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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, Master of Computer Applications (MCA)

Semester End Examination; June - 2017

Operations Research

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Define OR and write short notes on : 10

(i) Origin (ii) Objective (iii) Applications of OR study.

b. Write the general model of a linear programming problem and formulate the given problem.

The world light company produces two light fixtures requiring both metal frame parts and electrical components. The management wishes to determine how many units of each product to produce so as to maximize profit. For each unit of product 1, 1 unit of frame part and 2 units of electrical components are required. For each unit of product 2, 3 units of frame parts and 2 units of electrical components are required. The company has 200 units of frame parts and 300 units of electrical components. Each unit of product 1 gives a profit of \$10 and each unit of product 2 upto 60 units and gives profit of \$20, any excess over 60 units of product 2 brings no profit, so such an excess has to be over ruled. 10

2 a. List the six phases of OR study and explain each phase. 10

b. Using graphical method. Solve the LPP,

Minimize $Z = x+1.5y$

Such that $2x + y \geq 10$

$x + y \geq 8$ 10

$x + 3y \geq 12$

Where $x \geq 0, y \geq 0$.

UNIT - II

3 a. Define: 6

(i) Slack (ii) Surplus (iii) Artificial variables; With respect to a LPP.

b. Write important three steps involved in simplex method and explain each step. 4

c. Using Simplex method Solve,

Max $Z = 3x+2y$ Such that 10

$x + y \leq 4, x - y \leq 2$ where $x, y \geq 0$.

4 a. Define : 6

(i) Optimum solution (ii) Feasible solution

(iii) Unbounded solution with the help of graphs.

Contd…2

b. What is degeneracy? Explain the situation in a LPP. 4

c. Using Big-M method solve the LPP, 10

Max Z = $2x + 3y$

Such that $x+2y \leq 4$

$x + y = 3$ and $x \geq 0, y \geq 0$.

UNIT - III

5 a. Write steps involved in two phase method. 6

b. List the relationship between the primal and dual problems. 4

c. Write the dual of the given problem : 5

Max Z = $6x + 10y$ such that $x \leq 14$; $y \leq 16$, $3x + 2y \leq 18$; $x, y \geq 0$.

d. Write the advantages of revised simplex method. 5

6 a. What are sensitivity analysis and its objective? 6

b. Write short notes on "changes in the co-efficient of the objective function". 6

c. Use dual simplex method to solve the following problem, 8

Minimize $Z = 2x_1 + x_2 + 3x_3$

Such that $x_1 - 2x_2 + x_3 \geq 4$

$2x_1 + x_2 + x_3 \leq 8$

$x_1 - x_3 \geq 0$ with $x_1, x_2, x_3 \geq 0$.

UNIT - IV

7 a. Write the condition of a transportation problem and assignment problem to be unbalanced. How to make them balanced in each case? 8

b. Solve the transportation problem, using VAM method to find initial solution and check optimality by stepping stone method. 12

2	7	4	5
3	3	1	8
5	4	7	7
1	6	2	14
7	9	18	

8 a. Write the assignment problem model in the standard form with usual notations. 4

b. Explain Hungarian method to solve an assignment problem. 6

c. A company has 5 tasks and 5 persons to perform the same. The matrix shows the returns (profit) in hundreds of rupees. For assigning jobs to the persons. Assign the tasks to maximize the total returns: 10

Contd…3

Persons						
Task		P_1	P_2	P_3	P_4	P_5
	T_1	5	11	10	12	4
	T_2	2	4	6	3	5
	T_3	3	12	5	14	6
	T_4	6	14	4	11	7
	T_5	7	9	8	12	5

UNIT - V

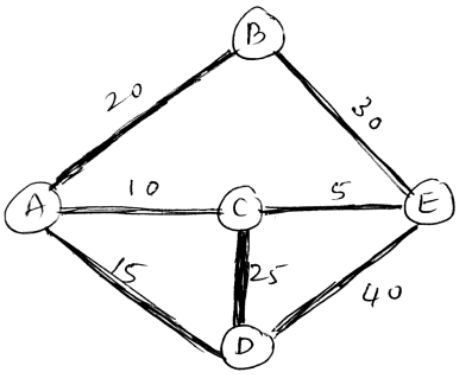
9 a. Write short notes on the following terms : 10

(i) Nature of Metaheuristics (ii) Simulated Annealing (iii) Routing problem.

b. Use Tabu search algorithm to find the optimal solution of the following illustration. 10

Constraint 1: Link AD can be included only if link DE also included.

Constraint 2: Almost one of the three links AD, CD and AB can be included charge a penalty of 100 if constraint 1 is violated. Charge a penalty of 100 if two of the three links of specified in constraint 2 are included. Increase this penalty to 200 if all three of the links are included.



10 a. Define the following with respect to Game theory : 8

(i) Two-person zero-sum game (ii) Payoff matrix

(iii) Value of game (iv) Non-zero sum game.

b. For the following pay off matrix. Determine optimal strategies and value of the game: 6

	B			
A	3	2	4	0
	3	4	2	4
	4	2	4	0
	0	4	0	8

c. Solve the following 3 X 2 game by graphical method 6

3	-2
-1	4
2	2

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