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07MCA25

Second Semester MCA Degree Examination, June 2012
Operations Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. What is OR? Discuss the factors responsible for growth of OR. Mention assumptions made in LPP. **(10 Marks)**

b. A firm uses milling machines, grinding machines and lathes to produce two motor parts. The machine time required for each part, the machine time available on different machines and the profit on each motor part are given below:

Type of machine	Machining time required for motor part		Maximum time available per week (minutes)
	I	II	
Milling machine	10	4	2000
Grinding	3	2	900
Lathe	6	12	3000
Profit/unit (Rs.)	100	40	

Determine graphically the number of parts of I and II to be manufactured per week to maximize the profit. Comment on the solution obtained. **(10 Marks)**

2 a. Define slack variable and surplus variable. List all the steps of simplex method to find an optimal solution of LPP. **(10 Marks)**

b. Maximize $z = 107x_1 + x_2 + 2x_3$

Subject to constraints, $14x_1 + x_2 - 6x_3 + 3x_4 = 7$

$16x_1 + \frac{1}{2} x_2 - 6x_3 \leq 5$

$-3x_1 - x_2 - x_3 \leq 0$

$x_1, x_2, x_3, x_4 \geq 0$ **(10 Marks)**

3 a. Find the basic feasible solution of the system by finding basic and non-basic variables:

$2x_1 + x_2 + 4x_3 = 11$

$3x_1 + x_2 + 5x_3 = 14$ **(06 Marks)**

b. Use two phase method to minimize $z = 7.5x_1 - 3x_2$

Subject to conditions, $3x_1 - x_2 - x_3 \geq 3$

$x_1 - x_2 + x_3 \geq 2$

$x_1, x_2, x_3 \geq 0$ **(14 Marks)**

4 a. Write the working procedure to find the optimal solution of LPP by dual simplex method. **(10 Marks)**

b. Find an optimal solution by dual simplex method.

Maximize $-3x_1 - 2x_2$

Subject to constraints, $x_1 + x_2 \geq 1$

$x_1 + x_2 \leq 7$

$x_1 + 2x_2 \geq 10$

$x_2 \leq 3$; $x_1 \geq 0$; $x_2 \geq 0$ **(10 Marks)**

5 a. Solve by revised simplex method.

Maximize $z = 5x_1 + 3x_2$

Subject to constraints, $x_1 + 2x_2 \leq 2$

$5x_1 + 2x_2 \leq 10$

$3x_1 + 8x_2 \leq 12$; $x_1, x_2 \geq 0$ **(10 Marks)**

b. Find an optimal solution by Big M method.
Maximize $z = 3x_1 + 2x_2$
Subject to constraints, $2x_1 + x_2 \leq 2$
$3x_1 + 4x_2 \geq 12$
$x_1 , x_2 \geq 0$ **(10 Marks)**

6 a. Find the Initial basic feasible solution by
i) Northwest corner rule
ii) Least cost method (Inspection method)
iii) VAM for the cost matrix given below:

	D_1	D_2	D_3	D_4	Supply
O_1	2	3	11	7	6
O_2	1	0	6	1	1
O_3	5	8	15	9	7
Demand	7	5	3	2	

If the objective is to minimize the total transportation cost, suggest the appropriate method to find initial solution. **(10 Marks)**

b. Find the optimal solution using VAM and MODI method.

Source	Destination						
	D_1	D_2	D_3	D_4	D_5	D_6	
O_1	9	12	9	6	9	10	5
O_2	7	3	7	7	5	5	6
O_3	6	5	9	11	3	11	2
O_4	6	8	11	2	2	10	9
	4	4	6	2	4	2	

(10 Marks)

7 a. A company has 4 machines to do 3 jobs. Each job can be assigned to one and only machine. The cost of each job on each machine is given below. Determine the job assignments which will minimize the total cost. **(10 Marks)**

		Machine			
		W	X	Y	Z
Job	A	18	24	28	32
	B	8	13	17	18
	C	10	15	19	22

b. Define: i) Strategy ii) Saddle point. What do you mean by two-person zero sum game? List the characteristics of two-person zero sum game. **(10 Marks)**

8 a. Solve the following game by graphical method:

$$\text{Player A} \begin{pmatrix} 3 & -3 & 4 \\ -1 & 1 & -3 \end{pmatrix} \quad \text{Player B}$$

(10 Marks)

b. What is meta heuristics? Discuss most prominent types of meta heuristics. **(10 Marks)**

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