

[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
(2123)

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M. Tech 1st Semester Examination
Computer Oriented Optimization Method
CSE1-513/MT-103

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all, selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in section E.

SECTION - A

1. (a) Define operation research (give any two definitions). Discuss briefly the uses and limitations of optimization methods.
(b) A manufacturer of packing material manufactures two type of packing tins; round and flat. Major production facilities involved are cutting and joining. The cutting department can process 300 round tins or 500 flat tins per hour. The joining department can process 500 round tins or 300 flat tins per hour. The profit for a round tin is Rs. 20 and for a flat tin is Rs 30. Formulate the problem as LPP. Using graphical method, determine optimum production level of above problem. **(20)**

2. (a) Use simplex algorithm to solve the following LPP

$$\text{Maximize } z = 50x_1 + 100x_2$$

$$\text{Subject to: } 10x_1 + 5x_2 \leq 2500,$$

$$4x_1 + 10x_2 \leq 2000,$$

$$2x_1 + 3x_2 \leq 900,$$

$$x_1, x_2, \geq 0.$$

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[P.T.O.]

- (b) Use Big-M method to solve

Maximize $z = 6x_1 - 2x_2 + 3x_3$

Subject to:

$$2x_1 + 2x_2 - x_3 \geq 2, 5x_1 + 2x_2 + 6x_3 \leq 10, 2x_1 + 3x_2 - 3x_3 = 6,$$

$$x_1, x_2 \geq 0. \quad (20)$$

SECTION - B

3. (a) What is duality? State fundamental theorem of duality. Write the dual of following LPP.

Maximize $z = 6x_1 - 2x_2 + 3x_3$

Subject to:

$$2x_1 + 2x_2 - x_3 \leq 2, 5x_1 + 2x_2 + 6x_3 \geq 10, 2x_1 + 3x_2 - 3x_3 = 6,$$

$$x_1, x_2 \geq 0.$$

- (b) Use revised simplex method to solve

Maximize $z = 6x_1 - 2x_2 + 3x_3$

Subject to:

$$2x_1 - x_2 + 2x_3 \leq 2, x_1 + 4x_3 \leq 4, x_1, x_2, x_3 \geq 0. \quad (20)$$

4. The following table gives data on normal time and cash, crash time and cost for a project

Activity	Normal		Crash	
	Time (weeks)	Cost(Rs)	Time(weeks)	Cost(Rs)
1-2	3	300	2	400
2-3	3	30	3	30
2-5	7	420	5	580
2-5	9	720	7	810
3-5	5	250	4	300
4-5	0	0	0	0
5-6	6	320	4	410
6-7	4	400	3	470
6-8	13	780	10	900
7-8	10	1000	9	1200

Indirect cost is Rs 50 per week

- (a) Draw network diagram for the project and identify the critical path.

- (b) What are normal project duration and associated cost.
 (c) Find out total float associated with each activity.
 (d) Crash the relevant activities systematically and determine the optimal project completion time and cost. **(20)**

SECTION - C

5. Explain degeneracy in transportation problem and its resolution. Hence find the shipping schedule to be used to minimize the shipping cost in following problem. Goods have to be transported from three sources to three destinations. The per unit transportation, capacities of sources and requirement of destinations are as given below

Destinations \longrightarrow

	D ₁	D ₂	D ₃	Supply
Source S ₁	8	5	6	120
S ₂	15	10	12	80
S ₃	3	9	10	80
Demand	150	80	50	

Determine transportation so that cost is minimized. **(20)**

6. Discuss assignment problem and explain it is different from transportation problem.

A solicitors firm employs typists on hourly piece -rate basis for their daily work. There are five typist and their charges and speed is different. According to earlier understanding only one job is given to one typist and typist is paid for full hour even if he works for a fraction of an hour. Find the least cost allocation for following data (explain each step involved)

Typist	Rate per Hour (Rs)	No of pages Typed/hour	Job	No. of Pages
A	5	12	P	199
B	6	14	Q	175
C	3	8	R	145
D	4	10	S	298
E	4	11	T	178 (20)

[P.T.O.]

SECTION - D

7. (a) Explain the following
- Payoff matrix
 - Pure and mixed strategies, the difference between the two
- (b) Payoff matrix of a game is as below. Solve it

Player B

Player A	B ₁	B ₂	B ₃	B ₄
A ₁	3	2	4	0
A ₂	3	4	2	4
A ₃	4	2	4	0
A ₄	0	4	0	8

(20)

8. (a) What are the major limitations and what are main assumptions of game theory?
- (b) Taking suitable example explain clearly the different costs that are involved in inventory problem. **(20)**

SECTION - E

9. (a) Explain AON Network and Dummy Activities
- (b) What do you mean by TVC?
- (c) Explain slack and surplus variables.
- (d) Unbounded variable
- (e) Explain briefly Vogel approximation method.
- (f) Saddle point in game theory
- (g) Critical path
- (h) Explain 'M' in Big M method
- (i) Merge and Burst Event
- (j) Duality principal. **(2×10=20)**