

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

<u><b>UNIT-I</b></u>		Marks	CO	Blooms Level
1.	a) List the difference between pattern and casting.	4	1	Understanding
	b) Draw elements of gating system and explain the functions of each element in the gating system.	10	1	Understanding
<b>(OR)</b>				
2.	a) Explain the working of electric arc furnace with a neat diagram.	7	1	Understanding
	b) Draw neat sketches of steps in investment casting process and label the parts.	7	1	Understanding
<u><b>UNIT-II</b></u>				
3.	a) Explain oxy acetylene gas cutting process with a sketch.	7	2	Understanding
	b) Explain the principle of resistance welding process.	7	2	Understanding
<b>(OR)</b>				
4.	a) Differentiate between TIG and MIG welding.	7	2	Analyze
	b) List the advantages, limitations and applications of thermit welding process.	7	2	Understanding
<u><b>UNIT-III</b></u>				
5.	a) Explain hydrostatic extrusion process with a neat sketch	7	3	Understanding
	b) Discuss briefly principle and mechanism of rolling.	7	3	Understanding
<b>(OR)</b>				
6.	a) What are the advantages and disadvantages of hot working?	7	3	Understanding
	b) Explain wire drawing process with a neat sketch.	7	3	Understanding
<u><b>UNIT-IV</b></u>				
7.	a) Differentiate between Punching and blanking.	7	4	Analyze
	b) Explain different types of forging operations with sketches.	7	4	Understanding
<b>(OR)</b>				
8.	a) Write short notes on:	7	4	Understanding
	a) Embossing			
	b) Coining			
	b) Explain briefly the cup drawing operation.	7	4	Understanding
<u><b>UNIT-V</b></u>				
9.	a) Distinguish between thermosetting plastics and thermoplastics. Give their applications.	7	5	Analyze
	b) Explain injection moulding process with its salient features	7	5	Understanding
<b>(OR)</b>				
10.	a) What are the characteristics of plastics? Explain.	7	5	Understanding
	b) Explain explosive forming process with a sketch	7	5	Understanding

Time: 3 Hours

Max Marks: 70

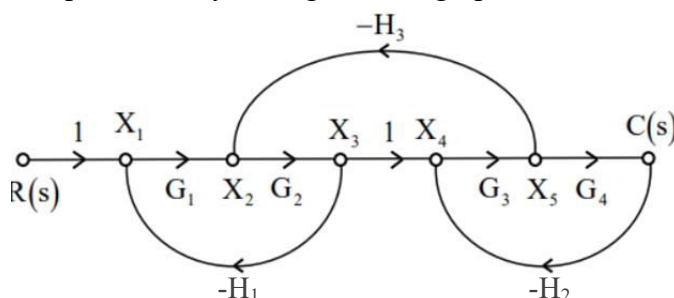
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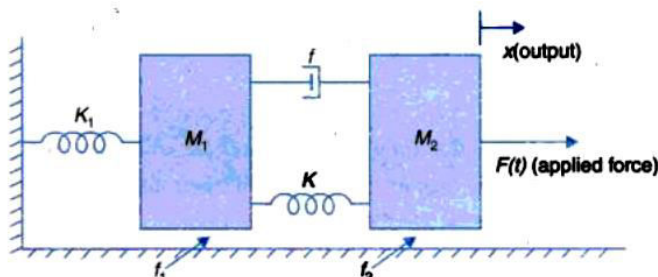
**UNIT-I**

- |  | <b>Marks</b> | <b>CO</b> | <b>Blooms Level</b> |
|--|--------------|-----------|---------------------|
| 1. a) Explain the role of feedback in control systems. Compare positive and negative feedback with their applications. | 07           | 1         | understanding       |
| b) Using Mason's Gain Formula, find the transfer function of the system represented by the signal flow graph below.    | 07           | 1         | Applying            |

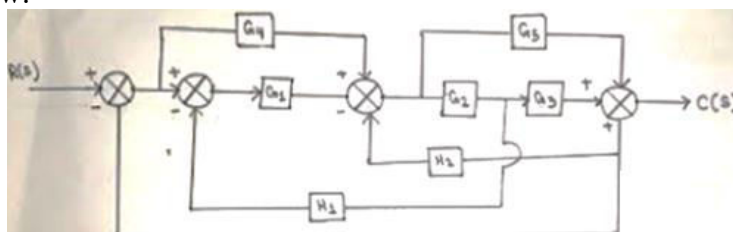


(OR)

- |   |    |   |          |
|---|----|---|----------|
| 2. a) Obtain the transfer functions of the mechanical system shown below. | 07 | 1 | Applying |
|---|----|---|----------|



- |   |    |   |          |
|---|----|---|----------|
| b) Obtain the transfer function of the block diagram shown below. | 07 | 1 | Applying |
|---|----|---|----------|

**UNIT-II**

- |  |    |   |               |
|--|----|---|---------------|
| 3. a) Derive the transfer function of a DC servo motor and explain its significance in control systems.    | 07 | 2 | Remembering   |
| b) Compare the transfer functions of a Synchro transmitter and a Synchro receiver with their applications. | 07 | 2 | Understanding |

(OR)

- |   |    |   |               |
|---|----|---|---------------|
| 4. a) A unity feedback system is characterized by an open loop transfer function $G(s) = K/s(s+10)$ . Determine the gain 'K' so that the system will have a damping ratio of 0.5. For this value of 'K' determine settling time, peak overshoot and time to peak overshoot for a unit step input. | 07 | 2 | Applying      |
| b) For a second-order system with a damping ratio $\zeta$ and natural frequency $\omega_n$ , derive the time-domain specifications such as rise time, peak time, and settling time.   | 07 | 2 | Understanding |

### UNIT-III

5. a) Determine the stability of the system having a characteristic equation using Routh's method.  $S^5+2S^4+2S^3+4S^2+11S+10=0$  4 3 Applying  
b) Draw the root locus for the system with the open-loop transfer function:  $G(s)=K/\{s(s+2)(s+4)\}$ . 10 3 Analysing  
Clearly mark the asymptotes, breakaway points, and centroid.

(OR)

6. Sketch the root locus for the given transfer function 14 3 Analysing  
 $G(S)=K/\{S(S+5)(S^2+4S+10)\}$ .

### UNIT-IV

7. For the given system 14 3 Analysing

$$G(s) = \frac{100}{(s+5)(s+20)}$$

- (i) Draw the asymptotic Bode plot (magnitude and phase).  
(ii) Find the gain crossover frequency and phase crossover frequency.  
(iii) Determine whether the system is stable using Bode plot criteria.

(OR)

8. For the given transfer function: 14 3 Analysing

$$G(s)H(s) = \frac{10}{s(s+2)(s+4)}$$

- (i) Sketch the Bode magnitude and phase plots.  
(ii) Determine the gain margin and phase margin.  
(iii) Find the crossover frequencies.

### UNIT-V

9. a) Construct the state model using phase variables for the differential equation. 7 3 Applying

$$\frac{d^3 y(t)}{dt^3} + 4 \frac{d^2 y(t)}{dt^2} + 7 \frac{dy(t)}{dt} + 2y(t) = 5u(t)$$

- b) For the given state space model, find the transfer function  $Y(s)/C(s)$ . 7 3 Applying

$$\frac{d}{dt} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} c(t)$$
$$y(t) = \begin{bmatrix} 2 & 1 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + [0]c(t)$$

(OR)

10. A state model of the system is given by, 14 3 Applying

$$\begin{bmatrix} \dot{q}_1(t) \\ \dot{q}_2(t) \end{bmatrix} = \underbrace{\begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}}_A \begin{bmatrix} q_1(t) \\ q_2(t) \end{bmatrix} + \underbrace{\begin{bmatrix} 0 \\ 1 \end{bmatrix}}_B x(t)$$
$$y(t) = \underbrace{\begin{bmatrix} 1 & 0 \end{bmatrix}}_C \begin{bmatrix} q_1(t) \\ q_2(t) \end{bmatrix}$$

Find

- (i) The characteristic equation and eigen values of the system  
(ii) The transfer function  
(iii) The state transition matrix  
(iv) The state response for a unit step input under zero initial conditions.

Time: 3 Hours

Max Marks: 70

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Perform the subtraction using r's complement method i) $(1101-1000)_2$ ii) $(82432-06825)_{10}$	7	1	L2
b)	Construct Hamming code for BCD 0110. Use even parity.	7	1	L3
	(OR)			
2. a)	Convert the following numbers from the given base to the other two bases indicated. (i) Binary 11010111 to decimal, octal (b) Hexadecimal 2AC5 to decimal, binary.	7	1	L1
b)	Encode the following decimal numbers in BCD code: (i) 327.89    (ii) 20.305    (iii) 98.276	7	1	L2
	<u>UNIT-II</u>			
3. a)	Represent the given expression in product of maxterms: $F = (A + B')(A' + D)$	7	2	L3
b)	Minimize the following function and realize using minimum number of NAND gates: $F = \sum m(0,3,5,6,9,10,12,15)$	7	2	L4
	(OR)			
4. a)	Convert the following expression to sum of minterms : $F = A + B'C'$	7	2	L3
b)	Simplify the following Boolean function using Tabulation method. $F(A, B, C, D) = \sum(1,3,4,5,10,11,12,13,14,15)$	7	2	L4
	<u>UNIT-III</u>			
5. a)	Illustrate the operation of BCD adder with neat diagram.	7	3	L2
b)	Design a 1 x 4 Demultiplexer with NAND gates.	7	3	L4
	(OR)			
6. a)	Implement a Full-Adder using two half-adders.	7	3	L3
b)	Implement the following using 8:1 MUX. $f(A, B, C, D) = \sum m(2,4,5,7,10,14)$	7	3	L2
	<u>UNIT-IV</u>			
7. a)	Illustrate the operation T flip-flop with Characteristic table.	7	4	L2
b)	Construct a BCD ripple counter using T flip-flops.	7	4	L4
	(OR)			
8. a)	What is race around problem in JK Flip-flop?	7	4	L2
b)	Design a MOD 6 synchronous counter using T flip-flops.	7	4	L4
	<u>UNIT-V</u>			
9. a)	Implement a Full- Subtractor using PAL.	7	5	L3
b)	Realize $F = \sum m(1,2,5,8,9,12)$ using PROM.	7	5	L3
	(OR)			
10. a)	Design a 3 bit Gray to Binary Code Converter using PAL..	7	5	L4
b)	Implement $F_1 = A'B' + ABC' + B'C$ and $F_2 = A'C' + AC$ using PLA.	7	5	L3

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		Marks	CO	Blooms Level
<b>UNIT-I</b>				
1.	a) Write a simple Java program to print "Hello, World!" on the screen. Explain the structure of the program and the role of each component within it.	7M	1	K3
	b) What is the Java Virtual Machine (JVM)? Explain its role in executing Java programs and describe how it provides platform independence	7M	1	K2
<b>(OR)</b>				
2.	a) Explain type conversion and type casting?	7M	1	K3
	b) Explain different control statements with examples?	7M	1	K2
<b>UNIT-II</b>				
3.	a) Explain the role of the new keyword and the constructor in the creation of an object.	7M	2	K2
	b) What is <b>encapsulation</b> in Java, and how does it relate to access control?	7M	2	K2
<b>(OR)</b>				
4.	a) Explain the followings by writing JAVA code a) static keyword b) this keyword	7M	2	K2
	b) Write an example program to declare a method in a class.	7M	2	K2
<b>UNIT-III</b>				
5.	a) Explain the concept of inheritance in Java. How does inheritance promote code reusability and improve software maintainability?	7M	3	K2
	b) What is method overriding in Java? How does the super keyword relate to method overriding in a subclass?	7M	3	K2
<b>(OR)</b>				
6.	a) What is method overriding? Explain with example	7M	3	K2
	b) Write java codes for implementing the followings: a) Abstract classes b) Dynamic method dispatch	7M	3	K2
<b>UNIT-IV</b>				
7.	a) What is an interface in Java? Explain the role of interfaces in Java and how they allow multiple classes to implement common behaviour.	7M	4	K3
	b) What is the difference between abstract classes and interfaces in Java?	7M	4	K2
<b>(OR)</b>				
8.	a) List the Built-in packages in java and explain.	7M	4	K3
	b) Write difference between classes and interfaces?	7M	4	K2
<b>UNIT-V</b>				
9.	a) What is exception handling in Java? Explain the importance of handling exceptions in a program.	7M	5	K3
	b) Explain the two main types of exceptions in Java: <b>checked exceptions</b> and <b>unchecked exceptions</b> .	7M	5	K2
<b>(OR)</b>				
10.	a) What are the built-in-exceptions that exist in Java, explain with example	7M	5	K2
	b) What is a Thread? Explain about Thread Life Cycle with Suitable example	7M	5	K2

**Time: 3 Hours****Max Marks: 70**

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**UNIT-I**

- |    |  | Marks | CO | BTL |
|----|--|-------|----|-----|
| 1. | a) Explain the process of soil formation and differentiate between residual and transported soil.  | 07    | 01 | K2  |
|    | b) Derive the relation between void ratio, water content, specific gravity and degree of saturation for a given soil.  | 07    | 01 | K2  |
|    | (OR)   |       |    |     |
| 2. | a) A soil sample has a mass of 500 g in its natural state. After oven drying, its mass reduces to 420 g. The volume of the sample is 250 cm <sup>3</sup> . Determine:<br>a) Moisture content of the soil b) Dry unit weight and bulk unit weight c) Saturated unit weight if $G = 2.65$ and the sample is fully saturated. | 07    | 01 | K3  |
|    | b) Explain in detail the Indian soil classification system of fine-grained soils.  | 07    | 01 | K2  |

**UNIT-II**

- |    |   |    |    |    |
|----|---|----|----|----|
| 3. | a) Define a Flow Net. Explain its properties and applications in seepage analysis.  | 07 | 02 | K2 |
|    | b) A soil deposit consists of three layers of equal thickness. The permeability values of the layers are in the ratio of 1:3:5 (top to bottom). Determine the ratio of horizontal to vertical permeability ( $k_h / k_v$ ).                                     | 07 | 02 | K3 |
|    | (OR)  |    |    |    |
| 4. | a) Explain the procedure of a Constant Head Permeability test for calculating the coefficient of permeability of a given soil.  | 07 | 02 | K2 |
|    | b) A constant head permeability test was performed on a soil sample 150 mm long and 50 mm in diameter. The head difference between the two ends was 60 mm, and 500 ml of water was collected in 300 seconds. Determine the coefficient of permeability ( $k$ ). | 07 | 02 | K3 |

**UNIT-III**

- |    |   |    |    |    |
|----|---|----|----|----|
| 5. | a) What is Quick Sand Condition? Derive the critical hydraulic gradient formula and explain its significance.   | 07 | 03 | K2 |
|    | b) A sandy soil has a specific gravity of grains ( $G$ ) = 2.65 and a void ratio ( $e$ ) = 0.75. Determine the critical hydraulic gradient for this soil. Find the depth at which quicksand conditions will occur if the groundwater table is at the surface. | 07 | 03 | K3 |

**(OR)**

6. a) Explain how you can determine vertical stress increase due to loading using Newmark's influence chart with a neat sketch. 07 03 K2
- b) A 4 m thick clay layer lies beneath a 3 m thick sand layer. The unit weight of sand is  $18 \text{ kN/m}^3$ , and the unit weight of clay is  $16 \text{ kN/m}^3$ . Determine the total stress, pore water pressure, and effective stress at 3 m and 7 m depth. 07 03 K3

**UNIT-IV**

7. a) Explain the mechanism of soil compaction. What are the factors affecting compaction? 07 04 K2
- b) A clay layer is 4 m thick with a coefficient of consolidation ( $C_v$ ) of  $3 \times 10^{-3} \text{ cm}^2/\text{sec}$ . Determine the time required for 50% consolidation if drainage occurs on both sides. 07 04 K3

**(OR)**

8. a) Define compression index, coefficient of compressibility, and coefficient of volume compressibility along with their concerned formulae. 07 04 K2
- b) A clay layer is 5 m thick, with a compression index ( $C_c$ ) of 0.25 and an initial void ratio ( $e_0$ ) of 0.85. The overburden pressure is  $150 \text{ kN/m}^2$ , and an additional load of  $100 \text{ kN/m}^2$  is applied. Determine the final settlement of the clay layer. 07 04 K3

**UNIT-V**

9. a) Explain in detail about the Direct Shear Test. 07 05 K2
- b) A triaxial shear test on a clay sample provided the following results: 07 05 K3

Confining Pressure ( $\text{kN/m}^2$ )	Deviator Stress at Failure ( $\text{kN/m}^2$ )
100	250
200	400
300	550

Determine the shear strength parameters ( $C$  and  $\phi$ ).

**(OR)**

10. a) Explain about liquefaction and critical void ratio. 07 05 K2
- b) A soil mass has the following properties: 07 05 K3
- Cohesion ( $C$ ) =  $20 \text{ kN/m}^2$
  - Angle of internal friction ( $\phi$ ) =  $30^\circ$
  - Normal stress ( $\sigma$ ) =  $200 \text{ kN/m}^2$
- Determine the shear strength ( $\tau$ ) of the soil mass.

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	<u><b>UNIT-I</b></u>	Marks	CO	Blooms Level
1.	a) Describe how the branch-and-bound technique could be used to find the shortest solution to a water jug problem.	7	1	K2
	b) Discuss the history and evolution of AI.	7	1	K1
	<b>(OR)</b>			
2.	a) Explain the Tic-Tac-Toe game-playing strategy using state-space representation.	7	1	K2
	b) Explain the Hill Climbing algorithm with an example.	7	1	K3
	<u><b>UNIT-II</b></u>			
3.	a) Formalize the Graceful Decay of Admissibility Corollary and prove that it is true of the A algorithm.	7	2	K4
	b) Show how means-ends analysis could be used to solve the problem of getting from one place to another. Assume that the available operators are walk, drive, take the bus, take a cab, and fly.	7	2	K3
	<b>(OR)</b>			
4.	a) Suppose we have a problem that we intend to solve using a heuristic best-first search procedure. We need to decide whether to implement it as a tree search or as a graph search. Suppose that we know that, on the average, each distinct node will be generated N times during the search process. We also know that if we use a graph, it will take, on the average, the same amount of time to check a node to see if it has already been generated as it takes to process M nodes if no checking is done. How can we decide whether to use a tree or a graph? In addition to the parameters N and M, what other assumptions must be made?	7	2	K4
	b) The constraint satisfaction procedure we have described performs depth-first search whenever some kind of search is necessary. But depth-first is not the only way to conduct such a search (although it is perhaps the simplest).	7	2	K3
	(a) Rewrite the constraint satisfaction procedure to use breadth-first search.			
	(b) Rewrite the constraint satisfaction procedure to use best-first search.			



### UNIT-III

5. a) A pea is placed under one of three shells, and the shells are then manipulated in such a fashion that all three appear to be equally likely to contain the pea. Nevertheless, you win a prize if you guess the correct shell, so you make a guess.  
The person running the game does know the correct shell, however, and uncovers one of the shells that you did not choose and that is empty. Thus, what remains are two shells: one you chose and one you did not choose.  
Furthermore, since the uncovered shell did not contain the pea, one of the two remaining shells does contain it. You are offered the opportunity to change your selection to the other shell.  
Should you switch?  
Work through the conditional probabilities mentioned in this problem using **Bayes' theorem**. What do the results talk about what you should do?
- b) Explain knowledge representation using semantic networks.

(OR)

6. a) Explain Cyc theory and its significance in AI.
- b) Represent the following knowledge using semantic nets:
- Anita is a scientist.
  - Anita works in NASA.
  - Raj is a professor.
  - Raj teaches at IIT.
  - Anita collaborated with Raj on a research paper.
  - Raj thanked Anita for her contribution.

### UNIT-IV

7. a) Explain how uncertainty is handled in expert systems.
- b) Discuss the role of Bayes Theorem in AI.
- (OR)
8. a) Describe the Certainty Factor approach with an example.
- b) Explain the concept of statistical inference in AI.

### UNIT-V

9. a) Explain the different types of planning in AI.
- b) Describe the architecture and components of an expert system.
- (OR)
10. a) Explain the hierarchical planning approach in AI.
- b) List and discuss the characteristics of expert systems.

**MANUFACTURING TECHNOLOGY-I**  
**(MECHANICAL ENGINEERING)****Time: 3 Hours****Max Marks: 60**

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<u><b>UNIT-I</b></u>		Marks	CO	Blooms Level
1.	a Explain the principle of metal casting.	5M	1	Remembering
	b Explain any four pattern allowances with neat sketch	5M	1	Understanding
<b>(OR)</b>				
2.	What is Cupola? Explain its operations with neat sketch.	10M	1	Remembering
<u><b>UNIT-II</b></u>		Marks	CO	Blooms Level
3.	Explain with sketches the gating system. What are the requirements of the gating system?	10 M	2	Understanding
<b>(OR)</b>				
4.	Describe the oxy-acetylene gas welding technique and give the applications.	10 M	2	Understanding
<u><b>UNIT-III</b></u>		Marks	CO	Blooms Level
5.	a What are the principles and application of Resistance welding?	5M	3	Remembering
	b What are the applications and limitations of MIG welding?	5M	3	Understanding
<b>(OR)</b>				
6.	a Explain the source of heat in Thermite welding.	5M	3	Understanding
	b Write a short note on Laser welding process.	5M	3	Understanding
<u><b>UNIT-IV</b></u>		Marks	CO	Blooms Level
7.	a Explain the various rolling process and variety of products obtained during rolling.	5M	4	Understanding
	b Write advantages and disadvantages of extrusion process	5M	4	Remembering
<b>(OR)</b>				
8.	a Sketch and explain impact extrusion process and their advantages.	5M	4	Understanding
	b Explain the principle of Drawing process? And it's working	5M	4	Understanding
<u><b>UNIT-V</b></u>		Marks	CO	Blooms Level
9.	a Write advantages and disadvantages of forging operation?	5M	5	Remembering
	b Explain the following terms. (i) Blanking (ii) Piercing	5M	5	Understanding
<b>(OR)</b>				
10.	Explain smith forging and drop forging with neat sketches	10M	5	Understanding
<u><b>UNIT-VI</b></u>		Marks	CO	Blooms Level
11.	Explain following methods with suitable figures (i)High velocity forming methods (ii)Explosive forming	10M	6	Understanding
<b>(OR)</b>				
12.	a Compare different types of plastics and their properties.	5M	6	Analysing
	b Compare the applications and advantages of blow moulding and injection moulding processes.	5M	6	Analysing

**A.C. MACHINES**  
**(ELECTRICAL AND ELECTRONICS ENGINEERING)****Time: 3 Hours****Max Marks: 60**

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		Marks	CO	Blooms Level
<b><u>UNIT-I</u></b>				
1.	A 3-phase 400V, 50Hz induction motor takes a power input of 35kW at its full speed of 980 r.p.m. The total stator losses are 1.5 kW. Calculate, (i)Slip (ii) Rotor Ohmic losses (iii)Shaft power (iv)Shaft torque (v)Efficiency	10M	CO1	BL3
<b>(OR)</b>				
2. a	Explain and draw the equivalent circuit of three phase induction motor	7M	CO1	BL 2
b	Identify why are rotor core losses negligible in three phase induction motor?	3M		BL 3
<b><u>UNIT-II</u></b>				
3. a	Explain the speed control of induction motor with V/f control method.	4M	CO2	BL 2
b	Examine the tests to be conducted on three phase induction motor to get its equivalent circuit?	6M		BL 4
<b>(OR)</b>				
4.	A 400 V 40 H.P, 50 Hz, 4-pole delta connected induction motor give following Test results No-load test : 400V , 20A, 1200W Blocked rotor test : 100V, 45A , 2800 W Draw the circle diagram and determine (i) Full load line current and power factor (ii) Maximum output power (iii)Full-load rotor speed Assume stator and rotor Cu losses to be equal at standstill condition.	10M	CO2	BL 3
<b><u>UNIT-III</u></b>				
5.	Explain armature reaction and the effect of armature reaction on the terminal voltage of an alternator at different p.f conditions.	10M	CO3	BL 2
<b>(OR)</b>				
6. a	A 3-phase, 16-pole alternator has the following data: Number of slots=192; conductors/slot=8; coil span=160 electrical degrees speed of the alternator=375 rpm; flux/pole=55 mWb; Calculate the phase and line voltages.	7M	CO3	BL 3
b	Why short-pitch winding is preferred over full pitch winding?	3M		
<b><u>UNIT-IV</u></b>				
7. a	Develop equation of the voltage regulation by synchronous impedance method of an alternator.	5M	CO4	BL 3
b	Illustrate the two-reaction theory of salient pole synchronous machine.	5M		BL 2

**(OR)**

8. A 6600V alternator gave the following test results: 10M CO4 BL 3
- |                              |      |      |      |      |      |
|------------------------------|------|------|------|------|------|
| Field Current(A)             | 16   | 25   | 37.5 | 50   | 70   |
| Open circuit Voltage (Volts) | 3100 | 4900 | 6600 | 7500 | 8300 |
- A field current of 22A is found necessary to circulate full-load current on short-circuit of the armature. Calculate the full-load regulation at 0.8 power factor lagging by: (i) The synchronous impedance method (ii) Ampere-turn method Comment the two values of regulation obtained by the above methods.
- UNIT-V**
9. a Explain the with neat sketches the principle of operation of a 3-phase synchronous motor. 6M CO5 BL 2
- b Give the applications of synchronous condenser? 4M BL 3
- (OR)**
10. A 2000V, 3-phase, 4-pole, Y- connected synchronous motor runs at 1500rpm. The excitation is constant and corresponds to an open circuit voltage of 2000V. The resistance is negligible as compared to a reactance of  $3\Omega$  per phase. Determine the power input, power factor and torque developed for an armature current of 200A. 10M CO5 BL 3
- UNIT-VI**
11. a Explain the construction and working of shaded pole motor with help of a neat diagram 6M CO6 BL 2
- b Analyse why a single-phase induction motor has zero starting torque. 4M BL 4
- (OR)**
12. a Construct split phase single phase induction motor 7M CO6 BL 3
- b List the applications of shaded pole motor 3M BL 4

**ANALOG COMMUNICATIONS  
(ELECTRONICS AND COMMUNICATION ENGINEERING)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
<b><u>UNIT-I</u></b>				
1.	a	5M	CO1	Remember
	b	5M	CO1	Remember
<b>(OR)</b>				
2.	a	5M	CO1	Apply
	The equation of amplitude wave is given by $s(t) = 20 [1 + 0.8 \cos(2\pi \times 10^3 t)] \cos(4\pi \times 10^5 t)$ Find the carrier power, the total sideband power, and the band width of AM wave.			
	b	5M	CO1	Understand
	Explain the basic elements of a communication system with a block diagram?			
<b><u>UNIT-II</u></b>				
3.	a	5M	CO2	Analyse
	Draw the block diagram and explain generation of DSB-SC signal using balanced modulator.			
	b	5M	CO2	Apply
	Describe the operation of Costas loop receiver.			
<b>(OR)</b>				
4.	a	5M	CO2	Apply
	Describe the filter method of SSB signal generation.			
	b	5M	CO2	Remember
	Distinguish between different amplitude modulation schemes.			
<b><u>UNIT-III</u></b>				
5.	a	5M	CO3	Understand
	Explain the direct method of FM generation.			
	b	5M	CO3	Apply
	A carrier signal $10\cos(8000000\pi t)$ is modulated by a modulating signal $5\cos(30000\pi t)$ .			
	i) Find the bandwidth for frequency modulation assuming $k_f = 15$ kHz per volt			
	ii) Assuming the same bandwidth, find $k_p$ for phase modulation.			
<b>(OR)</b>				
6.	a	5M	CO3	Understand
	What is angle modulation? Explain frequency deviation, percent modulation, phase deviation and modulation index in detail.			
	b	5M	CO3	Understand
	Explain pre-emphasis and de-emphasis circuits.			
<b><u>UNIT-IV</u></b>				
7.	a	5M	CO4	Understand
	List out the different Classification of Transmitters and explain any one type in detail.			
	b	5M	CO4	Analyse
	Write notes on frequency stability in FM transmitters.			
<b>(OR)</b>				
8.	a	5M	CO4	Analyse
	Explain the functions of various sections of a superheterodyne receiver.			
	b	5M	CO4	Apply
	In a broadcast super heterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100. If the IF frequency is 455 kHz, determine the image frequency and its rejection for tuning at 25MHz.			

**UNIT-V**

- |    |   |  |    |     |            |
|----|---|--|----|-----|------------|
| 9. | a | Enumerate the types of pulse modulation. Describe PDM system in detail | 5M | CO5 | Understand |
|    | b | Define PAM? Explain the generation of PAM along with circuit diagram.  | 5M | CO5 | Understand |

**(OR)**

- |     |   |  |    |     |            |
|-----|---|--|----|-----|------------|
| 10. | a | Explain the different methods for generation of PWM along with circuit diagrams. | 5M | CO5 | Understand |
|     | b | What are the advantages and disadvantages of PPM over PWM                        | 5M | CO5 | Remember   |

**UNIT-VI**

- |     |   |  |    |     |            |
|-----|---|--|----|-----|------------|
| 11. | a | What are the effects of noise in FM system? Explain.                               | 5M | CO6 | Understand |
|     | b | Explain the noise performance of DSB-SC receiver and prove its S/N ratio is unity. | 5M | CO6 | Understand |

**(OR)**

- |     |   |  |    |     |          |
|-----|---|--|----|-----|----------|
| 12. | a | What do you mean by multiplexing? Explain TDM and FDM.   | 5M | CO6 | Remember |
|     | b | Draw the block diagram of Time Division Multiplexing and explain the function of each block in detail. | 5M | CO6 | Analyse  |

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		<u>UNIT-I</u>	Marks	CO	BTL
1.	a	What are the advantages of DBMS over traditional file system?	5	1	Understand
	b	Write about three levels of Data abstraction.	5	1	Understand
(OR)					
2.	a	Explain the duties of a Database administrator.	5	1	Understand
	b	Describe the Components of a database management system.	5	1	Understand
		<u>UNIT-II</u>			
3.		Draw an ER model for Library Management System and explain its components.	10	2	Apply
(OR)					
4.		Discuss DDL, DML, DCL languages with syntax and example.	10	2	Understand
		<u>UNIT-III</u>			
5.		Write SQL Queries for following set of tables: EMPLOYEE (EmpNo, Name, DoB, Address, Gender, Salary, DNumber) DEPARTMENT (DNumber, Dname, ManagerEmpNo, MnagerStartDate).			
	i)	Display the name of highest salary paid 'female' employee.	10	3	Apply
	ii)	Which employee is oldest manger in company?			
	iii)	Display the name of department of the employee 'SMITH'.			
(OR)					
6.		What is a trigger What are the parts of a trigger Explain with an example.	10	3	Apply
		<u>UNIT-IV</u>			
7.	a	Explain the problems related to decomposition .	5	4	Understand
	b	What is functional dependency? Explain its use in database design	5	4	Understand
(OR)					
8.	a	Compare BCNF and 3NF. Explain with an example.	5	4	Understand
	b	Explain different types of functional dependencies.	5	4	Understand
		<u>UNIT-V</u>			
9.		Explain Time stamp-Based Concurrency Control protocol and the modifications implemented in it.	10	5	Understand
(OR)					
10.		Does two phase locking protocol ensure conflict serializability? Justify your answer with appropriate examples.	10	5	Understand
		<u>UNIT-VI</u>			
11.	a	By considering an example, show how to reduce access time with primary index.	5	6	Understand
	b	Describe different methods of defining indexes on multiple keys.	5	6	Understand
(OR)					
12.		Differentiate between Hash based, and Tree based Indexing Techniques	10	6	Understand

Time: 3 Hours

Max Marks: 60

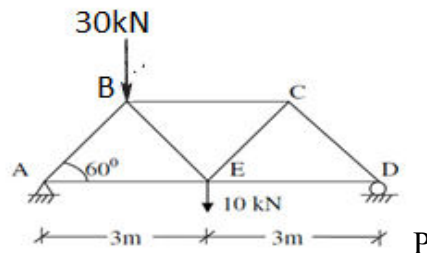
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

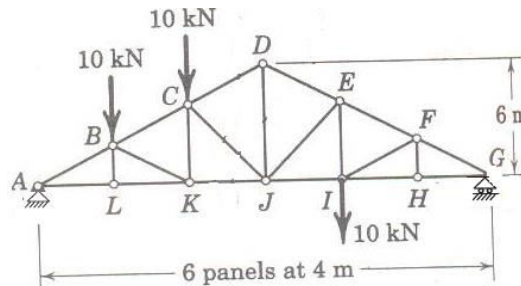
**UNIT-I**

1. Analyze the truss shown in figure and determine the forces in the members. All the members of the truss have same cross sectional area.

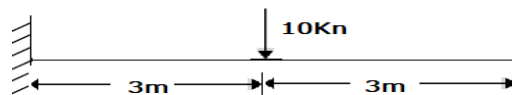


(OR)

2. A simply supported truss is supported and loaded as shown in fig. Find the forces in the members DE, EJ, FH and JI.

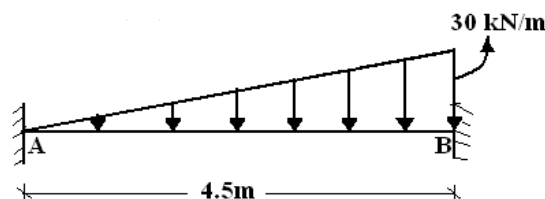
**UNIT-II**

3. A propped cantilever beam is shown in figure. Calculate the prop Reaction and also draw the BM and SF diagrams.



(OR)

4. A fixed beam AB of span 4.5m carries a gradually varying load from zero at A to 30 kN/m at B. Determine the fixed end moments and support reactions at both ends of the beam, also plot SFD and BMD.





### UNIT-III

5. a State and prove Castigliano's first theorem. 10 3 4

(OR)

6. Using the Castigliano's theorem Calculate the central deflection and slope at the ends of a simply supported beam carrying a UDL 20kN/m over the entire span of 4m. (EI is constant) 10 3 4

### UNIT-IV

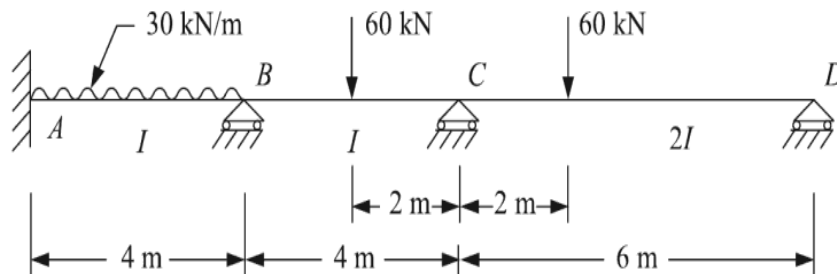
7. A parabolic two hinged arch has a span of 25m and a rise of 5m is subjected to 150kN and 120kN acting left and right quarter span respectively. Calculate the horizontal thrust and also calculate the bending moment at the loaded points. 10 4 4

(OR)

8. A three hinged parabolic arch has a span of 30m and a central rise of 6m. The arch is subject to a UDL over right half portion. Calculate the bending moment, radial shear and normal thrust at a section distant 12m from the left hinge. 10 4 3

### UNIT-V

9. Analyze the continuous beam shown in figure, using three-moment equation. Draw S.F and B.M diagrams. 10 5 4



(OR)

10. A continuous beam ABC is simply supported at A and C and continuous over support B with AB = 5m and BC = 6m. A uniformly distributed load of 12kN/m is acting over the beam. The moment of inertia is I throughout the span. Analyse the continuous beam and draw S.F.D and BMD 10 5 4

### UNIT-VI

11. Draw the influence diagram for bending moment at any section of a simply supported beam. Using the ILD, determine the support reactions and find bending moment at 2m and 4m for a simply supported beam of span 8m subjected to three point loads of 10kN, 15kN and 5kN placed at 1m, 4m and 6m respectively. 10 6 4

(OR)

12. Two concentrated rolling loads of 10 kN and 5 kN placed 4 m apart, travel along a simply supported girder of 15m span. Draw the diagrams for maximum positive shear force, maximum negative shear force and maximum bending moment. 10 6 4

# AR18

**CODE: 18EET207**

**SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**II B. Tech II Semester Supplementary Examinations, July,2025**

**ELECTRICAL MACHINES-II  
(Electrical and Electronics Engineering)**

**Time: 3 Hours**

**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) Write any 6 differences between Squirrel cage and Slip ring Induction Motor. 6M  
b) Explain briefly about the concept of Rotating magnetic field in a Induction motor. 6M
- (OR)**
2. a) Explain the constructional features of salient pole and non-salient pole Induction motor. 6M  
b) Explain the equivalent circuit of a Induction motor with a neat sketch. 6M

**UNIT-II**

3. Explain briefly about the different types of starting methods in a Induction Motor. 12 M
- (OR)**
4. a) Explain briefly the working principle of an Induction Generator 6M  
b) What is No-load test of an induction motor. Explain briefly. 6M

**UNIT-III**

5. Explain the phenomena of armature reaction when an alternator is delivering a load Current at i) purely lagging power factor ii) unity power factor iii) purely leading power Factor 12M
- (OR)**
6. Explain briefly about Pitch factor and Distribution factor in a Alternator. 12M

**UNIT-IV**

7. a) Explain briefly about Blondel's two reaction theory in synchronous machine. 6M  
b) Write the applications of synchronous generator and synchronous motor. 6M
- (OR)**
8. Explain briefly about parallel operation of alternators. Also write the advantages . 12M

**UNIT-V**

9. a) Explain briefly the working principle of Synchronous motor with a neat sketch. 6M  
b) What is the necessity of connecting a synchronous condenser in a network. 6M
- (OR)**
10. a) Explain briefly the different starting methods of Synchronous motor. 8M  
b) Write the applications of synchronous motor. 4M

**ANALOG COMMUNICATIONS  
(Electronics and Communication Engineering)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) Explain how the amplitude modulation can be expressed in time domain and frequency domain? 6M
- b) Explain the generation of AM wave by using switching modulation technique. 6M

**(OR)**

2. a) Explain the reasons for doing modulation. Mention its advantages. 6M
- b) A carrier wave of frequency 10MHz and peak value of 10V is amplitude modulated by 5KHz sine wave of amplitude 6V. Determine the modulation index and draw the one sided spectrum of modulated wave. 6M

**UNIT-II**

3. a) Explain about frequency discrimination method of SSB-SC wave generation and mention its advantages and disadvantages. 8M
- b) Draw the block diagram and explain generation of DSB-SC signal using balanced modulator. 4M

**(OR)**

4. a) A 400W carrier is modulated on a depth of 75%, Calculate the total power in the modulated wave in the following forms of AM. 6M
  - a) Double Sideband with Full Carrier (DSBFC)
  - b) Double Sideband Suppressed Carrier (DSBSC)
- b) Explain the need of VSB modulation and why VSB system is widely used for TV broadcasting? Explain. 6M

**UNIT-III**

5. a) Obtain the expression for angle modulation from fundamentals. 6M
- b) Explain the demodulation of FM signal with the help of PLL. 6M

**(OR)**

6. a) Explain the process of detection of FM wave using frequency discriminator method. 6M
- b) Explain frequency division multiplexing technique with neat diagram. 6M

**UNIT-IV**

7. a) Explicate the working of AM transmitter using high level modulation with a neat block diagram. 6M
- b) Clarify the operation of FM receiver with neat block diagram. 6M

**(OR)**

8. a) Elucidate the working of variable reactance type FM transmitter with a neat block diagram. 6M
- b) Explicate the operation of Tuned Radio Frequency Receiver (TRF) with neat block diagram. 6M

**UNIT-V**

9. a) Draw the circuit of PPM demodulator and explain the operation. 6M
- b) Discuss the noise performance of AM system using envelope detection. 6M

**(OR)**

10. a) Compare PAM, PWM and PPM pulse modulation techniques. 6M
- b) Distinguish between pre-emphasis and de-emphasis. 6M

**II B. Tech II Semester Supplementary Examinations, July, 2025**  
**Structural Analysis-I**  
**(CIVIL ENGINEERING)**

Time: 3 Hours

Max Marks: 60

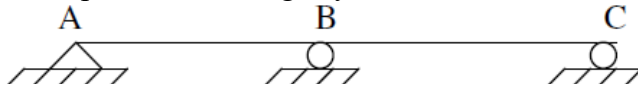
Answer ONE Question from each Unit

All Questions Carry Equal Marks

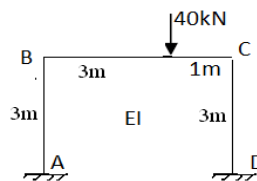
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**UNIT-I**

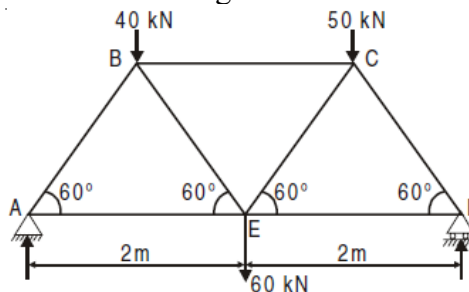
1. a) For the beam shown in Fig. what is the static and kinematic indeterminacy for inclined point load acting anywhere on the beam 6M



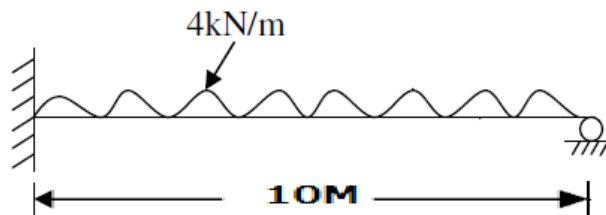
- b) For the frame shown in Fig. what is the static and kinematic indeterminacy 6M

**(OR)**

2. Determine the forces in all the members of the truss shown in Figure and indicate the magnitude and nature of forces on the diagram of the truss. All inclined members are at  $60^\circ$  to horizontal and length of each member is 2 m. 12M

**UNIT-II**

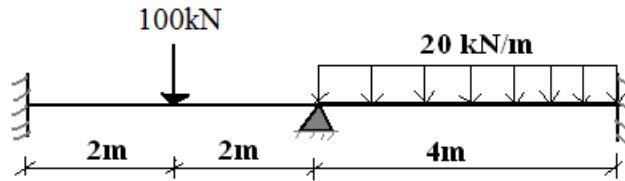
3. A propped cantilever beam is shown in figure. Calculate the prop Reaction and also draw the BM and SF diagrams. 12M

**(OR)**

4. A fixed beam of span 6 m is subjected a UDL of 20 kN/m on the left half of the span and a point load of 50 kN at the middle of the right half of the span. Draw the S.F. and B.M. diagrams. 12M

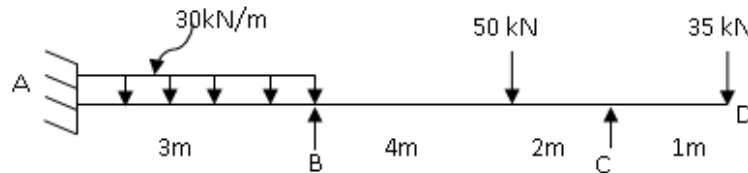
### UNIT-III

5. For the beam loaded as shown in **Figure**, Draw shear force and bending moment diagrams. Use Clapeyron's theorem of three moments 12M



(OR)

6. Analyse the continuous beam shown in Figure and draw the Bending Moment diagram and Shear Force Diagram. Use Clapeyron's theorem of three moments 12M



### UNIT-IV

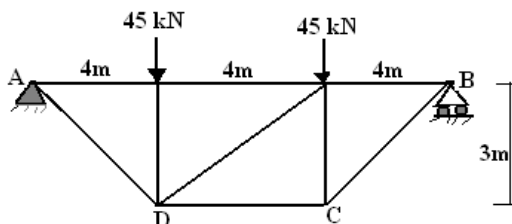
7. Find the deflection at free end and strain energy of a cantilever beam of span 3m carrying a load of 20kN if  $E=200\text{GPa}$  and  $I = 6 \times 10^{-4}\text{m}^4$ . 12M

(OR)

8. Discuss about the Castigliano's first and second theorems with suitable examples 12M

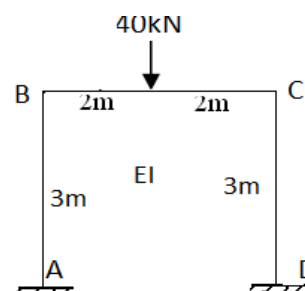
### UNIT-V

9. The steel truss supported as shown in Fig. if the truss is so designed that, under the given loading, all tension members are stressed to  $100 \text{ N/mm}^2$  and all compression members to  $80 \text{ N/mm}^2$ , find the vertical deflection of the point C take  $E= 200\text{Gpa}$ . 12M



(OR)

10. Determine the deflection under the point load for the frame loaded as shown in figure using Castigliano's theorem,  $EI$  is constant. 12M



# AR16

**CODE: 16CE2008**

**SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, July, 2025**

**Structural Analysis-I  
(CIVIL ENGINEERING)**

**Time: 3 Hours**

**Max Marks: 70**

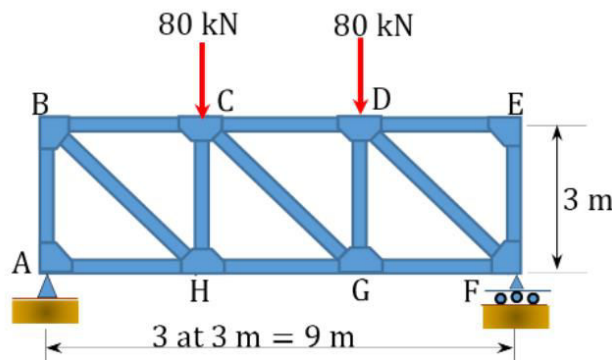
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

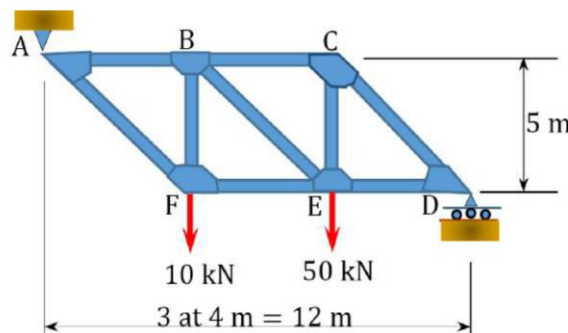
## UNIT-I

1. a) What is degree of static indeterminacy? Name any three indeterminate beams. 4M
- b) Using method of sections, determine the axial forces in member's CD, CG and HG of the truss shown below. 10 M



(OR)

2. a) Determine the forces in each member of the truss using method of joints 14 M



## UNIT-II

3. A cantilever of 6m length carries a U.D.L of 12 kN/m over the full span. If the free end is supported by a prop, find the reaction at the prop, and also draw the Shear force and Bending moment diagrams 14 M
- (OR)
4. A fixed beam of span 8 m is subjected a UDL of 20 kN/m over the entire span and a point load of 25 kN at the middle of the span. Draw the S.F. and B.M. diagrams. 14 M

### UNIT-III

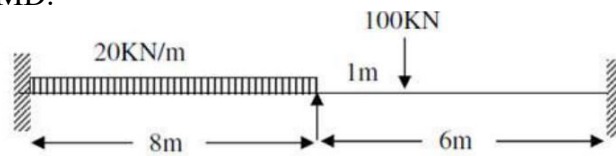
5. ABC is a continuous beam with constant EI throughout its length. The end supports A and C are fixed and beam is continuous over middle support B. Span BC is uniformly loaded with 10kN per metre length, while a concentrated vertical load of 100kN acts at the mid span AB. Calculate the moments using theorem of three moments. 14 M

(OR)

6. A continuous beam ABCD is simply supported over three spans. Span AB is 9m carrying an udl of 5kN/m, span BC is 14m carrying an udl of 5kN/m and span CD is 6m carrying an udl of 8kN/m. Find the moment over supports B and C using three moment equation and draw B.M.D. 14 M

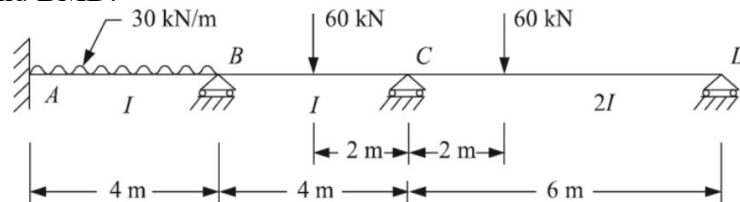
### UNIT-IV

7. Analyse the continuous beam shown below using slope deflection method and draw SFD and BMD. 14 M



(OR)

8. Analyse the continuous beam shown below using slope deflection method and draw SFD and BMD. 14 M



### UNIT-V

9. Define strain energy. Derive the expression for strain energy due to shear force 14 M
- (OR)
10. Determine the deflection at free end of the cantilever beam having span equal to 5m and subjected to 50 kN point load at mid span using Castigliano's theorem 14 M