

Code No: R18A0325

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY** **R18** **GY**  
(Autonomous Institution – UGC, Govt. of India)

**IV B.Tech I Semester Regular Examinations, Dec-21/Jan-22**

**Operations Research**

**(ME)**

<b>Roll No</b>									
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**Time: 3 hours**

**Max. Marks: 70**

**Note:** This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1 Explain steps involved in Graphical method and Use graphical method solve the following LP problem maximize  $Z=300x_1+400x_2$  subjected to  $5x_1+4x_2 \leq 200$ ,  $3x_1+5x_2 \leq 150$ ,  $5x_1+4x_2 \geq 100$ ,  $8x_1+4x_2 \geq 80$  and  $x_1, x_2 \geq 0$ . [14M]

OR

- 2 Explain the difference between two-phase simplex and big-M method of LPP and What are the major limitations of LPP? [14M]

**SECTION-II**

- 3 A company has 3 plants P1, P2 & P3 each producing 50, 100 and 150 units of a similar product. These are five warehouses W1, W2, W3, W4 and W5 having demand of 100, 70, 50, 40 and 40 units respectively. The cost of sending a unit from various plants to the warehouses differs as given by the cost matrix below. Determine a transportation schedule so that cost is minimized. [14M]

	W1	W2	W3	W4	W5	Supply
P1	20	28	32	55	70	50
P2	48	36	40	44	25	100
P3	35	55	22	45	48	150
Demand	100	70	50	40	40	

OR

- 4 i) Illustrate the variations in assignment problem. [14M]  
ii) Solve the travelling salesman problem given by the following data.

	A	B	C	D
A	$\infty$	30	80	50
B	40	$\infty$	140	30
C	40	50	$\infty$	20
D	70	80	130	$\infty$

**SECTION-III**

- 5 Use graphical method in solving the following game and find the value of the game. [14M]

		Player B			
Player A		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
A <sub>1</sub>		2	2	3	-2
A <sub>2</sub>		4	3	2	6

OR

- 6 i) Explain Minimax and Maximin principle used in the theory of games. [14M]  
ii) Solve the following game by using maximin principle whose payoff matrix is given below. Include (i) strategy of each player (ii) the value of the game to each player.

		Player B				
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>5</sub>
Player A	A <sub>1</sub>	-2	0	0	5	3
	A <sub>2</sub>	3	2	1	2	2
	A <sub>3</sub>	-4	-3	0	-2	6
	A <sub>4</sub>	5	3	-4	2	6

**SECTION-IV**

- 7 A taxi estimates from his past records that the costs per year for operating a taxi whose purchase price when new is Rs 60,000 are as given below table no 4.3. After 5 years, the operating cost is Rs 6,000 k, where k= 6,7,8,9,10, (k denoting age in year). If the resale value decreases by 10% of purchase price each year, what is the best replacement policy? Cost of money is zero. [14M]

Age	1	2	3	4	5
Operating Cost(Rs.)	10,000	12,000	15,000	18,000	20,000

OR

- 8 manufacturer has to supply his customer with 600 units of his products per year. Shortages are not allowed and storage cost amounts to 60 paise per unit per year. The set up cost is Rs 80.00 find i) EOQ ii) The minimum average yearly cost. iii) The optimum number of orders per year. iv) The optimum period of supply per optimum order. [14M]

**SECTION-V**

- 9 What are the factors must be considered when designing simulation experiment? Explain briefly [14M]

OR

- 10 There are 6 jobs to be processed on Machine A. The time required by each job on machine A is given in hours. Find the optimal sequence and the total time elapsed. [14M]

Job:	1	2	3	4	5	6
Time in hours.						
Machine A	6	4	3	2	9	8

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Code No: R18A1205

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular Examinations, Dec-21/Jan-22

Artificial Intelligence

(ME)

Roll No									

Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

1 Explain about Agents, Environments, Structure of Agents and Problem Solving Agents with appropriate example. [14M]

OR

2 Discuss about BreadthFirst, Depth-First Search and Depth-first with Iterative as part of Deepening Uninformed Search. [14M]

**SECTION-II**

3 Interpret about Propositional Logic, First-Order Logic and Bayes theorem. [14M]

OR

4 Briefly discuss about A\* Search Implementation, Minimax Search and Alpha-Beta Pruning. [14M]

**SECTION-III**

5 Describe about knowledge representation issues and non- monotonic reasoning in Artificial Intelligence. [14M]

OR

6 Write a short note on knowledge representation schemes, basic probability, acting under uncertainty and Bayes' Rule. [14M]

**SECTION-IV**

7 Briefly discuss about Learning from Examples, Winston's Learning Program and Decision Trees. [14M]

OR

8 What Is Learning?. Explain about Rote Learning, Learning by Taking Advice and Learning in Problem Solving. [14M]

**SECTION-V**

9 Discuss about representing and using domain knowledge in expert system. [14M]

OR

10 Describe about explanation and knowledge acquisition in expert systems. [14M]

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Code No: R18A0324

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular Examinations, Dec-21/Jan-22

Automation and Control Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1 Distinguish the following
- (a) Fixed automation [5M]
  - (b) Programmable automation [5M]
  - (c) Flexible automation. [4M]

OR

- 2 Write the scope, advantages and disadvantages of Mechatronics. [14M]

**SECTION-II**

- 3 Describe the working principle of Photoelectric Proximity sensor with proper diagram. [14M]

OR

- 4 Write the characteristics of strain gauges and their classification. [14M]

**SECTION-III**

- 5 Distinguish the Mechanical actuation and Hydraulic actuation with neat sketch. [14M]

OR

- 6 Write (a) Advantages of Hydraulic systems over Pneumatic systems. (b) Limitations of Hydraulic and Pneumatic actuators. [14M]

**SECTION-IV**

- 7 Distinguish
- (a) Linear control systems [3M]
  - (b) Non-Linear control systems [4M]
  - (c) Continuous-Time control system [4M]
  - (d) Discrete-Time control systems [3M]

OR

- 8 Describe the closed loop control system with one example. [14M]

**SECTION-V**

- 9 Describe the Composite controller with block diagram. [14M]

OR

- 10 Explain (a) P-D Controller (b) P-I-D Controller. [14M]

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Code No: R18A0327

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**  
(Autonomous Institution – UGC, Govt. of India)

**R18**

**IV B.Tech I Semester Regular Examinations, Dec-21/Jan-22**  
**Finite Element Analysis**

(ME)

Roll No									
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Time: 3 hours

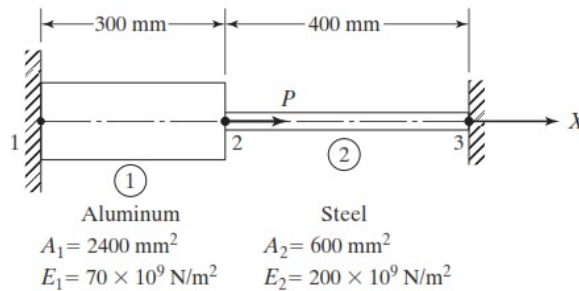
Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- Discuss the advantages and disadvantages of FEM over Classical methods [5M]
  - Consider the bar shown in Fig. An axial load  $P = 200 \times 10^3$  N is applied as shown. Using the penalty approach for handling boundary conditions, determine  
i) the nodal displacements. ii) the stress in each material. iii) the reaction forces. [9M]

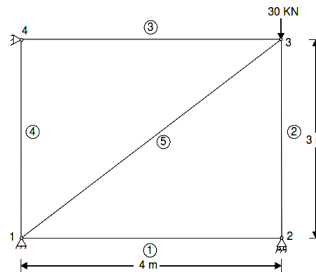


OR

- Derive the equations of equilibrium in case of a three dimensional stress system. [5M]
  - Derive the element stiffness matrix, force vector for bar element using potential energy method. [9M]

**SECTION-II**

- Determine the forces in the members of the truss shown in Fig. Take  $E = 200$  GPa,  $A = 2000 \text{ mm}^2$  [14M]



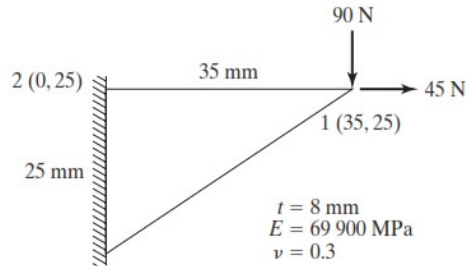
OR

- A beam of length 10 m, fixed at one end and supported by a roller at the other end carries a 20 kN concentrated load at the centre of the span. By taking the modulus of elasticity of material as 200 GPa and moment of inertia as  $24 \times 10^{-6} \text{ m}^4$ , determine: Deflection under load, shear force & bending moment and reaction at supports. [14M]

**SECTION-III**

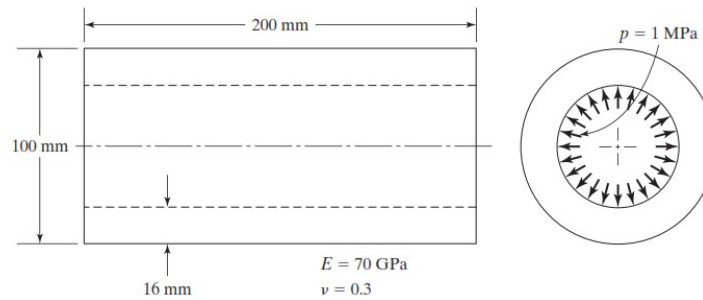
- For the configuration shown in Fig. determine the deflection at the point of load and [14M]

stress in the element using a one-element model.



OR

- 6 The open-ended steel cylinder shown in Fig. is subjected to an internal pressure of 1 MPa. Find the deformed shape and distribution of principal stresses. [14M]

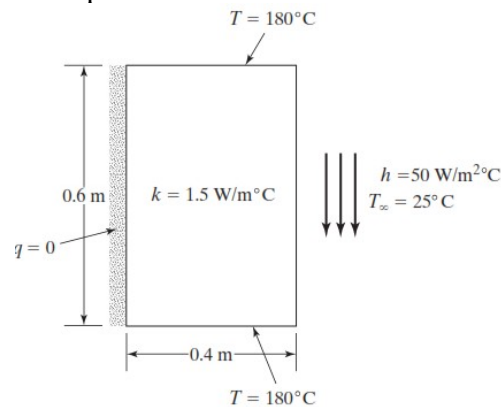


#### SECTION-IV

- 7 Derive the stiffness element stiffness matrix for the four node quadrilateral. [14M]

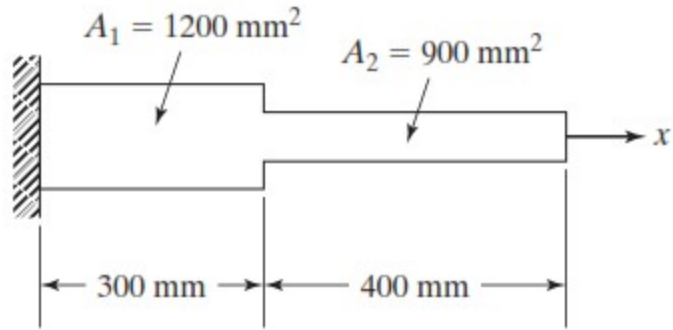
OR

- 8 A long bar of rectangular cross section, having thermal conductivity of  $1.5 \text{ W/m}\cdot\text{C}$ , is subjected to the boundary conditions shown in Fig. Two opposite sides are maintained at a uniform temperature of  $180^\circ \text{C}$ , one side is insulated, and the remaining side is subjected to a convection process with  $T_\infty = 25^\circ \text{C}$  and  $h = 50 \text{ W/m}^2\cdot\text{C}$ . Determine the temperature distribution in the bar. [14M]



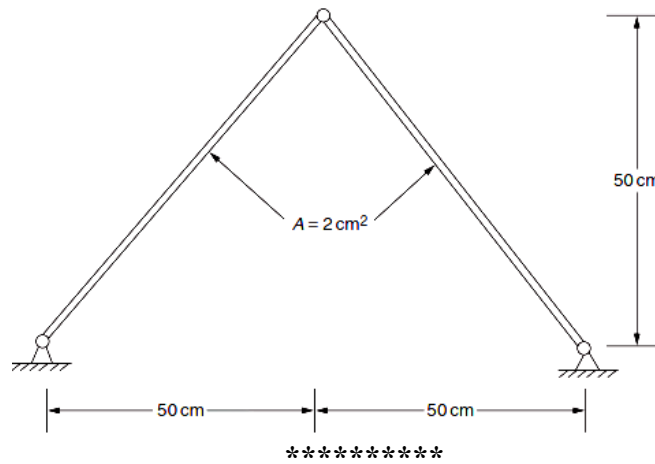
#### SECTION-V

- 9 Determine all natural frequencies of the beam shown in Fig. Take  $E = 210 \text{ GPa}$  and  $\rho = 7840 \text{ kg/m}^3$ . [14M]



OR

- 10 Find the natural frequencies of vibration of the two-bar truss shown in Fig. Assume [14M]  
 the Young's modulus to be  $2 \times 10^6 \text{ N/cm}^2$  and density as  $0.0078 \text{ kg/cm}^3$ .



Code No: R18A0329

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular Examinations, Dec-21/Jan-22

Heating Ventilation and Air Conditioning

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

Note: Psychrometric charts and steam tables are permitted

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**SECTION-I**

1 Discuss the working principle of a Reciprocating compressor with neat sketch. [14M]

OR

2 Classify the condensers based on the external fluid and describe any one of the condensers with neat sketch. [14M]

**SECTION-II**

3 Describe the working principle of Window Air conditioner with line diagram. [14M]

OR

4 Write the merits and demerits of Split Air conditioner and Window Air conditioner. [14M]

**SECTION-III**

5 Atmospheric air at 1.0132bar has a DBT of 30°C and a WBT of 25°C. Compute [14M]  
(a) The partial pressure of water vapour (b) The specific humidity (c) Dew point temperature (d) Relative humidity (e) Degree of saturation

OR

6 Describe about sensible heating and Sensible cooling with schematic representation? [14M]

**SECTION-IV**

7 Describe the various factors affecting survey of building. [14M]

OR

8 Describe about (a) Internal load due to occupants (b) Internal load due to lighting (c) Internal load due to equipment and appliances [14M]

**SECTION-V**

9 Summarize about piping arrange categories with line diagram (a) Single pipe (b) Two pipe (c) Three pipe (d) Four pipe (e) Series loop [14M]

OR

10 Explain different types of valves used in HVAC piping system. [14M]

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Code No: R18A0326

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular Examinations, Dec-21/Jan-22

Mechanical Measurements and Instrumentation

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

1 With neat sketch Explain the working of linear variable differentiation transformer (LVDT) for displacement measurement. [14M]

OR

2 Explain Functional Elements of a generalized measurement system. [14M]

**SECTION-II**

3 Classify the temperature measuring devices. Explain any one temperature measuring device with working principle. [14M]

OR

4 Explain the working of well-type manometer with a neat sketch. [14M]

**SECTION-III**

5 With Neat Sketch Explain Construction And Working Capacitive Liquid Level Sensor. [14M]

OR

6 Classify the Tachometers and explain any two mechanical Tachometers. [14M]

**SECTION-IV**

7 What are rosette gauges? Classify and Explain them briefly. [14M]

OR

8 Explain the working principle and applications of Sling Psychrometer. [14M]

**SECTION-V**

9 What is control system explain open loop and closed loop control systems with examples? [14M]

OR

10 Explain with a neat sketch determination of force using a load cell. [14M]

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Roll No									
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Time: 3 hours

Max. Marks: 70

**Note:** This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1 *A* What are the types of automation? Explain each in detailed manner? [7M]  
*B* What is the need for automated flow lines? Discuss any two types of automated flow lines? [7M]

OR

- 2 *A* What are the basic components of hydraulic system? Explain each with the help of diagram? [7M]  
*B* Discuss the evaluation of Mechatronics? What is the scope of mechatronics? [7M]

**SECTION-II**

- 3 *A* Define Transducer? Classify Transducers according to the measurement (or) Function? [7M]  
*B* Define LVDT? Explain its working principle? List out its advantages and disadvantages? [7M]

OR

- 4 *A* Discuss digital optical encoder? Classify and explain in detail? [7M]  
*B* Explain liquid flow sensors? Discuss orifice plate and turbine meter with the help of neat sketches? [7M]

**SECTION-III**

- 5 *A* Define actuator? What are the types of actuators? Discuss [7M]  
*B* Explain the characteristics of different drive systems [7M]

OR

- 6 *A* Draw the circuit diagram of hydraulic actuator? Explain all the components of it? [7M]  
*B* List out the industrial applications of drives systems? Explain any one with the help of a neat sketch? [7M]

**SECTION-IV**

- 7 *A* Discuss the following : i) Open loop control system [4M]  
 ii) Closed loop control system [3M]  
*B* Define transfer function? Explain transfer function for cascade systems? [7M]

OR

- 8 *A* Classify control systems based on control signal used? [7M]  
*B* What is meant by non-linear control systems? Classify? Explain all in detail? [7M]

**SECTION-V**

- 9 *A* What is meant by P-I, PD and P-I-D controllers explain briefly? [7M]  
*B* Explain the working principle of a controller? Discuss the applications of controllers? [7M]

OR

- 10 *A* Explain about Automatic controllers? [7M]  
*B* Discuss the following: [3M]  
 i) Electronic controllers, [2M]  
 ii) Pneumatic controllers, [2M]  
 iii) Hydraulic controllers [2M]

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Code No: R18A0327

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **R18**

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular/Supplementary Examinations, November 2022

Finite Element Analysis

(ME)

Roll No									
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Time: 3 hours

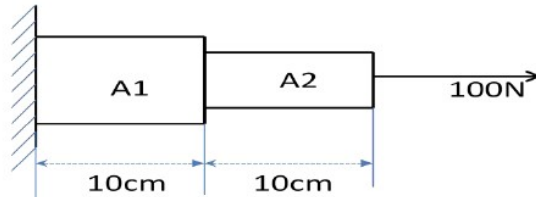
Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1 A Consider a bar as shown in figure shown, Young's Modulus  $E = 2 \times 10^5 \text{ N/mm}^2$ .  $A_1 = 2 \text{ cm}^2$ ,  $A_2 = 1 \text{ cm}^2$  and force of 100N is applied. Determine the nodal displacement. [7M]

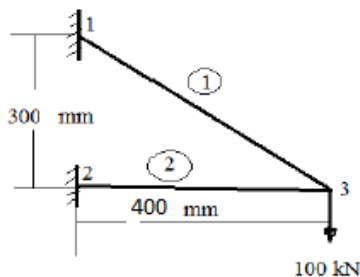


- B Derive the stress strain displacement relation for a 3 dimensional element? [7M]  
OR

- 2 A Describe the procedure involved in finite element method? [7M]  
B Write the advantages, disadvantages and applications of FEM? [7M]

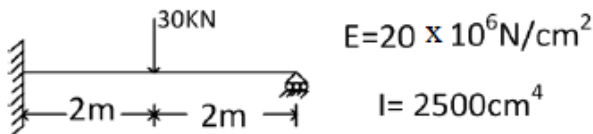
**SECTION-II**

- 3 For the two-bar truss shown in figure, determine the displacements and stress. [14M]  
 $A_1=500 \text{ mm}^2$ ,  $A_2=1200 \text{ mm}^2$ ,  $E=2 \times 10^5 \text{ N/mm}^2$ .



OR

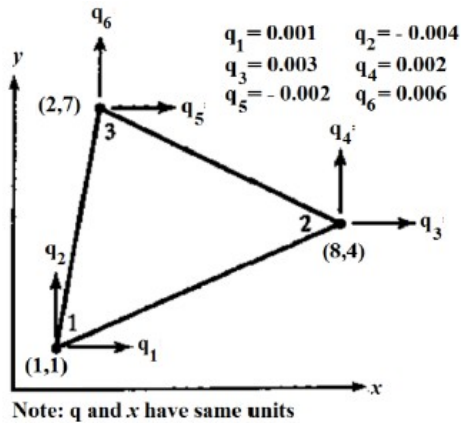
- 4 For the beam shown in figure calculate the deflection under the load for the beam [14M]



**SECTION-III**

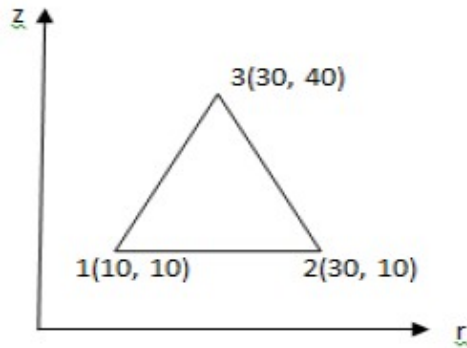
- 5 A Derive the strain displacement matrix of a constant strain triangle element. [7M]

- B** For the triangular element shown in the figure, obtain the strain - displacement relation matrix and determine the strains  $\epsilon_x$ ,  $\epsilon_y$  and  $\gamma_{xy}$ . [7M]



OR

- 6 Nodal coordinates for an Axi-Symmetric element are given below. Evaluate Stiffness Matrix.  $E=2 \times 10^5 \text{ N/mm}^2$ ,  $\nu = 0.25$ . [14M]

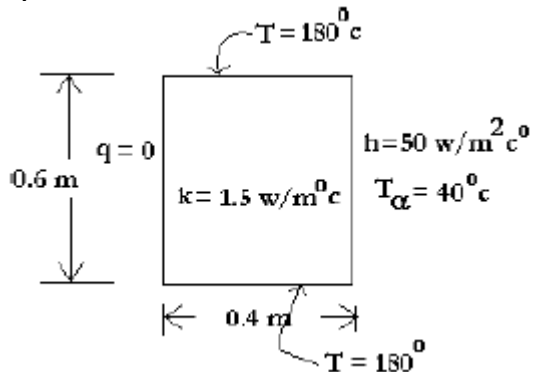


**SECTION-IV**

- 7 Derive Strain displacement relation matrix for four noded quadrilateral element? [14M]

OR

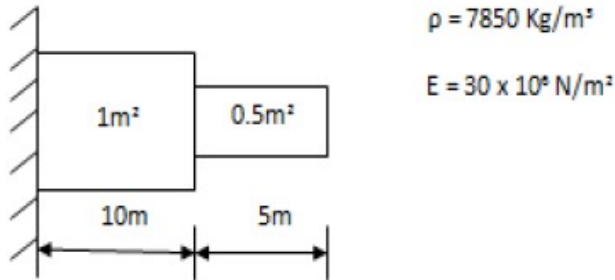
- 8 A long bar of rectangular c/s, having the thermal conductivity of  $1.5 \text{ w/m}^\circ\text{C}$  is subjected to the boundary conditions shown in figure. Determine the temperature distribution in the bar. [14M]





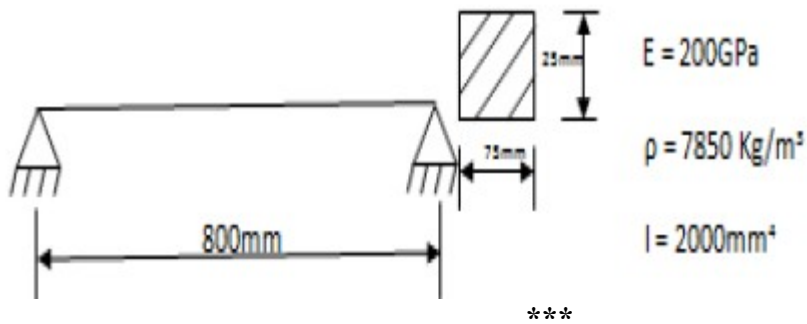
**SECTION-V**

- 9 Determine the Eigen values and Eigen Vectors for the stepped bar as shown in figure? [14M]



OR

- 10 Determine all natural frequencies of the simply supported beam as shown in figure? [14M]



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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, November 2022

Heating Ventilation and Air Conditioning

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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Note: Steam Tables and Psychrometric charts are permitted

SECTION-I

- 1 A Explain the mechanism of Vapour Compression Refrigeration System with a neat sketch. [7M]  
B Explain the working of Thermostatic Expansion valve with a neat sketch [7M]  
OR
- 2 A Explain the working of Flooded type evaporator with neat diagram [7M]  
B An ammonia refrigeration plant operates between  $-6.7^{\circ}\text{C}$  and  $26.7^{\circ}\text{C}$ . The vapor is dry at the end of the compression. Calculate the theoretical COP of the cycle. Use the following properties of ammonia [7M]

Temp ( $^{\circ}\text{C}$ )	Liquid Enthalpy	Vapour Enthalpy	Liquid Entropy	Vapour Entropy
	KJ/Kg	KJ/Kg	KJ/Kg k	KJ/Kg k
-6.7	-29.6	1262.36	0.1087	4.7401
26.7	124.56	1291.62	0.4264	4.3263

SECTION-II

- 3 A Describe briefly about the classification of Air conditioning systems. [7M]  
B Explain the working of Split A/c System with neat diagram? [7M]  
OR
- 4 A Explain with neat sketch working of packaged Air Conditioning System? [7M]  
B What are the industrial applications of Air conditioning systems [7M]

SECTION-III

- 5 A Explain about Sensible Heating and Sensible cooling with a neat sketch. [6M]  
B The atmospheric air at  $30^{\circ}\text{C}$  Dry bulb temperature and 75% Relative humidity enters a cooling coil at the rate of  $200\text{m}^3/\text{min}$ . The coil dew point temperature is  $14^{\circ}\text{C}$  and the by-pass factor of the coil is 0.1. Determine: 1. The temperature of air leaving the cooling coil. 2. The capacity of the cooling coil in TR. 3. Sensible heat factor for the process. [8M]  
OR
- 6 A Define (i) humidification (ii) Latent Heat (iii) Dew point temperature [6M]  
B The atmospheric air at  $25^{\circ}\text{C}$  dry bulb temperature and  $12^{\circ}\text{C}$  wet bulb temperature is flowing at the rate of  $100\text{m}^3/\text{min}$  through the duct. The dry saturated steam at  $100^{\circ}\text{C}$  is injected into the air stream at the rate of 72 kg/hr. Calculate the specific humidity and Enthalpy of the leaving air. Determine Dry bulb temperature, wet bulb temperature and relative humidity of the

leaving air.

**SECTION-IV**

7 Write the procedure for calculating cooling load [14M]

OR

8 *A* Describe the various factors affecting survey of building? [7M]

*B* Write ventilation requirements for indoor air quality [7M]

**SECTION-V**

9 *A* Describe about hydronic system? [7M]

*B* Discuss about the fittings used in HVAC piping System? [7M]

OR

10 *A* Explain different types of centrifugal fans [6M]

*B* Give a brief note on the selection of a motor for HP [8M]

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Code No: R18A0326

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **R18**  
(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Regular/Supplementary Examinations, November 2022  
Mechanical Measurements and Instrumentation  
(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1    *A*    Discuss about Primary and secondary & tertiary measurements?    [7M]  
      *B*    Define error? Discuss about Gross error, systematic error and Random error?    [7M]

OR

- 2    *A*    Explain generalized measurement system and its functional elements?    [7M]  
      *B*    Define transducer? Explain the functions of transducer?    [7M]

**SECTION-II**

- 3    *A*    What is meant by pyrometer? Classify? Discuss any one in detail?    [7M]  
      *B*    Explain Optical pyrometer with the help of a neat sketch?    [7M]

OR

- 4    *A*    Discuss the following: i) Pressure capsule, ii) Diaphragm pressure gauge    [7M]  
      *B*    What is meant by measurement of level? Classify? Explain capacitive method?    [7M]

**SECTION-III**

- 5    *A*    Explain direct methods in the measurement of liquid level? Discuss the construction and working?    [7M]  
      *B*    List out any seven types of flow meters? Discuss any two in detail?    [7M]

OR

- 6    *A*    Differentiate mechanical tachometers and electrical tachometers?    [7M]  
      *B*    What is meant by mechanical tachometers? Classify? Discuss any one type of mechanical tachometer with the help of a neat sketch?    [7M]

**SECTION-IV**

- 7    *A*    What is strain? Explain Electrical Resistance Strain Gage?    [7M]  
      *B*    Explain Sling Psychrometer with the help of a neat sketch? Discuss its applications?    [7M]

OR

- 8    *A*    What is the need for measuring strain? Explain the constructional features and working principle of foil strain gage?    [7M]  
      *B*    What are the issues involved in case of potentiometer? Differentiate linear and angular potentiometers?    [7M]

**SECTION-V**

- 9    *A*    How to measure force? Mention the methods involved in measuring the force?    [7M]

- B** What is meant by control systems? What are the elements involved? Explain closed loop control system? [7M]
- OR
- 10 A** Explain Unequal Arm balance with the help of a neat sketch? What is platform balance? [7M]
- B** What is the need for measuring torque? Discuss absorption dynamometer in detail? [7M]

\*\*\*\*\*



Code No: R18A0324

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **R18**

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, April 2023

Automation and Control Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

\*\*\*

**SECTION-I**

- 1    *A*    Define Automation? Mention its advantages, disadvantages and applications?    [7M]  
      *B*    What are the types of transfer mechanisms are available? Classify and explain any two types with the help of diagrams?    [7M]

OR

- 2    *A*    What are the basic components of pneumatic system? Explain with the help of diagram?    [7M]  
      *B*    Explain the general parameters for designing an intelligent mechatronic system?    [7M]

**SECTION-II**

- 3    *A*    What is meant by displacement sensors? Discuss any two types of displacement sensors in detail?    [7M]  
      *B*    Explain photoelectric sensors? List out its advantages and disadvantages?    [7M]

OR

- 4    *A*    Explain capacitive sensors with the help of a neat sketch? Discuss its applications?    [7M]  
      *B*    Discuss the working principle of proximity switches with the help of a neat diagram?    [7M]

**SECTION-III**

- 5    *A*    Explain double effect pneumatic actuators with sketch? List out its advantages?    [7M]  
      *B*    Differentiate Hydraulic and Pneumatic Actuators?    [7M]

OR

- 6    *A*    Explain any one type of hydraulic actuator with neat sketch? List out its advantages and disadvantages of hydraulic actuators?    [7M]  
      *B*    Explain about different Drive systems in detail?    [7M]

**SECTION-IV**

- 7    *A*    Define control system? Differentiate system and control system with few practical examples?    [7M]  
      *B*    Explain transfer function of passive and active elements with neat sketches?    [7M]

OR

- 8    *A*    Differentiate linear control system and non-linear control system    [7M]  
      *B*    Explain the components of control systems?    [7M]

**SECTION-V**

- 9    *A*    Discuss the following: i) integral controller, ii) derivative controller    [7M]  
      *B*    Explain about Hydraulic controllers?    [7M]

OR

- 10    *A*    Explain about Process control? Discuss various Electronic controllers    [7M]  
      *B*    Discuss the industrial applications of PID controllers?    [7M]

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Code No: R18A1205

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, April 2023

Artificial Intelligence

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

\*\*\*

**SECTION-I**

- 1 A Compose the algorithm for best first search and explain it [7M]  
B Briefly explain the search strategies in uninformed search [7M]

OR

- 2 A Analyse the characteristics of intelligent Agents [7M]  
B What are the problems encountered during hill climbing and what are the ways available to deal with these problems? [7M]

**SECTION-II**

- 3 A Describe Alpha-beta pruning with algorithm [7M]  
B Relate first order logic with proposition logic and discuss in detail [7M]

OR

- 4 A Explain propositional logic [7M]  
B Write algorithm for minmax [7M]

**SECTION-III**

- 5 A Explain Bayes' rule and its use [7M]  
B Write various knowledge representation issues. [7M]

OR

- 6 A Which are the key issues to be addressed in non monotonic reasoning system [7M]  
B What are the basic probability notation used under uncertainty [7M]

**SECTION-IV**

- 7 A Express the view about rote learning. [7M]  
B Define learning and explain about learning from examples. [7M]

OR

- 8 A Explain various forms of learning in problem solving [7M]  
B Explain how to evaluate and choose the best hypothesis in learning [7M]

**SECTION-V**

- 9 A With neat sketch explain the architecture, characteristic features and roles of expert system [7M]  
B Explain the applications of expert system [7M]

OR

- 10 A Design an expert system for Travel recommendation and discuss its roles [7M]  
B Discuss about the Knowledge Acquisition process in expert systems [7M]

\*\*\*



Code No: R18A0327

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **R18** DEGREE

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, April 2023

Finite Element Analysis

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

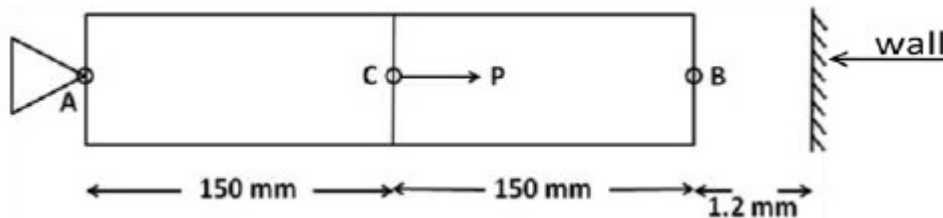
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**SECTION-I**

1 Explain Rayleigh Ritz and Galerkin formulation with example. [14M]

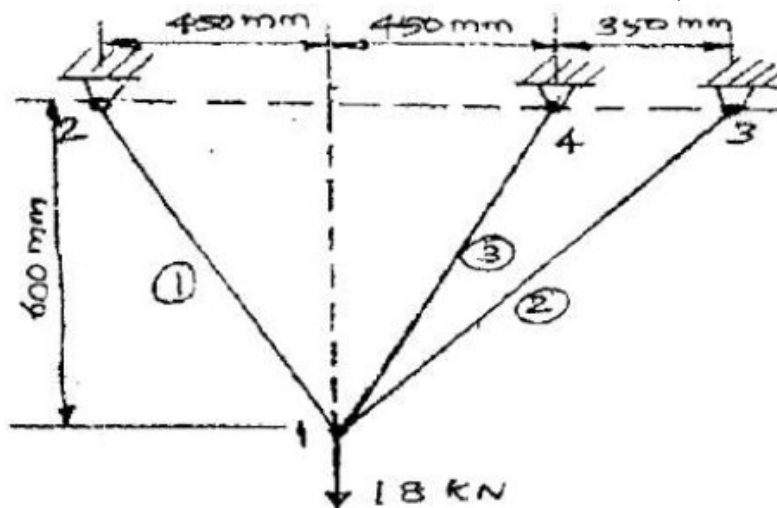
OR

2 A load  $P=60 \times 10^3 \text{ N}$  is applied on a bar as shown in figure, Determine (i) Displacement field (ii) Stresses and (iii) Support reactions. Take  $E=20 \text{ GPa}$ , gap between wall and beam =  $1.2 \text{ mm}$ ,  $A=250 \text{ mm}^2$  [14M]



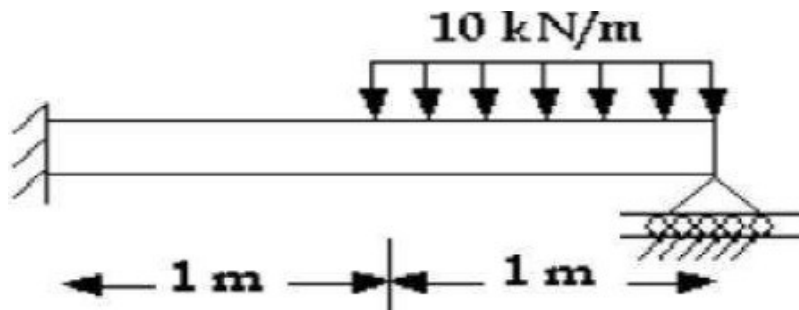
**SECTION-II**

3 For the three-bar truss shown in figure, determine the displacements in node 1 and the stress in element 3. Take  $A=250 \text{ mm}^2$ ,  $E=200 \text{ GPa}$ . [14M]



OR

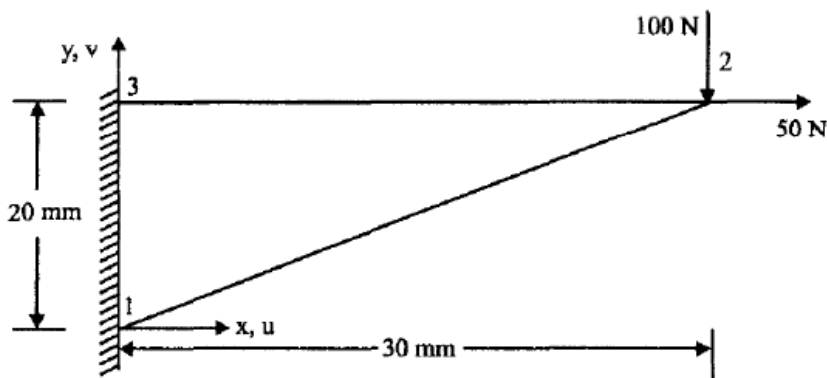
4 A Consider a beam with uniform distributed load as shown in the figure Estimate the deflection at the centre of the beam.  $E=200 \text{ GPa}$ ;  $A=25 \text{ mm} \times 25 \text{ mm}$  [7M]



**B** For two noded beam element, determine Hermite functions and plot them. Also obtain element stiffness matrix. **7M**

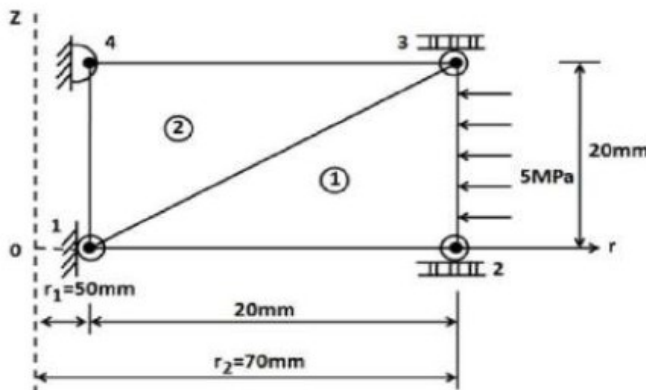
**SECTION-III**

**5** Calculate displacements and stress in a triangular plate, fixed along one edge and subjected to concentrated load at its free end. Assume  $E = 70,000 \text{ MPa}$ ,  $t = 10 \text{ mm}$  and  $\nu = 0.3$  **[14M]**



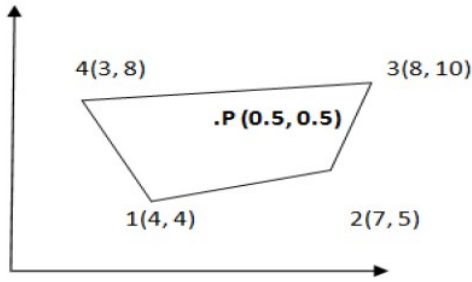
OR

**6** For the axisymmetric triangular element 1, determine consistent loads at the nodes 2 and 3 due to pressure load as shown in figure, Also calculate material property matrix  $[D]$ . **[14M]**



**SECTION-IV**

**7** Evaluate jacobian matrix at  $\xi = \eta = 0.5$  for the linear quadrilateral element shown in figure **[14M]**

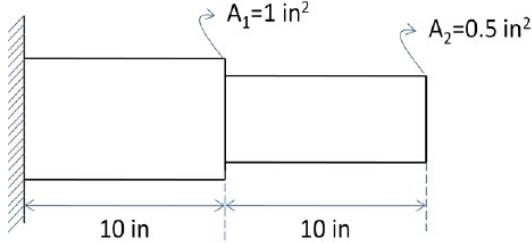


OR

- 8 Determine the temperature distribution in 1D rectangular cross section fin with 8cm long, 4cm wide, 1cm thick. Assume that convective heat loss occurs from the end of the fin. Take  $K = 3\text{W/cm K}$ ,  $h = 0.1\text{W/cm}^2\text{ k}$  and  $T_\infty = 20^\circ\text{C}$ . tip temperature is  $100^\circ\text{C}$ . [14M]

**SECTION-V**

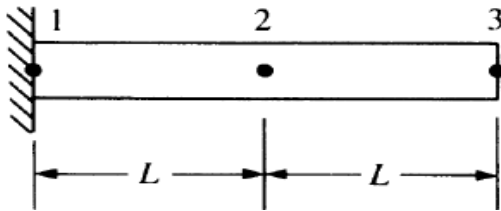
- 9 Find the natural frequencies of longitudinal vibration of the unconstrained stepped bar shown in figure. [14M]



$E = 30 \times 10^6 \text{ psi}$   
 Specific weight  $= 0.238 \text{ lb/in}^3$

OR

- 10 Determine the Eigen values and Eigen vectors of the bar shown in figure. [14M]  
 Take  $E=200 \text{ Gpa}$ ,  $\rho = 7862 \text{ kg/m}^3$ ,  $A=6 \text{ cm}^2$  and  $L=2.5 \text{ m}$ .



\*\*\*



coil and the by-pass factor.

**SECTION-IV**

- 7 A building has U-value of  $0.5 \text{ W/m}^2\text{K}$  and total exposed surface area of  $384 \text{ m}^2$ . The building is subjected to an external load (only sensible) of  $2 \text{ kW}$  and an internal load of  $1.2 \text{ kW}$  (sensible). If the required internal temperature is  $25^\circ\text{C}$ , state whether a cooling system is required or heating system is required when the external temperature is  $3^\circ\text{C}$ . How the result will change, if the U-value of the building is reduced to  $0.36 \text{ W/m K}$ ? [14M]

OR

- 8 *A* Write about the steps in cooling load calculations? [7M]  
*B* Explain about the ventilation systems standards? [7M]

**SECTION-V**

- 9 Write about the types , characteristics and applications of fans in a detail [14M]

OR

- 10 *A* Write about different types of valves used in HVAC piping system? [7M]  
*B* Explain the Classification of water piping system? [7M]

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Code No: R18A0326

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, April 2023

Mechanical Measurements and Instrumentation

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1    *A*    Discuss the following: i) Direct and indirect measurement, ii) Contact and non-contact type of measurement    [7M]
- B*    List out the transducers used for the Measurement of Displacement? Discuss the advantages and limitations of electrical transducers over other transducers?    [7M]

OR

- 2    *A*    Classify performance characteristics of a measuring instrument? Explain in detail?    [7M]
- B*    Differentiate between instrumental and accidental errors?    [7M]

**SECTION-II**

- 3    *A*    Explain the constructional feature of total Radiation Pyrometer? Mention its advantages?    [7M]
- B*    Discuss Infrared pyrometer? List out its advantages over other?    [7M]

OR

- 4    *A*    What is the need for pressure measurement? Explain Diaphragm pressure gauge? Mention its advantages over other?    [7M]
- B*    Classify pressure measuring devices? Explain any two in detail?    [7M]

**SECTION-III**

- 5    *A*    Explain indirect methods in the measurement of liquid level? Discuss the construction and working?    [7M]
- B*    What is tachometer? Classify? Discuss any one type of tachometer with the help of neat sketch?    [7M]

OR

- 6    *A*    What is Noncontact type of tachometer? Explain its working principle with the help of a neat sketch? List out its advantages?    [7M]
- B*    Explain the concept of Ultrasonic Flow measurement? Give example    [7M]

**SECTION-IV**

- 7    *A*    How does a measuring system works? Explain with the help of a diagram? List out general parameters to be measured?    [7M]
- B*    What is a strain gauge? How it works in case of supported beam is bent by applying a lateral force?    [7M]

OR

- 8    *A*    What is strain rosette? Explain the common arrangements of it? Mention the formulae involved in each?    [7M]

**B** Explain the constructional feature and operation of a sling Psychrometer? [7M]

**SECTION-V**

**9** **A** Differentiate Direct and Indirect methods in case of measurement of Force? [7M]

**B** Explain Torque measurement using strain gauge? [7M]

OR

**10** **A** Explain the concept of multiple lever system? List out its advantages? [7M]

**B** Discuss the concept of torque measurement using strain gauge and torsion bars? Explain SAW method? [7M]

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Code No: R18A0325

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY  
(Autonomous Institution – UGC, Govt. of India)

R18

IV B.Tech I Semester Supplementary Examinations, June 2022  
Operations Research

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions  
All Questions carries equal marks.

\*\*\*

- 1 solve the following LP problem using graphical method. [14M]

$$\text{Minimize } Z = 5x_1 + 3x_2$$

Subject to the constraints

$$2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \geq 10$$

$$x_1, x_2 \geq 0$$

- 2 Use the simplex method to solve the following LPP [14M]

$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$

Subject to the constraints

$$2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

$$x_1, x_2, x_3 \geq 0$$

- 3 What do you mean by an unbalance transportation problem and explain how to convert the unbalance transportation problem in to a balanced one? [14M]

- 4 i) Give the mathematical formulation of an assignment problem. How does it differ from a transportation problem? [7M]

- ii) Solve the following transportation problem and calculate the optimal transportation cost. [7M]

	D1	D2	D3	D4	Supply
S1	21	16	25	13	11
S2	17	18	14	23	13
S3	32	27	18	41	19
Demand	6	10	12	15	

- 5 Describe the Dominance Principle [14M]

Reduce the following game by dominance and find the game value.

Player A	Player B			
	I	II	III	IV
I	3	2	4	0



	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

- 6 i) Describe the assumptions and major limitations of game theory [7M]  
 ii) A and B play a game in which each has three coins a 5p, a 10p and a 20p. [7M]  
 Each player selects a coin without the knowledge of the other's choice. If the sum of the coins is an odd amount, A wins B's coin; if the sum is even, B wins A's coin. Find the best strategy for each player and the value of the game.

- 7 The cost of a machine is Rs.6,100 and its scrap value is Rs 100. The maintenance costs found from experience are as following .When should the machine be replaced? [14M]

Years	1	2	3	4	5	6	7	8
Maintenance Cost(Rs.)	100	250	400	600	900	1,200	1,600	2,000

- 8 Classify the Simulation models and list out the Advantages and Limitations of Simulation Techniques [14M]

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Code No: R18A0324

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY  
(Autonomous Institution – UGC, Govt. of India)

R18

IV B.Tech I Semester Supplementary Examinations, June 2022

Automation and Control Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions  
All Questions carries equal marks.

\*\*\*

- 1 Describe the necessity automation in industries with proper justification. [14M]
- 2 List the strategies for automation and describe them in detail. [14M]
- 3 Describe the static characteristics of the transducer. (a) Range and span (b) Accuracy (c) Sensitivity (d) Hysteresis error (e) Repeatability (f) Reliability (g) Stability [14M]
- 4 Classify the Sensor system according to (a) Power supply (b) Mode of operation (c) Signal characteristics (d) Functionality (e) Performance [14M]
- 5 List advantages and disadvantages of Hydraulic systems and Pneumatic systems. [14M]
- 6 Describe the principle of Hydraulic system with neat sketch. [14M]
- 7 Describe Open loop control system and Closed loop control system with neat block diagrams. [14M]
- 8 Describe the following with neat diagrams  
(a) Digital controller [7M]  
(b) Analog controller [7M]

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Code No: R18A1205

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY  
(Autonomous Institution – UGC, Govt. of India)

R18

IV B.Tech I Semester Supplementary Examinations, June 2022

Artificial Intelligence

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions  
All Questions carries equal marks.

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- 1 Discuss all three uniformed search algorithms. [14M]
- 2 Explain about Generic Best-First, A\* and Hill Climbing in the context of Heuristic Search. [14M]
- 3 Explain  $\alpha, \beta$  pruning, AO\* algorithm and minimax search algorithm. [14M]
- 4 Analyse about Propositional Logic, First-Order Logic and Bayes theorem. [14M]
- 5 Explain about Forward Chaining, Backward Chaining and Probabilistic Reasoning with respect to knowledge representation. [14M]
- 6 Describe about knowledge representation schemes, basic probability, acting under uncertainty and Bayes' Rule [14M]
- 7 Describe about Learning from Examples, Winston's Learning Program and Decision Trees. [14M]
- 8 What is an expert system? And explain get knowledge acquisition in expert system [14M]

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Code No: R18A0327

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY  
(Autonomous Institution – UGC, Govt. of India)

R18

IV B.Tech I Semester Supplementary Examinations, June 2022

Finite Element Analysis

(ME)

Roll No									
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Time: 3 hours

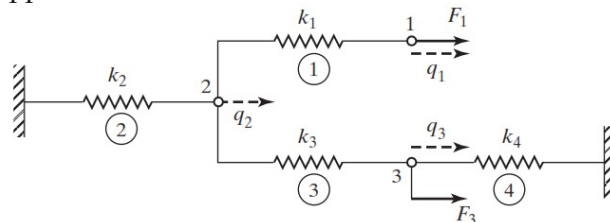
Max. Marks: 70

Answer Any Five Questions

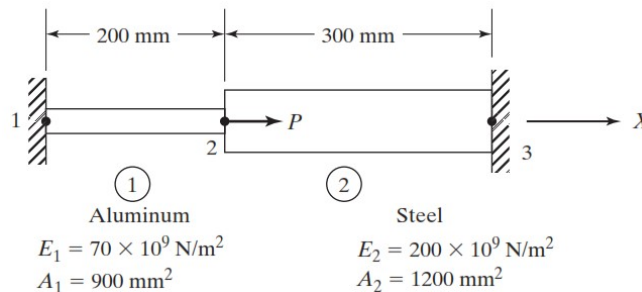
All Questions carries equal marks.

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- 1 Derive the equilibrium equations for a system of springs shown in Fig. using potential energy approach. [14M]



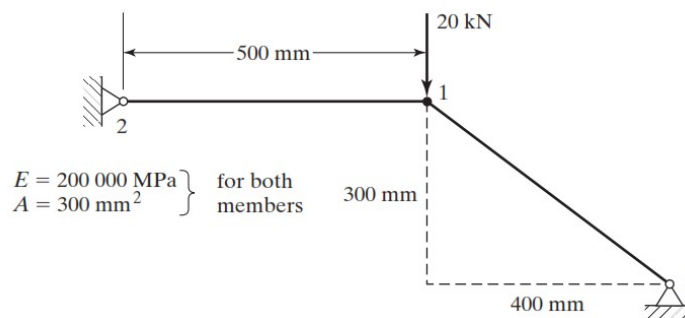
- 2 A load  $P = 300 \times 10^3 \text{ N}$  is applied along the axis to the rod as shown in Fig. [14M]  
Determine i) Assemble the K and F matrices. ii) Determine the nodal displacements and element stresses.



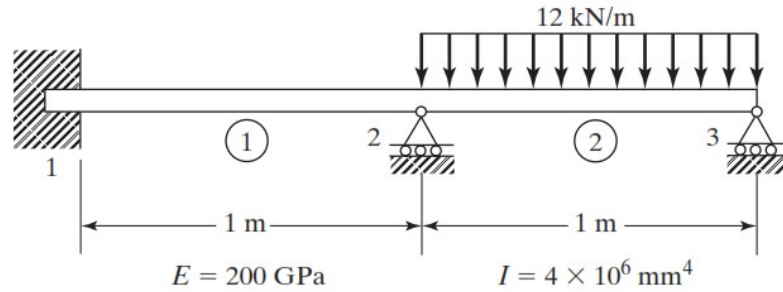
Aluminum  $E_1 = 70 \times 10^9 \text{ N/m}^2$   
 $A_1 = 900 \text{ mm}^2$

Steel  $E_2 = 200 \times 10^9 \text{ N/m}^2$   
 $A_2 = 1200 \text{ mm}^2$

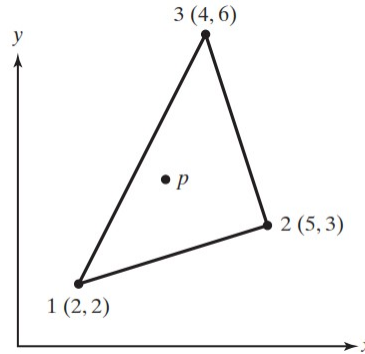
- 3 The two-bar truss shown in Fig. determines the displacements of node 1 and the stress in elements 1–3. [14M]



- 4 The beam shown in Fig. determines i) slopes at 2 and 3 ii) the vertical deflection at the midpoint of the distributed load. [14M]



- 5 a A Point P located inside the triangle shown in Fig. the shape functions  $N_1$  and  $N_2$  are 0.2 and 0.3 respectively. Determine the x and y coordinates of point P. [6M]

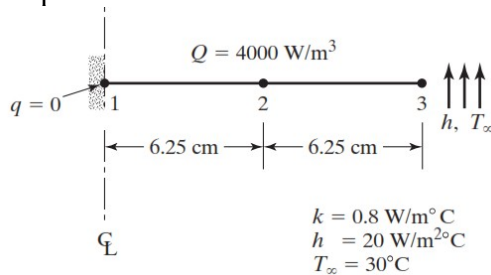


- b Explain the Jacobin matrix with the help of CST [8M]

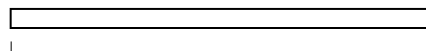
- 6 Derive the matrix for the deflection and stress for one element model using basics of FEM [14M]

- 7 a Define the shape function for Nine-Node Quadrilateral element [8M]

- b Heat is generated in a large plate ( $k = 0.8 \text{ W/m}^\circ\text{C}$ ) at the rate of  $4000 \text{ W/m}^3$ . The plate is 25 cm thick. The outside surfaces of the plate are exposed to ambient air at  $30^\circ\text{C}$  with a convective heat-transfer coefficient of  $20 \text{ W/m}^2\cdot^\circ\text{C}$ . Determine the temperature distribution in the wall. [6M]



- 8 Determine the frequencies and nodal displacements of the steel cantilever beam length of 600 mm with cross section of 60 mm x 20 mm shown in Fig. Take  $E = 70 \text{ GPa}$ ,  $\nu = 0.3$  and  $\rho = 7840 \text{ kg/m}^3$ . [14M]



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Code No: R18A0329

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY** **R18**  
(Autonomous Institution – UGC, Govt. of India)

**IV B.Tech I Semester Supplementary Examinations, June 2022**

**Heating Ventilation and Air Conditioning**

**(ME)**

<b>Roll No</b>										
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**Time: 3 hours**

**Max. Marks: 70**

Answer Any **Five** Questions  
All Questions carries equal marks.

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**Note: Psychometric charts and steam tables are permitted.**

- 1 Distinguish the following with water cooled condensers [14M]
  - (a) Double pipe
  - (b) Shell- and-coil type
  - (c) Shell-and-tube type.
  
- 2 a. Draw the schematic diagram of the Thermostatic expansion valve and discuss the working principle. [14M]  
b. Classify the different types of expansion devices.
  
- 3 Explain the classification of Air conditioning system with flow chart. [14M]
  
- 4 Explain the working of window air conditioning system with a neat diagram [14M]
  
- 5 On a particular day, the atmospheric air was found to have a dry bulb temperature of 30°C and a wet bulb temperature of 18°C. The barometric pressure was observed to be 756mm of Hg. Using the tables of psychrometric properties of air, determine the relative humidity, the specific humidity, the dew point temperature, the enthalpy of air per kg of dry air and the volume of mixture per kg of dry air. [14M]
  
- 6 Describe the following psychrometric terms [2\*7=14M]
  - (a) Relative humidity
  - (b) Dry bulb temperature
  - (c) Wet bulb temperature
  - (d) Wet bulb depression
  - (e) Dew point temperature
  - (f) Dew point depression
  - (g) Saturated air
  
- 7 Describe the factors affecting the comfort in winter. [14M]
  
- 8 Explain the Classification of water piping system with neat diagram, [14M]

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Code No: R18A0326

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Mechanical Measurements and Instrumentation

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions  
All Questions carries equal marks.

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- 1 Describe in detail the different types of dynamic errors in a measurement system. [14M]
- 2 Classify the Transducers and explain about photoelectric transducers with neat sketch. [14M]
- 3 Explain thermistors and with sketches, describe the different forms of thermistors. [14M]
- 4 What is pyrometry? Briefly explain the theory of pyrometry. Mention the advantages and disadvantages of an optical pyrometer. [14M]
- 5 With neat sketch explain working of Rotameter and its advantages . [14M]
- 6 Classify Accelerometers and Differentiate Piezo-electric and seismic accelerometers. [14M]
- 7 Discuss the method of calibration of strain gauges. Enumerate advantages and applications of strain gauges. [14M]
- 8 Differentiate open loop and closed loop control systems and list out their merits . [14M]

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Code No: R18A0328

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY** **R18** **GY**  
(Autonomous Institution – UGC, Govt. of India)

**IV B.Tech I Semester Supplementary Examinations, Oct/Nov 2023**  
**Production and Operations Management**

(ME)

<b>Roll No</b>									
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**Time: 3 hours**

**Max. Marks: 70**

**Note:** This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1 *A* Distinguish between production management and operations management [7M]  
*B* Discuss the characteristics of job shop production, batch production, mass production, continuous or flow production. [7M]

OR

- 2 *A* Discuss a “production system model” with a diagram. Describe its elements such as inputs, conversion and control subsystems and outputs. [7M]  
*B* Explain what is meant by "organising to produce goods and services". Draw a typical organisational chart for a manufacturing and a service organisation [7M]

**SECTION-II**

- 3 *A* Define the objectives of maintenance management in a manufacturing organization. Discuss why maintenance is a crucial function for ensuring operational efficiency [7M]  
*B* Explain the concept of failure in the context of maintenance management. Describe the different types of failures and their implications for production operations. [7M]

OR

- 4 *A* A production line is required to produce three different products (X, Y, and Z) with setup times and processing times as follows: [7M]  
• Setup times (in minutes):  $X-Y = 15$ ,  $Y-Z = 10$ ,  $Z-X = 12$   
• Processing times (in minutes):  $X = 30$ ,  $Y = 25$ ,  $Z = 20$   
Determine the optimal sequence in which to produce these products to minimize the total production time  
*B* A manufacturing plant has a daily production capacity of 1,000 units. There are three workstations in the production process, each with different cycle times: Workstation 1 = 5 minutes, Workstation 2 = 4 minutes, Workstation 3 = 6 minutes. Determine if the production line is balanced and, if not, suggest a balanced configuration. [7M]

**SECTION-III**

- 5 *A* Differentiate between qualitative and quantitative forecasting methods. Provide examples of situations where each type of method is most appropriate. [7M]  
*B* Find the 4-quarter moving average of the following time series representing the quarterly production of coffee in an Indian state. [7M]



Production (in tones)				
Year	Quarter I	Quarter II	Quarter III	Quarter IV
1983	5	1	10	17
1984	7	1	10	16
1985	9	3	8	18
1986	5	2	15	19
1987	8	4	14	21

OR

- 6 *A* Compare time series analysis with other methods of forecasting? Briefly summarize the strength and weakness of various methods. [7M]
- B* A survey of used car sales in a city for the 10 year period 1976-85 has been made. A linear trend was fitted to the sales for month for each year and the equation was found to be  $Y = 400 + 18t$ , where  $t=0$  on January 1, 1981 and  $t$  is measured in 1/2 year (6 monthly) units [7M]
- a) use this trend to predict sales for June, 1990.
- b) If the actual sales in June, 1987 are 600 and the seasonal index for June sales is 1.20, what would be the relative cyclical, irregular index for June, 1987?

**SECTION-IV**

- 7 *A* Discuss an MRP system which helps management to monitor the performance of the inventory system [7M]
- B* Explain how Material Requirement Planning (MRP) and Enterprise Resource Planning (ERP) systems can be integrated to enhance operational efficiency and decision-making in manufacturing companies. [7M]

OR

- 8 *A* Define Resource Requirement Planning (RRP) and explain its significance in manufacturing operations. [7M]
- B* Discuss the role of Bill of Materials (BOM) in Material Requirement Planning (MRP) and how it is used in the computational procedure. [7M]

**SECTION-V**

- 9 *A* What are the advantages and disadvantages of centralised store room facilities? [7M]
- B* What do you understand by automated storage and retrieval? For what kinds of goods and in which companies in India do you think such systems would be appropriate? [7M]

OR

- 10 *A* What are the objectives of good store room layout? Explain [7M]
- B* Discuss the use of perpetual inventory record in both the closed and open stores systems. [7M]

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Code No: R18A0324

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **R18**  
(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, Oct/Nov 2023  
Automation and Control Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

1 A How do hydraulic systems contribute to automation? Provide examples of hydraulic applications in automation. [7M]

B Discuss the role of mechatronics in enhancing consumer electronics and smart home automation. [7M]

OR

2 A What is automation, and why is it important in modern manufacturing processes? [7M]

B How does electrical and electronics engineering contribute to the development of mechatronic systems? Give examples of electronic components used in mechatronics. [7M]

**SECTION-II**

3 A How do sensors measure velocity and motion in mechatronic systems? Provide examples. [7M]

B How do temperature sensors work, and what are their applications in mechatronics? [7M]

OR

4 A Differentiate between sensors and transducers, providing examples of each. [7M]

B Discuss the significance of liquid level sensors and their applications, especially in automation. [7M]

**SECTION-III**

5 A What are the key advantages and limitations of mechanical drive systems? [7M]

B Discuss the working principles of hydraulic actuators and their use in mechatronic systems. [7M]

OR

6 A Describe the key features and limitations of hydraulic drive systems. [7M]

B Discuss the working principles of pneumatic actuators and their use in mechatronic systems. [7M]

**SECTION-IV**

7 A Provide examples of real-world mechatronic systems that use a combination of different types of actuators. [7M]

B Compare and contrast the advantages and disadvantages of mechanical, electrical, hydraulic, and pneumatic actuators. [7M]

OR

**8**    *A*    Discuss the working principles of closed-loop (feedback) control systems and their significance in mechatronics.    **[7M]**

*B*    How is control system performance evaluated, and what are some common performance criteria?    **[7M]**

**SECTION-V**

**9**    *A*    Provide examples of real-world processes where P-I, PD, or P-I-D controllers are used for control and regulation.    **[7M]**

*B*    Describe the concept of automatic controllers and their role in maintaining desired process parameters.    **[7M]**

OR

**10**    *A*    Explain the concept of setpoint and feedback in process control, and their roles in achieving desired system behavior.    **[7M]**

*B*    Provide examples of industries and applications where advanced process control techniques are crucial for efficient operation.    **[7M]**

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Code No: R18A1205

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **R18**  
(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, Oct/Nov-23  
Artificial Intelligence

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1    *A*    Given a simple problem scenario, describe how you would structure an agent to solve it.    [7M]  
      *B*    Explain the key components of an agent-environment interaction in AI. How do sensors and actuators contribute to an agent's functioning?    [7M]
- OR
- 2    Assess the suitability of backtracking for solving constraint satisfaction problems Explain.    [14M]

**SECTION-II**

- 3    *A*    What is propositional logic, and how does it represent knowledge? Provide a basic example of a proposition.    [7M]  
      *B*    Describe the difference between forward chaining and backward chaining in the context of first-order logic reasoning.    [7M]
- OR
- 4    Create a simple Bayesian network to represent a medical diagnosis scenario involving multiple symptoms and diseases. Define conditional probabilities for the network.    [14M]

**SECTION-III**

- 5    *A*    Explain why knowledge representation issues, such as expressiveness and scalability, are critical considerations when designing AI systems. Provide examples to illustrate their importance.    [7M]  
      *B*    Analyze the differences between monotonic and non-monotonic reasoning in AI. Provide scenarios where each type of reasoning is more suitable.    [7M]
- OR
- 6    *A*    State Bayes' theorem and explain its significance in probabilistic reasoning.    [7M]  
      *B*    In a medical diagnosis context, how can Bayes' rule be applied to determine the likelihood of a disease given a positive test result?    [7M]

**SECTION-IV**

- 7    Analyze the significance of Winston's Learning Program in AI. How does it contribute to the development of intelligent systems, and what are its key components?    [14M]
- OR
- 8    Develop a decision tree for a real-world problem of your choice, such as classifying diseases based on symptoms. Explain the decision nodes and criteria used in your decision tree.    [14M]

**SECTION-V**

- 9**    *A*    Evaluate the significance of knowledge representation in the development of expert systems.    **[7M]**  
      *B*    Compare and contrast the knowledge acquisition process from human experts with knowledge elicitation techniques. What are the pros and cons of each approach?    **[7M]**

OR

- 10**   *A*    Explain the concept of knowledge representation in expert systems. How does an expert system organize and store domain-specific information?    **[7M]**  
      *B*    Use an expert system shell to design a basic knowledge base for a recommendation system, such as suggesting movies based on user preferences.    **[7M]**

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Code No: R18A0327

MALLA REDDY COLLEGE OF ENGINEERING & TECH R18 GY  
(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, Oct/Nov 2023  
Finite Element Analysis

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1    *A*    Discuss advantages, limitations and applications of FEM. [7M]  
      *B*    What do you understand by the assembly of 1 D bar elements and formulate the global stiffness matrix and global load vector. [7M]

OR

- 2    From the basic elasticity equations derive the stress strain relation matrices for both plane stress and plane strain conditions. [14M]

**SECTION-II**

- 3    Calculate nodal displacement and elemental stresses for the truss shown in figure 1. Take  $E=70$  GPa and cross-sectional area  $A=2$  cm<sup>2</sup> for all truss members. [14M]

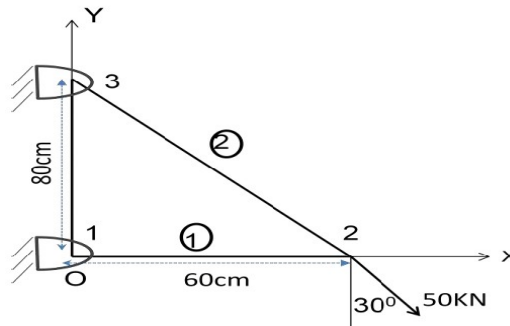


Figure 1

OR

- 4    Compute the slopes and deflections at C and D for the simply supported beam shown in figure 2. The section of the beam is 150 mm × 300 mm and having  $E = 30$  kN/mm<sup>2</sup>. [14M]

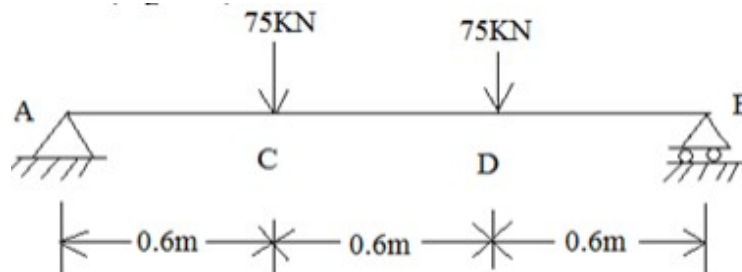


Figure 2

**SECTION-III**

- 5    Determine the stiffness matrix for the elements shown in Figure 3. Assume [14M]

plane strain conditions. Take  $E = 210 \text{ GPa}$ ,  $\nu = 0.3$  and  $t = 10 \text{ mm}$

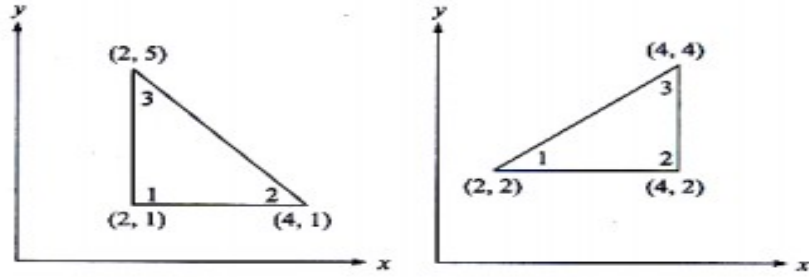


Figure 3

OR

- 6 *A* What are axi-symmetric elements and explain its applications. [7M]  
*B* Derive the strain displacement relation matrix for axi-symmetric triangular element from the first principle. [7M]

**SECTION-IV**

- 7 For the composite wall shown in figure 4, determine the interface [14M]  
 temperatures considering three elements.

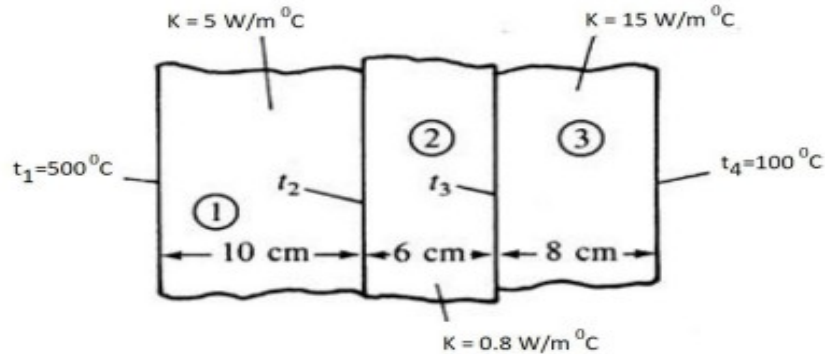


Figure 4

OR

- 8 *A* Derive the shape functions for four noded quadrilateral element using [7M]  
 isoparametric condition.  
*B* Discuss the Isoparametric, subparametric and super parametric elements. [7M]

**SECTION-V**

- 9 For the stepped bar shown in the figure 5. Develop the global [14M]  
 stiffness and mass matrices and also determine the natural  
 frequencies and mode shapes. Assume  $E = 200 \text{ GPa}$  and mass  
 density =  $7850 \text{ kg/m}^3$ ,  $L1 = L2 = 0.3 \text{ m}$ ,  $A1 = 350 \text{ mm}^2$ ,  $A2 = 600$   
 $\text{mm}^2$ .

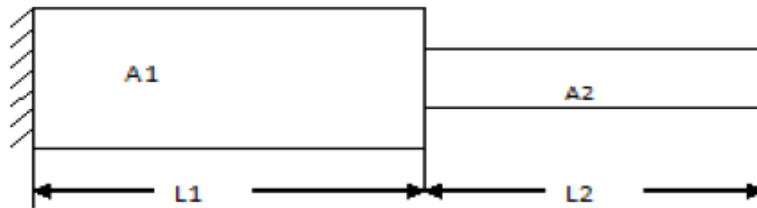


Figure 5

OR

- 10 Derive the consistent mass matrix for a four degree of freedom flexural beam [14M]  
 element.

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Code No: R18A0329

MALLA REDDY COLLEGE OF ENGINEERING & TECH R18 GY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, Oct/Nov 2023

Heating Ventilation and Air Conditioning

(ME)

<b>Roll No</b>										
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**Note: Refrigeration Tables and Psychrometric charts are permitted**

**SECTION-I**

- 1    *A*    What is the function of an evaporator in an HVAC system, and what are its various types?    [7M]
- B*    Describe the function and different types of condensers in refrigeration and air conditioning.    [7M]

OR

- 2    *A*    What are the key factors to consider when designing an HVAC system for a specific environment?    [7M]
- B*    Describe the fundamental components of an air-conditioning and refrigeration system.    [7M]

**SECTION-II**

- 3    *A*    Discuss the suitability of packaged A/C systems for commercial and industrial applications and their advantages in terms of ease of installation and maintenance.    [7M]
- B*    Discuss the advantages of VRV/VRF systems in terms of energy efficiency and zoning capabilities.    [7M]

OR

- 4    *A*    Discuss the advantages of ductable split A/C systems and the types of spaces they are suitable for.    [7M]
- B*    Explain the situations where non-ductable split A/C systems are commonly used.    [7M]

**SECTION-III**

- 5    An air conditioned hall is to be maintained at 27°C dry bulb temperature and 21°C wet bulb temperature. It has a sensible heat load of 46.5 kW and latent heat load of 17.5 kW. The air supplied from outside atmosphere at 38°C dry bulb temperature and 27°C wet bulb temperature is 25m<sup>3</sup> /min, directly into the room through ventilation and infiltration. Outside air to be conditioned is passed through the cooling coil whose apparatus dew point is 15°C. The quantity of re-circulated air from the hall is 60%. This quantity is mixed with the conditioned air after the cooling coil. Determine :    [14M]
1. condition of air after the coil and before the re-circulated air mixes with it;
  2. condition of air entering the hall, i.e. after mixing with re-circulated air;
  3. mass of fresh air entering the cooler;
  4. by-pass factor of the cooling coil: and

5. refrigerating load on the cooling coil.

OR

- 6** 39.6 m<sup>3</sup> /min of a mixture of re-circulated room air and outdoor air enters cooling coil at 31°C dry bulb temperature and 18.5°C wet bulb temperature. The effective surface temperature of the coil is 4.4°C. The surface area of the coil is such as would give 12.5 kW of refrigeration with the given entering air state. Determine the dry and wet bulb temperatures of the air leaving the coil and the by-pass factor. **[14M]**

**SECTION-IV**

- 7** *A* Explain about the u factor of wall,roof? **[7M]**  
*B* Explain ventilation requirements of IAQ? **[7M]**

OR

- 8** *A* Write steps to find ESHF. **[7M]**  
*B* Write about the steps in cooling load calculations? **[7M]**

**SECTION-V**

- 9** *A* Explain different types of fans & blowers? **[7M]**  
*B* Write about different types of valves used in HVAC piping system? **[7M]**

OR

- 10** *A* Explain the Classification of water piping system? **[7M]**  
*B* Discuss about the fittings used in HVAC piping System? **[7M]**

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(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, Oct/Nov 2023

Mechanical Measurements and Instrumentation

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

**Note:** This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

- 1 *A* State and explain basic principles and types of measurement systems. [7M]  
*B* What are the different types of errors observed while measurement? Explain each type of error with suitable examples [7M]

OR

- 2 *A* Discuss the Capacitance transducers with respect to their construction, working and characteristics. [7M]  
*B* Explain the piezo electric transducers for displacement measurement. [7M]

**SECTION-II**

- 3 *A* Describe the construction, working and theory of McLeod gauge for measurement of vacuum. [7M]  
*B* Compare and contrast the advantages and limitations of thermocouples and resistance thermometers. [7M]

OR

- 4 *A* With neat sketch explain the working principle of a bubbler gauge. [7M]  
*B* Explain the working of a total radiation pyrometer with a neat sketch. [7M]

**SECTION-III**

- 5 *A* What is hot wire anemometer? Briefly explain its working principle and construction details. [7M]  
*B* Explain the principle of working of vibrometer with neat sketch. [7M]

OR

- 6 *A* What is the mechanical tachometer? Explain with examples. Describe the disadvantages of mechanical tachometers. [7M]  
*B* Explain the working principle of non-contact type tachometer. [7M]

**SECTION-IV**

- 7 *A* Explain the measurement of humidity by dew point meter in detail. [7M]  
*B* With neat sketch explain the working principle of Absorption psychrometer. [7M]

OR

- 8 *A* How a Wheatstone bridge circuit is used for the measurement of strain. [7M]  
*B* Explain the working of a null balance Wheatstone bridge circuit. [7M]

**SECTION-V**

- 9 *A* Explain the constructional details of torsion meter. [7M]  
*B* Explain the working of temperature control system. [7M]

OR

- 10 *A* Describe open loop control system with suitable examples. State the advantages and limitations [7M]  
*B* Explain the applications of servomechanism. [7M]

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