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CODE: 19MOE1002
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. II Semester Regular & Supplementary Examinations, August-2022
OPERATIONSRESEARCH
(Open Elective)

Time: 3 Hours **Max Marks:60**

Answer any FIVE questions
All questions carry EQUAL marks

1. Solve the following linear programming problem using Simplex Method to **[12 M]**

   Maximize $Z = 3x_1 + 4x_2 + x_3$

   Subject to:

   $$x_1 + 2x_2 + x_3 \le 6$$

   $$2x_1 + 2x_3 \le 4$$

   $$3x_1 + x_2 + x_3 \le 9$$

   $$x_1, x_2, x_3 \ge 0$$

2. Solve Graphically **[12 M]**

   Minimize $Z = 2x_1 + x_2$
   Subject to: $x_1 + x_2 \ge 1$
   $x_1 + 2x_2 \le 10$
   $x_2 \le 4$
   $x_1, x_2 \ge 0$

3. A company has three plants A,B,C and three ware houses X,Y,Z Number of units available at the plant is 10,15,40 respectively. Demand at X,Y,Z are 20,15,30 respectively. Transportation cost per unit in rupees is given in the following table. Find the optimum cost of transportation using MODI method. **[12 M]**

	X	Y	Z	Available
A	5	1	8	10
B	9	4	0	15
C	17	6	7	40
Required	20	15	30	

4. ACompanyhasfour machines are available to do four different jobs time in hours that each machine take to do each job is known and given the following table..Determine the assignment of machine to jobs that will minimize the total time.

Jobs

Machines

	J₁	J₂	J₃	J₄
M₁	18	26	17	11
M₂	13	28	14	26
M₃	38	19	18	15
M₄	19	26	24	10

5. (a) Explain the characteristics of queuing theory?   **[4+8 M]**
   (b) A department store has only one cashier. During the rush hours customer arrives at a rate of 20 customers per hour. The average number of customers that can be handled by the casher is 24 customers per hour. Assume that the condition for use of the single channel queuing model determine (a) Utilization parameter (or) Traffic intensity (b) Average number of customers in the quee.(c) Average number of customers in the system (d) Average time a customer spend in the quee (e) Average number of customer spend in the system

6. Solve the following game and find the value of the game   **[12 M]**

		Player-B	
		B₁	B₂
	A₁	0	5
Player-A	A₂	-2	4
	A₃	2	-3

7. Construct the network diagram for the following data. Calculate (a) Critical path (b) Project completion time (c) Total float (d) Free float   **[12 M]**

Activity	Duration (Days)
1-2	2
1-3	5
1-4	4
3-4	5
2-5	7
2-6	3
3-6	3
4-6	6
4-7	2
5-8	5
6-8	4
6-9	3
7-9	12
8-9	8

8. Discuss Khun-Tucker conditions to solve a non linear programming problem **[12 M]**

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**I M.Tech II Semester Supplementary Examinations, August-2022**

COMPOSITE MATERIALS
(Common to All Branches)

Time: 3 Hours   Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1	a)	Explain the Function of the matrix in fiber reinforced composite?	6M
	b)	Explain in detailed the list of Factors that control the properties of fibers	6M
2	a)	Discuss types of glass fibre. Write advantages and disadvantages of glass fibres	6M
	b)	Explain in detail the Potential use of natural fiber composite materials in India	6M
3	a)	Write a short note on Aramid Fiber-Reinforced Polymer Composites with Schematic representation of repeat unit and chain structures for aramid (Kevlar) fibers.	6M
	b)	Name the different types of bonds that may form at the fibre matrix interface	6M
4	a)	Name the different methods employed for fabrication of MMCs and explain anyone method with a neat sketch	8M
	b)	Explain Characteristics and design considerations of MMCs	4M
5	a)	Explain sol-gel processing of CMCs with the help of flow sheet	8M
	b)	Distinguish between monolithic and ceramic composites?	4M
6	a)	What is a prepreg? Explain with a neat sketch. Explain the different techniques of making prepregs?	8M
	b)	Difference between Thermo plastic and Thermosetting Plastic polymer	4M
7	a)	Write a short note on PEEK matrix composite with applications?	6M
	b)	How the environmental effects by using polymer matrix composites and how to recycle the PMCs.	6M
8	a)	A unidirectional composite lamina is subjected to stresses as shown in Fig. It has the allowable tensile stress of 750 MPa in the fiber direction and 50 MPa in the fiber transverse direction and the allowable compressive stress of 400 MPa in the fiber direction and 100 MPa in the fiber transverse direction. The allowable shear stress is 50 MPa. Determine whether, the lamina will fail under the applied stresses using the maximum-stress theory.	8M
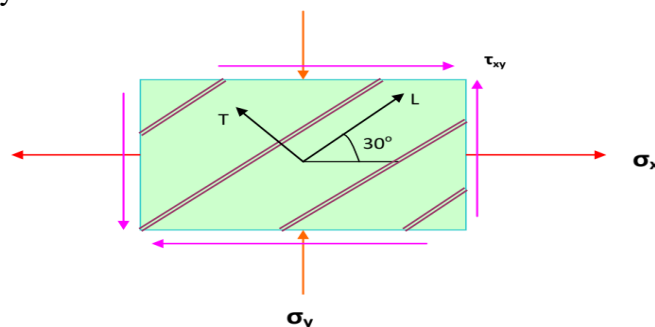
	b)	The E-glass fibre in a polyester resin is 35% by weight. If $\rho_f = 250\ gm/ml$ and $\rho_m = 1$ gm/ml. Calculate V_f and ρ_c for lamina.	4M