Code No. 9616

FACULTY OF INFORMATICS
M.C.A. II Year I – Semester (Main) Examination, Jan. / Feb. 2015
Subject: Operations Research

Time: 3 Hours **Max.Marks: 80**

Note: Answer one question from each unit. All questions carry equal marks.

Unit – I

1 a) Explain the following 6
   i) Infeasible solution
   ii) Surplus variable
   iii) Unbounded solution

   b) Solve the following LPP using dual simplex method. 10
   Minimize $z = x_1 + x_2$
   Subject to $2x_1 + x_2 \geq 2$
   $-x_1 - x_2 \geq 1$
   x_1 and $x_2 \geq 0$

OR

2 a) Explain briefly about graphical method. 6

   b) Solve the following LPP using simplex method. 10
   Maximize $z = 3x_1 + 2x_2 + 5x_3$
   Subject to $x_1 + x_2 + x_3 \leq 9$
   $2x_1 + 3x_2 + 5x_3 \leq 30$
   $2x_1 - x_2 - x_3 \leq 8$
   x_1, x_2 and $x_3 \geq 0$

Unit – II

3 a) Explain briefly about transshipment model. 6

   b) Find the initial basic feasible solution to the following transportation problem by Northwest-corner cell method and least cost cell method. 10

		To 1	2	3	Supply
From	1	2	7	4	5
	2	3	3	1	8
	3	5	4	7	7
	4	1	6	2	14
Demand		2	9	18	

OR

4 Consider the following transportation problem involving three sources and four destinations. The cell entries represent the cost of transportation per unit. 16

		Destination 1	2	3	4	Supply
Source	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	

Obtain the initial basic feasible solution using the northwest-corner cell method and then optimize the solution using U-V method.

...2.

Unit – III

5 Consider the problem of assigning four sales persons to four different sales regions as shown below such that the total sales is maximized. 16

		Sales region			
		1	2	3	4
Salesman	1	5	11	8	9
	2	5	7	9	7
	3	7	8	9	9
	4	6	8	11	12

The cell entries represent annual sales figures in crores of rupees. Find the optimal allocation of the sales persons to different regions.

OR

6 a) Write a branch-and-bound algorithm for integer programming problem. 8

b) Write an additive algorithm. 8

Unit – IV

7 An electronic item has three components in series. So, the reliability of the system is equal to the product of the reliabilities of the three components. It is a known fact that the reliability of the system can be improved by providing standby units at extra cost. The details of costs and reliabilities for different number of standby units for each of the components of the system are summarized in the following table. 16

No. of standby units	Component 1		Component 2		Component 3	
	Cost (Rs.)	Reliability	Cost (Rs.)	Reliability	Cost (Rs.)	Reliability
1	1	0.70	3	0.85	2	0.85
2	2	0.85	4	0.95	3	0.92
3	3	0.95	6	0.98	5	0.97

The total capital budgeted for this purpose is Rs. 8. Determine the optimal number of standby units for each of the components of the system such that the total reliability of the system is maximized.

OR

8 Solve the following linear programming problem using dynamic programming technique. 16

Maximize $z = 30x_1 + 15x_2 + 6x_3$

Subject to $6x_1 + 8x_2 + 9x_3 \leq 210$

$12x_2 + 6x_3 \leq 180$

x_1, x_2 and $x_3 \geq 0$

…3.

Unit – V

9 a) Explain the following: 8
   i) Saddle point
   ii) Dominance property

   b) Solve the following 4 x 2 game using graphical method. 8

		Player B	
		1	2
Player A	1	5	3
	2	6	4
	3	2	-7
	4	9	-8

OR

10 Solve the following game using linear programming method. 16

		Player B		
		1	2	3
Player A	1	2	3	-4
	2	5	-2	6
	3	2	6	3

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