

**I B.Tech. I Semester****BASIC ELECTRICAL SCIENCES**

(Common to EEE, ECE, CSE &amp; IT)

Time : 3Hrs

Max. Marks : 60

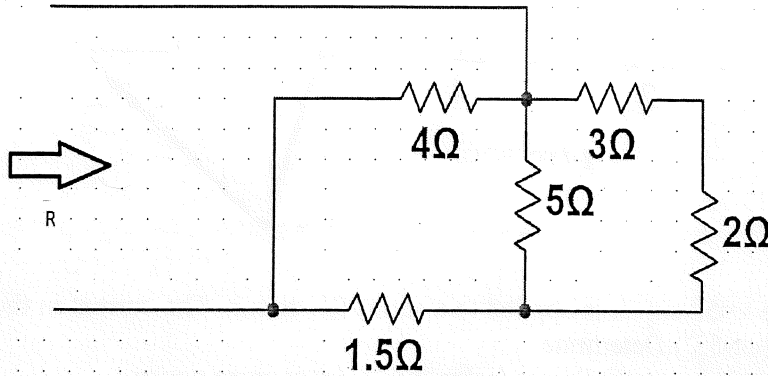
Answer *SIX* Questions, Choosing *ONE* Question from each section

All Questions carry equal marks

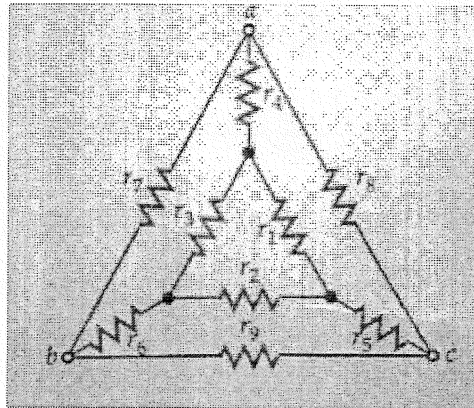
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**SECTION - I**

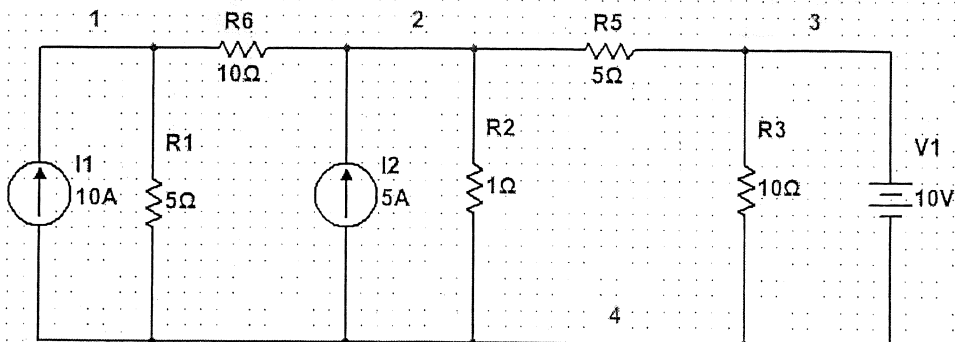
1. (a) Find equivalent resistance  $R$  of the circuit shown in below figure.



- (b) Find the equivalent pi circuit of the following network. All the resistances are 1 ohms.

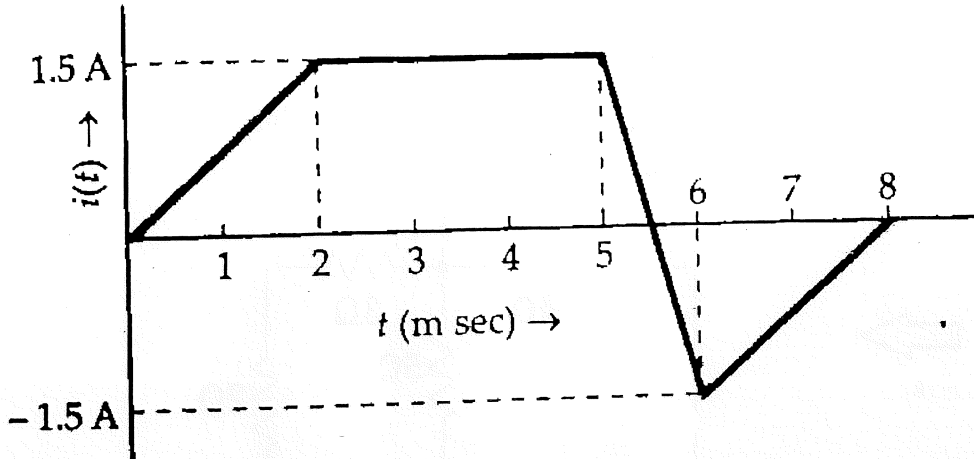


2. Obtain the current through 10 ohms ( $R_6$ ) using source transformation and KVL.

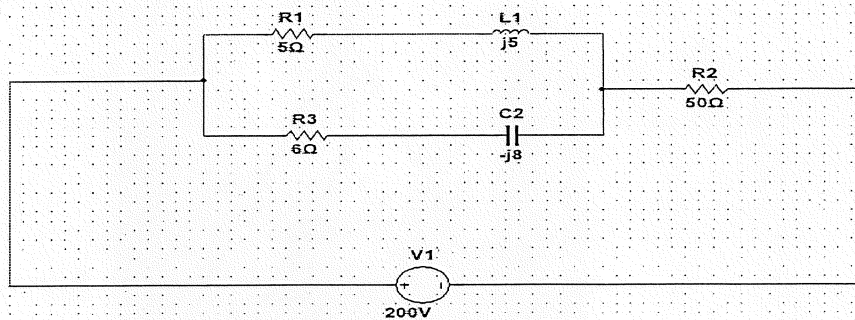


## SECTION - II

3. (a) Define the following :  
 (i) Average value                      (ii) RMS value  
 (iii) Form factor and Peak factor of an alternating quantity.
- (b) A current wave  $i(t)$  is applied to an inductor of 10 H. Find  $v(t)$ .

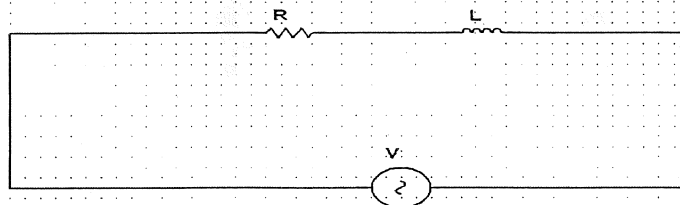


4. (a) A sinusoidal voltage  $v=50 \sin \omega t$  is applied to a series RL circuit. The current in the circuit is given by  $i=25 \sin(\omega t-53^\circ)$ . Determine  
 (a) apparent power    (b) Power factor and    (c) average power.
- (b) Find the total current and power consumed by the circuit.



## SECTION - III

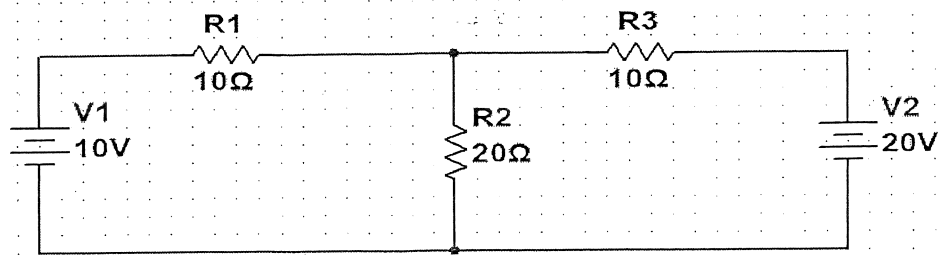
5. (a) Define (i) Active power (ii) Reactive power (iii) Susceptance (iv) Power factor.  
 (b) Determine the source voltage and the phase angle, if voltage across the resistance is 70 V and voltage across the inductive reactance is 20 V as shown in figure.



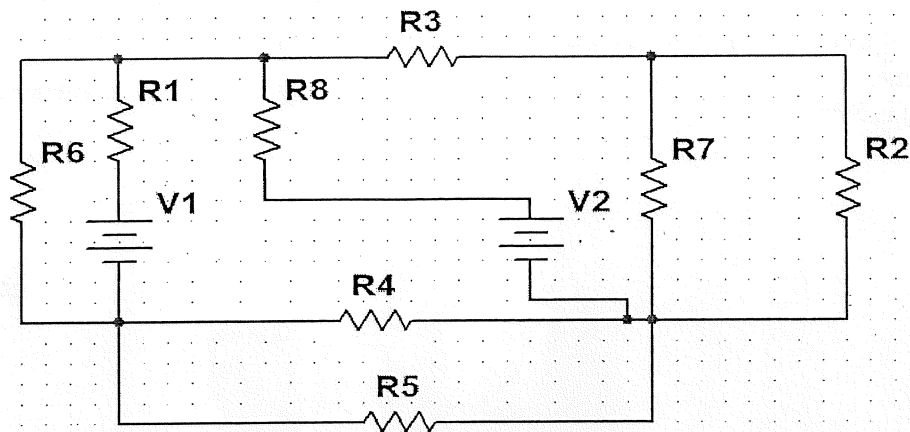
6. (a) A current  $i=4 \sin(314 t-100)$  produces a voltage drop  $V=220 \sin(314 t-200)$  in a circuit. Find the values of the circuit parameters assuming a series circuit.
- (b) A sine wave of  $v(t)=200 \sin 50 t$  is applied to a 10 ohms resistor in series with a coil. The reading of a voltmeter across the resistor is 120 V and across the coil 75 V. Calculate the power and reactive volt-amperes in the coil and the power factor of the circuit.

**SECTION - IV**

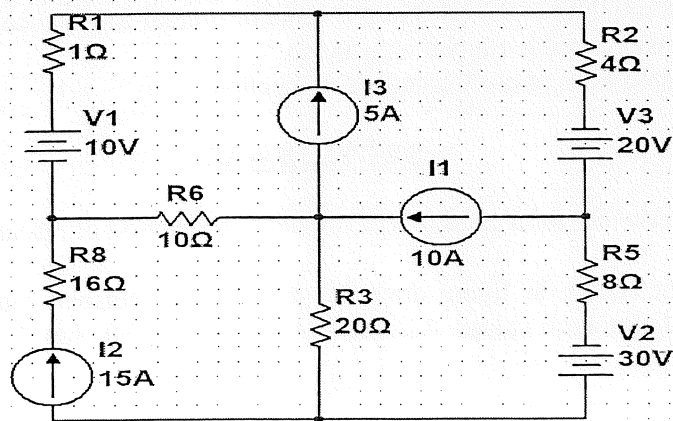
- 7 (a) For the network shown in figure obtain the incidence matrix and mesh equations. Obtain the current through 20 ohms.



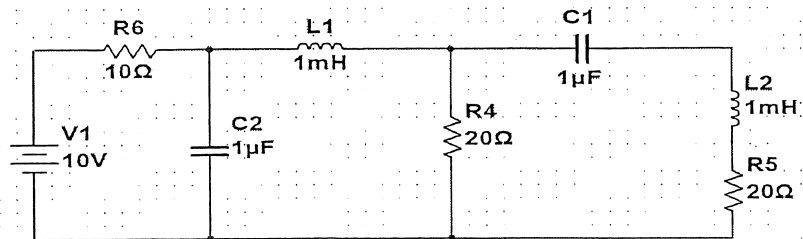
- (b) For the network shown in figure draw the oriented graph and draw all possible trees.



- 8 (a) Determine the loop currents for the circuit shown in figure using mesh analysis.

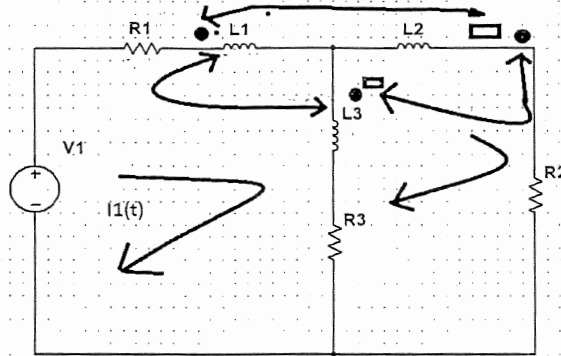


- (b) Draw the dual circuit of the figure given below.

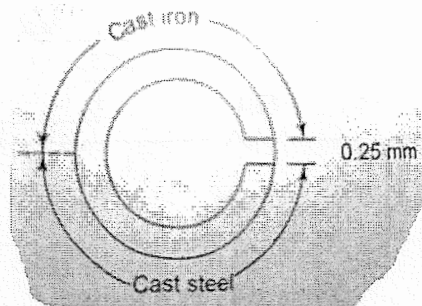


### SECTION - V

- 9 (a) Formulate the loop equation for the network shown in figure.



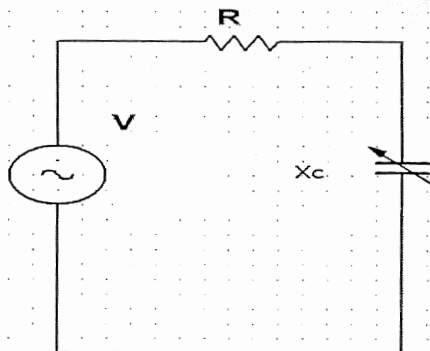
- (b) A circular ring consists of semi circular cross sections of cast iron and cast steel with an air gap of 0.25 mm as shown in figure. The mean path of the iron and steel are 0.35 m and 0.25 m respectively. Find the ampere-turns required to produce a flux of 5 mWb. The relative permeability's of iron and steel are 170 and 800 respectively. The cross sectional area of the ring is  $5 \text{ cm}^2$ .



- 10 (a) Two inductively coupled coils have self inductances  $L_1 = 40 \text{ mH}$  and  $L_2 = 150 \text{ mH}$ . If the coefficient of coupling is 0.7, (i) find the value of mutual inductance between the coils, and (ii) the maximum possible mutual inductance.  
 (b) Explain Faradays laws of electromagnetic induction.

### SECTION - VI

- 11 Derive the bandwidth for a parallel RLC circuit as a function of resonant frequency.  
 12 (a) For the circuit shown in figure draw the locus of the current. Mark the range of I for maximum and minimum values. Assume  $X_C = 50 \text{ ohms}$ ,  $R = 10 \text{ ohms}$ ,  $V = 400 \text{ V}$ .



- (b) A series RLC circuit is connected across a variable frequency supply and has  $R = 12 \text{ ohms}$ ,  $L = 1 \text{ mH}$  and  $C = 1000 \text{ pF}$ . Calculate  
 (i) resonant frequency  
 (ii) Q factor and  
 (iii) Half power frequencies .



**I B.Tech. I Semester****ELECTRICAL CIRCUITS**  
(Electronics & Communication Engineering)

Time : 3Hrs

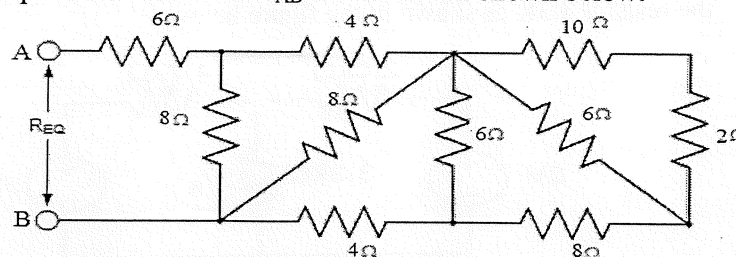
Max. Marks : 60

Answer **SIX** Questions, Choosing **ONE** Question from each section  
All Questions carry equal marks

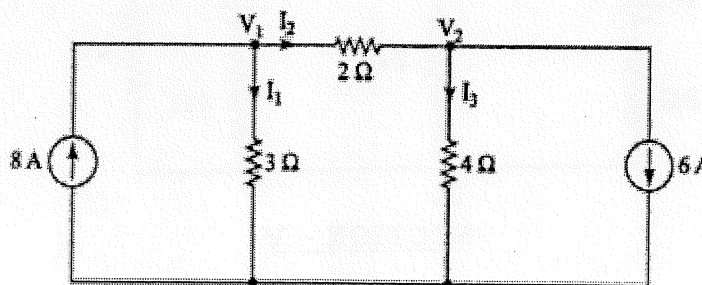
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**SECTION - I**

- (a) State and explain Kirchoff's laws with examples.
- (b) Find the equivalent resistance  $R_{AB}$  for the circuit shown below.



- (a) Explain the Star-Delta transformation for a resistive network
- (b) Using the nodal analysis find the current flowing through the 2 ohms resistance in the network shown in fig

**SECTION - II**

- Define the Average value of sinusoidal varying voltage and find the relation with its maximum value  
Find the form factor of half wave rectified alternating current
- Find the form factor and peak factor for the sinusoidal waveform.

**SECTION - III**

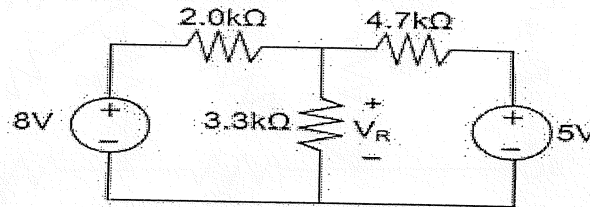
- (a) Find the impedance, current and the power factor of the RL Series circuit and draw the phasor diagram



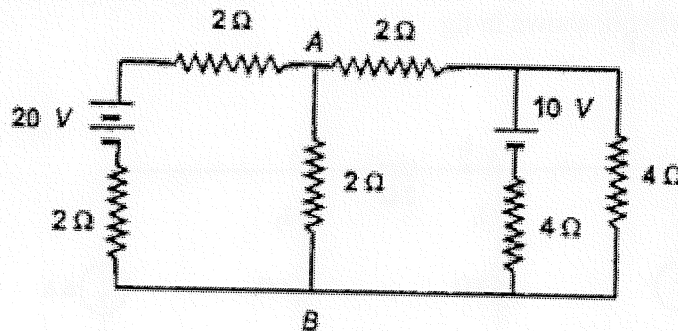
- (b) A resistance of 50 ohms, inductance of 110 mH and a capacitance of 120  $\mu$ F are connected in series across 220 V, 50 Hz supply. Determine the following ;
- Inductive reactance and Capacitive reactance
  - Impedance
  - Current flowing through the circuit
6. (a) Discuss the various characteristics of a parallel RLC resonant circuit. Derive mathematical expression in support of discussion
- (b) A variable inductor is connected in series with a resistor and a capacitor. The circuit is connected to a 200V, 50Hz supply and the maximum current obtainable by varying inductance is 0.314A. The voltage across the capacitor then is 300V. Determine the R , L and C elements.

#### SECTION - IV

7. Using the superposition theorem, determine the voltage drop and current across the resistor 3.3K as shown in the figure below.

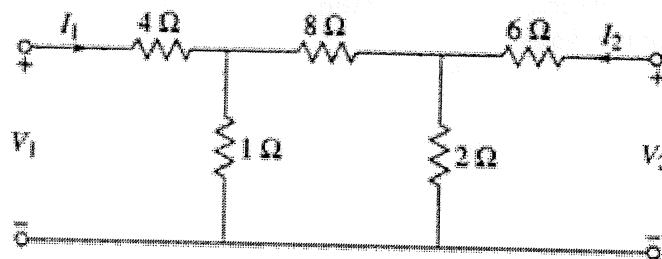


8. Applying Nortons's theorem, calculate the current through the resistance 2 ohms connected between A and B in the circuit shown in below circuit.

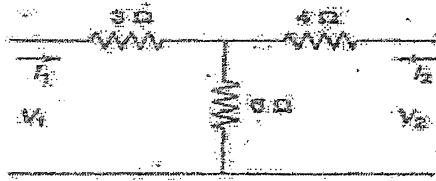


#### SECTION - V

9. (a) Obtain the relationship between the admittance and hybrid parameters.
- (b) Find ABCD parameters for the network shown in Figure.



10. (a) Deduce the relation between Z- Parameters and Y-parameters.  
(b) Find h- parameters of the network shown in below figure



**SECTION - VI**

11. (a) Derive an expression for current response of RL series circuit transient  
(b) The constant voltage of 100 V is applied at  $t=0$  to a series RC circuit having  $R=5000 \text{ K } \Omega$ ,  $C=20 \text{ } \mu\text{F}$ . By assuming no initial charge to the capacitor, find the voltage across R and C
12. A series RLC circuits with  $R=300 \text{ ohms}$ ,  $L=1\text{H}$  and  $C=100\text{ }\mu\text{F}$  has a constant voltage of 50V applied to it at  $t=0$ . Find the maximum value of current. Assume zero initial conditions





B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester****ENGINEERING MECHANICS - I**  
(Mechanical Engineering)

Time : 3Hrs

Max. Marks : 60

*Answer SIX questions choosing ONE from each section  
All questions carry equal marks.*

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**SECTION - I**

1. (a) State and Explain the principle of transmissibility of forces.
- (b) Three forces of magnitude 40 kN, 15 kN and 20 kN are acting at a point O as shown in Fig.1. The angles made by 40 kN, 15 kN and 20 kN forces with X-axis are  $60^\circ$ ,  $120^\circ$  and  $240^\circ$  respectively. Determine the magnitude and direction of the resultant force.

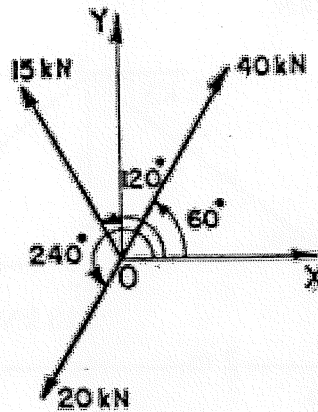


Fig.1

2. State and explain the following laws of forces: (i) Law of parallelogram of forces, (ii) Law of triangle of forces, (iii) Law of polygon of forces

**SECTION - II**

3. Two spheres, each of weight 1000 N and of radius 25 cm rest in a horizontal channel of width 90 cm as shown in Fig. 2. Find the reactions on the points of contact A, B and C.

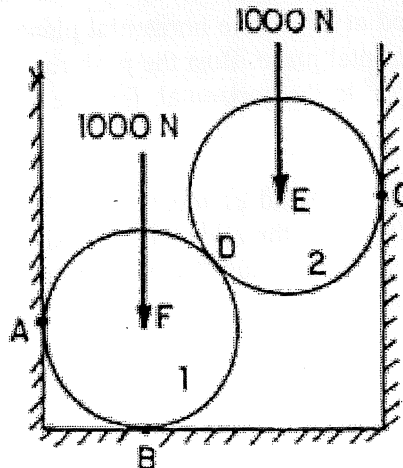


Fig.2



4. (a) What are the different types of beams? Differentiate between statically determinate and indeterminate beams.
- (b) A beam AB 6 m long is loaded as shown in Fig.3. Determine the reactions at A and B.

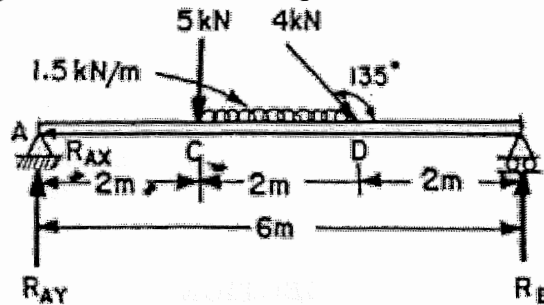


Fig.3

### SECTION - III

5. Determine the forces in the truss shown in Fig.4 which carries a horizontal load of 12 kN and a vertical load of 18 kN.

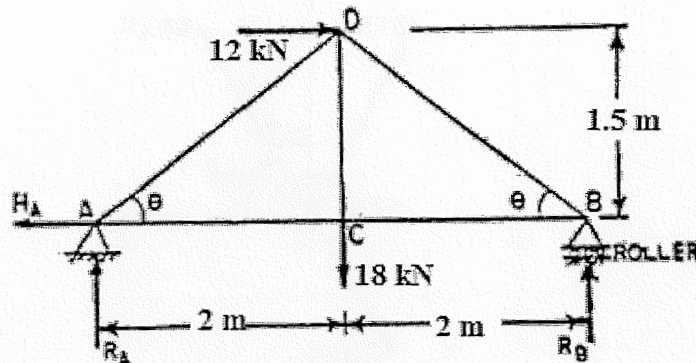


Fig.4

6. What is the advantage of method of section over method of joints? How will you use method of section in finding forces in the members of a truss?

### SECTION - IV

7. (a) What do you mean by 'angle of repose'? Prove that angle of repose is equal to the angle of friction.
- (b) A pull of 20 N, inclined at  $25^\circ$  to the horizontal plane, is required just to move a body placed on a rough horizontal plane. But the push required to move the body is 25 N. If the push is inclined at  $25^\circ$  to the horizontal, find the weight of the body and co-efficient of friction.
8. A screw jack has a square thread of mean diameter 6 cm and pitch 0.8 cm. the co-efficient of friction at the screw thread is 0.09. A load of 4 kN is to be lifted through 12 cm. Determine the torque required and the work done in lifting the load through 12 cm. Find the efficiency of the jack also.

**SECTION - V**

9. Find the centroid of the shaded area shown in Fig.5.

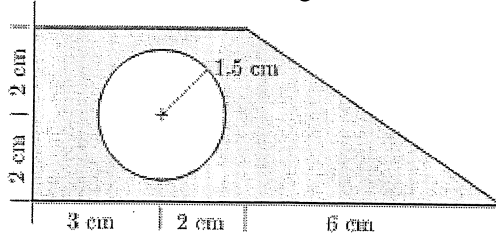


Fig.5

10. Determine the centre of gravity of plane uniform lamina shown in Fig.6.

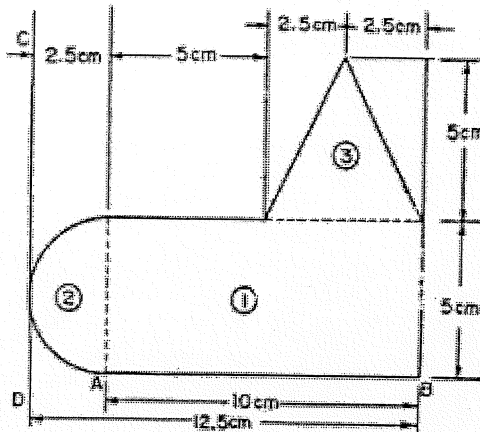


Fig.6

**SECTION - VI**

11. (a) State the theorem of perpendicular axis. How will you prove this theorem?  
 (b) Determine the moment of inertia of the section about an axis passing through the base BC of a triangular section shown in Fig.7.

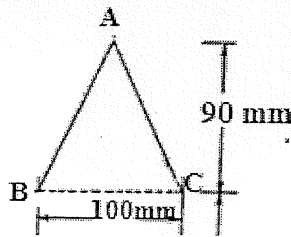


Fig.7

12. Derive the mass moment of inertia of a right circular cone of base radius R, height H and mass M about its axis.







**I B.Tech. I Semester****BASIC ELECTRICAL SCIENCES**

(Common to EEE, CSE &amp; IT)

Time : 3Hrs

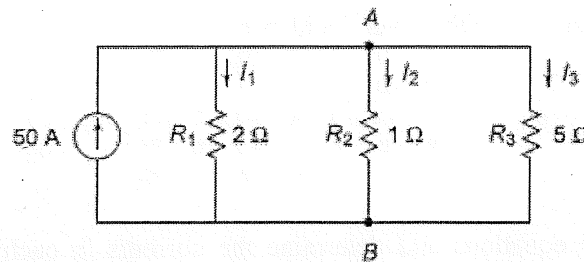
Max. Marks : 60

Answer **SIX** Questions, Choosing **ONE** Question from each section  
All Questions carry equal marks

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**SECTION - I**

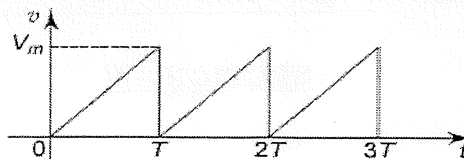
1. (a) State and explain kirchoff's voltage and current laws.  
(b) Determine the current in all resistors in the circuit shown in below figure.



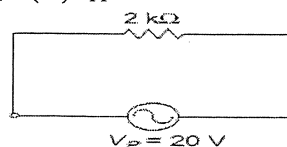
2. (a) Obtain the expressions for equivalent capacitance when two capacitances  $C_1$  and  $C_2$  are connected in series and parallel.  
(b) When a dc voltage is applied to a capacitor, the voltage across its terminals is found to build up in accordance with  $V_C = 50(1 - e^{-100t})$ . After a lapse of 0.01 s, the current flow is equal to 2 mA.  
i. Find the value of capacitance in microfarads.  
ii. How much energy is stored in the electric field at this time?

**SECTION - II**

3. (a) A sine wave has a peak value of 25 V. Determine the following values:  
(i) r.m.s (ii) peak to peak (iii) average  
(b) Find the average and effective values of the saw tooth waveform shown in figure below.



4. (a) Explain briefly about reactance, impedance, susceptance and admittance.  
(b) A sinusoidal voltage is applied to the resistive circuit shown in figure. Determine the following values.  
(i)  $I_{RMS}$  (ii)  $I_{AV}$  (iii)  $I_P$  (iv)  $I_{PP}$



### SECTION - III

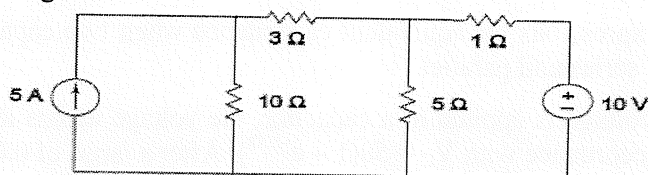
5. (a) Derive the expression for active power.  
 (b) A voltage of  $v(t) = 100 \sin \omega t$  is applied to a circuit. The current flowing through the circuit is  $i(t) = 15 \sin (\omega t - 30^\circ)$ . Determine the active power delivered to the circuit.
6. (a) Obtain the phasor diagram of a series RL circuit when a sinusoidal excitation is given as input.  
 (b) A circuit consisting of 1kW resistor connected in series with a 50 mH coil, a 10 V rms, 10 kHz signal is applied. Find impedance Z, current I, voltage across resistance  $V_R$ , and the voltage across inductance  $V_L$ .

### SECTION - IV

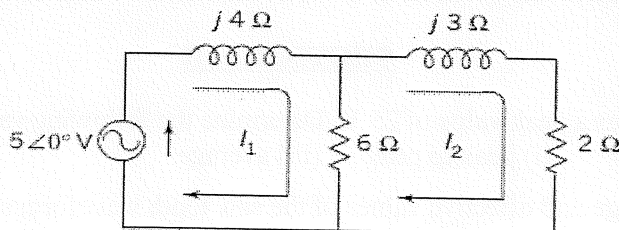
7. (a) Explain about incidence matrix with example.  
 (b) Draw the graph corresponding to the given incidence matrix.

$$A = \begin{bmatrix} -1 & 0 & 0 & 0 & +1 & 0 & +1 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 & -1 & +1 \\ 0 & 0 & -1 & -1 & 0 & -1 & 0 & -1 \\ 0 & 0 & 0 & 0 & -1 & +1 & 0 & 0 \\ -1 & +1 & +1 & +1 & 0 & 0 & 0 & 0 \end{bmatrix}$$

8. (a) Write the node voltage equations and determine the currents in each branch for the network shown in figure.



- (b) Write the mesh current equations in the circuit shown in figure, and determine the currents.

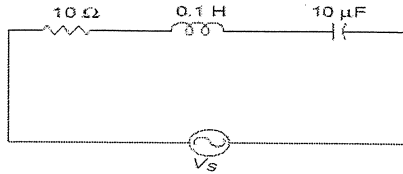


### SECTION - V

9. (a) Derive the expression for coefficient of coupling.  
 (b) Two inductively coupled coils have self-inductances  $L_1 = 50 \text{ mH}$  and  $L_2 = 200 \text{ mH}$ . If the coefficient of coupling is 0.5 (i), find the value of mutual inductance between the coils, and (ii) what is the maximum possible mutual inductance?
10. (a) Obtain the equation for equivalent inductance when two mutually coupled inductors are connected in series.  
 (b) Two coils connected in series have an equivalent inductance of 0.4 H when connected in aiding, and an equivalent inductance 0.2 H when the connection is opposing. Calculate the mutual inductance of the coils.

**SECTION - VI**

11. (a) Obtain the expression for resonant frequency for a series RLC circuit.  
(b) For the circuit shown, determine the impedance at resonant frequency, 10 Hz above resonant frequency, and 10 Hz below resonant frequency.



12. Draw the locus diagram for series RC circuit for fixed resistance and varying reactance.





**I B.Tech. I Semester****PROGRAMMING FOR PROBLEM SOLVING**  
(Common to All Branches)

Time: 3Hrs

Max. Marks: 60

*Answer SIX Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

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**SECTION - I**

1. (a) Draw the flowchart and algorithm to compute simple interest.  
(b) Explain the basic structure of a C program with an example.
2. (a) Define variable. Explain the rules for constricting variables in C language.  
(b) Write a C program in C to find the area and perimeter of a rectangle.

**SECTION - II**

3. (a) Explain the following operators in C language (i) Relational (ii) Logical (iii) Conditional.  
(b) Write a program in C to print the numbers from 4 to 9 and their squares.
4. (a) What are the formatted input and output functions. Explain with examples.  
(b) Write a C program to find the largest of three numbers using ternary operator.

**SECTION - III**

5. (a) List all conditional control statements used in C. Explain any two with syntax and example.  
(b) Write a C program to find the factorial of a number using do-while, where the number n is entered by user.
6. (a) What are unconditional control statements? Explain any two with syntax and example.  
(b) Write a C program to find GCD of two numbers using ternary operator and for loop.

**SECTION - IV**

7. (a) Define array. Explain with suitable example how to declare and initialize 1D array?  
(b) Write a C program to find the transpose of a given matrix.
8. (a) What is string? Write a C program that reads a sentence and prints the frequency of each of the vowels and total count of consonants.  
(b) Write a C program that accepts (3×3 ordered matrices A and B), and compute the following (i) summation of Two numbers (ii) Subtraction of Two numbers



### **SECTION - V**

9. (a) What is function? Explain different classification of user defined functions based on parameter passing and return type with examples.  
(b) Write a program in C using functions to swap two numbers using global variables concept and call by reference concept.
10. (a) What is a pointer? Write a C program to find the sum and mean of all elements in an array using pointer.  
(b) Explain the array of pointers with example.

### **SECTION - VI**

11. (a) Explain array of structure and structure within a structure with an example.  
(b) Write a C program to pass structure variable as function argument.
12. (a) Write a program in C that copies the contents of one file to another file.  
(b) How to use fseek() for randomly access the file content? Explain with an example.

**R-17**

**Code: 17CS1102**

**B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023**

**I B.Tech. I Semester**

**INTRODUCTION TO COMPUTING  
(Common to CE & ME)**

Time : 3Hrs

Max. Marks: 60

*Answer SIX Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION - I**

1. (a) Explain in detail about note book computers.  
(b) Name and explain different storage devices in computer.
2. (a) Explain different phases of information processing cycle in computers.  
(b) Explain the uses of computers in the fields of education and small business.

**SECTION - II**

3. (a) What is the purpose of START Key? What happens when you press a key on keyboard?  
(b) Explain about different storage devices.
4. (a) How the operating system access the data form hard drive.  
(b) What is the purpose of mouse pointer? What is the term dragging means?

**SECTION - III**

5. (a) Discuss about real time operating system.  
(b) Describe various user interfaces. Explain them briefly.
6. (a) How the information is sharable? Explain it in detail.  
(b) Distinguish between Graphical User Interface and Command Line Interface. And write any two examples for each of the operating systems.

**SECTION - IV**

- 7 (a) What are Identifiers in C explain the rules of identifiers.  
(b) Write a C program to find the area and circumference of a circle.
- 8 (a) Write a C program to find the sum and average of marks in five subjects.  
(b) Explain about relational and logical expressions with examples.

**SECTION - V**

- 9 (a) Discuss about formatted and unformatted input and output functions in c programming language.  
(b) Write a C program to find biggest of three numbers.



- 10 (a) Explain about decision making statements in c programming language.  
(b) Write the syntax of switch statement and explain with an example.

**SECTION – VI**

- 11 (a) Explain about different iterative statements in C language with suitable examples.  
(b) Write a c program to find max element in an array of n elements.
- 12 (a) What is an Array? How to declare and initialize one dimensional arrays.  
(b) Write a C program to find whether the given number is prime or not.



R-17

Code: 17CS1101

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester**

**BASIC COMPUTER ENGINEERING**  
(Common to EEE, ECE & CSE)

Time: 3Hrs

Max. Marks: 60

*Answer SIX Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION - I**

1. (a) What are the parts of computer?  
(b) Describe the CRT Monitors.
2. (a) Explain system software and application software.  
(b) How the computer accepts Input from the key board?

**SECTION - II**

3. (a) Describe the solid-state storage devices.  
(b) How computers represent data?
4. (a) Explain Diskettes and Recordable Optical Technologies.  
(b) What is the role of the Arithmetic and Logic Unit in processing data?

**SECTION - III**

5. (a) Describe Hardware / Software interaction.  
(b) Explain High Level Languages.
6. (a) Explain planning of Computer Program.  
(b) With neat sketch explain the Systems Development Life Cycle for Programming.

**SECTION - IV**

- 7 Describe Single-User/Single-Tasking and Multi-User/Multitasking Operating Systems.
- 8 Explain the following  
a) Command line Interfaces      b) Sharing Information

**SECTION - V**

- 9 Describe Common types of networks and Intranet and Extranets.
- 10 Explain Network Topologies with suitable sketch.

**SECTION - VI**

- 11 (a) What is the DBMS? How reports are generated in DBMS?  
(b) What are the countermeasures for security threats?
- 12 (a) Explain creating Queries on Database.  
(b) Describe online Spying tools.





B.TECH.DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**ENGINEERING MATHEMATICS - I**  
(Common to All Branches)

Time : 3Hrs

Max. Marks : 60

*Answer SIX questions choosing ONE from each section*  
*All questions carry equal marks.*

\* \* \*

**SECTION - I**

1. (a) Solve  $\frac{dy}{dx} + y \tan x = y^2 \sec x$ .
- (b) Bacteria in a culture grows exponentially so that the initial number has doubled in three hours. How many times the initial number will be present after 9 hours?
2. (a) Define Exact Differential equation. Also solve  $(hx + by + f)dy + (ax + hy + g)dx = 0$ .
- (b) Solve  $\frac{dy}{dx} - \frac{2y}{x+1} = (x+1)^3$ .

**SECTION - II**

3. Solve  $\frac{d^2y}{dx^2} + y = e^{-x} + x^3 + e^x \sin x$ .
4. (a) Solve  $(4D^2 - 4D + 1)y = 100$ .
- (b) Solve  $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$ .

**SECTION - III**

5. (a) State and prove First Shifting Theorem of Laplace Transforms.
- (b) Find (i)  $L\{\cos(\omega t + \theta)\}$  (ii)  $L(\sin t \cos t)$
6. (a) If  $L\{t^{1/2}\} = \frac{\sqrt{\pi}}{2s^{3/2}}$  then find  $L\{t^{-1/2}\}$ .
- (b) Using change of scale property, find  $L\{\sin^2(at)\}$ .

**SECTION - IV**

7. (a) Using Convolution theorem, find  $L^{-1}\left(\frac{1}{(s+a)(s+b)}\right)$ .
- (b) Find the inverse Laplace Transform of  $\frac{s^2 + s - 2}{s(s+3)(s-2)}$ .



8. Solve  $(D^2 + 1)x = t \cos 2t$  given  $x = 0, \frac{dx}{dt} = 0$  at  $t = 0$ , using Laplace Transforms.

**SECTION - V**

9. (a) Define rank of a matrix. Reduce the matrix  $A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$  into echelon form and

hence find its rank.

- (b) Solve the system of equations

$$x + y - 3z + 2w = 0, 2x - y + 2z - 3w = 0, 3x - 2y + z - w = 0, -4x + y - 3z + w = 0 .$$

10. Determine the Eigen values and Eigen vectors of  $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ .

**SECTION - VI**

11. (a) Find the Maclaurin series for the function  $f(x) = \frac{1}{1+x^2}$
- (b) Using Taylor's series, expand  $\log x$  in powers of  $(x-1)$ .
12. (a) Find the dimensions of the rectangular box open at the top of maximum capacity whose surface area is 108 sq. inches.
- (b) Identify the shortest distance from origin to the plane  $x + 2y + 3z = 14$  using Lagrange's method of multipliers.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester****NUMERICAL ANALYSIS**

(Common to All Branches)

Time : 3Hrs

Max. Marks : 60

*Answer SIX Questions, Choosing ONE Question from each section**All Questions carry equal marks*

\* \* \*

**SECTION - I**

- Find a real root of  $xe^x = 2$  by using Regular-Falsi method.
- Using Newton-Raphson's method, find a positive root of  $x^4 - x - 9 = 0$ .

**SECTION - II**

- Apply Gauss elimination method to solve the equations  $x + 4y - z = -5$ ;  
 $x + y - 6z = -12$ ;  $3x - y - z = 4$ .
- Apply Gauss-Seidal method to solve the equations, correct up to three decimals.  
 $10x_1 - 2x_2 - x_3 - x_4 = 3$ ,  $-2x_1 + 10x_2 - x_3 - x_4 = 15$ ,  $-x_1 - x_2 + 10x_3 - 2x_4 = 27$ ,  
 $-x_1 - x_2 - 2x_3 + 10x_4 = -9$ .

**SECTION - III**

- (a) Using Newton's forward interpolation formula, and the given table of values

x	1.1	1.3	1.5	1.7	1.9
f(x)	0.21	0.69	1.25	1.89	2.61

Obtain the value of f(x) when x=1.4.

- (b) Using Lagrange's interpolation formula, find the value of y(10) from the following table:

x	5	6	9	11
y	12	13	14	16

- Using Stirling's formula to evaluate f(25) from the following data

x	10	20	30	40
f(x)	1.1	2	4.4	7.9

**SECTION - IV**

- Given the following table of values of x and y

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y	1.000	1.025	1.049	1.072	1.095	1.118	1.140

Find First and Second derivatives at (i) x=1.05 (ii) x=1.25



8. Evaluate  $\int_0^1 \frac{1}{1+x} dx$  by using (i) Trapezoidal rule(ii) Simpsons'1/3 rule (iii) ) Simpsons'3/8 rule.

**SECTION - V**

9. Tabulate  $y(0.1)$ ,  $y(0.2)$  and  $y(0.3)$  using Taylor's series method given that  $y' = y^2 + x$  and  $y(0) = 1$ .
10. Find the solution of  $\frac{dy}{dx} = x - y$ ,  $y(0) = 1$  at  $x=0.1, 0.2, 0.3$  and  $0.4$  using modified Euler's method.

**SECTION - VI**

11. Fit a second degree polynomial to the following data by the method of least square.

x	10	12	15	23	20
y	14	17	23	25	21

12. Psychological tests of intelligence and of engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ration (IR) and engineering ration(ER). Calculate the co-efficient of correlation.

Student	A	B	C	D	E	F	G	H	I	J
I. R	105	104	102	101	100	99	98	96	93	92
E.R	101	103	100	98	95	96	104	92	97	94

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester****ENGINEERING CHEMISTRY****(Common to CE & ME)**

Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section**All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. (a) Explain the Significance of standard electrode potentials.  
(b) Explain the Nernst equation for electrode potential.
2. (a) What is meant by conductometric titrations? Explain the titration of strong acid and strong base.  
(b) What are the advantages of conductometric titrations?

**SECTION - II**

3. (a) Define corrosion and explain with suitable examples.  
(b) Describe the mechanism of oxidation corrosion.
4. (a) Explain the significance of pilling Bedworth rule to explain the corrosion.  
(b) What are metallic coatings? Explain briefly.

**SECTION - III**

5. (a) Give the classification of refractories with examples.  
(b) What are lubricants? How are they classified on the basis of their physical state?
6. (a) Explain thick film, thin film and extreme pressure lubrication.  
(b) Define flash and fire points. Explain their significances.

**SECTION - IV**

7. (a) Describe the method of determination of calorific value of solid fuel by bomb calorimeter.  
(b) Write formula for minimum volume of Air is required for complete combustion of Fuel.
8. (a) Explain the manufacture of synthetic petrol by fischer propsch's process,  
(b) Describe the fractional distillation of petroleum.

**SECTION - V**

9. (a) How do you estimate dissolved oxygen in water?  
(b) Distinguish between priming and foaming.
10. (a) Explain zeolite process for the softening of water.  
(b) Describe the method for the estimation of chlorides,

**SECTION - VI**

11. (a) What is natural rubber? Why does natural rubber need compounding?  
(b) What is bakelite? How is it manufactured? Mention its properties and uses?
12. Explain the preparation, properties and applications of PVC and nylons.







B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester****ENGINEERING PHYSICS****(Common to EEE, ECE , CSE & IT)**

Time : 3Hrs

Max. Marks : 60

*Answer SIX Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION – I**

1. (a) Derive the packing factor of Face centred cubic crystal.  
(b) Derive the expression of inter planar spacing for cubic crystal.
2. (a) Derive the Bragg's law of X-Ray diffraction.  
(b) Explain the construction and working of powder method for determining the crystal structure.

**SECTION – II**

3. Define electronic polarization and derive the expression for electronic polarizability.
4. (a) Distinguish soft and hard magnetic materials.  
(b) Derive the expression for orbital magnetic moment.

**SECTION – III**

5. (a) Illustrate the formation of free electrons and holes in N-type semiconductor.  
(b) Distinguish direct and indirect band gap semiconductors.
6. (a) Explain the I-V characteristics of P-N diode.  
(b) Explain the construction and working of solar cell.

**SECTION – IV**

- 7 (a) Illustrate the block diagram of digital communication system.  
(b) Illustrate the sampling theorem.
- 8 (a) Explain the frequency modulation of the signal.  
(b) Explain demodulation process.

**SECTION – V**

- 9 (a) Explain the construction and working of He-Ne laser.  
(b) Explain the stimulated emission of radiation.
- 10 (a) Analyse the optical signal propagation through multimode step index optical fibre.  
(b) Illustrate any two applications of optical fibres.

**SECTION – VI**

- 11 (a) Illustrate the formation of paired electrons in superconductors with BCS theory.  
(b) Explain Meissner effect.
- 12 (a) Explain the construction and working of chemical vapour deposition method.  
(b) Describe the types of nanomaterials.





B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester****APPLIED PHYSICS**  
(Common to EEE ECE, CSE & IT)

Time : 3Hrs

Max. Marks : 60

*Answer SIX Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. (a) Define Interference and Coherence.  
(b) Find an expression for the fringe width in the interference pattern of young's double slit experiment.
2. (a) Explain the principle, construction and working of He-Ne laser.  
(b) List any three applications of lasers.

**SECTION - II**

3. Explain Crystal systems and their Bravais lattices with neat diagrams
4. (a) State and prove Bragg's law of X-ray diffraction  
(b) Calculate the inter-planar spacing for (3 2 1) planes in a simple cubic crystal whose lattice constant is 4.2 A.U.

**SECTION - III**

5. (a) Develop time independent Schrodinger wave equation.  
(b) Explain the physical significance of the wave function.
6. (a) Show that the energy of an electron confined in a one dimensional potential well of length L and infinite depth is quantized.  
(b) An electron is bound in a one-dimensional box having size of  $4 \times 10^{-10}$  m. Calculate its minimum energy in eV?

**SECTION - IV**

7. (a) Distinguish between intrinsic semiconductor and extrinsic semiconductor.  
(b) Distinguish between N-type semiconductor and P-type semiconductor.
8. (a) Explain the various current components of P-N junction diode in detail.  
(b) A Si diode operates at a fixed forward bias of 0.4 V. Calculate the factor by which the current will get multiplied when its temperature is raised from 25°C to 150°C.



### SECTION – V

9. (a) Explain electronic polarization in a dielectric.  
(b) An elemental dielectric has a relative dielectric constant of 12. It also contains  $5 \times 10^{28}$  atoms/m<sup>3</sup>. Calculate its polarizability assuming Lorentz field.
10. Define orbital magnetic dipole moment. Calculate the orbital magnetic dipole moment for revolving electron around the nucleus in an atom.

### SECTION – VI

11. (a) Distinguish type-I and type-II superconductors.  
(b) State and explain Meissner effect. Hence show that susceptibility is negative in superconducting state.
12. (a) Describe different types of nanomaterials.  
(b) Explain Ball mill method of production of nanomaterials.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

**I B.Tech. I Semester****ENGINEERING CHEMISTRY**

(Common to CE &amp; ME)

Time : 3Hrs

Max. Marks : 60

*Answer SIX Questions, Choosing ONE Question from each section**All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. (a) What are Zeolites? Explain the zeolite exchange process for softening of water.  
(b) With the help of a neat diagram, explain the use of electrodialysis for desalination of brackish water.
2. (a) Define carbonate and non-carbonate hardness of water. List the various disadvantages of hard water for domestic use and industrial use.  
(b) What do you understand by the priming and foaming problems in boilers?

**SECTION - II**

3. (a) Explain the construction and functioning of a Daniel cell.  
(b) What are reference electrodes? Describe the construction and working of calomel electrode.
4. (a) Describe any four factors affecting on the rate of corrosion.  
(b) Mention various methods used to prevent corrosion of metals and discuss in brief.

**SECTION - III**

5. (a) Define Degree of Polymerization. Differentiate between addition polymerization and condensation polymerization with suitable examples.  
(b) Describe the method of preparation, properties and applications of PVC and Nylon 6:6.
6. (a) What are silicones? Describe the preparation, properties and applications of Silicone rubber.  
(b) Describe the preparation, properties and applications of BUNA-N & Thiokol.

**SECTION - IV**

7. (a) Explain the determination of calorific value by using Bomb calorimeter.  
(b) What are the different types of fuels? What are the characteristics of a good fuel?
8. (a) What is meant by Knocking in IC engine? Explain the mechanism of knocking in the chemical terms.  
(b) Calculate the gross and net calorific values of a coal sample containing 85% Carbon, 1% Sulphur, 2% Nitrogen, 8% Hydrogen, 4% ash, latent heat of steam = 587 cal/g.



### **SECTION - V**

9. (a) Describe the processes of 'setting and hardening' of cement, giving the reactions involved in such processes. What is the difference, if any, between 'setting and hardening'?
- (b) Which type of cement will you recommend for the following and why?
- (i) Construction of dam (ii) lining of fire bricks in furnace (iii) oil and gas wells.
10. (a) What is a lubricant? Discuss the classification and functions of lubricants.
- (b) Discuss any three properties and various applications of lubricants.

### **SECTION - VI**

11. (a) Write a brief note on Langmuir adsorption isotherm.
- (b) Discuss about the colloids that play a major role in our daily life and industry.
12. (a) What are the differences between lyophilic and lyophobic sols?
- (b) Discuss the various applications of colloids.