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

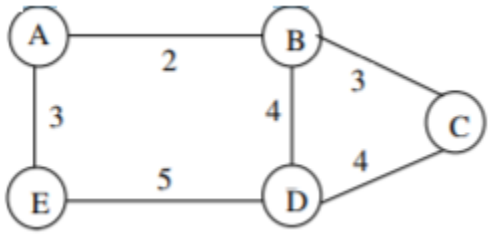
   Pre-Order Traversal: G B Q A C K F P D E R H

   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 : **19EET201** **R19**

I B. Tech II Semester Regular Examinations, December - 2020
BASIC CIRCUIT ANALYSIS
(Electrical and Electronics Engineering)

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

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

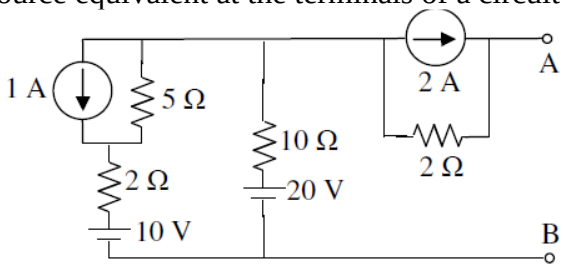
UNIT - I

1. a) Two groups of resistances, one consisting of 4 ohms, 6 ohms and 12 ohms in parallel and other consisting of 3 ohms and 6 ohms in parallel are connected in series with a source of 10 V having an internal resistance of 1 ohm. Calculate the resistance of entire circuit, the potential drop across each group and current in each resistance. 6M

   b) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the resistances and ratio of voltage and current sharing between the elements if the supply voltage is 50 V. 6M

(OR)

2. a) Find a single source equivalent at the terminals of a circuit shown in fig. 8M



   b) Explain source transformation technique. 4M

UNIT – II

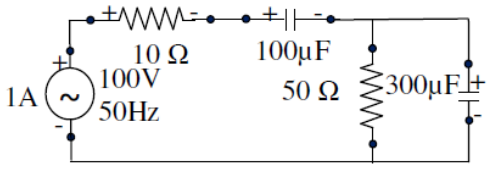
3. a) A resistor *R*, a choke coil having resistance *r* & inductance *L*, a capacitor C=25.5 μF are connected in series. When supplied from the AC source it takes 0.4 A. If voltage across the resistor is 20 V, voltage across the resistor and choke is 45 V, voltage across the choke is 35 V and voltage across the capacitor is 55 V, find: (i) the values of *r, L*, (ii) the applied voltage and its frequency, (iii) power factor of total circuit and power consumed (iv) power loss in choke coil. Also draw the phasor diagram. 10M

   b) Explain why current lags the voltage by 90^0 in case of ideal inductor. 2M

(OR)

4. a) Define average value, rms value and form factor. 4M

   b) For the circuit shown in Figure, determine the total impedance, total current and phase angle 8M



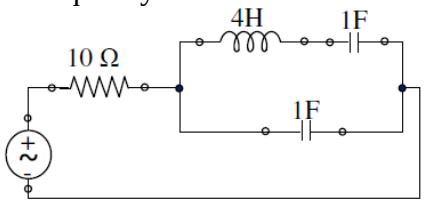
UNIT – III

5. a) An inductive coil having a resistance of 30 ohm and inductance of 0.03H is connected in series with 0.03 μF capacitor. Calculate i) Q of the coil ii) Resonant frequency and iii) the half-power frequencies. 8M

   b) Define selectivity and bandwidth of a series resonant circuit. 4M

(OR)

6. a) Determine the resonant frequency of the circuit shown below Figure 6M

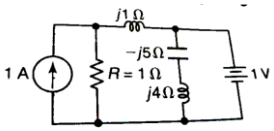


   b) Explain the meaning of half-power frequencies and derive the expressions for a series RLC Circuit. 6M

UNIT –IV

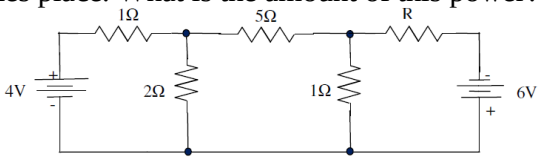
7. a) State and explain Thevenin's theorem. 6M

   b) Calculate the voltage V across the resistor R by using the superposition theorem as shown in Figure 6M



(OR)

8. a) Find the value of R in the circuit shown in below figure such that maximum power transfer takes place. What is the amount of this power? 8M



   b) Explain Millman's theorem with an example 4M

UNIT –V

9. a) Explain the dot convention in coupled circuits. 3M

   b) Explain Faraday's Laws of Electro magnetic Induction. 3M

   c) Two coils having 750 and 1200 turns, respectively, are wound on a common nonmagnetic core. The leakage flux and mutual flux, due to a current of 7.5A in coil 1, is 0.25 mWb, and 0.75 mWb, respectively. Find: i) Self Inductance, ii) Mutual Inductance, iii) coefficient of coupling. 6M

(OR)

10. a) Explain Ohm's law for magnetic circuits and write its expression in terms of magnetic quantities. 4M

    b) A rectangular shaped core is made of mild steel plate 15mm ×20mm cross-section. The mean length of the magnetic path is 18cm. The exciting coil has 300turns and 0.7 amperes current. Calculate (i) magnetizing force (ii) flux density (iii) reluctance (iv) flux of magnetic circuit. Assume relative permeability of mild steel as 940. 6M

    c) Define reluctance and permeance of a magnetic circuit. 2M

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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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