

USN

--	--	--	--	--	--	--	--	--	--

06CS/IS661

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Operations Research

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.**PART - A**

- 1 a. Mention six phases of an Operation Research study. Write any two applications of Operation Research. (05 Marks)
- b. Formulate a linear programming model for the problem given below. A firm can produce 3 types of cloths. Three kinds of wool are required for it, say red, green and blue wool. One unit length of type A cloth needs 2 meters of red wool and 3 meters of blue wool. One unit length of type B cloth needs 3 meters of red wool, 2 meters of green wool and 2 meters of blue wool. One unit length of type C cloth needs 5 meters of green wool and 4 meters of blue wool. The firm has only a stock of 8 meters of red wool, 10 meters of green wool and 15 meters of blue wool. It is assumed that the income obtained from one unit length of type A cloth is Rs 3, of type B is Rs 5 and of type C is Rs 4. (05 Marks)
- c. With an example, define the following terms for a LP model : i) Feasible solution ii) Infeasible solution iii) Optimal solution iv) Feasible region v) CPF solution. (05 Marks)
- d. Using graphical method, solve the following LPP.
 Maximize $Z = 2x_1 + x_2$
 Subject to $x_2 \leq 10$
 $2x_1 + 5x_2 \leq 60$
 $x_1 + x_2 \leq 18$
 $3x_1 + x_2 \leq 44$
 $x_1 \geq 0, x_2 \geq 0.$ (05 Marks)
- 2 a. Write four assumptions of Linear programming. (04 Marks)
- b. Solve the following LPP using Simplex method in tabular form
 Maximize $Z = 4x_1 + 3x_2 + 6x_3$
 Subject to $3x_1 + x_2 + 3x_3 \leq 30$
 $2x_1 + 2x_2 + 3x_3 \leq 40$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0.$ (10 Marks)
- c. With example, explain i) slack variable ii) Augmented form of LP model iii) Augmented solution. (06 Marks)
- 3 a. Solve by Big M method
 Minimized $Z = 0.4x_1 + 0.5x_2$
 Subject to $0.3x_1 + 0.1x_2 \leq 2.7$
 $0.5x_1 + 0.5x_2 = 6$
 $0.6x_1 + 0.4x_2 \geq 6$
 $x_1 \geq 0, x_2 \geq 0.$ (08 Marks)
- b. Solve by two phase method
 Minimize $Z = 3x_1 + 2x_2 + x_3.$
 Subject to $x_1 + x_2 = 7$
 $3x_1 + x_2 + x_3 \geq 10$
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0.$ (12 Marks)

- 4 a. Use revised Simplex method to solve the following LPP.
 Maximize $Z = 3x_1 + 5x_2$
 Subject to $x_1 \leq 4$
 $2x_2 \leq 12$
 $3x_1 + 2x_2 \leq 18$
 $x_1 \geq 0, x_2 \geq 0.$ (10 Marks)
- b. Construct dual problem of following LPP.
 Minimize $Z = 2x_1 + 3x_2 + x_3$
 Subject to $x_1 + 4x_2 + 2x_3 \geq 8$
 $3x_1 + 2x_2 \geq 6$
 $x_1, x_2, x_3 \geq 0.$ (05 Marks)
- c. With respect to primal dual relationships, define the following : i) Weak duality property
 ii) Strong duality property iii) Complementary solution property iv) Complementary
 optimal solution property v) Symmetry property. (05 Marks)

PART - B

- 5 a. Explain different steps in dual Simplex method. (10 Marks)
 b. Explain Upper bound technique. (10 Marks)
- 6 a. Consider the following transportation problem having the following parameter table :

	Destination			Supply
	1	2	3	
1	162	121.5	82.8	70
Source 2	93.6	108	75	110
3	158.4	100.8	100.8	80
Demand	125	60	75	

- Using northwest corner rule, find the initial basic feasible solution. Then use transportation algorithm to obtain an optimal solution. (10 Marks)
- b. Explain Hungarian algorithm to solve an assignment problem. Apply this algorithm to solve the following : (10 Marks)

	Task				
	1	2	3	4	5
A	820	810	840	960	0
B	820	810	840	960	0
Assignee C	800	870	M	920	0
D	800	870	M	920	0
E	740	900	810	840	M

- 7 a. Explain basic characteristics of two persons, zero sum game. For the game having following pay off table, determine the optimal strategy for each player by successively eliminating dominated strategies. Indicate the order in which you eliminate strategies. (10 Marks)

Strategy	Player 2		
	1	2	3
1	1	2	0
Player 2	2	-3	-2
3	0	3	-1

- b. Consider the following pay off table for a decision analysis problem :

Alternation	State of Nature	
	S ₁	S ₂
A ₁	700	-100
A ₂	90	90
Prior probability	0.25	0.75

Which alternative should be chosen under i) Maximum pay off criterion ii) Maximum likelihood criterion iii) Baye's decision rule. (10 Marks)

- 8 a. Explain how to construct a decision tree and how it is used for decision analysis. (10 Marks)
- b. What is a Metaheuristics? What is the nature of Metaheuristics? Explain Sub – Tour Reversal Algorithm for getting a good feasible solution for travelling salesman problem. (10 Marks)
