Hall Ticket Number :										

R-19

Code: 19A37ET / 19A37LT

IV B.Tech. I Semester Regular Examinations Nov/Dec 2022

Non-Conventional Sources of Energy

(Common to ME & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.	a)	Explain the following terms related to Solar radiation Geometry: i) Altitude Angle ii) Declination Angle iii) Solar Azimuth angle	6M	CO1	L2
	b)	Explain the working of any one type of instrument used for the measurement of Global solar radiation.	8M	CO1	L2
		OR			
2.	a)	What are the advantages and limitations of renewable energy sources?	4M	CO1	L1
	b)	Derive an expression for total radiation on inclined surface.	10M	CO1	L3
		UNIT–II			
3.	a)	Enumerate and explain in brief the different types of concentrating type collectors.	7M	CO2	L2
	b)	Explain in detail about the passive Solar Space heating System.	7M	CO2	L2
		OR			
4.	a)	Explain the main components of a flat plate Solar collector with a neat diagram.	7M	CO2	L2
	b)	With the aid of a neat sketch, explain the working of a Solar pond.	7M	CO2	L2
		UNIT–III			
5.	a)	Discuss the various factors that affect the production of biogas.	7M	CO3	L2
	b)	Explain the constructional features of any one type of bio-gas plant.	7M	CO3	L2
		OR			
6.	a)	Describe the main considerations in selecting a site for wind generators.	6M	CO3	L2
	b)	Derive an expression for the maximum wind power that can be extracted using Betz criteria?	8M	CO3	L6
		UNIT–IV			
7.	a)	What are the merits and demerits of geothermal energy?	7M	CO4	L1
	b)	Explain the operation of an oscillating water type of wave device.	7M	CO4	L2
		OR			
8.	a)	Explain in detail about the Liquid dominated geothermal system.	7M	CO4	L2
	b)	Explain the working of an Ocean thermal energy conversion plant (OTEC) with a neat diagram.	7M	CO4	L2
		UNIT–V			
9.	a)	Explain liquid metal system of MHD power generation with a neat schematic.	8M	CO5	L2
	b)	Write short notes on the following: (i) Criterion for selection of material for thermo electric generators (ii) Carnot cycle	6M	CO5	L2
		OR			
10.	a)	Explain Peltier and Joule effects.	4M	CO5	L2
	b)	With the aid of a neat sketch explain the working of a thermoelectric power generator.	10M	CO5	L2

END

Hall Ticket Number :										

R-19

Code: 19A372T

IV B.Tech. I Semester Regular Examinations Nov/Dec 2022

Operations Research

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.	a)	Define Operations research.	4M	1	1
	b)	Solve the following Linear Programming Problem by Graphical method. Minimize $Z=20X_1 + 10X_2$ Subject to the conditions $X_1 + 2X_2 \leq 40$; $3X_1 + X_2 \geq 30$; $4X_1 + 3X_2 \geq 60$ and $X_1, X_2 \geq 0$	10M	1	3
		OR			
2.		Analyze the following LPP by Big M method. Maximize $Z=2X_1+ 3X_2$ Subject to the conditions $X_1 + X_2 \geq 2$; $X_1 + 2X_2 \leq 8$; $X_1, X_2 \geq 0$	14M	1	4
		UNIT–II			
3.		There are 4 plants A, B, C and D where planned productions per week are respectively 8, 7, 9 and 4 units. There are four warehouses 1, 2, 3 and 4 whose forecast requirements are respectively 10, 8, 9 and 1 units. The transportation costs from plant to warehouses are given in table (figures in Rupees). Find the optimal distribution pattern to the transportation model.	14M	2	3

		PLANTS			
		A	B	C	D
WARE HOUSES	1	10	8	10	8
	2	10	7	8	10
	3	11	9	9	7
	4	12	14	13	10

OR

4. Solve the assignment problem (allocate Jobs to the Persons) for minimum total cost. — 14M — CO 2 — BL 3

Persons ▼ Jobs ►	**J_1**	**J_2**	**J_3**	**J_4**
A	**20**	**25**	**22**	**28**
B	**15**	**18**	**23**	**17**
C	**19**	**17**	**21**	**24**
D	**25**	**23**	**24**	**24**

UNIT–III

5. For a particular type of light bulb, the following failure rates have been observed:

Week	1	2	3	4	5
% Failing by end of week	10	25	50	80	100

There are 1000 bulbs in use, and it costs Rs. 2 to replace an individual bulb that has burnt out. If all the bulbs were replaced simultaneously, it would cost 50ps per bulb. It is proposed to replace all the bulbs at fixed intervals, whether they have burnt out or not and to continue replacing burnt out bulbs as they fail. When should all the bulbs be replaced? 14M 3 1

OR

6. Solve the following (2 × 3) game graphically:

A	B			
		I	II	III
	I	1	3	11
	II	8	5	2

14M 3 3

UNIT–IV

7. Arrivals at a telephone booth are following Poisson law of distribution with an average time of 10 minutes between one arrival and the next. Length of a phone call is assumed to be distributed exponentially with mean of 3 minutes. What is the probability that a person arriving at the booth will have to wait? What is the system length? How many are the in the queue waiting for the service to take phone call? 14M 4 1

OR

8. a) Explain the phases of simulation. 7M 4 2

   b) How will you apply Simulation technique for solving Queuing problem? 7M 4 3

UNIT–V

9. A stockiest purchases an item at the rate of Rs. 40 per piece from a manufacturer. 2,000 units of the item are required per year. What should be the order quantity per order if the cost per order is Rs.15 and the inventory charges per year are 20 per cent? 14M 5 1

OR

10. Solve by Dynamic programming the following LPP:

    Maximize: $z = 4x_1 + 14x_2$

    Subject to: $2x_1 + 7x_2 \leq 21$; $7x_1 + 2x_2 \leq 21$; and $x_1, x_2 \geq 0$ 14M 5 3

END

Hall Ticket Number :										

R-19

Code: 19A37CT

IV B.Tech. I Semester Regular Examinations Nov/Dec 2022

Unconventional Machining Process

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.	a)	What are the various types of energy sources used in non-traditional machining techniques? Give examples for each.	7M	1	2
	b)	Enlist the requirement that demands the use of advanced machining process.	7M	1	3
		OR			
2.	a)	Explain the factors that should be considered during the selection of an appropriate unconventional machining process for a given job.	7M	1	2
	b)	Write the functions of slurry and oscillator in USM.	7M	1	3
		UNIT–II			
3.	a)	Discuss in detail about the AJM process variables that influence the rate of material removal and accuracy in the machining.	7M	2	3
	b)	State the benefits of Water Jet Machining process	7M	2	3
		OR			
4.	a)	Express the desirable properties of carrier gas in AJM?	7M	2	2
	b)	Demonstrate, why reuse of abrasives is not recommended in abrasive jet machining process?	7M	2	3
		UNIT–III			
5.	a)	Briefly discuss about the effect of high temperature and pressure of electrolyte on the ECM process.	7M	3	2
	b)	Explain the principle of ECG with sketch.	7M	3	2
		OR			
6.	a)	What are the materials used for tools in ECM?	7M	3	3
	b)	Explain the electro-chemical Honing process with a neat sketch.	7M	3	2
		UNIT–IV			
7.	a)	What are the basic requirements of tool materials in EDM process? Name any four tool materials with their specific applications.	7M	4	2
	b)	With a neat sketch, describe the mechanism of material removal in EDM.	7M	4	3
		OR			
8.	a)	What are functions of dielectric fluid used in EDM?	7M	4	2
	b)	With the help of a neat sketch, explain the working of wire EDM.	7M	4	2
		UNIT–V			
9.	a)	Discuss the process parameters of EBM and their influence on machining quality.	7M	5	3
	b)	List out the advantages and limitations of LBM process.	7M	5	3
		OR			
10.	a)	Discuss the advantages of using plasma machining.	7M	5	2
	b)	Explain non-transferred and transferred modes of Plasma arc.	7M	5	2

END

Hall Ticket Number :											R-19

Code: 19A371T

IV B.Tech. I Semester Regular Examinations Nov/Dec 2022

CAD/CAM

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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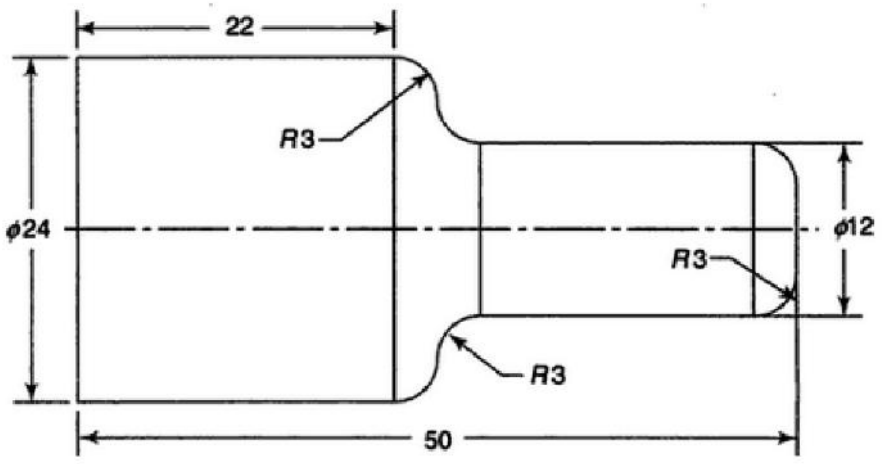
			Marks	CO	BL
		UNIT–I			
1.	a)	Differentiate stroke writing and raster scan approaches.	7M	1	1 & 2
	b)	Articulate transformation matrices when an object is: (i) Translated about X-axis by 2 units and Y-axis by 3 units (ii) Rotated about X-axis	7M	1	1 & 2
		OR			
2.	a)	Discuss in detail the database structure used in computer graphics modeling.	10M	1	1 & 2
	b)	List the benefits of CAD/CAM.	4M	1	1 & 2
		UNIT–II			
3.		The coordinates of four control points relative to a curve are given by P1 (3,3,0) P2 (3,,5,0) P3 (5,5,0) and P4 (5,3,0). Solve to find the equation of a Bezier curve. Also find the points on curve at u=0, 0.5 and 1.	14M	2	2
		OR			
4.	a)	Differentiate wireframe and solid modeling.	6M	2	2
	b)	Explain the B-rep and CSG approaches of solid modeling?	8M	2	2
		UNIT–III			
5.		Write a part program for the object shown in the figure below. All the dimensions are in mm. R3 = 2 mm  	14M	3	3

OR

6.	a)	Discuss the features of a CNC machining center.	6M	3	3
	b)	List out any five G and M codes along with their functions.	8M	3	3

UNIT–IV

7.	a)	Discuss the MICLASS system of codification.	7M	4	3
	b)	Explain the principal components of Flexible Manufacturing Systems.	7M	4	3

OR

8.	a)	Discuss various attributes of guidance and AGV systems.	7M	4	3
	b)	Explain the role of human labour in manufacturing system.	7M	4	3

UNIT–V

9.	a)	Write a note on computer aided testing.	6M	5	4
	b)	State the objectives of computer aided quality control. Also discuss about elements of machine vision systems.	8M	5	4

OR

10.	a)	State the benefits of Computer Integrated Manufacturing in industry.	7M	5	4
	b)	Discuss about Just-in-Time approach.	7M	5	4

END

Hall Ticket Number :											R-19

Code: 19A37BT

IV B.Tech. I Semester Regular Examinations Nov/Dec 2022

Finite Element Methods

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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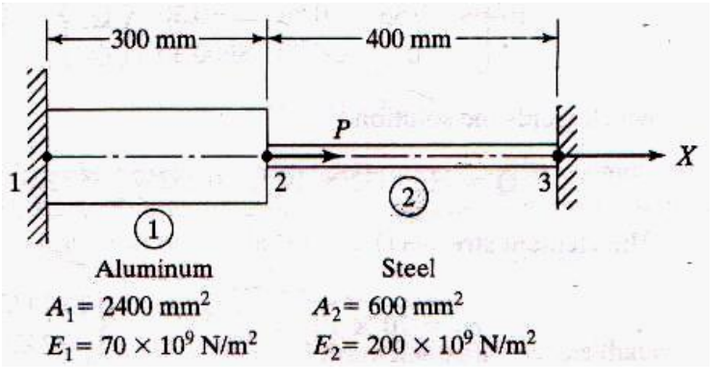
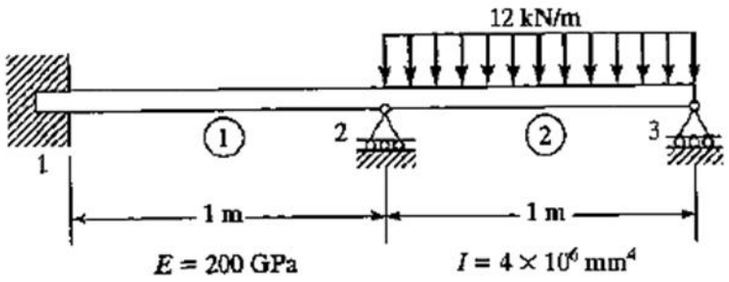
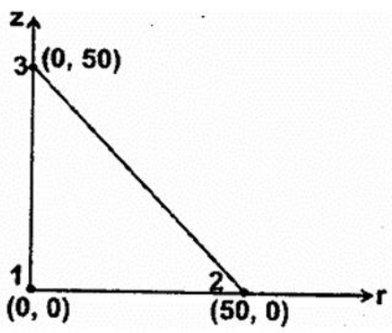
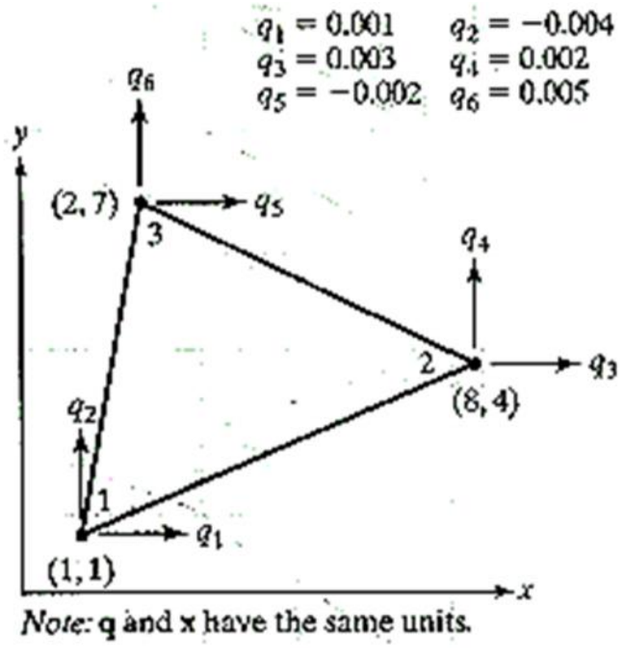
			Marks	CO	BL
		UNIT–I			
1.	a)	Briefly explain the concept of FEM and also describe the general steps of finite element method.	7M	1	1
	b)	Derive equations of equilibrium in case of three-dimensional body subjected to body force and traction.	7M	1	2
		OR			
2.		A stepped bar is subjected to an axial load of P = 200 kN at the place of change of cross section as shown in figure. Find (i) the nodal displacements (ii) the reaction forces (iii) the induced stresses in each material. 	14M	1	3
		UNIT–II			
3.		Explain the role of transformation matrix in truss and derive stiffness matrix of truss element.	14M	2	2
		OR			
4.		A continuous beam subjected to loading as shown in figure. Determine i) the slopes at nodes 2 and 3 and ii) the vertical deflection at the midpoint of the distributed load. 	14M	2	3
		UNIT–III			
5.		Determine the stiffness matrix for the axisymmetric element shown in figure. Take E = 2.1x10^5 MN/m^2 and ν = 0.25. The coordinates are in mm. 	14M	3	3
		OR			

6. a) Derive the shape functions for CST element. 4M 3 2

   b) Obtain the strain-displacement relation matrix and determine the strains ε_x, ε_y and γ_{xy} for the triangular element shown in figure.



Note: q and x have the same units. 10M 3 3

UNIT–IV

7. a) Briefly explain iso-parametric, sub-parametric and super- parametric elements. 7M 4 2

   b) Evaluate the integral $I = \int\int (2x^2+3xy+4y^2)dxdy$ in the limits of –1 to +1 using Gauss quadrature numerical integration. 7M 4 3

OR

8. A uniform aluminum circular fin of diameter 0.8 cm and 6 cm length is extruded from the surface whose temperature is 100 °C. The convection takes place from the lateral surface and tip of the fin. Assuming k = 20 W/mK, h = 100 W/m^{2}K and T_∞ = 20°C, determine the temperature distribution in the fin using three element idealization. 14M 4 3

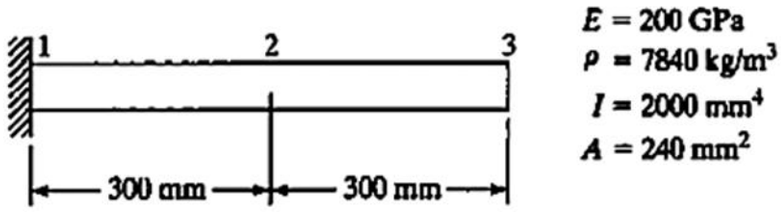
UNIT–V

9. a) Derive the mass matrix for bar element. 7M 5 2

   b) Write the FEM procedure in finding the Eigen values and Eigen vectors. 7M 5 1

OR

10. Evaluate the lowest Eigen value and the corresponding Eigen mode for the beam shown in figure.



14M 5 4

****END***