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10CS/IS661

Sixth Semester B.E. Degree Examination, June/July 2015**Operations Research**

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Define : i) Feasible solution ii) Feasible region iii) Optimal solution. (06 Marks)
b. A manufacturer produces three models I, II, III of certain product using raw materials A and B. The following table gives the data for the problem.

Raw material	Requirement per unit			Availability
	I	II	III	
A	2	3	5	4000
B	4	2	7	6000
Minimum Demand	200	200	150	-
Profit per unit (Rs)	30	20	50	-

Formulate the problem as a linear program model.

(07 Marks)

- c. Using graphical method solve the LPP

Maximize $Z = 5x_1 + 4x_2$

Subject to $6x_1 + 4x_2 \leq 24$

$x_1 + 2x_2 \leq 6$

$-x_1 + x_2 \leq 1$

$x_2 \leq 2, x_1, x_2 \geq 0$

(07 Marks)

- 2 a. Define slack variable and surplus variable. (04 Marks)

- b. Solve the following LPP by simplex method :

Maximize $z = 6x_1 + 8x_2$

Subject to $2x_1 + 8x_2 \leq 16$

$2x_1 + 4x_2 \leq 8$

$x_1, x_2 \geq 0$

(10 Marks)

- c. Explain the following :

i) A standard form of the LPP

ii) Basic solution of a LPP

iii) Degeneracy and un bounded solution with respect to simplex methods. (06 Marks)

- 3 a. Solve the following LPP by Charne's big M method

Maximize $z = 20x_1 + 10x_2$

Subject to : $x_1 + x_2 = 150$

$x_1 \leq 40$

$x_2 \geq 20$

where $x_1, x_2 \geq 0$

(15 Marks)

- b. Write procedure to solve LPP of two phase simplex method. (05 Marks)

- 4 a. Explain the computational procedure of revised simplex method in standard form. (10 Marks)

- b. Explain the following:

i) Weak duality property

ii) Strong duality property

iii) Complementary solutions property

iv) Complementary optimal solution property.

(10 Marks)

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.



PART - B

5 a. User dual simplex method and solve the following LPP:

Maximize $z = 3x_1 + x_2$

Subject to : $x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$

$x_1, x_2 \geq 0$

(10 Marks)

b. Explain the role of duality theory in sensitivity analysis. (05 Marks)

c. Write any five key relationships between the primal and the dual problems. (05 Marks)

6 a. Find an initial solution to the following transportation problem using VAM

		Destination					
		D ₁	D ₂	D ₃	D ₄	D ₅	
Origin	O ₁	7	6	4	5	9	40
	O ₂	8	5	6	7	8	30
	O ₃	6	8	9	6	5	20
	O ₄	5	2	7	8	6	10
		30	30	15	20	5	
		Demand					

(10 Marks)

b. Solve the following assignment problem

		Jobs				
		J ₁	J ₂	J ₃	J ₄	J ₅
Machine	M ₁	11	17	8	16	20
	M ₂	9	7	12	6	15
	M ₃	13	16	15	12	16
	M ₄	21	24	17	28	26
	M ₅	14	10	12	11	15

(10 Marks)

7 a. Define the following with respect to games

i) Pay – off

ii) Zero – sum game

iii) Saddle point

(03 Marks)

b. Solve the following game graphically

		Player B		
		B ₁	B ₂	B ₃
Player A	A ₁	2	6	22
	A ₂	16	10	24

(07 Marks)

c. Solve the following game:

		B			
		I	II	III	IV
A	1	20	15	12	35
	2	25	14	8	10
	3	40	2	19	5
	4	5	4	11	0

(10 Marks)

8 a. Write the outline of a basic table search algorithm. Explain it with the help of a minimum spanning tree problem with constraints. (10 Marks)

b. Write short notes on : i) simulated annealing ii) Genetic algorithms. (10 Marks)
