using TCP streams.
4. a) How are unused remote objects handled by Java Garbage Handling? How the algorithm helps to avoid failure? Explain.
b) Explain about design and implementation of Java RMI
5. a) How the process and threads are implemented in UNIX operating system?
b) Explain how a shared region could be used for a process to read data written by kernel.
6. a) Discuss the server managing a Mutual exclusion token for a set of process.
b) Write in detailed note on Multicast Communication.
7. a) How a server manages mutual exclusion token for a set of processes? Explain with an example.
b) Write about Passive replication and Active replication.

\title{
IV B.Tech II Semester Supplementary Examinations, June - 2022 \\ CELLULAR MOBILE COMMUNICATION \\ (Electronics and Communications Engineering)
}

Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any THREE questions from Part-B \\ *****}

PART-A (22 Marks)
1. a) Explain about co-channel interference reduction factor.
b) Explain about long distance propagation.
c) Write a short note on high gain antennas.
d) Define a dropped call rate and explain how it differ from blocked call.
e) Difference between soft handoff and hard handoff.
f) List some differences of GSM and GPRS.

\section*{PART-B (3x16 = 48 Marks)}
2. a) What are the various mobile phone technologies that are existing in addition to the cellular networks?
b) What are the different types of Cell Splitting? Explain.
3. a) Give the differences between co-channel interference and neighboring channel interference.
b) Explain the concept of lowering the antenna height to decrease the co-channel interference.
4. a) What are the different types of antennas used at cell site? Explain them in detail.
b) Explain the concept of diversity antenna spacing in cell site with a simple diagram.
5. a) Discuss about non fixed channel assignments.
b) Describe the grouping of the voice, setup, and paging channels.
6. a) Explain about the types of Hand offs in detail.
b) Explain in detail about microcells and its advantages.
7. a) Explain the principle of CDMA with a neat sketch and write its advantages and disadvantages.
b) Explain the architecture of NA-TDMA.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 HVDC TRANSMISSION \\ (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70

\title{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A (14 Marks)
1. a) Write the advantages of controllability of DC transmission systems?
b) Write the relation between source reactance and coupling factor of 12 pulse converter?
c) What is meant by constant AC voltage control?
d) List out the sources of reactive power.
e) What is meant by current extinction malfunction in the controllers?
f) Write the objective of design of AC filters?

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Draw the characteristics and explain the cost variation characteristics of AC and [7] DC transmission systems.
b) Explain the reliability of HVDC transmission systems with necessary equations.
3. a) Discuss in detail about the 5 modes of region of the rectifier operation of a 12 [7] pulse converter.
b) Explain in detail about the differences between the operational features of 6 pulse and 12 pulse converters for HVDC system.
4. a) Analyze the steady state equivalent circuit of a two terminal DC link by using relevant expressions.
b) Draw and explain the converter control characteristics for negative current margin.
5. a) Discuss in detail about the sequential method of power flow solution with necessary equations.
b) Explain in detail about the conventional control strategies of the reactive power control in the steady state.
6. a) Elaborate the short circuit in a bridge with voltage and current wave forms.
b) Discuss in detail about the differences between the voltage and current harmonics with necessary equations.
7. a) Derive the expression for the inductance of a single tuned filter.
b) Explain in detail about the design aspects of high pass filter with necessary [7] equations.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 HVDC TRANSMISSION (Electrical and Electronics Engineering)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) List out the factors to be considered for AC and DC transmission systems.
b) Write the role of converters in HVDC transmission systems?
c) What is the function of control variable in the DC link control?
d) What is meant by a static VAr compensation system?
e) What is meant by fire through malfunction?
f) Write the need of AC filter design?
\[
\underline{\text { PART-B }(4 x 14=56 ~ M a r k s) ~}
\]
2. a) Discuss in detail about the economics of power transmission by using the [7] distance verses cost characteristics of AC and DC transmission systems.
b) Explain the choice of voltage level for long distance bulk power transmission.
3. a) Write the current and voltage equations and analyze in detail about the 12 pulse converter?
b) Draw the circuit diagram and explain the operation of Graetze converter.
4. a) Discuss in detail about the individual phase control of firing scheme along with the draw backs.
b) Draw and explain about the block diagram of power and auxiliary controller.
5. a) Explain in detail about the solution of non linear equations in the power flows of AC/DC systems.
b) A back to back HVDC link with one bridge at each end is transmitting 120MW with \(\mathrm{V}_{\mathrm{d}}=122 \mathrm{kV}\). If \(\alpha=17^{0}\) and \(\gamma=19^{0}\), find \(\mathrm{V}_{\mathrm{dor}}, \mathrm{V}_{\mathrm{doi}}, \mathrm{Q}_{\mathrm{r}}, \mathrm{Q}_{\mathrm{i}}\) by assuming \(\mathrm{R}_{\mathrm{cr}}=\mathrm{R}_{\mathrm{ci}}=15\) ohms. If the DC link is controlled such that \(\mathrm{Q}_{\mathrm{i}}\) is kept at the value calculated earlier, find \(V_{d}, I_{d}, Q_{r}, \alpha, \gamma\) for \(P_{d}=55 \mathrm{MW}\).
6. a) Discuss in detail about the effect of corona on the DC lines with relevant equations.
b) Elaborate various adverse effects of harmonics on the DC transmission lines.
7. a) Draw the diagram and explain the operation of damped filter circuit.
b) Explain the characteristics of impedance of the single tuned filter.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 HVDC TRANSMISSION \\ (Electrical and Electronics Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) What is meant by synchronous interconnection?
b) List out the modes of general rectifier operation.
c) How the control of power in the DC link is achieved?
d) Write the disadvantages of forced commutation?
e) What is meant by arc through malfunction in the converters?
f) Write the relation between filter design and harmonic distortion?

\section*{PART-B (4x14 = 56 Marks)}
2. a) Explain in detail about the stability limits and voltage control of AC/DC transmission.
b) Discuss about the various new trends used to reduce cost of the converter station and improving the performance of the HVDC transmission.
3. a) Elaborate the factors to be considered for the choice of the converter configuration.
b) A Graetz bridge operates with a delay angle of \(17^{0}\). The leakage reactance of the transformer is 14 ohms. The line to line AC voltage is 88 kV . Find the overlap angle and DC voltage for \(\mathrm{I}_{\mathrm{d}}=2200 \mathrm{amps}\) and 4700 amps .
4. a) Draw the block diagram and explain in detail about the pulse frequency control of equidistant pulse control.
b) Explain in detail about the starting and stopping criterion of DC link.
5. a) Discuss in detail the basic converter model with circuit diagram.
b) Explain in detail about the alternate control strategies of reactive power control in the steady state.
6. a) Explain in detail about the effect of pulse number on the harmonics.
b) Discuss about the calculation of characteristic AC harmonics with relevant equations.
7. a) Draw the diagram and explain the operation of C-type high pass filter.
b) Explain the variation of impedance characteristics of damped filter with different quality factors.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 HVDC TRANSMISSION (Electrical and Electronics Engineering)
}

Time: 3 hours
Max. Marks: 70
\[
\begin{gathered}
\text { Question paper consists of Part-A and Part-B } \\
\text { Answer ALL sub questions from Part-A } \\
\text { Answer any FOUR questions from Part-B } \\
* * * * * \\
\text { PART-A (14 Marks) }
\end{gathered}
\]
1. a) Write short notes and formula of energy availability?
b) Define the coupling factor of 12 pulse converter.
c) What is meant by constant DC voltage control?
d) Write the relation between forced commutation and reactive power?
e) Define the arc backs in the valves.
f) Write the draw backs of AC filters?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Explain in detail about the application of \(D C\) transmission systems.
b) Draw the diagrams and explain the types of HVDC links.
3. a) Elaborate the performance of two three phase converters connected in star-star model.
b) By using the circuit diagram analyze the operation of 6 pulse converter with relevant wave forms.
4. a) Draw and explain in detail about the characteristics of converter controller.
b) A bipolar HVDC link operates with \(\pm 300 \mathrm{kV}, 620 \mathrm{MW}\) rated voltage and powers respectively at the rectifier end. The resistance of each line conductor is 18 ohms. The converter transformers have a leakage reactance of \(0.17 \mathrm{p} . \mathrm{u}\) on their own base values. There are two series connected converter bridges per pole. The AC bus voltage at both rectifier and inverter buses are regulated at rated voltage of 230 kV . Find the ratings and turns ratios of the converter transformers at the rectifier and inverter? Also find the reactive power supplied at the rectifier and inverter stations? Assume operating values of delay angle and extinction angles as \(16^{0}\) at the inverter.
5. a) Explain in detail about the solution of AC-DC power flow problem with necessary equations.
b) Discuss the operation of shunt capacitor and synchronous condenser in reactive power control of HVDC systems.
6. a) What is meant by commutation failure? Explain the voltage waveforms of single commutation failure.
b) What are non characteristic harmonics? Discuss their effects on the HVDC transmission.
7. a) Elaborate the design aspects of single tuned filter and write its advantages.
b) Explain the variation of impedance of a damped filter with characteristics.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 UNCONVENTIONAL MACHINING PROCESSES
}

\section*{(Mechanical Engineering)}

Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) What are the basic elements of ultrasonic machining?
b) What are the economic aspects to be considered for ECM?
c) What are the dielectric fluids commonly used in EDM process?
d) Explain the principle of Laser beam?
e) What are the limitations of plasma arc machining?
f) List out the applications of water jet machining?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Explain the factors, which influence the metal removal rate in USM. Explain briefly.
b) Describe the horn of an ultrasonic machine.
3. a) Comment about surface finish and accuracy in electro-chemical machining.
b) What are the steps involved in the chemical machining? Explain.
4. a) Explain about the characteristics of spark eroded surfaces.
b) Explain any four power circuits used for EDM process.
5. a) With the help of line diagram explain the construction, working and applications of electron beam machining.
b) Compare the difference between electron beam and laser beam machining.
6. a) Describe the Process parameters of PAM and influence on machining quality? Explain.
b) Explain the metal removal mechanism, applications of plasma in manufacturing industries.
7. a) Explain the influence of nature of abrasives on metal removal rate in abrasive jet [7] machining.
b) Explain Electro stream drilling.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 UNCONVENTIONAL MACHINING PROCESSES
}

\section*{(Mechanical Engineering)}

Time: \(\mathbf{3}\) hours
Max. Marks:70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B ***** \\ PART-A(14 Marks)}
1. a) What is non-traditional machining methods?
b) Write the application of electrochemical deburring?
c) Name some of the tool material used in EDM?
d) Comment about accuracy of cut in electron beam machining[2]
e) Explain the principle of Plasma arc machining?[2]
f) Name different gases used in AJM?

\section*{PART-B \((4 x 14=56\) Marks)}
2. a) How to classify modern machining process?
b) Explain the basic mechanism of metal removal in ultrasonic machining.
3. a) Write a short note on electro chemical honing process.
b) Briefly explain the process of electro chemical grinding.
4. a) Explain the basic mechanism of metal removal in electric discharge machining.
b) Write a short note on selection of tool electrode and dielectric fluids in EDM.
5. a) Explain the mechanism of metal removal in electron beam machining.
b) List out the applications for Laser beam machining.
6. a) Explain the process parameters of plasma machining.
b) What are the different modes of operation of plasma torches? Explain.
7. a) Explain the mechanism of material removal for Abrasive Jet Machining.
b) Write a short note on magnetic abrasive finishing.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 UNCONVENTIONAL MACHINING PROCESSES

\section*{(Mechanical Engineering)}

Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) Differentiate the conventional and unconventional machining processes in terms of principles.
b) What are the applications of chemical machining?
c) What factors are to be considered for the selection of tool material in electric discharge machining?
d) What are the process parameters involved in Laser beam machining?
e) What are the applications of plasma in manufacturing industries?
f) Why WJM is not suitable for brittle materials? Explain

PART-B ( \(4 x 14=56\) Marks)
2. a) Explain the process of USM and list any two of its advantages, limitations and applications.
b) What are the main parameters to be considered while selecting a particular process? Why?
3. a) Describe the chemistry involved in ECM process.
b) List out the applications, advantages and disadvantages of ECM process.
4. a) What is flushing in EDM process? Explain about various flushing techniques.
b) Explain the mechanism of material removal process of EDM.
5. a) What are the working principle and the applications of electron beam machining process? Diagrammatically show the electron beam machining system.
b) Explain the mechanism of material removal process of Laser Beam Machining.
6. a) Explain the surface finish obtained in PAM.
b) Explain with a figure about the Plasma arc torch.
7. a) Write the names of various elements of Abrasive water jet machining and explain them in brief.
b) Write a short note on Shaped Tube Electrolytic Machining.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
UNCONVENTIONAL MACHINING PROCESSES

\section*{(Mechanical Engineering)}

Time: \(\mathbf{3}\) hours
Max. Marks:70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) What is meant by the term non-traditional machining?
b) Give the electro-chemistry associated with electro-chemical machining?
c) What is wire EDM?
d) What are the applications of Laser beam machining?
e) Write the various types of torches used in plasma arc machining?
f) List the applications of shaped tube electrolytic machining.

PART-B ( \(4 x 14=56\) Marks)
2. a) Describe the structure of the transducer in an ultrasonic machine.
b) Explain economic considerations in USM.
3. a) Explain the principle and working of electro chemical machining with a neat sketch.
b) What are the various electro chemical processes used for material removal?

Enumerate the principle differences in working in these processes.
4. a) With the help of a line diagram explain the working of electric discharge[7] grinding.
b) Derive an expression for determining the surface finish in EDM process.
5. a) Write four specific applications where you feel that EBM should be the [7] preferable choice.
b) Sketch the electron beam gun and explain the function of each part.
6. a) Explain the metal removal mechanism of Plasma Machining.
b) Describe the various elements used in plasma arc cutting system. How the performance of the process is measured.
7. a) Explain the mechanism of material removal for water Jet Machining.
b) Write a short note on abrasive flow finishing.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
} ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) Explain the importance of Ohmmeters
b) Draw the Basic wave analyzer and explain its operation
c) Define deflection sensitivity of a CRT?
d) Derive the balance condition of Bridge
e) Explain the different Advantages of Electrical Transducers in detail
f) Explain any one of the method for the measurement of humidity?

\section*{PART-B(4x14 = 56 Marks)}
2. a) Explain the following terms in detail
(i) Accuracy (ii) Resolution (iii) Precision (iv) Expected value
b) List out different AC voltmeters and explain the working of any one voltmeter in detail
3. a) What is Heterodyning and explain the use of Heterodyning in spectrum analyzer along with its circuit diagram
b) Write short notes on Function Generator in detail
4. a) Explain the concept of Storage oscilloscope along with circuit diagram
b) Draw the circuit diagram of Sampling oscilloscope and explain its operation \(n\) detail.
5. a) Draw and explain the operation of Wien Bridge and derive the bridge balance condition
b) In the case of a Schering Bridge, arm Ac has \(\mathrm{R}=7.7 \mathrm{k} \Omega\). Arm CD has unknown elements. Arm BD has \(\mathrm{C}=0.01 \mu \mathrm{~F}\) Arm \(\mathrm{AB}=4.7 \mathrm{~K} \Omega\) is shunt with 1 MF . Determine Values of components is the arm CD
6. a) Explain the Resistive position Transducer along with circuit diagram.
b) List out different types of Strain Gauges used Transducer and explain any one in detail.
7. a) With the help of a neat sketch explain the principle and working of Electromagnetic Flow meter. What are the advantages and Limitations of this Method?
b) Briefly explain the working principles and measurement of force by any two nonelectric techniques?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION \\ (Electronics and Communication Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)
}
1. a) Explain the term Dynamic error in detail
b) Distinguish between spectrum analyzer and harmonic distortion analyzer
c) Explain the concept of delay line in CRO
d) Define Quality factor and give the expressions for the inductive and capacitive Quality factors
e) List out difference between active and passive transducer in detail
f) Explain the significance of load cell in force measurement

\section*{PART-B(4x14 = 56 Marks)}
2. a) Draw the Sketch and explain the principle and operation of Thermocouple type Ammeter.
b) Two ammeters are joined in series in a circuit carrying 150 A . one ammeter has a resistance of 20000 ohm shunted by 0.10 ohm while the other ammeter has a resistance of 100 ohm shunted by 0.02 ohm . if the shunts are interchanged what would be the readings of the instruments?
3. a) What is AF oscillators and explain its operation along with circuit diagram.
b) Draw the circuit diagram of Digital Fourier Analyzers and explain its operation.
4. a) Explain the Measurement procedure of Lissajous patterns with one example.
b) Explain the principle and working of a storage oscilloscope
5. a) Draw the circuit diagram of Schering's Bridge and explain the operation of it.
b) Explain the "parallel-connection" method of using Q-meter and Obtain the expressions for resistance, reactance and Q factor.
6. a) Draw the Linear variable differential Transducer and explain its operation in detail.
b) What is Thermistor and explain its importance along with advantages of it?
7. a) What is proximity? Explain the operation of proximity transducer.
b) How angular speed shall be measured using the digital method?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION \\ (Electronics and Communication Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Draw the series type Ohmmeter and explain its operation
b) Define the terms Dynamic range and Harmonic mixing
c) List out specifications of CRO
d) What are the problems associated with shielding? And explain the remedies [2]
e) Define Gauge factor for transducer and explain its significance
f) List the applications of Hydraulic force meter

\section*{PART-B \(\mathbf{~} \mathbf{4 x} 14=56\) Marks \()\)}
2. a) Draw the Block diagram of successive approximation type Digital voltmeter and [7] explain its operation
b) Differentiate between a true R.M.S meter and an average responding meter.
3. a) Draw the circuit diagram and explain the operation of Digital spectrum analyzer'
b) Explain the requirements of pulse with reference to generator along with block diagram.
4. a) Draw the circuit diagram of Sampling oscilloscope and explain its operation \(n\) detail.
b) Explain various types of probes used for CRO.
5. a) Explain the operation of Maxwell's Bridge and derive the condition for balance of a Bridge.
b) In the case of Hay's Bridge one arm has resistance of \(100 \mathrm{~K} \Omega\). Another arm has a resistance of \(6.7 \mathrm{~K} \Omega\). The third arm \(16 \mathrm{~K} \Omega\) in series with a capacitor of \(0.5 \mu \mathrm{~F}\). Determine the values of the elements Rx and Lx in the fourth arm.
6. a) What is Piezo-electric effect? Explain the operation of Piezo-electric transducer.
b) Explain the working of capacitive transducers.
7. a) Define and explain about Absolute humidity, Relative humidity, Specific humidity. Elaborate how humidity is measured.
b) Explain in detail about the stroboscope for the measurement of speed.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION \\ (Electronics and Communication Engineering)
}

\author{
Time: 3 hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Give a classification of voltmeters
b) List the applications of wave analyzers
c) List out the different Futures of CRT in detail
d) Explain the limitations of Wheatstone bridge
e) Write short notes on Sensistor's and Thermistor's
f) Explain the concept of Data acquisition systems in detail

\section*{PART-B(4x14 = 56 Marks)}
2. a) Explain in detail about \(D \bar{C}\) voltmeters with the suitable example
b) A Voltmeter having a sensitivity of \(30 \mathrm{k} / \mathrm{V}\) reads 80 V on a 100 V scale, when connected across an unknown resistor. The current through the resistor is 2 mA . Calculate the \% of error due to loading effect
3. a) Explain the working principle of a harmonic distortion analyzer along with circuit diagram
b) Explain the significance and working of frequency selective wave analyzer
4. a) Illustrate about construction of Cathode Ray Oscilloscope.
b) Explain the operation of trigger pulse circuit along with circuit diagram
5. a) Describe the method of measuring high impedance using Q-meter.
b) Draw the circuit diagram of Maxwell's bridge and derive conditions of balance
6. a) What is the difference between photo-emissive, photo-conductive and [7] photovoltaic transducers?
b) Derive the expression for Gauge factor of a strain Gauge.
7. a) Define moisture and explain a method to measure it
b) Explain the working principle of an accelerometer along with diagram

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 \\ MANAGEMENT SCIENCE
}
(Common to Computer Science and Engineering and Information Technology)
Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Define Management and its process
b) Why we use p-Chart?
c) What is HRM(Human Resource management)?
d) Explain the steps in PERT (Program Evaluation and Review Technique)
e) What should a vision statement include?
f) Define \& explain the term MIS. State its objectives
\[
\underline{\text { PART-B }}(4 x 14=56 \text { Marks })
\]
2. a) Explain about the nature and significance of management
b) Discuss briefly the steps involved in Decision making process
3. a) What is meant by method study, its objectives and steps involved in method study.
b) Explain about the objectives and importance of EOQ approach, how do you decide EOQ in Textile industry
4. a) Define HRM, and explain function of HRM
b) What is Distribution? And discuss various channels of distribution.
5. a) What are the three components to build a net work?
b) Compute Corresponding value of \(Z(x)\) i.e., probability to complete project within the time, if Time Scheduled is 48 days.
\begin{tabular}{|c|c|c|c|}
\hline Activity Alternate & \begin{tabular}{l} 
Time Optimistic \\
(To) Days
\end{tabular} & \begin{tabular}{l} 
Time Optimistic \\
(To) Days
\end{tabular} & \begin{tabular}{l} 
Time Optimistic \\
( To) Days
\end{tabular} \\
\hline \(1-2\) & 4 & 5 & 12 \\
\hline \(2-3\) & 8 & 10 & 18 \\
\hline \(2-4\) & 6 & 11 & 22 \\
\hline \(3-5\) & 2 & 6 & 10 \\
\hline \(4-5\) & 10 & 15 & 20 \\
\hline \(5-6\) & 7 & 9 & 17 \\
\hline
\end{tabular}
6. a) What is Corporate Planning Process and explain various steps involved.
b) List and explain different components of SWOT Analysis? How SWOT analysis can be conducted in Service Sector?
7. a) Explain the concept of JIT. How does it help the manufacturing system to improve productivity?
b) What is Enterprise Resource Planning (ERP)? Explain the process of ERP.

IV B.Tech II Semester Regular/Supplementary Examinations, June- 2022 MANAGEMENT SCIENCE
(Common to Computer Science and Engineering and Information Technology) Time: \(\mathbf{3}\) hours

\title{
Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B *****
}

\section*{PART-A(14 Marks)}
1. a) Define Management Science
b) How ABC analysis is useful in inventory management?
c) Discuss the instruments of HRD (Human Resource Development ).
d) How is total project variance determined in CPM?
e) Explain Mission Statement anatomy.
f) What are the Four principles of TQM ( Total Quality Management )

\section*{PART-B \((4 x 14=56\) Marks \()\)}
2. a) What are the principles of organization? Discuss its need
b) Explain about Global Leadership and Organisational Behaviour Effectiveness (GLOBE) structure
3. a) Define Inventory, and discuss the need of Inventory Control in an organization
b) What is ABC analysis. Explain about various types of ABC analysis
4. a) Define HRD, and differentiate it from HRM
b) What is Merit rating? How it is useful for Job evaluation
5. a) Following Data relates to a certain project
\begin{tabular}{|c|c|c|c|}
\hline Activity & Optimistic Time & Most likely time & Pessimistic Time \\
\hline \(1-2\) & 2 & 5 & 14 \\
\hline \(1-3\) & 3 & 12 & 21 \\
\hline \(2-4\) & 5 & 14 & 17 \\
\hline \(3-4\) & 2 & 5 & 8 \\
\hline \(4-5\) & 1 & 4 & 7 \\
\hline \(3-5\) & 6 & 15 & 30 \\
\hline
\end{tabular}

Find out:
i) Construct the network.
ii) Identify the critical path and duration of the project.
b) What do you mean by crashing a network? State the step by step procedure of crashing.
6. a) What is Mission? What are the characteristics of a good Mission statement?
b) Define Environmental Scanning and how is it useful to business organizations?
7. a) What is MIS? How MIS is useful for decision making?
b) Explain about bench marking

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
}

MANAGEMENT SCIENCE
(Common to Computer Science and Engineering and Information Technology)
Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A(14 Marks)
1. a) Illustrate the generic functions of management.
b) What can be controlled using R chart?
c) What are the factors determining job evaluation?
d) What are the three types of probability?
e) Write a short note on Corporate Planning
f) Discuss the Salient features of Supply Chain Management

\section*{PART-B(4x14 = 56 Marks)}
2. a) Define and explain in detail the management and its various functions
b) Explain the principles and types of organizational structures
3. a) Elucidate on the role and importance of control charts in production
b) The following information is about the shock observers used by automobile work shop Annual demand 5000 units, Unit price Rs 350 Cost of placing an order Rs 60, Storage cost 4 Percent per annum Interest rate 8 percent per annum Calculate EOQ and also find the number of orders to be placed
4. a) Discuss the various functions of marketing.
b) What is performance appraisal? discuss the various tools and techniques of [7] performance appraisal.
5. a) How does the PERT technique helps a business manager in decision making
b) A project schedule has the following characteristics
\begin{tabular}{|c|c|c|c|}
\hline Activity & Time (week) & Activity & Time (week) \\
\hline \(1-2\) & 4 & \(5-6\) & 4 \\
\hline \(1-3\) & 1 & \(5-7\) & 8 \\
\hline \(2-4\) & 1 & \(6-8\) & 1 \\
\hline \(3-4\) & 1 & \(7-8\) & 2 \\
\hline \(3-5\) & 6 & \(8-10\) & 5 \\
\hline \(4-9\) & 5 & \(9-10\) & 7 \\
\hline
\end{tabular}

Find out: (i) Construct a network (ii) Compute earliest occurrence time (E) and least occurrence time (L) for each event (iii) Find the critical path.
6. a) Briefly explain about
i) Vission ii) Mission iii) Goals and iv) Strategy
b) Define strategy. Explain various Steps in Strategy Formulation, Implementation and Evaluation.
7. a) Write about the balance score card
b) Explain the importance of Business Process Outsourcing

\section*{IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022} MANAGEMENT SCIENCE
(Common to Computer Science and Engineering and Information Technology)
Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A(14 Marks)
1. a) What are the Levels of Organization structure?
b) Discuss Advantages of FSN Analysis
c) Explain Stages of Product Life Cycle
d) What is network analysis used for?
e) How SWOT analysis is useful in business?
f) What does a balanced score card measure?
\(\underline{\text { PART-B }} \mathbf{( 4 x 1 4 = 5 6 ~ M a r k s ) ~}\)
2. a) Define Motivation. Explain any two motivational theories
b) Discuss the challenges to management in the new millennium
3. a) Briefly explain ABC analysis significance in inventory management
b) A manufacturer has to supply his customers 800 units of his products per year. Shortages are not allowed and the inventory carrying cost amount to Rs:0.8/- per unit per year. The setup cost per run is Rs:90/-.
Find:
i) Economic Order Quantity
ii) Minimum Average Yearly cost
iii) Time between two orders and optimal number of orders per year
4. a) Define marketing, and explain various functions of marketing
b) Discuss different wage payment system
5. a) Enumerate the network analysis and its advantages.
b) Determine Critical Path for following information:
\begin{tabular}{|c|c|c|}
\hline Activity & Predecessor & Duration (Days) \\
\hline A & -- & 12 \\
\hline B & A & 10 \\
\hline C & A & 16 \\
\hline D & A & 14 \\
\hline E & B & 8 \\
\hline F & C & 18 \\
\hline G & D & 20 \\
\hline H & E, F\&G & 22 \\
\hline
\end{tabular}
6. a) State the significance of corporate planning.
b) Explain about the theories of multinational companies
7. a) What is six-sigma?
b) Explain about Business process Re-Engineering.

\title{
IV B.Tech II Semester Supplementary Examinations, June - 2022 ELECTRONIC MEASUREMENTS \& INSTRUMENTATION (Electronics and Communications Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any THREE questions from Part-B \\ ***** \\ PART-A (22 Marks)}
1. a) A 500 Volts voltmeter is accurate within \(+/-1 \%\) at full scale. Calculate the limiting error when the instrument is used to measure a voltage of 200 Volts.
b) What are the limitations of AF Oscillators?
c) Explain the concept of Triggered Sweep CRO along with circuit diagram.
d) Define Accuracy, Resolution, Sensitivity
e) Explain the working principle of Linear variable differential Transformer(LVDT).
f) List the applications of Hydraulic force meter.

\section*{PART-B ( \(3 x 16=48\) Marks)}
2. a) Illustrate in detail about the dynamic characteristic of instruments.
b) Mention the use of Ohmmeter. Draw and explain the operation of Series Ohmmeter and Shunt Ohmmeter.
3. a) Draw the circuit diagram of Digital Fourier Analyzers and explain its operation.
b) Describe the generation of square and pulse in laboratory type generator.
4. a) With a neat block diagram, explain the operating principles of Dual trace CRO. Also, give the significance of vertical deflection plates in a CRT.
b) Elaborate the different modes of operation in Dual Trace Oscilloscope.
5. a) Explain the construction of Anderson's Bridge and Draw the phasor diagram of it.
b) Quantitatively explain about a bridge which is used for the measurement of the High Quality factor values.
6. a) With a neat diagram, explain the construction operation and applications of LVDT
b) Explain strain construction principle and also derive expression for gauge factor.
7. Write short notes on the following
a) Measurement of pressure
b) Measurement of proximity

\section*{IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022}

ELECTRICAL DISTRIBUTION SYSTEMS
(Electrical and Electronics Engineering)
Time: 3 hours

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Define Coincidence factor
b) What is the need of substations
c) What is the main objective of distribution system protection?
d) What is the need of voltage drop calculating indistribution systems.
e) What are the causes of low power factor
f) What are the equipments used for voltage control.
\[
\text { PART-B }(4 x 14=56 \text { Marks })
\]
2. a) Discuss the characteristics of different loads
b) Derive the relationship between the load factor and loss factor.
3. a) Compare the four and six feeder's patterns in substation location.
b) Classify different types of primary feeders and give their merits and demerits
4. a) Discuss a four wire multi-grounded common neutral distribution system.
b) Consider a three phase, 3 wire, 240 V secondary system with balanced loads at A , B and C as shown in Figure. Determine: (i) The voltage drop per phase (ii) The real power per phase for each load (iii) The reactive power per phase for each load.
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline 26 & \multicolumn{2}{|l|}{A} & B & & \multirow[t]{2}{*}{C} & \multirow[t]{2}{*}{\[
\mathrm{Z}_{1}=(0.03+\mathrm{j} 0.01) \Omega / \text { phase }
\]} \\
\hline -2e & \(\mathrm{Z}_{1}\) & \multirow[t]{2}{*}{\(\mathrm{Z}_{2}\)} & & \(\mathrm{Z}_{3}\) & & \\
\hline Distribution transformer & 20 A & & 30 A & & 50 A & \(\mathrm{Z}_{3}=(0.05+\mathrm{j} 0.05) \Omega /\) phase \\
\hline & UPF & & 0.5 lag & & 0.9 lag & \\
\hline
\end{tabular}
5. a) Explain the principle of operation of circuit reclosure with a neat sketch.
b) Explain the general coordination procedure of protective devices.
6. a) Discuss the general procedure to determine the best location of capacitors in distribution system.
b) A synchronous motor improves the p.f of a load of 300 kW from 0.8 lagging to 0.95 lagging. Simultaneously the motor carries a load of 150 kW . Find the leading kVAR taken by the motor, kVA rating of the motor and the \(\mathrm{p} . \mathrm{f}\) at which the motor operates.
7. a) How an AVR can control voltage. With the aid of suitable diagram explain its function.
b) Describe the effect of series capacitor for voltage control with neat diagrams.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ELECTRICAL DISTRIBUTION SYSTEMS
}

\title{
(Electrical and Electronics Engineering)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

> Question paper consists of Part-A and Part-B
> Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B
> \(* * * * *\)

\section*{PART-A (14 Marks)}
1. a) Define Contribution factor
b) What is Primary distribution system
c) What is the function of Circuit breaker?
d) What is the need of power loss calculating in distribution systems?
e) What is most economical power factor
f) What is the need of voltage control in distribution systems.

\section*{PART-B ( \(4 \times 14=56 \mathrm{Marks}\) )}
2. a) Discuss the characteristics of the following categories of loads: (i) Residential
(ii) Agriculture
b) Explain the load modelling of distribution system.
3. a) How the rating of distribution substation can be calculated. Explain taking a general case with `n' no. of feeders
b) Explain radial type primary feeder with neat diagram
4. a) Discuss the voltage drop in A.C distribution? how it is estimated approximately
b) A single phase feeder circuit has total impedance of \((0.5+j 0.2) \Omega\) and \(V_{R}=11 \mathrm{kV}\) and \(\mathrm{I}_{\mathrm{R}}=5 \angle-30 \mathrm{~A}\), respectively. Find (i) Power factor of the load, (ii) Load p.f. for which the impedance angle is maximum and(iii) load p.f. for which impedance angle is maximum and derive the formula used.
5. a) Derive the expression for fault current of line to ground fault in distribution systems.
b) An earth fault occurs on one conductor of a three conductor are supplied by a 10MVA, 6.6 kV , three phase source with neutral earthed. The source has positive, negative and zero sequence impedances of \((0.5+\mathrm{j} 4.7),(0.2+\mathrm{j} 0.5)\) and j 0.43 ohms per phase. The corresponding impedance values for the cable up to the fault point are \((0.36+\mathrm{j} 0.25),(0.36+\mathrm{j} 0.25),(2.8+\mathrm{j} 0.9)\) ohms per phase. Find the fault current
6. a) Explain the economic justification of power factor correction.
b) A single-phase motor connected to a \(230 \mathrm{~V}, 50 \mathrm{~Hz}\) supply takes 25 A at p.f. of 0.7
lag. A capacitor is shunted across the motor terminals to improve the p.f to 0.9 lag. Determine the capacitance of the capacitor to be used.
7. a) Explain the effect of series capacitor compensation and its advantages
b) What is the need of line drop compensator? Explain how it is done in the [7] distribution systems

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
}

ELECTRICAL DISTRIBUTION SYSTEMS
(Electrical and Electronics Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Define load factor?
b) What are the conditions for best location of substations.
c) What is the need of line sectionalizes
d) What is mean by uniformly distributed load?
e) What are the different types of power capacitor?
f) What are the draw backs of series capacitors in distribution system?

PART-B ( \(4 x 14=56\) Marks)
2. a) Obtain the relation between the load factor and loss factor
b) Discuss the characteristics of the following categories of loads: (i) Commercial (ii) Industrial
3. a) How do you analyze a substation service area with `n' primary feeders
b) Discuss the basic design practice of the secondary distribution system
4. a) Derive the expression for voltage drop and power loss of non-uniformly [7] distributed loads.
b) A \(3-\phi\) radial is feeder is receiving end voltage 11 kV , a total impedance of ( \(5.0+\mathrm{j}\)
12) ohms/phase, and a load of 5 MW with a lagging power factor of 0.85 .

Calculate the sending end phase and line voltages and the load angle.
5. a) Describe the recloser to circuit breaker coordination with current time characteristics.
b) List out the frequently occurring faults on a distribution system and derive the formulae for fault currents.
6. a) Explain about different types of power capacitors and their applications
b) Discuss in detail about the economic justification of capacitor compensation.
7. a) Explain effect of the series capacitors in the distribution system with phasor diagrams. What are the limitations in this method?
b) Explain about the AVB in the distribution feeder with neat diagram

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ELECTRICAL DISTRIBUTION SYSTEMS
(Electrical and Electronics Engineering)

\author{
Time: \(\mathbf{3}\) hours
}

> Question paper consists of Part-A and Part-B
> Answer ALL sub questions from Part-A
> Answer any FOUR questions from Part-B
> \(* * * * *\)
> PART-A \((14 \mathrm{Marks})\)
1. a) What are the various types of loads?
b) Explain how the distribution system is classified
c) What is the operating principle of Fuses
d) What is meant by non-uniformly distributed loads?
e) What is the need of shunt compensation
f) What is the voltage drop in the single phase two-wire uni-grounded lateral with full capacity neutral?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Discuss about different load modelling and its characteristics
b) A substation is to supply three regions of loads whose maximum values are 4000 \(\mathrm{kW}, 7000 \mathrm{~kW}\) and 6000 kW . The diversity factor of the load at the substation is 1.4 and the average annual load factor is 0.45 . Determine the peak demand on the substation and annual energy supplied from the substation.
3. a) What are the various factors that are to be considered in selecting optimal location of substation?
b) Describe the design consideration of loop type primary feeder.
4. a) Prove that the power loss due to the load currents in the conductors of singlephase lateral ungrounded neutral case is 2 times larger than one in the equivalent three phase lateral
b) Derive the voltage drop and power loss equation for a uniform distributed loads.
5. a) List out the types of common faults occurred on distribution system and explain the procedure for fault calculations.
b) Explain in detail about fuse- fuse coordination.
6. a) Explain the power factor correction by installing the shunt capacitor bank.
b) An industrial plant has 300 HP induction motor load that runs at 0.8 p.f lagging and efficiency 0.85 . A synchronous motor of 150 HP and an average efficiency \(85 \%\) is available. If the motor is run on no load with same losses, determine the p.f of the motor, to make the overall p.f of the plant to 0.9 . Can the p.f of the plant be raised to u.p.f.? If so what will the KVA intake of synchronous motors
7. a) Why we need to control the voltage of distribution system. What are the methods used for it.
b) Describe the effect of AVB for voltage control on distribution feeders?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 AUTOMOBILE ENGINEERING \\ (Mechanical Engineering)
}

Max. Marks: 70
Time: 3 hours

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Write any four Differences between Turbo Charging and Super Charging.
b) Write a short note on Fluid Flywheel.
c) What is camber and Caster? Explain their significance in steering.
d) List the functions of an Automobile Suspension system.
e) Explain the working principle of Anti-lock Braking System.
f) Discuss the Mechanism of formation of NOx emissions from an automobile engine.

\section*{PART-B \(4 x 14=56\) Marks \()\)}
2. a) Explain the working principle of Splash lubrication system, with the help of a [7] neat sketch.
b) What is a four-wheel drive? Explain the different parts of the four-wheel drive with a neat layout diagram.
3. a) With the help of a neat sketch, explain the construction and working of a multiplate clutch.
b) Mention the Differences between synchro mesh gear box and epicyclic gear box.
4. a) Explain Davis steering mechanism.
b) With the help of neat sketches, explain the working of different steering linkages.
5. a) Discuss the requirements of braking fluids.
\[
\begin{aligned}
& \text { b) Explain with a schematic diagram, working of rigid axle front wheel suspension [9] } \\
& \text { system }
\end{aligned}
\]
6. a) Discuss in detail, the engine specifications with regard to power and speed.
b) Explain about central locking and electric windows?
7. a) Discuss the tests that a crank shaft should be subjected to before re-assembly in a engine.
b) Write about the service details of valves and valve mechanism?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 AUTOMOBILE ENGINEERING \\ (Mechanical Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

PART-A(14 Marks)
1. a) Explain the working principle of Crank Case Ventilation
b) Differentiate between sliding mesh gear box and synchro mesh gear box
c) What is Toe-in and Toe-out? Explain.
d) Give the requirements of a good automobile braking system.
e) List the safety features of a modern automobiles?
f) What is a catalytic converter? Discuss its applications.

\section*{PART-B \((4 x 14=56\) Marks)}
2. a) What is a chassis? Explain the functions of chassis in an automobile. Give the classification of chassis. Explain any two.
b) Explain different methods of repairing an engine which has worn out cylinder walls.
3. a) Draw a schematic diagram and explain the working of a torque convertor.
b) What is a tyre? Discuss the different types of tyres. Explain the differences between Radial and Bias tyres.
4. a) Explain in detail about (i) center point steering and (ii) king pin rake.
b) Explain the term "Backlash" in Steering Gear. Write the common procedure adopted to adjust the backlash in steering gear
5. a) What are the different types of automobile braking systems? Write short notes on pneumatic braking system with a neat sketch.
b) Mention the points to be considered while designing braking system of an automobile. Discuss the different types of braking systems.
6. a) What do you understand by Anti-lock Braking System? Explain its working and mention its advantages over conventional braking system.
b) Write short notes on (i) Air bags and (ii) Bumper of an automobile.
7. a) Explain service details of engine cylinder head?
b) Explain briefly the exhaust gas recirculation device for the control of NOx.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 AUTOMOBILE ENGINEERING
(Mechanical Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A(14 Marks)}
1. a) What is Nitriding of Crank Shaft? Explain.
b) What is a Universal Joint? Where it is used?
c) Write short notes on kingpin rake in automobile steering.
d) Differentiate between Mechanical and Pneumatic braking systems of an [2] automobile.
e) Write the need for cooling system for automobile engine. What are the effects of over cooling and under cooling of an engine on its performance.
f) Write a short note on the strategies to reduce the CO emissions from an [3] Automobile engine.

\section*{PART-B(4x14 = 56 Marks)}
2. a) What is the importance of Lubrication in IC engines? What are the objectives of Lubrication?
b) Explain the working principle of Pressure lubrication system of a Diesel Engine, with the help of a neat sketch.
3. a) What is a clutch? What are the functions of a clutch? Explain the functioning of a cone clutch with a neat sketch.
b) What are the different types of rare axles? Write a short note on any one of them with a neat sketch.
4. a) Write the working principle of Ackerman steering mechanism with the help of a neat sketch. Mention its advantages and disadvantages.
b) Discuss in detail, the different nomenclature involved in steering geometry?
5. a) Name the various electrical components used in an automobile \& give their functions?
b) With the help of neat sketch, explain Independent suspension system.
6. a) Explain with relevant sketches, working of central looking and electric windows in an automobile
b) What are various safety systems adopted for automobiles? Explain wind shield and speed control in detail.
7. a) Explain about thermal and catalytic converters, with neat sketches.
b) Explain the use of alternative fuels for emission control?

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 AUTOMOBILE ENGINEERING
(Mechanical Engineering)
Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Differentiate between Front Wheel Drive and Rare wheel Drive.
b) What is the working principle of a Clutch and give its classification.
c) Difference between Ackerman steering mechanism and Davis steering [2] mechanism.
d) Classify the different types of shock absorbers used in different automobiles.
e) Mention the necessity of a lubrication system for an engine. Discuss what will [2] happen if it fails?
f) Explain why engine servicing is required?

\section*{PART-B \((4 x 14=56\) Marks)}
2. a) What is Turbo charging, Explain its working with the help of a neat sketch. [7] Mention its effect on the performance of an engine.
b) Explain the factors that limit the extent of supercharging of S.I and C.I engines.
3. a) Explain with a simple sketch, construction and working of differential in an [7] automobile
b) What is a gearbox in an automobile? What are the types of automobile gear Box?

Explain the working of a sliding mesh gear box with a neat sketch.
4. a) Explain briefly the Worm and worm wheel steering gear.
b) Explain the steering geometry, with the help of neat sketch.
5. a) Write a short note on torsion bar with the help of a neat sketch and mention its [7] advantages and disadvantages.
b) Describe briefly a `tandem master cylinder` used in a hydraulic braking system.
6. a) Discuss the engine specification with regard to number of cylinders and [7] arrangement?
b) Explain the working principles of operation of mirrors and seat belt in an automobile with the help of a sketch.
7. a) Briefly discuss the mechanism of formation of pollutants in automobile engine exhaust.
b) Discuss the different national and international emission standards is [7] automobiles.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 SATELLITE COMMUNICATIONS (Electronics and Communication Engineering)
}

\author{
Time: 3 hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) How to determine look angle in geostationary satellite?
b) What is the significance of spacecraft subsystem?
c) What is free space loss (FSL)?
d) Differentiate multiplexing and multiple access.
e) Describe the operation of Dual cone sensor.
f) List the major sources of errors in a GPS receiver.

\section*{PART-B(4x14 = 56 Marks)}
2. a) Explain the functions of each element of a Mobile Satellite Service(MSS)
b) Describe various orbital parameters required to determine a satellite's orbit?
3. a) Explain how the spin stabilization shall take place? Discuss.
b) Discuss about \(6 / 4 \mathrm{GHz}\) communication subsystem.
4. a) Narrate the process of the design of downlink in satellite communications.
b) What is the effect of noise and interference on the performance of satellite?
5. a) Explain about the frequency division multiple access of satellite system with a suitable example.
b) An antenna has a noise temperature of 35 K and it is matched into a receiver whichhas a noise temperature of 100 K . Calculate the noise power density and the noisepowerfor a BW of 36 MHz .
6. a) Explain each block of the block diagram of Earth station transmitter.
b) Discuss about the delay and throughput in satellite system.
7. a) Discuss in detail about GPS position location principles.
b) What is the importance of the costal loop in GPS receiver? Discuss

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 SATELLITE COMMUNICATIONS (Electronics and Communication Engineering)
}

\title{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A(14 Marks)
1. a) List the applications of satellites.
b) What is the significance of spin stabilization?
c) What is antenna pointing loss? Explain.
d) Write about Time division multiple access (TDMA).
e) Explain the structure of cassegrain antenna.
f) What is Costas loop?

\section*{PART-B \((4 x 14=56\) Marks)}
2. a) Discuss in detail about the design considerations of a satellite communication [7] system.
b) How can be the look angle determination can be done?.
3. a) Explain in detail about tracking subsystem with neat block diagram.
b) Discuss about spacecraft subsystems.
4. a) Discuss about noise figure and temperature and derive them.
b) Draw the satellite uplink model and discuss each block.
5. a) Find the expression for transmitted power of a satellite using FDMA.
b) Explain the Traffic burst in TDMA.
6. a) Discuss about monitoring and control for an earth station equipment.
b) Illustrate the scan angle of an individual beam width within instantaneous [7] coverage.
7. a) How GPS receiver works?
b) Write short notes on differential GPS.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 SATELLITE COMMUNICATIONS (Electronics and Communication Engineering)
}

\author{
Time: 3 hours
}

Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A(14 Marks)}
1. a) Define Kepler's laws and list the orbital elements of a satellite.
b) What are the requirements of telemetry system?
c) Define noise figure. Find the relation between noise figure and noise [3] temperature.
d) Write about Processing Gain.
e) Describe the terminal characteristics of NGOSS.
f) How to avoid clock error in GPS satellite?

\section*{PART-B \(4 x 14=56\) Marks)}
2. a) Show that three communication satellites are necessary for earth's coverage.
b) The longitude and lattitude of an earth station are \(73^{\circ} \mathrm{E}\) and \(19^{\circ} \mathrm{N}\). Calculate azimuth and elevation angles from earth station to a satellite launched at \(135^{\circ} \mathrm{E}\).
3. a) Discuss about Telemetry, Tracking and command in satellite system.
b) Describe various functions and characteristics of a transponder.
4. a) Explain about the double conversion earth station receiver.
b) Why uplink frequency is different from downlink frequency? Explain.
5. a) Derive the overall carrier to noise ratio in FDMA.
b) A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km . find the period of the orbit and eccentricity of the orbit.
6. a) Distinguish about the Low-noise amplifier and High power amplifier in satellite earth station.
b) Explain the connectivity of LEO satellites to MCS via geostationary satellite.
7. a) What are the signal processing techniques used in GPS receiver?.
b) Explain the technique of range error budget used to provide accuracy in GPS C/A code receiver.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 \\ SATELLITE COMMUNICATIONS \\ (Electronics and Communication Engineering)
}

Time: 3 hours

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

Max. Marks: 70

PART-A(14 Marks)
1. a) Define perigee of a satellite.
b) Write about Doppler effect.
c) What is the effect of interference on the performance of satellite?
d) Write about the importance of guard time in TDMA.
e) What is meant by sun-sync orbit?
f) Describe the codeless signal processing technique used in GPS receiver.
\[
\text { PART-B( } 4 x 14=56 \text { Marks) }
\]
2. a) Discuss the applications of satellite communications.
b) Satellite receives sun rays at \(7^{0} 6^{\prime}\) and the duration of eclipse is 56 min . calculate i) Radius of orbit ii) Height of the satellite.
3. a) Explain various ways of electrical power generation in satellite.
b) Discuss about the practical satellite antennas.
4. a) Explain about different losses exist in EM wave propagation from earth station to satellite.
b) Thermal noise in and earth station receives results in a \((\mathrm{C} / \mathrm{N})_{\mathrm{dn}}\) ratio of 20 dB . A signal is received from a bent pipe transponder with a carrier to noise ratio \((\mathrm{C} / \mathrm{N})_{\mathrm{up}}=20 \mathrm{~dB}\). What is the value of overall \((\mathrm{C} / \mathrm{N})_{\mathrm{o}}\) ratio at the earth station? If the transponder introduces intermodulation products with \((\mathrm{C} / \mathrm{N})_{\mathrm{I}}\) ratio \(=24 \mathrm{~dB}\). What is the overall \((\mathrm{C} / \mathrm{N})_{o}\) ratio at the receiving earth station?
5. a) Distinguish about processing gain and intermodulation.
b) Write about Code Division Multiple Access (CDMA).
6. a) Draw the block diagram of earth station receiver and explain each block.
\[
\begin{aligned}
& \text { b) Explain the general aspects of coverage and frequency considerations of low } \\
& \text { earth orbit. }
\end{aligned}
\]
7. a) Write subframe details of GPS navigation message.
b) What are the major sources of errors in GPS receiver? Explain.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 \\ MACHINE LEARNING \\ (Computer Science and Engineering)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) What problem can be solved by machine learning?
b) What is regression?
c) Give the significance of decision tree.
d) Define linear model.
e) What are probabilistic models?
f) How neural networks are represented in computer?

\section*{PART-B (4x14 = 56 Marks)}
2. a) Explain the features of the machine learning.
b) What is binary classification? Explain scoring and ranking.
3. a) Differentiate between unsupervised and descriptive learning
b) Explain i) multi-class classification ii) multi-class scores and probabilities
4. a) What is decision tree? How is it used in learning? Explain with an example
b) Compare first order rule earning with descriptive rule learning.
5. a) Explain heuristic learning algorithm for linear classifiers.
b) Compare and contrast clustering with classification.
6. a) What is normal distribution and what are the properties of Normal distribution?
b) Explain the probabilistic model for categorical data.
7. a) What is dimensionality reduction? What are the benefits of applying dimensionality reduction?
b) Discuss various problems encountered in neural network learning.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 MACHINE LEARNING (Computer Science and Engineering)
}

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B ***** \\ PART-A (14 Marks)}
1. a) What are the advantages of machine learning?
b) Define classification
c) What is first order rule learning?
d) Give the significance of least squares method.
e) What is normal distribution in Machine learning?
f) What is the use of back propagation algorithm?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Explain the components of machine learning model
b) Compare Regression analysis with cluster analysis
3. a) What is hypothesis state concept of hypothesis space? How does it help in concept learning?
b) How to handle more than two classes? Explain.
4. a) What are the tree -based models in machine learning? Give their features.
b) How does the learning process differ from ordered rule list to unordered rule list
5. a) Explain in detail about Support vector machines
b) How to obtaining Probabilities from Linear classifiers: Illustrate
6. a) Difference between the terms "Probability" and "Likelihood", give the examples for both.
b) How bagging and boosting are used to reduce variance? Give an example.
7. a) Explain dimensionality reduction techniques in detail
b) Why you use PCA? Discuss some advantages and disadvantages of PCA

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 MACHINE LEARNING
}
(Computer Science and Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B ***** \\ PART-A (14 Marks)}
1. a) What is binary splitting?
b) Explain unsupervised ML
c) List out the different types of nodes in Decision Trees
d) Define hierarchical clustering
e) What is bagging?
f) What are the advantages of back propagation?

\section*{PART-B ( \(4 x 14=56 \mathrm{Marks}\) )}
2. a) Explain the models of output in machine learning
b) How binary classification is performed on data?
3. a) What is concept learning? Describe the role of hypothesis space in it.
b) What is regression? Explain types of regression
4. a) What is First-order rule learning in machine learning? Explain witan example
b) Illustrate the process of descriptive rule learning with an example.
5. a) How does perceptron act as a heuristic learning algorithm for linear classifier?

Explain
b) Write about Hierarchical clustering with an example
6. a) What is the necessity of feature transformation in learning?
b) Discuss in detail about probabilistic models with hidden variable.
7. a) What is Artificial Neural Network? Explain architecture of Artificial neural network
b) How does Artificial neural network works, and how it differs to Biological neural network.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 MACHINE LEARNING (Computer Science and Engineering)
}

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B ***** \\ PART-A (14 Marks)}
1. a) What is class probability estimation
b) Define binary classification
c) What are various types of estimates?
d) Give the role of kernel function in SVM.
e) What is feature transformation?
f) What is the necessity of dimensionality reduction?
\[
\text { PART-B }(4 x 14=56 \text { Marks })
\]
2. a) Discuss: i) scoring and ranking

> ii) visualising classification performance
b) How does machine learning differ from data mining? Explain with an example.
3. a) How does regression is used as a classifier? Give its classification.
b) What are the factors affecting concept learning? Explain them.
4. a) What is learning ordered rule list? Explain with an example
b) How does tree learning assist in variance reduction?
5. a) Explain about distance based clustering with an example
b) How to obtain probabilities from linear classifier? Explain with an example.
6. a) Discus about various probabilistic models used in machine learning algorithms.
\[
\begin{aligned}
& \text { b) Difference between Bagging and Boosting, write the implementation steps for } \\
& \text { Bagging. }
\end{aligned}
\]
7. a) Why do we need Backpropagation in multilayer neural networks
b) How does PCA used in dimensionality reduction? Explain.

\title{
IV B.Tech II Semester Supplementary Examinations, June - 2022 FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (Electrical and Electronics Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A Answer any THREE questions from Part-B \\ ****** \\ PART-A (22 Marks)}
1. a) List out the trade off parameters of switching devices.
b) Write the features of current source converter.
c) What is power oscillation damping? How is it minimized?
d) Draw block diagram for implementation of operating point control using SVC.
e) What is Bang-Bang control in TCSC?
f) What are the applications of UPFC and IPFC in transmission lines?

\section*{PART-B ( \(3 \times 16=48\) Marks)}
2. a) Discuss the importance of controllable parameters of FACTS controllers.
b) What are the basic types of FACTS controllers? Discuss them.
3. Explain the operation of 3-phase full wave bridge converter with neat diagram and wave forms. Discuss its merits and demerits.
4. a) Describe how to improve the transient stability by using shunt compensation.
b) What are different methods for controllable VAR generation? Explain the operation of Thyristor-Controlled Reactor (TCR) with necessary waveforms.
5. a) Explain Thyristor switched capacitor with neat diagrams.
b) Describe the summary of compensation control.
6. With the help of circuit diagram and waveforms, explain the operation of thyristor switched series capacitor. Also draw their V-I characteristics.
7. a) Discuss how an UPFC scheme can be implemented using two back to back voltage source converters.
b) Explain how the control of a basic IPFC is achieved.

\title{
IV B.Tech II Semester Supplementary Examinations, June - 2022 \\ EMBEDDED SYSTEMS
}
(Common to Electronics and Communications Engineering, Electronics and Instrumentation Engineering and Electronics and Computer Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any THREE questions from Part-B \\ *****}

\section*{PART-A (22 Marks)}
1. a) Mention what are the major components in embedded system.
b) What is the use of Watch dog timer in embedded systems.
c) List out few comparisons of Compiler versus Cross-compiler
d) Explain about how to choose an RTOS
e) Define simulator? Explain its importance
f) List and describe the translation tools used in an embedded system

\section*{PART-B (3x16 = 48 Marks)}
2. a) Differentiate General Purpose Processor and Application Specific System Processor.
b) List out different Quality attributes of an Embedded systems and explain them
3. a) Explain the merits and limitations of parallel port over serial interface
b) Explain about Timer and counting devices in Embedded Hardware
4. a) Define Interrupt and explain the concept of Interrupt servicing mechanism in detail
b) Write short notes on Device driver programming in detail
5. a) What is task scheduling? Explain Round Rabin scheduling algorithm
b) Differentiate Multi threading and Multi tasking in detail.
6. a) Explain the concept of Target hardware debugging along with one example
b) Explain in detail about Boundary scan along with circuit diagram
7. a) Write short notes on quality assurance and testing of the embedded system design
b) Explain the concept of Testing on host machine in detail

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS \\ (Electrical and Electronics Engineering)
}

\author{
Time: \(\mathbf{3}\) hours
}

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

Max. Marks: 70

PART-A (14 Marks)
1. a) What is the need of FACTS controllers?
b) Mention the importance of self commutating converters?
c) Why shunt compensation is always attempted at midpoint of a transmission line
d) Why static compensator not used as perfect voltage regulator?
e) What are the characteristics differences between TSSC and TCSC?
f) What is the need of UPFC?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Discuss the technical benefits of FACTS technology.
b) Explain the power flow considerations of a transmission interconnected systems.
3. a) What are harmonics? Define total harmonic distortion.
b) Differentiate between voltage sourced and current sourced converters. Also mention the applications of voltage sourced converters.
4. a) Describe the basic thyristor switched capacitor and its operation.
b) Explain the power oscillation damping in shunt compensation
5. a) Discuss the implementation of the VAR reserve control
b) Enumerate the operating features of STATCOM.
6. a) Enumerate the basic operating control schemes of TSSC and TCSC.
b) Discuss the effect of series capacitive compensation in transmission lines.
7. Describe the basic operating principles and concepts of UPFC.

\section*{Set No. 2}

\title{
IV B.Tech II Semester Regular/ Supplementary Examinations, June - 2022 FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS
}
(Electrical and Electronics Engineering)

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A (14 Marks)
1. a) What are limits the loading capacity of a transmission line?
b) Mention the various types of current source converters
c) What is meant by power oscillations damping?
d) Mention the various control approaches in static VAR generation
e) What are the objectives of series compensation?
f) What are the parameters of the transmission line can be controlled by UPFC?

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Discuss the various categories of FACTS controllers in brief.
b) Describe the parameter trade-off of high power devices.
3. a) Enumerate single phase full-wave bridge converter operation.
b) Discuss three-phase current source converter operation in brief
4. a) Explain the concept of end of line voltage support to prevent voltage stability in shunt compensation
b) Describe any of the variable impedance type static VAR generators.
5. a) What is a STATCOM? Discuss its advantages and applications.
b) What is the advantage of regulation slope control? Draw and explain the control scheme for STATCOM with regulation slope control.
6. a) Explain the improvement of transient stability using static series compensation.
b) Describe the Thyristor controlled series capacitor.
7. a) Describe dependence of real and reactive power flow control in UPFC.
b) Illustrate the UPFC application on transmission lines.

IV B.Tech II Semester Regular/ Supplementary Examinations, June - 2022 FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS
(Electrical and Electronics Engineering)

\author{
Time: \(\mathbf{3}\) hours
}

Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A (14 Marks)}
1. a) What are the benefits with FACTs controller?
b) What is the principle of current source converter?
c) Write the three important objectives of shunt compensation
d) Compare between SVC and STATCOM.
e) Write the basic principle difference between series and shunt compensation
f) What are the applications of UPFC on transmission lines.

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) List various FACTS controllers with their control attributes.
b) Explain loss and speed of switching in high power FACTs devices.
3. a) Explain the concept of voltage sourced converters..
b) Derive expression for square-wave voltage harmonics for a single-phase bridge converter
4. a) Explain the operation of two-machine Power system with an ideal midpoint reactive compensator with an equivalent circuit and necessary phasor diagram.
b) Explain in detail about power oscillation damping with shunt compensation and why it is considered as dynamic event
5. a) Discuss the operation of STATCOM with a neat diagram and characteristics.
b) Describe the transient stability enhancement using STATCOM and SVC
6. a) What is meant by variable impedance type series compensator? Explain the operation of Thyristor Controlled Series Capacitor (GCSC).
b) Explain the basic control schemes of TCSC and TSSC.
7. Describe the operating principles of unified power flow controller with [14] schematic diagram.

\section*{Set No. 4}

\title{
IV B.Tech II Semester Regular/ Supplementary Examinations, June - 2022 \\ \\ FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS
} \\ \\ FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS
}
(Electrical and Electronics Engineering)
Time: 3 hours
Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A (14 Marks)}
1. a) Mention the voltage and current ratings of high power devices.
b) Why in general voltage sourced converters is preferred over current sourced [3] converters in FACTS controllers
c) List out the requirements of shunt compensation.
d) What are the advantages of slope in SVC dynamic characteristics?
e) What are the important features of GTO thyrister controlled series capacitor?
f) What is the basic operating principle of an UPFC?

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Discuss the benefits of FACTS controllers.
b) Explain the importance of control parameter of FACTS devices.
3. a) With a neat circuit diagram and necessary waveforms, discuss the working of a [7] single-phase bridge converter.
b) What are harmonics? What are their sources? How to measure the harmonics?
4. a) Discuss how to prevent voltage instability using shunt compensation connecting [7] at the end of line.
b) Explain the power oscillation damping with shunt compensation.
5. a) Explain with a neat block diagram, general control scheme of Static VAT [7] Compensator (SVC).
b) What is transient stability? How attainable enhancement of transient stability can be done by SVC and STATCOM?
6. a) Discuss how series capacitive compensation improves the transient stability of a line.
b) Discuss the working of a Thyristor controlled Series Capacitor.
7. a) Describe the various transmission control capabilities of UPFC.
b) Draw and explain the schematic diagram of UPFC.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 NON - DESTRUCTIVE EVALUATION
(Mechanical Engineering)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) List the applications of \(X\) and Gamma Rays and its limitations?
b) Define reflection and refraction?
c) Outline the basic concept of liquid penetrant test?
d) State the principle of magnetic particle test?
e) List the applications of thermal testing?
f) Outline the span of NDE activities in railways?

\section*{\(\underline{\text { PART-B }}(4 x 14=56\) Marks)}
2. How would you explain the safety measurement of Industrial Radiography?
3. a) Explain the principle of ultrasonic testing in detail.
b) Discuss the effectiveness and limitations of ultrasonic testing?
4. a) Write in your own words about effectiveness and limitations of Liquid Penetrant Testing.
b) Illustrate the principle of eddy current testing in detail?
5. Discuss the effective applications and limitations of the magnetic particle test?
6. a) Explain active and passive techniques in detail.
b) Discuss thermo mechanical behavior of materials?
7. What do you think of activities and applications in nuclear, Non-nuclear and [14] chemical industries in NDE?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 NON - DESTRUCTIVE EVALUATION \\ (Mechanical Engineering)
}

\title{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\section*{PART-A(14 Marks)}
1. a) List the advantages of Non-destructive testing?
b) Outline diffraction, mode conversion and attenuation?
c) State the significance of liquid penetrant test?
d) Outline the demagnetization of materials?
e) List the applications of infrared testing?
f) Give the importance of NDE in Automotive Industries?
\[
\underline{\text { PART-B }}(4 x 14=56 \text { Marks })
\]
2. Analyze radiographic techniques in detail?
3. a) Illustrate the interpretations and guidelines for acceptance of ultrasonic testing?
b) State and explain the variables affecting ultrasonic test?
4. a) Explain the steps involved in liquid penetrant test in detail.
b) Discuss the applications of Eddy Current Testing?
5. a) Explain about magnetic particle test equipment in detail?
b) Describe the merits and demerits of standardization and calibration.
6. a) Analyze the contact thermal inspection methods?
b) Explain the importance of heat sensitive paints and heat sensitive papers?
7. Discuss the applications of NDE in Aircraft and Aerospace Industries?

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 NON - DESTRUCTIVE EVALUATION \\ (Mechanical Engineering)
}

Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Outline the benefits of radiographic test?
b) State piezo-electric effect?
c) List the applications of eddy current test?
d) State the significance of magnetic materials?
e) List the limitations of thermal testing?
f) Outline the span of NDE activities in railways?

\section*{\(\underline{\text { PART-B }}(4 x 14=56\) Marks)}
2. Illustrate the steps involved in film processing of radiographic testing.
3. a) Illustrate ultrasonic equipment with neat diagram?
b) Discuss the applications of ultrasonic testing?
4. a) Explain the working of liquid penetrant system with neat diagram.
b) Analyze eddy current test system in detail?
5. Can you write in your own words of standardization, calibration, interpretation and evaluation of magnetic particle test?
6. a) Explain the techniques for applying liquid crystals.
b) Discuss IR imaging in aerospace applications?
7. Discuss the applications of NDE in Offshore Gas and Petroleum Projects.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 NON - DESTRUCTIVE EVALUATION \\ (Mechanical Engineering)
}

Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****}

\section*{PART-A(14 Marks)}
1. a) Outline the significance of Non-destructive testing?
b) State the principle of wave propagation?
c) List the advantages of liquid penetrant test?
d) Explain magnetization of materials in brief?
e) Outline the significance of pulse thermography?
f) Give the importance of NDE in Coal Mining Industry?

\section*{PART-B \((4 x 14=56\) Marks \()\)}
2. Discuss radiographic test and radiographic equipment?
3. a) Explain the guidelines for rejection and effectiveness of ultrasonic testing.
b) Analyze the characteristics of ultrasonic transducers?
4. a) Illustrate the principle of Liquid Penetrant Test with neat diagrams?
b) Evaluate the theoretical analysis of eddy-current circuit and effectiveness of eddy current testing?
5. Discuss the procedure of magnetic particle test in detail?
6. a) Illustrate the non-contact thermal inspection methods?
b) Explain infrared radiation and infrared detectors.
7. Discuss the applications of NDE in pressure vessels, castings and welded constructions?

\section*{IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 OPERATING SYSTEMS \\ (Electronics and Communication Engineering)}

\author{
Time: \(\mathbf{3}\) hours
}

\author{
Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

\author{
Max. Marks: 70
}

PART-A (14 Marks)
1. a) List out the services provided by an operating system.
b) When a process creates a new process, what is shared between parent process and child process?
c) Why are segmentation and paging sometimes combined into one scheme?
d) Define monitor.
e) What are the two ways of accessing disk storage?
f) List out the various interrupts in LINUX.

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Write the difference between the function and system call. Briefly explain the six [7] major categories of system calls
b) Explain the Time-shared operating system.
3. a) Write and explain various scheduling criteria's with respect CPU scheduling.
b) Explain the process scheduling with a neat queuing diagram.
4. a) Explain the difference between External fragmentation and Internal [7] fragmentation. How to solve the fragmentation problem using paging?
b) Compare the main memory organization schemes of continuous memory allocation, pure segmentation, and pure paging with respect to the following issues: i) External fragmentation, ii) Internal fragmentation, iii) Ability to share code across the process.
5. a) What is a deadlock? Explain the necessary condition for deadlock
b) How does the signal() operation associated with monitors differ from the corresponding operation defined for semaphores.
6. a) Elucidate the Indexed allocation of disk space.
b) Discuss various file access methods in detail
7. a) Illustrate IPC mechanism in LINUX
b) Explain life cycle of android application

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 OPERATING SYSTEMS \\ (Electronics and Communication Engineering) \\ > Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B \(* * * * *\)
> PART-A (14 Marks) \\ \\ Question paper consists of Part-A and Part-B \\ \\ Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B Answer any FOUR questions from Part-B ***** ***** \\ \\ PART-A (14 Marks)
} \\ \\ PART-A (14 Marks)
}

Time: 3 hours
1. a) What is an operating system? Give some examples.
b) List Fields of Process Control Block.
c) What is the cause of Thrashing?
d) Define the Safe, unsafe, and deadlock state spaces.
e) What is a file? Give it properties
f) What is an Activity Stack in Android?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) With a neat sketch, Explain in detail about the interrelation between various services provided by the operating system.
b) What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices?
3. a) Discuss how the following pairs of scheduling criteria conflict in a certain settings. i) CPU utilization and response time, ii) Average turnaround time and maximum waiting time, and iii) I/O device utilization and CPU utilization.
b) Explain typical elements of inter process communication models.
4. a) Consider the following page reference string: 1,2,4,7,3,5,6,3,6,1,4,2,3,6,5,2 How many page faults would occur for the optimal page replacement algorithm, assuming four frames and all frames are initially empty.
b) Discuss various issued related to the allocation of frames to processes.
5. a) Explain the following deadlock avoidance algorithms:

Banker's algorithm.
b) What is critical section problem? Write and explain Peterson's solution for it
6. a) Compare the SCAN and C-SCAN disk scheduling algorithms with an example.
b) Illustrate the various methods for free-space management.
7. a) Discus about interrupt mechanism in LINUX.
b) What is Android? Is Android Open-Source? Discuss the features of Android.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022
OPERATING SYSTEMS
(Electronics and Communication Engineering)
Time: \(\mathbf{3}\) hours
\[
\begin{aligned}
& \text { Question paper consists of Part-A and Part-B } \\
& \text { Answer ALL sub questions from Part-A } \\
& \text { Answer any FOUR questions from Part-B } \\
& * * * * * \\
& \text { PART-A (14 Marks) } \\
& \text { ed structure of Operating system. }
\end{aligned}
\]
1. a) Draw the Layered structure of Operating system.

Max. Marks: 70
b) What is Multi-Threading?
c) What is Virtual Address Space?
d) What is Critical Section Problem?
e) Write about Master File Directory in two-level directory structure.
f) List the components of LINUX.

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Explain the objectives and functions of Operating system
b) Why Real time operating systems are needed? Give some examples.
3. Assume the following workload in a system. All jobs arrive at time 0 in the order given.
Process Burst Time Priority
\begin{tabular}{ccc} 
P1 & 30 & High \\
P2 & 28 & High \\
P3 & 04 & Low \\
P4 & 16 & Medium
\end{tabular}

Draw a Gantt chart illustrating the execution of these jobs using Priority CPU scheduling algorithm and also Calculate the average waiting time and average turnaround time.
4. a) Consider the following page reference string: \(1,2,4,7,3,5,6,3,6,1,4,2,3,6,5,2\) How many page faults would occur for the LRU page replacement algorithm, assuming four frames and all frames are initially empty.
b) What is paging? Explain the hardware support given for paging
5. a) Explain the usage and structure of monitors with an example
b) Write about Characterization of deadlock by resource allocation graph.
6. a) Briefly explain about single-level, two-level and Tree-Structured directories.
b) Discuss in detail the file allocation techniques: Sequential, Indexed and Linked.
7. a) Explain each and every component of the Android architecture with a neat sketch.
b) Discuss in detail about Android Runtime Application Development.

\title{
IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 OPERATING SYSTEMS \\ (Electronics and Communication Engineering)
}

Time: 3 hours
Max. Marks: 70

\author{
Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B
}

PART-A (14 Marks)
1. a) List out the types of System calls.
b) Define Interprocess Communication
c) Differentiate between Logical and Physical address space
d) What is Resource-Allocation-Graph?
e) Write short notes on File operations and types.
f) What is the Linux? Why it is used?

\section*{PART-B ( \(4 x 14=56 \mathrm{Marks}\) )}
2. a) Explain in detail about the functions of System Call Interface.
b) Discuss various challenges and issues that are to be considered while designing an operating system.
3. a) Explain in detail, the sequence of actions taken by the operating system to context switch between processes.
b) How communication takes place in a shared-memory environment? Explain.
4. a) Consider the following page reference string \(2,3,4,5,3,2,6,7,3,2,3,4,1,7\), \(1,4,3,2,3,4,7\). Calculate the number of page faults with LRU, FIFO and optimal page replacement algorithms with frame size of 3 .
b) What is effective access time? Compute it for \(70 \%\) hit ratio, 20 ns to search TLB and 100 ns to access memory. Observe the difference when it is changed to \(90 \%\) hit ratio.
5. a) Explain Banker's deadlock-avoidance algorithm with an illustration
b) What is semaphore? Why it is important? Suggest the solution for bounded buffer problem with semaphores.
6. a) Consider a disk queue with following requests for I/O to blocks on cylinders \(30,70,115,130.110,80,20,25\) (Assume disk head is at 90 )
Draw FCFS and SSTF scheduling and also determine how many times the disk head changes its direction for each of the above mentioned scheduling techniques.
b) Give a brief note on Disk scheduling algorithms.
7. a) Describe the components of LINUX system.
b) How Interrupts and Exceptions are handled in LINUX? Explain.

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ARTIFICIAL NEURAL NETWORKS
(Common to Computer Science and Engineering and Information Technology)
Time: \(\mathbf{3}\) hours

\title{
Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ *****
}

PART-A (14 Marks)
1. a) Explain the role of activation function in artificial neuron.
b) Discuss about competitive learning algorithm.
c) What kind of operations can be implemented with perceptron?
d) What are feed forward artificial neural networks?
e) What is universal approximation theorem?
f) Write a short note on inner product kernels.

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Compare and contrast Biological neuron with artificial neuron.
b) Describe various functional aspects of artificial neuron model with respect to activation functions
3. a) How state space model of artificial neural networks can be used for optimization of various applications? Explain.
b) Illustrate the working principles of supervised learning with an example
4. a) Explain about linear adaptive filtering

> b) Discuss the Signal Flow graph representations with respect to Perceptron [7] algorithm
5. a) Describe the training steps for back propagations networks
b) Explain the importance of hidden and output layers in Multi-layer feed forward networks
6. a) Write a short note on Radial Basis Function networks
b) Explain about interpolation
7. a) Give the classification of hyperplanes. How SVM overcomes the drawbacks of other classification approaches?
b) Illustrate the idea of an optimal hyperplane for linearly separable patterns

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ARTIFICIAL NEURAL NETWORKS
(Common to Computer Science and Engineering and Information Technology)
Time: 3 hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) What are the applications of artificial neural networks?
b) Explain the working principles of unsupervised learning
c) Give the role of mean square error in delta learning rule
d) Discuss the use of Back Propagation networks
e) What are the approximation properties of Radial Basis Function networks?
f) Write a short note on linear seperability

\section*{\(\underline{\text { PART-B }}\) ( \(4 x 14=56\) Marks)}
2. a) Explain the architecture of artificial neural network
b) Write a short note on recurrent neural networks
3. a) How to find multiplication by inverse in vector algebra? Explain with example.
b) Explain the concept of optimization with suitable example. Give its application in the design of learning systems.
4. a) Explain the Convergence Considerations with respect to Perceptron algorithm?
b) Elaborate on the two-class pattern classification problem
5. a) Explain the training algorithm in back propagation networks
b) Write a short note on forward propagation of function signals
6. a) Write about the RBF networks design with respect to Radial Basis Function network
b) How interpolation problem is solved with Radial Basis Function networks? Illustrate.
7. a) Explain inner product kernels for various types of Support Vector Machines
b) Design the Support Vector Machine for Classification Problems

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ARTIFICIAL NEURAL NETWORKS
(Common to Computer Science and Engineering and Information Technology)
Time: \(\mathbf{3}\) hours
Max. Marks: 70

\section*{Question paper consists of Part-A and Part-B \\ Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Why activation function is used in Artificial neuron?
b) What is state space model of artificial neural networks?
c) Define perceptron.
d) Write a short note on Multi-layer feed forward networks
e) What is interpolation problem?
f) How to build a Support Vector Machine for pattern recognition problem?

\section*{PART-B ( \(4 x 14=56\) Marks)}
2. a) Give the role of activation function in Artificial neural networks. Explain different activation functions.
b) How single layer perceptron is different from multi-layer perceptron? Explain the concept of multi-layer neuron model.
3. a) Describe about systems of linear equations and substitutions. Give its applications
b) Explain various operations that can be performed on vectors
4. a) What is the need of convergence of perceptron? Explain the perceptron convergence theorem.
b) Write a short note on linear adaptive filtering
5. a) Describe the design issues of back propagation learning
b) Explain various steps involved in solving function approximation with back propagation networks
6. Write about the RBF networks training with respect to Radial Basis Function(RBF) networks with a suitable example
7. a) Explain the architecture of Support Vector Machine
b) How to find maximal hyper planes to solve two class classification problem with Support Vector Machine, when data is Linearly Inseparable?

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022 ARTIFICIAL NEURAL NETWORKS
(Common to Computer Science and Engineering and Information Technology)

\section*{Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A \\ Answer any FOUR questions from Part-B \\ ***** \\ PART-A (14 Marks)}
1. a) Write a short note on activation function
b) What is unsupervised learning?
c) What is Jacobian matrix?
d) Give the structure of multi layer feed forward network.
e) What is radial basis function network ?
f) Write a short note on Support Vector Machine

\section*{PART-B ( \(4 \times 14=56\) Marks)}
2. a) Explain the working principles of neurons with " \(R\) " number of inputs
b) Explain the role of synapse in biological neuron with a neat diagram.
3. a) Give the role of optimization in the design of neural networks? Illustrate.
b) Differentiate memory based learning with competitive learining.
4. a) Explain the working principle of perceptron with a pair of non-linearly separable patterns
b) Describe the Virtues and limitations with respect to Perceptron algorithm
5. a) Describe about various notations used in back propagation algorithm?
b) The back propagation law is also known as generalized delta rule. Is it true? [7] Justify.
6. a) Describe the training algorithm used for RBFN with fixed centers
b) Briefly explain about regularization networks
7. a) Explain how Support Vector Machine separates non-separable patterns
b) Explain various constraints involved in quadratic optimization for finding the optimal hyperplanes

\title{
IV B.Tech II Semester Supplementary Examinations, June - 2022 \\ BIO MEDICAL INSTRUMENTATION \\ (Electronics and Communications Engineering) \\ Max. Marks: 70 \\ \\ Question paper consists of Part-A and Part-B \\ \\ Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer ALL sub questions from Part-A Answer any THREE questions from Part-B Answer any THREE questions from Part-B \\ \\ *****
} \\ \\ *****
}

Time: 3 hours

\section*{PART-A (22 Marks)}
1. a) What is a glass electrode used for?
b) What part of the cardiovascular system normally contains the greatest volume of blood?
c) What equipment would you need in a diagnostic catheterization laboratory?
d) What do you understand by the term "blood count"?
e) Write a note on Isolation of Patient-connected parts.
f) Write a note on A-scan display.

\section*{PART-B (3x16 = 48 Marks)}
2. a) How does an evoked EEG response differ from a conventional electroencephalogram?
b) Explain about polarization and depolarization.
3. a) Would you expect blood flow to obey Bernoulli`s equation, even with reservations? Explain why.
b) What is the difference between a single-lumen catheter and a multiple-lumen "floatation" catheter?
4. a) What do you understand by fibrillation? How do you correct for it? Draw a circuit of a direct-current defibrillator.
b) Define the important lung capacities and explain them.
5. a) Design a hospital with a telemetry system, explaining why you would telemetrize the functions you have selected.
b) Explain the difference between the continuous-flow method and the discrete sample method of automated clinical chemistry equipment.
6. a) Describe the principle of visualizing body organs by radioisotope methods.
b) Explain the processing of X-ray film.
7. a) Define MRI(Magnetic Resonance Imaging)? What happens if a person develops difficulty breathing while in the MRI?
b) Explain briefly about Real-Time Ultrasonic Imaging System.~~~~~~~~~~~~~~~~~~~~~~~~~~

