Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: B.Tech, IDD (B.Tech and M.Tech)**
Sub_Code: REC3C001

3rd Semester Regular/Back Examination: 2023-24
SUBJECT: Analog Electronic Circuits
BRANCH(S): AEIE, BIOMED, EEE, ELECTRONICS & C.E, EIE, ELECTRICAL, ECE, ETC, EE, ECE
Time: 3 Hour
Max Marks: 100
Q.Code: N451
Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is the significant of pinch off voltage and threshold voltage in MOSFET?
b) Discuss about load line in a BJT biasing circuit.
c) Explain the roles of different external capacitors used in an amplifier circuit.
d) What is a super-beta transistor? Justify.
e) Whether the output of a CE configuration is in phase or out of phase with the input? Justify
f) Draw the hybrid and π model of a transistor in CE configuration. Write the difference between them.
g) With a neat sketch locate the parasitic capacitances for high frequency response. Among them which one is largest and which one is smallest?
h) Differentiate between small-signal amplifier and large-signal amplifier.
i) What are the advantages and disadvantages of negative feedback in an amplifier?
j) How the class A, B, C amplifiers are defined? Briefly discuss class A type.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Explain how the transconductance of D-MOSFET is determined both graphically and mathematically?
b) Draw and explain the circuits of self-bias and Emitter bias. Write the differences between.
c) For a base-biased transistor circuit with V_{CC} = 30V, R_B = 300 KΩ, R_C = 2 KΩ, R_E = 1 KΩ and current gain = 100, find the Q-point, I_C(sat), V_C, and V_E.
d) What is source-degenerative resistance? Considering this resistance, draw the equivalent model of a CS MOSFET amplifier. Find its input impedance, output impedance, open loop voltage gain and the voltage gain in consideration of the load resistance.
e) Explain in detail the effect of R_S and R_L on BJT low frequency response.

f) What is modeling of a device? Draw the r_e models of all three configurations. Draw the hybrid model of a transistor in CE and derive the expressions for input impedance, output impedance, voltage and current gain.

g) Derive the expression of A_v and Z_o of the self-biased CS MOSFET circuit with un-bypassed R_S.

h) What is trans-conductance and overdrive voltage of a MOSFET? Write the relation between trans-conductance and overdrive voltage. Describe in detail, how the T equivalent model of a MOSFET is developed.

i) Draw and explain the small signal analysis of JFET CS and CD configuration.

j) What is a feedback network? Describe a positive feedback circuit as an oscillator. Explain Barkhausen's criteria for oscillation.

k) Explain the operation of an Op-amp as a non-inverting amplifier, a differentiator, and an Integrator.

l) Draw and explain the operation of an Instrumentation amplifier. What are the advantages of an Instrumentation amplifier?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 With suitable diagrams, describe the operational principle of FETs and MOSFETs. Extend your discussion to V-I Characteristics of E- MOSFET and D-MOSFET. **(16)**

Q4 How many biasing circuits are there in a BJT circuit? Explain each of it. Out of all the biasing circuits which one is practically not employed? **(16)**

Q5 Which capacitors affect the low frequency and high frequency responses of a BJT amplifier circuit? What is Miller effect capacitance? Describe all in detail. **(16)**

Q6 What is a power amplifier circuit? Why is it named so? Explain class A, class B, class AB, and class C power amplifiers providing their efficiencies. **(16)**

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Total Number of Pages: 02 **B. Tech, IDD (B. Tech and M. Tech)**
RCS3C002

3rd Semester Regular/Back Examination: 2023-24
Data Structure
CSE, CST, CSEAI, CSEDS, CSIT, CSEAIME, ELECTRICAL & C.E, ELECTRONICS & C.E, IT
Time: 3 Hours
Max Marks: 100
Q.Code : N497
Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What do you mean by the complexity of an algorithm?
b) Write the physical significance of the asymptotic notations.
c) Write an algorithm to delete an element from the middle of an array of elements.
d) Write the ADT for circular queue.
e) Write the advantages of postfix expression over infix expression.
f) Write the ADT of a self-referential structure.
g) What is the worst-case time complexity of quick sort. Justify your answer.
h) Differentiate between B tree and B^+ tree.
i) What is the time complexity of bubble sort if the array is fully sorted? Justify your answer.
j) Write the advantages of threaded binary tree over binary tree with respect to tree traversal.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Write an algorithm to implement linear search for a sorted array. Find the best case, worst case and average case time complexity.
b) Write the recursive algorithm of binary search. Find the best case, worst case and average case time complexity.
c) Write the algorithms to illustrate the insertion and deletion of on a circular queue.
d) Write an algorithm to evaluate a prefix expression. Explain your algorithm with an example.
e) Convert the following infix expression to postfix expression. Show each step of the procedure.
(a+b)*(c-d)/e$f*g
f) Write any two applications of stack and two applications of queue.

g) Write the algorithm to illustrate the insertion and deletion operation on a doubly linked list.

h) Write the algorithm to search an element from a circular linked list.

i) Write the heapify procedure to create a heap with an array of *n* numbers and find the time complexity.

j) Differentiate between DFS and BFS with example. Explain their advantages and disadvantages.

k) Sort the following array of elements using quick sort.
43, 56, 12, 98, 27, 54, 67, 29, 15, 36

l) What is collision in hashing and explain the methods to overcome it.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Define the asymptotic notations Big O, Big Omega, Big theta, small o and small omega. **(8)**

b) If $f(n) = 5n^2 + 3n - 5$ then prove that $f(n) = O(n^2)$. **(8)**

Q4 a) Write the conditions to illustrate the empty and full condition of circular queue. Also write the algorithms to illustrate the insertion and deletion operations on a circular queue. **(8)**

b) What is priority queue? Explain the insertion and deletion operations on a priority queue implemented by using an array. **(8)**

Q5 a) Write an algorithm to create a single linked list with 10 elements and then display the linked list. **(8)**

b) What is AVL tree? Explain various rotations used in AVL tree to construct a balanced tree. **(8)**

Q6 a) Write the algorithm of merge sort and find the worst, best and average case time complexity. **(8)**

b) Write the algorithm to illustrate the insertion and deletion operation in a binary search tree. **(8)**

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Total Number of Pages : 02 **B. Tech, IDD (B. Tech and M. Tech)**
RCS3C001

3rd Semester Reg/Back Examination: 2023-24
Digital Logic Design
CST,CSEAI,CSEDS,CSE,CSIT,CSEAIME,IT
Time : 3 Hour
Max Marks : 100
Q. Code : N456

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Explain how a transistor can act as a switch?
b) Find the 16's complement of $BBD5_H$.
c) Implement a 2-input XOR gate using minimum no. of 2-input NAND gate.
d) State and prove DeMorgan's theorem.
e) Represent the Boolean expression F = A'B + AC+ BC' in the form of maxterms.
f) Derive the characteristic equations for the JK Flip-flop.
g) Determine the Gray code equivalent of $(11100101)_2$.
h) Convert the following number with the indicated bases to decimal: $(43150)_6$.
i) The contents of a four-bit register are initially 1011. The register is shifted six times to the right, with the serial input being 101101. What is the content of the register after sixth shift?
j) Implement the carry of a full adder using 2-input NOR gates only.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Explain error detecting and error correcting codes with an example in both cases. Also specify the application of these codes.
b) Given, Boolean expression F=AB + BC+ AB'C. Express F as
(i) In product of sum terms only
(ii) In product of maxterms only
(iii) Implement F using NOR gates only.
c) Minimize and implement the following Boolean function F, together with the don't-care conditions d, using NAND gates: F(A , B, C, D) = ∑(1, 2, 4, 6, 8, 9, 10) and d(A, B, C, D) = ∑ (0, 5, 9, 13, 14).
d) Implement a full subtractor circuit using a 4:1 MUX and additional logic gates.
e) Convert by adding external gates: (a) a D flip-flop to a J-K flip-flop. (b) a T flip-flop to a D flip-flop.
f) Simplify the following Boolean function, f(W,X,Y,Z)= ∑m(2,6,8,9,10,11,14,15) using Quine-McCluskey tabular method.
g) Implement a 4 to 16 decoder using 1 to 2 decoder only and explain its operation.

h) What is a priority encoder? Show the gate level circuit diagram of a 8-to-3 priority encoder.

i) Show that the characteristic equation for the complement output of a JK flip-flop is Q' (t + I) = J 'Q' + KQ

j) Explain how to convert serial data to parallel and parallel data to serial. What type of register is needed?

k) Draw the CMOS schematic diagram of the Boolean expression Y = [A + BCD]'.

l) Show that a ring counter with 'N' flip -flops produces a sequence of 'N' stares. List the 5 states produced with five flip-flops. State the application of such counter.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Design a BCD to seven segment decoder which has four input lines (A, B, C and D) and 7 output lines (a, b, c, d, e, f and g), this output is given to seven segment LED display which displays the decimal number depending upon inputs. Implement the decoder using basic logic gates. **(16)**

Q4 **a)** Design a combinational circuit with three inputs x, y, and z, and three outputs A, B, and C. When the binary input is 0, 1, 2, or 3, the binary output is three greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is two less than the input. **(8+8)**

b) What is the application of a parity bit generator? Design a 3-bit odd parity generator circuit.

Q5 **a)** Design a four-bit shift register with a parallel load using D flip- flops. There are two control inputs: shift and load. When shift = 1, the contents of the register are shifted by one position to right. New data are transferred into the register when load = 1 and shift = 0. If both control inputs are equal to 0, the contents of the register do not change. **(8+8)**

b) Implement a 2-bit multiplier circuit using AND gates and parallel adder with explanation

Q6 **a)** A sequential circuit with two D flip-flops A and B, two inputs x and y, and one output z is specified by the following next-state and output equations: **(8+8)**

A(t + I) = x 'y + x + B, B(t + I) = x'A + xB , z = A + B

(a) Draw the logic diagram of the circuit.

(b) List the stale table for the sequential circuit.

(c) Draw the corresponding state diagram.

b) Design a decade counter using JK flip-flop.

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Total Number of Pages : 02 **B. Tech**
REN3E001

3rd Semester Reg/Back Examination: 2023-24
Engineering Economics
AERO, AE, AEIE, AUTO, BIOTECH, CHEM, C&EE, CIVIL,CST,CSEAI,CSEDS,CSE,CSIT,CSEAIME, ELECTRICAL & C.E, EEE, ELECTRONICS & C.E,EIE,ELECTRICAL,ECE,ETC,IT,MANUTECH,MECH,MME,MMEAM,METTA,MINING,PT,PLASTIC
Time : 3 Hour
Max Marks : 100
Q. Code : N428

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the basic problems of an economy?
b) Explain with example the concept of externalities.
c) What is time preference of money?
d) Explain the law of returns to scale.
e) Explain the market structures like monopoly, oligopoly and monopolistic competition with examples.
f) Distinguish between nominal rate of interest and effective rate of interest.
g) Explain the essential features of private projects and public projects.
h) What is the rationale behind using SOYD method of depreciation? Which type of organizations use this method?
i) Explain the two types of Inflation we generally experience in an economy.
j) Write two primary functions of a commercial Bank.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Consider the following simplified demand and supply functions;
Demand: Q=200-2P Supply: Q=20+4P
   i. What are the equilibrium price and quantity supplied?
   ii. What would be the effect upon price and quantity sold if the supply shifts to Q=50+4P and demand remains constant?
   iii. What would be the effect upon price and quantity sold if the supply shifts to Q=260-2P and supply remains Q=20+4P?
b) Suppose the price elasticity of demand of X is equal to unity and at Rs 15 per unit, the quantity demanded is 100 units. How much price of the commodity should be fixed so that the demand is 80 units.
c) You are asked to evaluate the proposal of construction of a dam across a river near your village / town. List the different social benefits and costs related to the proposal. How will evaluate such proposal?
d) 'More the price, more is the supply'. Is it correct? Justify.
e) Distinguish between perfect competition and pure competitions.

f) Distinguish between autonomous demand and derived demand with examples.

g) Why does a demand curve slope downward? What are its exceptions?

h) Explain through diagram the behaviour of short-run and long-run cost functions

i) Why is depreciation charged on a capital asset? What is the mostly accepted method in the modern business world? What is the treatment of the charged amount of depreciation? What would be the result if depreciation is not charged on capital asset?

j) A Company takes a loan of Rs.2, 00,000 to expand its plant. The loan is to be repaid in 20 equal installments at 12% interest rate, compounded annually. Find the equal installment amount that should be paid for the next 20 years

k) Distinguish between Microeconomics and Macroeconomics.

l) A company is planning to expand its present business activity. It has two proposals. These two alternatives have the following data for your consideration. The MACR for the company is 10%. Suggest the best alternative.

1st proposal: Initial investment Rs 5,00,000,annual revenue Rs 1,70,000 Life is 5 years

2nd Proposal: Initial Investment Rs 8,00,000, annual revenue Rs 2,70,000 Life is 5 years.

There is no salvage value.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain the Law of Demand and Law of Supply. Discuss the determinants of Demand and Supply. **(16)**

Q4 What is inflation? Explain the causes of inflation and the measures to control inflation. **(16)**

Q5 A multi-product company furnishes you the following data relating to its products. The manufacturer has made the following estimates: **(16)**

Selling price per unit	Rs.20
Fixed costs	Rs.15,00,000
Variable cost per unit	Rs.16
Sales volume	5,00,000 units

You are required to:

a. Calculate the Break-even point, Break-even sales, Margin of safety, contribution.

b. Suppose selling price decrease by 10% resulting in hike of 15% in sales volume. What will be the profit?

Q6 Why do we call RBI of our country as the bankers' bank? Discuss its important functions. **(16)**

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Total Number of Pages: 02 **Course: IDD (B.Tech and M.Tech)**
Sub_Code: RME3C002

3rd Semester Regular/Back Examination: 2023-24
SUBJECT: FLUID MECHANICS AND HYDRAULIC MACHINES
BRANCH(S): AERO, C&EE, CIVIL, ENV, MECH, MMEAM, CE, ME
Time: 3 Hour
Max Marks: 100
Q.Code: N463

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) List the causes of minor energy losses in a pipe line.
b) What is the draft tube? In which kind of turbines, draft tubes are attached.
c) Define specific speed of centrifugal pump.
d) What do you mean by manometric efficiency and mechanical efficiency of centrifugal pump?
e) Define slip of reciprocating pump.
f) Define bulk modulus and compressibility of a hydraulic fluid.
g) The pressure in a pipeline is 0.2 vacuum. Find the absolute pressure in kPa when atmospheric pressure is 1 bar.
h) Write the significance of flownet.
i) What do you mean by potential function?
j) Specify the measuring instruments for velocity and discharge of fluid flow.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Derive the expression for finding the center of pressure on an inclined submerged plate.
b) Explain the working of Hydraulic intensifier with sketch.
c) With dimensionless curves, describe performance of hydraulic turbines.
d) Define the following i) Laminar flow and turbulent flow ii) rotational and irrotational flow iii) Uniform flow and steady flow
e) Define i) Stream lines ii) Path lines iii) Streak lines
f) A single cylinder double acting reciprocating pump of 300 mm bore and 400 mm stroke runs at 35 rpm. It discharges 31 litres/sec of water under a total head of 15 m. what will be the volumetric efficiency, work done per second, if overall efficiency is 72%.

g) Derive the differential form of continuity equation for in-compressible fluid in Cartesian coordinates.

h) State the Newton's law of viscosity. Sketch the Newton's law relationship for Newtonian and Non-Newtonian fluids. Give examples for each fluid.

i) Explain any two pressure measuring instruments used in fluid flow with sketch.

j) Derive the Bernoulli's theorem from Euler's' theorem specifying all relevant assumptions.

k) Determine the velocity and acceleration of a fluid particle at (2, 4, 6) at t = 0.3s for the velocity field given by V = 12x2z i + 20xy j + 50t

l) A cylinder of 150mm radius rotates concentrically inside a fixed cylinder of 155 mm radius. Both cylinders are 300 mm long. Determine the viscosity of the liquid which fills the space between the cylinders if a torque 0.98 N-m is required to maintain an angular velocity of 60 r.p.m..

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Differentiate between potential function and stream function. **(8x2)**

b) The two dimensional flow is represented by $u = 8x^2y - (8/3)y^3 + (8/3)x^3$. Determine the stream function for the flow and find the velocity potential function. State, if the flow is rotational or irrotational.

Q4 **a)** Derive the expression of metacentric height for a floating body which satisfies stable equilibrium condition. **(8x2)**

b) A cylindrical buoy is 2 meters in diameter, 2.5 meters long and weighs 2.2 metric tons. The density of sea water is 1025 kg/m^3. Show that the body cannot float with its axis vertical.

Q5 A centrifugal water pump has an impeller of outer diameter of 60 cm and inner diameters 20 cm. It is 2 cm wide at outlet and 5 cm wide at inlet. The blade angles at inlet and outlet are 20° and 10° respectively. The impeller rotates at 1800 rpm. Neglecting losses and vane thickness, determine **(16)**

(i) the discharge foe shockless radial entry
(ii) the theoretical head
(iii) the power required
(iv) the pressure rise through impeller

Q6 **a)** Obtain an expression for the work done per second by water on the runner of a Pelton wheel. **(8x2)**

b) A Pelton wheel has a mean bucket speed of 12 m/s and supplied with water at the rate of 0.7 m^3/s under head of 300 m. If the buckets deflect the jet through an angle of 160°, find the power developed and hydraulic efficiency of the turbine.

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Total Number of Pages : 02 **B. Tech. & IDD (B.Tech and M.Tech)**
RMA3A001

3rd Semester Regular/Back Examination: 2023-24
Mathematics III
AERO, AE, AG, AEIE, AUTO, BIOMED, BIOTECH, CHEM, C&EE, CIVIL, CST, CSEAI, CSEDS, CSE, CSIT, CSEAIME, ELECTRICAL & C.E,EEE, ELECTRONICS & C.E, EIE, ELECTRICAL, ECE, ENV, ETC, IT, MANUTECH,MECH,MME, MMEAM,METTA, MINERAL, MINING, PT, PLASTIC
Time : 3 Hour
Max Marks : 100
Q. Code : N394

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** **(2 x 10)**

a) Write the convergence criteria for the fixed point iteration method.
b) The rate of convergence for fixed point iteration is _____and the Newton-Raphson method is _____.
c) Define diagonally dominant matrix.
d) What is the range of under relaxation parameter?
e) Write any one formulae for evaluating numerical integration.
f) When two events A and B are said to be independent?
g) Find the density function for a Binomial distribution whose mean is 7 and variance 6.
h) Define COV(X,Y)
i) Suppose a continuous random variable X has the probability density

$$f(x)=\begin{cases} K(1-x^2) & 0<x<1 \\ 0 & Otherwise \end{cases}$$ Find K.

j) Define null hypothesis.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Solve the following system by Dolittle's or Crout's method
$2x_1 + 2x_2 + 4x_3 = -2$; $4x_1 + 5x_2 + 13x_3 = -7$; $10x_1 + 14x_2 + 43x_3 = -25$.

b) Use Euler's method to find the solution to the differential equation $\frac{dy}{dx} = 3x + 4y$ at x=0.75 with the initial condition y(0)=0 and step size $h = 0.25$

c) Evaluate $\int_0^{\pi} x^3$ using Simpson's $\frac{1}{3}$rd rule with n=4.

d) Find the real root of the equation $2x^2 + 5 - e^x = 0$ accurate to four decimal places by using the Newton- Raphson Method with $x_0 = 3.5$

e) Using quadratic Lagrange Interpolation find the Lagrange interpolating polynomial P(x) and hence find the value of y at $x = 2$, given $y(0) = 15,\ y(1) = 48,\ y(5) = 85$

f) There are two boxes. One has 10 red balls and 5 white balls and the other has 5 red and 5 white balls. You randomly pick a box then randomly pick out a ball. What is the probability you pick out a red ball?

g) Sketch the density $f(x) = \begin{cases} K, & -1 < x < 1. \\ 0 & Otherwise \end{cases}$ function and the distribution function.

h) Using the Runge-Kutta 4th order method find the solution of $\frac{dy}{dx} = y - x$, $y(0) = 1.5$ on $[0,0.6]$ by choosing step length 0.2

i) 4% of the bulbs manufactured by a farm are found to be defective, find the probability that a box containing 150 bulbs contains (i) no defective (ii) three or more defectives

j) Find the mean of the normal distribution

k) Suppose that X is a discrete random variable with the following probability mass function: where 0 ≤ λ ≤ 1 is a parameter. The following 11 independent observations were chosen from such a distribution: (1,4,2,3,3,2,1,4,2,1,4). Compute a suitable point estimate of λ.

X	1	2	3	4
P(X)	$\lambda/4$	3(1- λ)/4	(1- λ)/4	$3\lambda/4$

l) A discrete random variable X has Poisson distribution such that $P(X = 1) = P(X = 2)$. Find the mean and variance of X.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** (a) Solve the following system by Gauss-Seidel method **(12+4)**
12x + 3y -5z = 1; x + 5 y + 3 z = 28; 3x + 7y + 13z = 76 with initial guess (1 0 1).

b) Compare Newton's Forward interpolation and Lagrange interpolation

Q4 **a)** Using the following data find Newton's forward interpolating polynomial and also find the value of y at x=24. **(8+8)**

x	20	35	50	65	80
y	3	11	24	50	98

b)
Find the simple linear regression equation that fits the given data.

X	6	6.1	6.2	6.3	6.5
Y	1	6	8	10	11

Q5 Determine a 95% confidence interval for the mean μ of a normal population with variance 16, using a sample of 200 with mean 74.81 **(16)**

Q6 In the population, the average IQ is 100 with a standard deviation of 15. A team of scientists wants to test a new medication to see if it has either a positive or negative effect on intelligence, or not effect at all. A sample of 30 participants who have taken the medication has a mean of 140. Did the medication affect intelligence? **(16)**

Registration No: | | | | | | | | | | |

Total Number of Pages: 03 **Course: B.Tech**

Sub_Code: PCI3I001, PME3I101

3rd Semester Back Examination: 2023-24

SUBJECT: Mechanics of Solid

BRANCH(S): CIVIL, MECH

Time: 3 Hour

Max Marks: 100

Q.Code : N395

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is resilience?

b) Define Principal stress.

c) Describe the advantage of hollow shaft over solid shaft.

d) What is the value of shear stress at the centre of a circular shaft under torsion?

e) What is temperature stress?

f) What is statically indeterminate problem? Explain with an example.

g) What is the use of Mohr's stress circle?

h) What is Proof stress?

i) What is principal plane?

j) Explain your understanding on "Slenderness ratio".

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Describe the steps to draw Mohr's circle for strain.

b) Explain Principle of St .Venant,

c) Derive Slope and deflection of beams using area - moment method.

d) Discuss on Euler's column formula for different boundary conditions.

e) Derive pure beam bending formula mentioning the relevant assumptions.

f) A simply supported beam of length 800 mm and cross section diameter 15 mm, fails on applying 360 N at the midspan. Determine the maximum magnitude of the uniformly distributed load that can safely applied to this beam.

g) A steel tube, 3 m long, 3.75 cm diameter, 0.06 cm thick, is twisted by a couple of 50 Nm. Find the maximum shearing stress, the maximum tensile stress, and the angle through which the tube twists. Take G = 80 GN/m^2.

h) A 400 mm long shaft with a diameter of 40 mm carries a flywheel weighing 3 kN in the mid way. The shaft transmits 12 kW at 200 rpm. Determine the principal stresses.

i) Derive the relation $E = 2G(1+\mu)$. The symbols carry their usual meaning.

j) Two shafts are of same material. Each shaft transmits same power. The first shaft rotates at 50 r.p.m. while the second at 5000 r.p.m. Determine the ratio of diameters of the two shafts for the same maximum shear stress for each shaft.

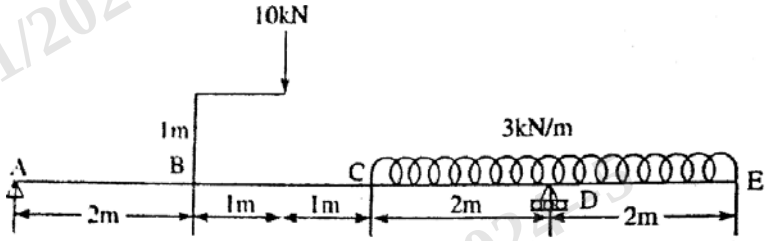
k) A circular pipe of external diameter 70 mm and thickness 8 mm is used as a simply supported beam over an effective span 2.5 m. Find the maximum concentrated load that can be applied at the centre of the span if the permissible stress in the tube is 150 N/mm^2.

l) In simple tension test, a test specimen of 10 mm diameter is gradually loaded from zero to 20 kN within elastic limit. Draw Mohr's circle and find Maximum shear stress developed.

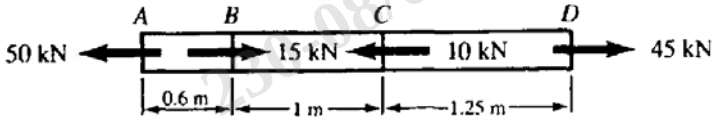
Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

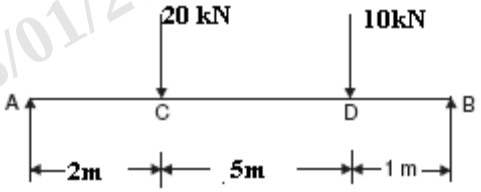
Q3 **(a)** Draw the shear force and the bending moment diagram of the beam shown below. Also show the point of contraflexure if exists. **(12)**



(b) A steel bar of cross section 500 mm^2 is acted upon by the forces shown in Fig. below. Determine the total elongation of the bar. For steel, consider E = 200 G Pa. **(4)**



Q4 **(a)** Determine the deflection of the simply supported beam at C and D. Find the position of the maximum deflection and the value of it. Assume E = 210 GPa, I = 6000 cm^4 **(10)**



(b) Calculate the buckling load of a strut fixed at both ends, the cross-section being a square 1 cm by 1 cm, and the length 2 m. Take E = 200 GN/m^2. **(6)**

Q5 **(a)** The following three beams having the same length, same weight and made up of the same material. **(8)**

(I) I-section *400mm X 180mm* with *20mm* thick flanges and *12.5 mm* thick web.
(II) Rectangular section of depth twice its width.
(III) Solid circular section

Compare the strength of the I-section with the rectangular and circular sections.

(b) A strain gauge rosette has the axes of the three gauges OA, OB and OC at 120^0 to each other. The observed strains are **(8)**

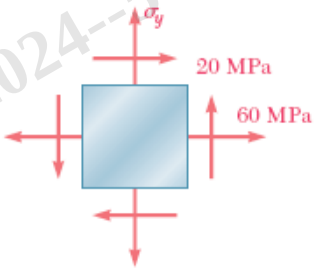
ε_A = 600 micron, ε_B = –450 micron and ε_C = 100 micron

Determine the principal stresses. Given E = 2 x 10^5 N/mm^2 and μ = 0.3.

Q6 **(a)** In a compound helical spring the inner spring is arranged within and concentric with the outer one, but is 9 mm shorter. The outer spring has ten coils of mean diameter 24 mm, and the wire diameter is 3 mm. Find the stiffness of the inner spring if an axial load of 150 N causes the outer one to compress 18 mm. **(8)**

If the radial clearance between the springs is 1.5 mm find the wire diameter of the inner-spring when it has eight coils. G = 77, 000 N/mm^2.

(b) For the state of plane stress shown in Fig. below, determine the largest value of σ_y for which the maximum inplane shearing stress is equal to or less than 75 MPa. **(8)**



Registration No.: | | | | | | | | | | |

Total Number of Pages: 03 **Course: B.Tech, IDD (B.Tech and M.Tech)**
Sub_Code: RME3C001

3rd Semester Regular/Back Examination: 2023-24
SUBJECT: Mechanics of Solid
BRANCH(S): AERO, AUTO, C&EE, CIVIL, ENV, MECH, MMEAM, CE, ME
Time: 3 Hour
Max Marks: 100
Q.Code: N504
Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is complimentary shear stress?
b) What are temperature stresses?
c) Define Principal stress.
d) What is critical load in buckling?
e) What is the value of shear stress at the centre of a circular shaft under torsion?
f) Describe the advantage of hollow shaft over solid shaft.
g) What is slenderness ratio? Write Euler's load equation for fixed-fixed end conditions.
h) What do you understand by statically indeterminate problem? Illustrate with an example.
i) What do you understand by point of inflection or contraflexure? Explain with a neat diagram.
j) A material has modulus of rigidity 0.4 x 10^5 N/mm^2 and bulk modulus 0.75 x 10^5 N/mm^2. Find the modulus of elasticity and Poisson's ratio.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) The axial loads are applied to the compound rod (Fig. 1) that is composed of an aluminum segment rigidly connected between steel and bronze segments. For P = 10 kN, find the stress in each material and the total elongation. E_S =200GPa, E_{Al} =68GPa and E_B=70GPa.

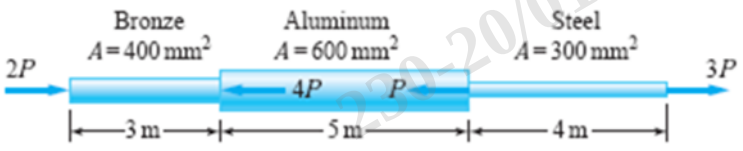


Fig. 1

b) A steel tube, 3 m long, 3.75 cm diameter, 0.06 cm thick, is twisted by a couple of 50 Nm. Find the maximum shearing stress, the maximum tensile stress, and the angle through which the tube twists. Take G = 80 GN/m^2.

c) The bronze bar 3 m long with a cross-sectional area of 320 mm^2 is placed between two rigid walls. At a temperature of –20°C, there is a gap Δ = 2.5 mm, as shown in the Fig. 2. Find the temperature at which the compressive stress in the bar will be 35 MPa. Use α = 18.0 x 10^{-6} /°C and *E* = 80 GPa.

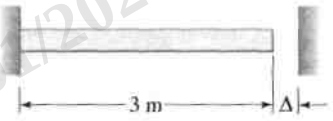


Fig. 2

d) For the beam loaded as shown in Fig. 3, draw shear force and bending moment diagrams. Write the equation of V(x) and M(x) for each part of the beam.

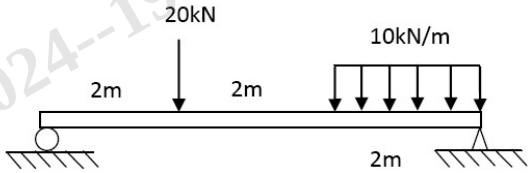


Fig. 3

e) Two shafts are of same material. Each shaft transmits same power. The first shaft rotates at 50 r.p.m. while the second at 5000 r.p.m. Determine the ratio of diameters of the two shafts for the same maximum shear stress for each shaft.

f) Describe the steps to draw Mohr's circle for strain.

g) Derive the expression for slope and deflection and indicate their values at important locations for a cantilever beam carrying a concentrated load *W* at its free end. Use method of integration.

h) A copper tube 38 mm external diameter is closely wound with steel wire 0.75 mm diameter. Stating clearly the assumptions made, estimate the tension at which the wire must have been wound if an internal pressure of 2 N/mm^2 produces a tensile circumferential stress of 6.5 N/mm^2 in the tube. E_s = 1.6 x E_c.

i) A 400 mm long shaft with a diameter of 40mm caries a flywheel weighing 3kN in the mid way. The shaft transmits 12 kW at 200 rpm. Determine the principal stresses.

j) Calculate the buckling load of a strut fixed at both ends, the cross section being a square 1 cm by 1 cm, and the length 2 m. Take ***E*** = 200 GN/m^2.

k) A simply supported beam of length 800 mm and cross section diameter 15 mm, fails on applying 360 N at the midspan. Determine the maximum magnitude of the uniformly distributed load that can safely applied to this beam.

l) The following three beams having the same length, same weight and made up of the same material.

(I) I-section *400 mm x 180 mm* with *20 mm* thick flanges and *12.5 mm* thick web.
(II) Rectangular section of depth twice its width.
(III) Solid circular section

Compare the strength of the I-section with the rectangular and circular sections.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **(a)** Derive the Euler's formula for critical load for a column considering ends with (i) Pinned-pinned conditions and (ii) Fixed-fixed conditions. **(8)**

(b) A round steel rod of diameter 15 mm and length 2 meter is subjected to a gradually increasing axial compressive load. Using Euler's formula find the buckling load. Find also the maximum lateral deflection corresponding to the buckling condition. Both ends of the rod may be taken as hinged. Take E = 2.1 x 10^5 N/mm^2 and the yield stress of steel = 250 N/mm^2. **(8)**

Q4 **(a)** Derive the equation for pure torsion for circular shaft stating all assumptions and with a neat diagram. **(8)**

(b) A solid shaft of 200 mm diameter has the cross-sectional area as that of a hollow shaft of the same material with inside diameter 150 mm. Find the ratio of power transmitted by the two shafts at the same speed. **(8)**

Q5 **(a)** For the given state of stress as shown in Fig. 4, (a) draw Mohr's circle, (b) find principal stresses, and (c) orientation of the principal planes **(8)**

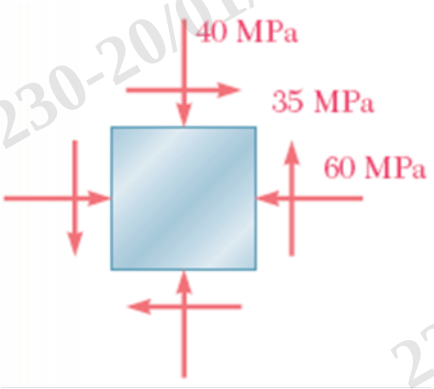


Fig. 4

(b) Determine the deflection of the simply supported beam at C and D as shown in Fig. 5. Find the position of the maximum deflection and the value of it. Assume E = 210 GPa, I = 6000 cm^4 **(8)**

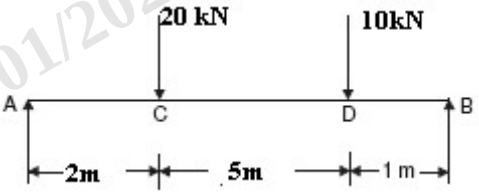


Fig. 5

Q6 **(a)** In a compound helical spring the inner spring is arranged within and concentric with the outer one, but is 9 mm shorter. The outer spring has ten coils of mean diameter 24 mm, and the wire diameter is 3 mm. Find the stiffness of the inner spring if an axial load of 150 N causes the outer one to compress 18 mm. If the radial clearance between the springs is 1.5 mm find the wire diameter of the inner-spring when it has eight coils. G = 77,000 N/mm^2. **(8)**

(b) A simply supported beam of span length of 4 m supports a uniformly distributed load of intensity W = 4 kN/m spread over the entire span. The beam is constructed of rectangular cross-section with width 10 cm and depth of 20 cm. Determine the maximum tensile and compressive stresses developed due to bending. Also show the variation of bending stress across the cross-section. **(8)**

Registration No.: | | | | | | | | | | |

Total Number of Pages: 03 **B. Tech, IDD (B.Tech. & M.Tech.)**
REE3C002

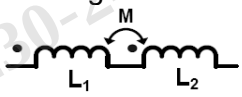
3rd Semester Regular / Back Examination: 2023-24
NETWORK THEORY
AEIE, EEE, EIE, ELECTRICAL, ELECTRICAL & C.E.
Time: 3 Hour
Max Marks: 100
Q.Code: N541

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2×10)**

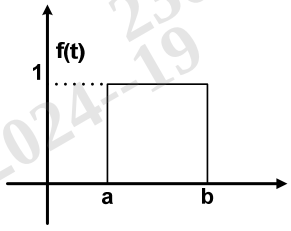
a) The efficiency of a network is 50% during maximum power transfer. Briefly explain.
b) Draw the phasor diagram of a series R-L-C circuit at resonance.
c) Write the 'h' and 'A-B-C-D' parameter equations of a two-port network.
d) Write the conditions for reciprocity for a 2-port network in z, y, h and ABCD parameters.
e) Find the complex power, when the given voltage is 125 + 30j Volt and current is 25 + 12j Amp.
f) Find the equivalent inductance in the figure below.



g) State the number of poles and zeroes, and obtain the locations in real-imaginary plane.

$$F(s) = \frac{25(10s+4)(s+6)}{s(s^2+1)}$$

h) Define an Impulse function and write its Laplace Transform.
i) A capacitor in an RC circuit with R = 2 Ω and C = 4 F is being charged. How much time is required for the capacitor voltage to reach 63.2% of its steady-state value?
j)



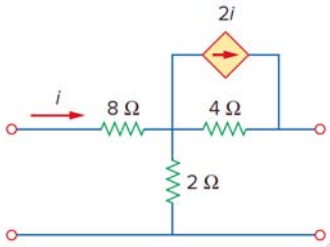
Find the Laplace Transform of the given rectangular pulse.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6×8)**

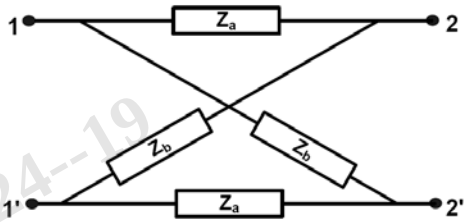
a) What is 'Duality' in electrical networks explain with suitable examples.
b) Define Q factor, Bandwidth, and Selectivity with reference to a series R-L-C circuit. How are these related?

c)

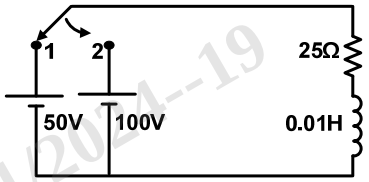


Determine the 'y' parameters for the two port as shown in figure above.

d) For the lattice network shown in figure below, prove that $z_{11} = z_{22} = 1/2(Z_a+Z_b)$ and $z_{12} = z_{21} = 1/2(Z_b-Z_a)$.



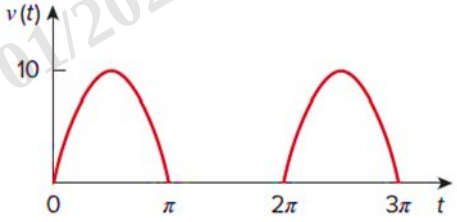
e) In the R-L circuit as shown in figure below, the switch is in position-1 long enough to establish steady state condition and at t = 0, it is switched to position-2. Find the resulting current in the circuit



f) Define transfer function. Discuss the significance of poles and zeroes of the transfer function.

g) Derive the expression for average power over a time period (T) where, $v(t) = V_m \sin(\omega t + \beta)$ and $i(t) = I_m \sin(\omega t + \alpha)$.

h) The waveform shown in figure below is a half wave rectified sine wave. Find the average and rms value and also the amount of average power dissipated in a 10 Ω resistor connected to such a voltage source.



i) State Thevenin's theorem. For the circuit shown in the figure below, determine the Thevenin's voltage and resistance looking into the terminals a-b.

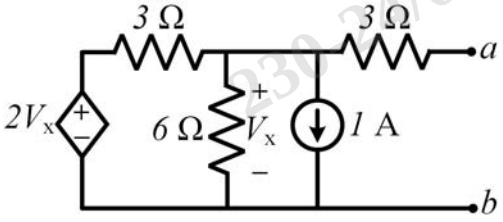
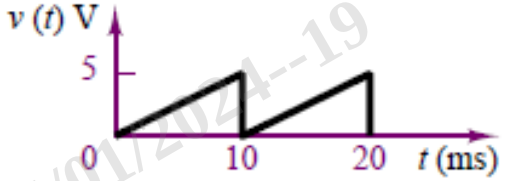


Fig.5

j) A series circuit has R = 10Ω, L = 50mH, and C = 100μF and is supplied with 200V, 50Hz. Find (i) Impedance (ii) current (iii) active power (iv) reactive power (v) power factor (vi) voltage drop across each element.

k) In a series circuit, the resistance, inductance and capacitance values are 2Ω, 1H and 0.5F respectively. The circuit is excited with the help of a switch from a dc source of 50V having negligible internal resistance. By applying Laplace Transform method find the current i(t) in the circuit, if the switch is closed at t = 0.

l) Find the form-factor of the saw tooth waveform as shown in figure below.



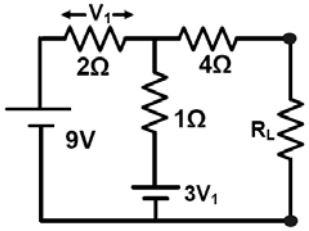
Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** State and prove Maximum Power Transfer theorem. **(6)**

b) State and explain Reciprocity theorem with an example. **(4)**

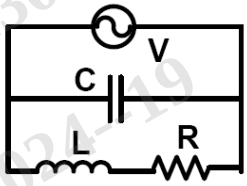
c) Calculate the value of the load resistance R_L, that would draw maximum power from the rest of the circuit as shown in figure below. **(6)**



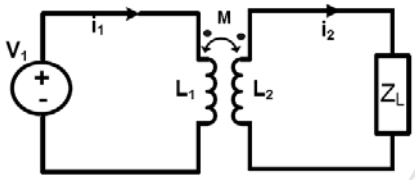
Q4 **a)** Describe the various types of responses in a series R-L-C circuit with a step input. **(8)**

b) A resistance of 4Ω and an inductance of 0.1H are connected in series and excited by a voltage v = 100sin40t. Find an expression for the current. The initial current in the circuit is zero. **(8)**

Q5 **a)** Find the frequency of resonance for the following parallel resonance circuit below **(8)**



b) Write the loop equations for the circuit as in the figure below. **(2)**



c) Find the initial and final value of the function f(t), whose Laplace Transform is given as $F(s) = \frac{(s+4)}{(s+1)(s+3)}$. **(6)**

Q6 **a)** Deduce the expression for z- parameters in terms of h-parameters for a 2-port network and vice versa. **(8)**

b) Discuss about various types interconnections of 2-port networks with examples. **(8)**

Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **B. Tech, IDD (B. Tech and M. Tech)**
ROP3B001

3rd Semester Reg/Back Examination: 2023-24
Object Oriented Programming Using JAVA
AERO, AE, AG,AEIE,AUTO,BIOMED,BIOTECH, CHEM, C&EE, CIVIL, CST, CSEAI, CSEDS, CSE, CSIT, CSEAIME, ELECTRICAL & C.E, EEE, ELECTRONICS & C.E, EIE, ELECTRICAL, ECE, ENV, ETC, IT, MANUTECH, MECH, MME, MMEAM, METTA, MINERAL, MINING, PT, PLASTIC
Time: 3 Hour
Max Marks: 100
Q. Code: N414
Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Define OOP.
b) Can we overload a static method in JAVA? Explain.
c) Explain different operators in JAVA.
d) What is constructor overloading?
e) What is inheritance?
f) Can we overload or override the main method in JAVA? Explain.
g) How do we set priorities for threads?
h) What is scope of variable?
i) What is constructor? Explain with JAVA program.
j) What are wrapper classes?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Discuss public, private, protected and default access modifier with example.
b) Describe how JAVA supports runtime polymorphism with an example by considering get Interest Rate() of RBI being overridden with get Interest Rate() of various banks like sbi, axis, icici, etc which extend RBI.
c) Justify statement.
(i) JVM is platform dependent.
(ii) There is no destructor in JAVA.
d) Explain different types of control statements used in JAVA.
e) Define the use of static keyword. Write any four String methods used in JAVA with example.
f) Write a JAVA program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula.
g) List and explain any five swing controls with their uses.
h) Define super, final and this keyword in JAVA. Explain the concept of MVC in brief.

i) How to pass parameters to an applet? Explain with example.

j) Explain streams in JAVA.

k) What is method overloading? can you define two methods that have same name but different parameter types? Can you define two methods in class that have identical method names and parameter profile with different return values types or different modifier?

l) Explain any five object oriented features supported by JAVA with examples.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	**a)**	Explain the life cycle of an applet with neat diagram and state the reason for destroy() method invocation.	**(8)**
	b)	What is multithreading? Explain how multithreading in single processor system is different from multithreading in multiprocessor system.	**(8)**
Q4	**a)**	Write a JAVA program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with ”Stop” or ”Ready” or ”Go” should appear above the buttons in selected color. Initially there is no message shown.	**(8)**
	b)	Write a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 20 numbers.	**(8)**
Q5	**a)**	Write a JAVA Program that inserts book details like bookid, author, pages, price, in to library database, update the database by adding publisher column and display the result from library database using JDBC connectivity.	**(8)**
	b)	Explain the necessity of drivers and describe the steps involved in establishment of a JDBC connection to retrieve the data from database.	**(8)**
Q6	**a)**	Write a JAVA program that reads a .txt file from user and display number of words and lines in the file.	**(8)**
	b)	What is an Exception? List out the keywords for exception handing and write steps to develop user defined exception.	**(8)**

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 **B. Tech. & IDD (B.Tech and M.Tech)**

ROB3E001

3rd Semester Regular/Back Examination: 2023-24

Organizational Behaviour

ELECTRONICS & C.E,
AE,AEIE,AUTO,BIOMED,CIVIL,CST,CSEDS,CSE,CSIT,CSEAIME,ELECTRICAL & C.E,EEE,EIE,ELECTRICAL,ECE,ENV,ETC,IT,MECH,MME,METTA,MINERAL,MINING

Time : 3 Hour

Max Marks :100

Q. Code : N433

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions : **(2 x 10)**

a) What do you mean by attitudinal change?
b) Write a short note on person-job fit.
c) How are individual values manifested in the group values?
d) How are values needed at workplace?
e) What is a culture iceberg?
f) Write a short note on attribution.
g) Define cultural shock?
h) How group behaviour is reflected?
i) What is big five personality model?
j) What are the traits of a learning organization?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) **(6 × 8)**

a) What are the features and norms of group dynamics?
b) How does attitude manifested in the performance of employees?
c) What are the perceptual errors?
d) How does emotional intelligence improve workplace harmony?
e) Explain the relationship between attitude and behavior.
f) What are the salient features of contemporary leadership styles?
g) Discuss perceptual process with example.
h) What are different types of groups and their necessity in organizations?
i) Discuss Kurt Lewin's three step process of change.
j) Why achieving team results is so challenging?
k) Organizational behaviour has certain limitations too. Comment.
l) What is the use of MBTI? Discuss how to perform a personality test in organization?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Explain the process of group development. Discuss different types of functional and cross functional teams in the organization?	**(16)**
Q4	What are the strategies to manage organizational change? What are the prerequisites for successful change?	**(16)**
Q5	How motivation works? How the content theories of motivation differ from process theories?	**(16)**
Q6	Elucidate cognitive and behavioristic theoretical framework of organizational behaviour. Discuss different OB framework.	**(16)**