PAPER ID-410770

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MCA
(SEM. III) THEORY EXAMINATION 2021-22
COMPUTER BASED OPTIMIZATION TECHNIQUES

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Define Inventory. What are the various types of Inventory?
b.	What is duality? Explain with suitable example.
c.	What do you mean by feasible solution?
d.	Show that assignment model is a special case of Transportation problem?
e.	How an assignment problem can be solved?
f.	Write Kuhn-Tucker condition.
g.	Explain Dynamic Programming problem.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	Explain Group replacement of items that fail completely in detail.
b.	Solve LPP by Graphical method: Minimize $Z = 6X_1 + 14X_2$ s.to. $5X_1 + 4X_2 \geq 60$ $3X_1 + 7X_2 \leq 84$ $X_1 + 2X_2 \geq 18$ where as $X_1, X_2 \geq 0$
c.	Explain various steps in Vogel's approximation method for finding initial basic feasible solution of the transportation problem.
d.	Use dynamic programming to solve the following L.P.P: Max. $Z = 3x_1 + 5x_2$ s.t. $x_1 \leq 4$ $x_2 \leq 6$ $3x_1 + x_2 \leq 18$ where as $x_1, x_2 \geq 0$
e.	Explain the main characteristics and steady state of queuing system. Also explain the Erlang Distribution.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain EOQ model. What are the practical limitations on the EOQ formula.
(b)	A taxi owner estimates from his past record that the cost per year for operating a taxi whose purchase price when new is Rs. 60,000 are as given below:

Year	1	2	3	4	5
Operating Cost	10,000	12,000	15,000	18,000	20,000

From 6^{th} year the operating cost = 6000K, where K = 6,7,8,9,10 (K = age in years). If the resale value decreases by 10% of purchase price each year what is the best replacement policy ? Cost of money is zero.

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4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Solve the following LPP : Max. $Z = X_1 + 2X_2 + 3X_3$ s.to. $X_1 - X_2 + X_3 \geq 4$ $X_1 + X_2 + 2X_3 \leq 8$ $X_1 - X_3 \geq 2$ where as $X_1, X_2, X_3 \geq 0$
(b)	Discuss the ways to identify the following situations while solving LPP – i) Infeasible problem ii) Unbounded problem iii) Degenerate problem

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Distinguish between integer programming problem and linear programming problem and write the steps of branch-bound method for solving integer programming problem.
(b)	Consider the following problem of assigning five jobs to five persons, The assignment costs are given as follows:

		Job				
		I	II	III	IV	V
Person	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

Determine the optimum assignment schedule and minimum cost.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Find the necessary conditions for the following non-linear programming problem : Min. $Z = 2x_1^2 - 24x_1 + 2x_2^2 - 8x_2 + 2x_3^2 - 12x_3 + 200$ s.t. $x_1 + x_2 + x_3 = 11$ where as $x_1, x_2, x_3 \geq 0$
(b)	State Bellman's principle of optimality in Dynamic Programming. Also write dynamic programming algorithm to solve a multi-stage decision problem.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	What do you understand by a queue? Give some important applications of queue.
(b)	Explain and derive (M/M/I):(∞/FCFS): Birth and Death queuing model.

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