Code No: **19CST202** **R19**

I B. Tech II Semester Regular Examinations, December - 2020
DATA STRUCTURES
(Common to EEE and ECE)

Time: 3 hours **Max. Marks: 60**

Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks)**

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UNIT - I

1. a) Define data structure. Discuss different types of data structure their implementations applications. 6M

   b) Define array. Discuss different types of array with examples. 6M

(OR)

2. a) Show the algorithm for merge sort. 6M

   b) Discuss how to sort elements using merge sort with suitable example. 6M

UNIT – II

3. a) Explain the evaluation of prefix expression. Find the equivalent prefix of : 8 6 3 + * 1 2 3 -/- 6M

   b) Explain basic operations of the queue. List the steps to implement queue using stack. (6M)

(OR)

4. a) Design an algorithm to insert and delete a key from a circular queue. 6M

   b) Explain the procedure to convert infix expression to postfix expression with the following expression: ((A –(B+C) * D) / (E+F)) 6M

UNIT – III

5. a) Show an algorithm to push and pop an element from a linked stack. 6M

   b) Discuss sparse matrix representation using linked list. 6M

(OR)

6. a) Design an algorithm to insert new node at the beginning, at middle position and at the end of a singly linked list. 6M

   b) Explain following applications of a linked list for 6M
   (i) Representation of a polynomial expression.
   (ii) Sparse matrix manipulation.
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UNIT –IV

7. a) Define binary search tree. Show how to insert and delete an element from the binary search tree. 6M

   b) Develop a binary search tree resulting after inserting the following integer keys 49, 27, 12, 11, 33, 77, 26, 66, 23, 6. Write in-order, pre-order and post-order traversals. 6M

(OR)

8. a) Define binary tree? Construct a binary tree given the pre-order traversal and in-order traversals as follows: 6M

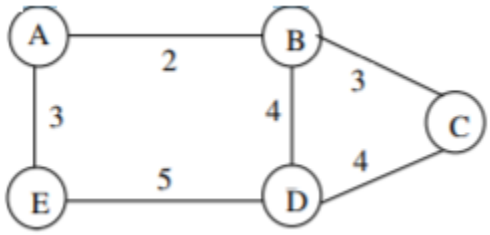
   Pre-Order Traversal: G B Q A C K F P D E R H

   In-Order Traversal: Q B K C F A G P E D H R

   b) Show that the maximum number of nodes in a binary tree of height H is 2^{H+1} -1. 6M

UNIT –V

9. Design an algorithm for minimum cost spanning tree using Kruskal's algorithm. Construct a minimum cost spanning tree of the following graph using Kruskal's algorithm. 12M



(OR)

10. Discuss about graph traversal techniques with suitable examples. 12M

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Code No : 19SHT201 **R19**

I B. Tech II Semester Regular Examinations, December - 2020
MATHEMATICS-II
(Common to ALL Branches)

Time : 3 hours **Max. Marks : 60**

Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks)**

UNIT - I

1. a) Find a real root of the eq. $x^3 - x - 1 = 0$ correct to three decimal places by Iteration method. 6M

   b) Solve the following system of equations by Jacobi's method starting with the solution (2, 3, 0) 6M
   $5x - y + z = 10$; $2x + 4y = 12$; $x + y + 5z = -1$

(OR)

2. a) Find a real root of the equation $x^4 - x - 9 = 0$ by Newton-Raphson method correct to three places of decimal. 6M

   b) Use method of false position to find the 4^{th} root of 32 correct to three decimal places. 6M

UNIT – II

3. a) Prove the following relations between the operators. 4M
   (i) $\Delta = E - 1$ (ii) $\nabla = 1 - E^{-1}$ (iii) $\delta = E^{1/2} - E^{-1/2}$ (iv) $\mu = \frac{1}{2}(E^{1/2} + E^{-1/2})$

   b) From the following table estimate the number of students who obtained marks between 40 and 45 by Newton's formula. 8M

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

(OR)

4. a) Use Gauss's forward formula to evaluate y_{30}, given that $y_{21} = 18.4708$; $y_{25} = 17.8144$; $y_{29} = 17.1070$; $y_{33} = 16.3432$; $y_{37} = 15.5154$. 6M

   b) Use Newton's divided difference formula to find f(9) for the following data 6M

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

UNIT – III

5. a) Evaluate $\int_0^6 \frac{1}{1+x^2}\,dx$ using (i) Trapezoidal rule (ii) Simpson's 3/8 rule by dividing into 6 equal sub intervals. 6M

   b) Apply Runge-Kutta Method to find an approximate value of y for x = 0.2 in steps of 0.1, if $\frac{dy}{dx} = x + y^2$ given that y = 1 when x = 0. 6M

(OR)

6. a) Using Picard's method obtain a solution up to the fifth approximation of the equation $\frac{dy}{dx} = x + y$ such that y = 1 when x = 0. 6M

   b) Using Modified Euler's method, find approximate value of y when x = 0.3, given $\frac{dy}{dx} = x + y$ and y = 1 when x = 0. 6M

UNIT –IV

7. a) Find $L(t^2e^{-2t}\cos t)$ 6M

b) Using Laplace transform, solve $(D^2 + 1)x = t\cos 2t$, given that $x = 0$, $\frac{dx}{dt} = 0$ at $t = 0$. 6M

(OR)

8. a) Evaluate $\int_0^\infty \frac{e^{-t} - e^{-2t}}{t}\,dt$, by using the Laplace transform. 6M

b) Find $L^{-1}\{\frac{1}{s(s^2+2s+2)}\}$ by using convolution theorem. 6M

UNIT –V

9. a) State Dirichlet's conditions for the expansion of a function in Fourier series. 2M

b) Find the Fourier cosine series over the interval $0 < x < 2$ for the function $f(x) = x$. 10M

(OR)

10. a) State Fourier integral theorem. 2M

b) Find the Fourier transform of $f(x) = \begin{cases} -1; & -1 \le x < 0 \\ 1; & 0 \le x \le 1 \\ 0; & \text{else where} \end{cases}$ 10M

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Code No: **19SHT202** **R19**

I B. Tech II Semester Regular Examinations, December - 2020
MATHEMATICS-III
(Common to ALL Branches)

Time: 3 hours **Max. Marks: 60**

Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks)**

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UNIT - I

1. a) Find rank of $A=\begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ by reducing into Echelon form. 6M

   b) For what values of 'a' and 'b' the system of equations 6M
   $x + y + z = 6;\ x + 2y + 3z = 10;\ x + 2y + az = b$ has
   i) No solution ii) Unique solution iii) Infinite number of solutions.

OR

2. a) Find the Eigen values and the corresponding Eigen vectors of the matrix 6M
$$A=\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

   b) Solve 5x + 10y + z = 28; 4x + 8y + 3z = 29; x + y + z = 6 by using Gauss Jordan method 6M

UNIT - II

3. a) Verify Cayley-Hamilton theorem for $A=\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence find A^{-1} and A^4. 6M

   b) Reduce the matrix $A = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ into diagonal matrix and find A^6. 6M

OR

4. Reduce the quadratic form $6x^2+3y^2+3z^2-4xy+4xz-2yz$ to a canonical form by orthogonal transformation method. Find Index, Rank, Signature and Nature of the quadratic form. 12M

UNIT - III

5. a) Calculate the angle between the normal to the surface $xy-z^2=9$ at points (4, 1, 2) and (3, 3, -3). 6M

   b) Find the values of a and b so that the surfaces $ax^2-byz=(a+2)x$ and $4x^2y+z^3=4$ intersect orthogonally at (1, -1, 2). 6M
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OR

6. a) Find a, b, c such that $\overline{F}=(2x+3y+az)\bar{i}+(bx+2y+3z)\bar{j}+(2x+cy+3z)\bar{k}$ is irrotational. 6M

b) Show that $\nabla^2 r^n = n\,(n+1)r^{n-2}$. 6M

UNIT – IV

7. Apply Green's theorem to evaluate $\oint_C (2xy-x^2)dx+(x^2+y^2)dy$ where C is the region bounded by $x = y^2$ and $y = x^2$. 12M

OR

8. a) If $\overline{F}=(5xy-6x^2)\bar{i}+(2y-4x)\bar{j}$ and C is the curve $y=x^3$ in xy - plane. Evaluate the line integral $\int_C \overline{F}\,.\,d\,\bar{r}$ from (1, 1) to (2, 8). 6M

b) Verify Stoke's theorem for $\overline{F}=(x^2+y^2)\bar{i}-2xy\,\bar{j}$ where taken around the rectangle bounded by the lines $x = \pm a$, $y = 0$, $y = b$. 6M

UNIT - V

9. a) Form a partial differential equation by eliminating arbitrary function from the equation $z = xy + f(x^2+y^2)$ 6M

b) Solve $(yz)p+(zx)q=xy$ 6M

OR

10. a) Solve $z^2(p^2+q^2+1)=1$ 6M

b) Solve $\left(D^2-4DD'+4D'^2\right)z=0$ 6M

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Code No: **19SHT203** **R19**

I B. Tech II Semester Regular Examinations, December - 2020
APPLIED CHEMISTRY
(Common to EEE and ECE)

Time : 3 hours **Max. Marks: 60**

Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks)**

UNIT - I

1.	a)	Differentiate between emulsion and suspension polymerisation.	4M
	b)	Explain stepwise preparation of Bakelite including its applications.	5M
	c)	Give merits and application of biodegradable polymers.	3M
		(OR)	
2.	a)	What are the draw backs of raw rubber? Write about Vulcanization of rubber.	5M
	b)	Discuss briefly about Fibre Reinforced Plastics with suitable example.	4M
	c)	How polyacetylene show better conductivity? Explain	3M

UNIT – II

3.	a)	Illustrate the merits of Lithium ion battery over other batteries.	4M
	b)	Explain differential aeration corrosion with example.	4M
	c)	What are the main differences between electrochemical series and galvanic series?	4M
		(OR)	
4.	a)	How to give better protection to metals against corrosion by any one of the methods? Discuss about it.	5M
	b)	Describe the construction & working of Calomel electrode.	4M
	c)	What is over voltage? How it affect the corrosion rate?	3M

UNIT – III

5.	a)	Explain preparation of semiconductors by zone refining method.	5M
	b)	Write industrial applications of carbon nano tubes.	4M
	c)	Give few applications of nematic and smectic LCs.	3M
		(OR)	
6.	a)	Give brief note on construction of P-type semiconductor.	4M
	b)	Differentiate between type-I and type-II super conductors.	4M
	c)	What are liquid crystals? Give its classification.	4M

UNIT –IV

7.	a)	What is phase transfer catalyst? Give its role in organic synthesis.	4M
	b)	What is green synthesis? Give any one green synthetic method.	4M
	c)	Justify the principle ‘atom economy’ with a suitable example.	4M
		(OR)	

8.	a)	Give some examples of micro wave assisted chemical reactions.	4M
	b)	Discuss the role of green solvents in synthetic process.	4M
	c)	Write short note on rotaxanes with examples.	4M

UNIT –V

9.	a)	Derive the equation for Beer-Lambert's law.	3M
	b)	What is finger print region? Give its importance.	4M
	c)	Describe the construction and working of Photovoltaic cell.	5M

(OR)

10.	a)	Write the applications of NMR spectroscopy.	4M
	b)	Differentiate open cycle OTEC from hybrid OTEC.	4M
	c)	What is electromagnetic spectrum? Give its uses.	4M

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Code No: **19EET203** **R19**

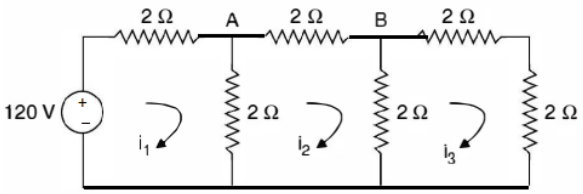
I B. Tech II Semester Regular Examinations, December - 2020
BASIC ELECTRICAL ENGINEERING
Electronics and Communication Engineering

Time: 3 hours **Max. Marks: 60**

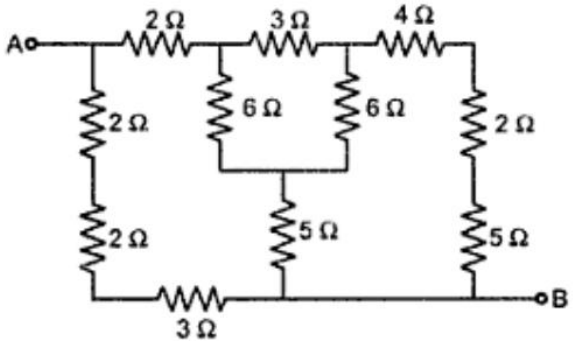
Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks)**

UNIT - I

1. a) Determine the current through the branch AB of the network shown in Fig. 8M



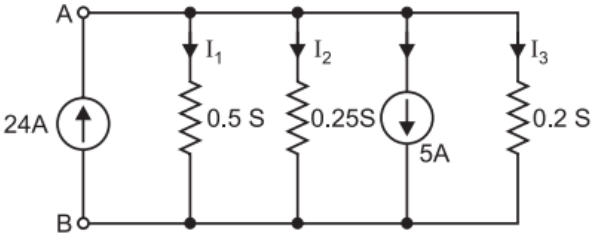
b) Calculate the effective resistance between points A and B in the given Fig. 4M



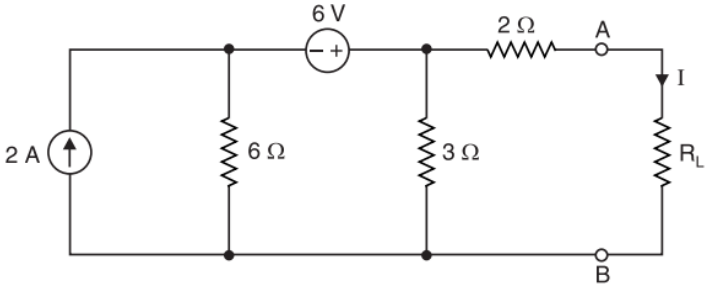
(OR)

2. a) Two filament lamps A and B take 0.8A and 0.9A respectively when connected across 110V supply individually. Calculate the value of current when they are connected in series across a 220V supply, assuming the filament resistances to remain unaltered. Also find the voltage across each lamp. 4M

b) Find the three branch currents in the circuit shown in Fig. What is the potential difference between points A and B? (Where 'S' stands for siemen or mho). 4M



c) Find Thevenin's equivalent resistance to the left of terminals AB in Fig. 4M



UNIT – II

3. a) Determine (i) The average value and (ii) R.M.S. value of the sin wave expression v(t) = 230 sin314t. 4M

   b) Define form factor and peak factors and also determine these values for the expression v(t) = 230 sin314t. 4M

   c) A 100Ω resistance is carrying a sinusoidal current given by 3coswt. Determine (i) instantaneous power taken by resistance (ii) average power. 4M

(OR)

4. a) Discuss various characteristics of a general parallel RLC circuit at resonance. Derive resonance frequency. 6M

   b) Show that the sum of energy stored by the inductor and the capacitor in a parallel RLC circuit at any instant is constant at resonant frequency and is equal to CV^2. 6M

UNIT – III

5. a) Explain Different types of DC generators. 6M

   b) A 25-kW, 250V, dc shunt generator has armature and field resistance of 0.06Ω and 100Ω respectively. Determine the total armature power developed when working as generator delivering 25kW output. 6M

(OR)

6. a) Explain three-point starter with neat diagram. 6M

   b) A 250V, 4-pole wave-wound dc series motor has 782 conductors on its armature. It has armature and series field resistances of 0.75Ω respectively. The motor takes a current of 40A. Estimate its speed and gross torque developed if it has a flux per pole of 25mWb. 6M

UNIT –IV

7. a) Explain OC and SC test of a single-phase transformer with neat circuit diagrams. 8M

   b) A 30kVA, 2400/120V, 50Hz transformer has a high voltage winding resistance of 0.1Ω and a leakage reactance of 0.22Ω. The low voltage winding resistance is 0.035Ω and the leakage reactance is 0.012Ω. Find the equivalent winding resistance, reactance and impedance referred to the high voltage side. 4M

(OR)

8. a) Explain various losses of a single-phase transformer. 8M

   b) A 230/460V transformer has a primary resistance of 0.2Ω and reactance of 0.5Ω and the corresponding values for the secondary are 0.75Ω and 1.8Ω respectively. Find the secondary terminal voltage when supplying 10A at 0.8p.f lagging. 4M

UNIT –V

9. a) Explain in detail about torque slip and torque speed characteristics of 3-Phase induction motor. 6M

   b) A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50Hz, Calculate (i) the speed at which the magnetic field of the stator is rotating (ii) the speed of the rotor when the slip is 0.04, (iii) the frequency of the rotor currents when the slip is 0.03. 6M

(OR)

10. a) Explain the working principle of a three-phase alternator 6M

    b) Find the value of k_d for an alternator with 9 slots per pole for one winding in all the slots 3M

    c) Explain the constructional details of 3-Phase alternator. 3M

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