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Sixth Semester B.E. Degree Examination, December 2010
Operations Research

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions,
selecting at least TWO questions from each part.
2. Missing data, if any, may be suitably assumed.

PART - A

- 1 a. What is operations research? Explain the six phases of a study. (07 Marks)
- b. Use the graphical method to solve the problem :
 Maximise $Z = 10x_1 + 20x_2$
 Subject to $-x_1 + 2x_2 \leq 15$
 $x_1 + x_2 \leq 12$
 $5x_1 + 3x_2 \leq 45$
 and $x_1, x_2 \geq 0$. (07 Marks)
- c. Explain the linear programming model. (06 Marks)
- 2 a. Explain the steps needed to find feasible solution using simplex method. (06 Marks)
- b. Work through the simplex method step by step to solve the following problem :
 Minimize $Z = x_1 - 3x_2 + 3x_3$
 Subject to $3x_1 - x_2 + 2x_3 \leq 7$
 $2x_1 + 4x_2 \geq -12$
 $-4x_1 + 3x_2 + 8x_3 \leq 10$
 and $x_1, x_2, x_3 \geq 0$. (14 Marks)
- 3 a. Solve, by using Big - M method, the following linear programming problem :
 Maximise $Z = -2x_1 - x_2$
 Subject to $3x_1 + x_2 = 3$
 $4x_1 + 3x_2 \geq 6$
 $x_1 + 2x_2 \leq 4$
 and $x_1, x_2 \geq 0$. (07 Marks)
- b. Use two-phase method to solve the problem :
 Minimize $Z = 0.4x_1 + 0.5x_2$
 Subject to $0.3x_1 + 0.1x_2 \leq 2.7$
 $0.5x_1 + 0.5x_2 = 6$
 $0.6x_1 + 0.4x_2 \geq 6$
 and $x_1, x_2 \geq 0$. (13 Marks)
- 4 a. Apply revised simplex method to solve the following problem :
 Maximise $Z = 6x_1 - 2x_2 + 3x_3$
 Subject to $2x_1 - x_2 + 2x_3 \leq 2$
 $x_1 + 4x_3 \leq 4$
 and $x_1, x_2, x_3 \geq 0$. (14 Marks)
- b. Explain :
 i) Weak duality property
 ii) Strong duality property
 iii) Complementary solutions property. (06 Marks)

PART – B

- 5 a. Explain the key relationships between primal and dual problems. (06 Marks)
 b. Solve the following problem by dual simplex method.

$$\text{Minimise } Z = 2x_1 + x_2$$

$$\text{Subject to } 3x_1 + x_2 \geq 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \geq 3$$

$$\text{and } x_1, x_2 \geq 0.$$

(14 Marks)

- 6 a. Write different steps in Hungarian algorithm to solve an assignment problem. (08 Marks)
 b. Find the initial basic feasible solution of transportation problem where cost – matrix is given below :

		Destination				Supply
		A	B	C	D	
Origin	I	1	5	3	3	34
	II	3	3	1	2	15
	III	0	2	2	3	12
	IV	2	7	2	4	19
Demand		21	25	17	17	

(12 Marks)

- 7 a. Explain the various variations in solving games, with examples. (08 Marks)
 b. Solve the game whose payoff matrix to the player A is given below :

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	5	2	6

(12 Marks)

- 8 Explain briefly :
 a. Decision trees
 b. Tabu search algorithm
 c. Genetic algorithm
 d. Metaheuristics.

(20 Marks)
