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

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester - Master of Computer Applications (MCA)

Semester End Examination; June -2016

Operations Research

Time: 3 hrs *Max. Marks: 100*

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

UNIT - I

1 a. Name the phases for implementation OR in practices briefly discuss about each phase. 10

b. A manufacturer produces two types of models, M_1 and M_2.Each model of the type M_1 requires 4 hours of grinding and 2 hours of polishing where as each model of the type M_2 requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinder and 3 polishers. Each grinder works 40 hours a week and each polisher works for 60 hours a week. Profit on M_1 mode1 is ` 3.00 and on mode1 M_2 is 400. Whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models? So that he may make the maximum profit in week. 10

2 a. Discuss the origin and nature of operation research. 5

b. Briefly Discuss the assumptions of 2PP. 5

c. Solve the following LPP by graphical method.

Minimize $Z = 20x_1+10x_2$

Subject to $x_1+2x_2 \leq 40$

$3x_1+x_2 \geq 30$

$4x_1+3x_2 \geq 60$ *and* $x_1, x_2 \geq 0$ 10

UNIT - II

3 a. Explain the following with example :

(i) Unbounded solution

(ii) Mathematical model with an example

(iii) Slack variable

(iv) Surplus variable

(v) Feasible solution 10

b. By using simplex method. Solve the following Linear programming problem.

Maximize $Z = 7x_1+5x_2$

subject to $x_1 + 2x_2 \leq 6$

$4x_1 + 3x_2 \leq 12$ *and* $x_1, x_2 \geq 0$ 10

Contd…2

4 a. Write the procedure to solve LPP using two phase simplex method. 8

b. Use Big-M method to solve following LPP,

Max $Z = 3x_1 - x_2$ *subject to*

$2x_1 + x_2 \geq 2$

$x_1 + 3x_2 \leq 3$

$x_2 \leq 4$ *and* $x_1, x_2 \geq 0$ 12

UNIT - III

5 a. Solve by using dual simplex method,

Maximize $Z = -3x_1 - x_2$

Subject to $x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$ *and* $x_1, x_2 \geq 0$ 10

b. List the changes needed in parameters in LPP in sensitivity analysis. 10

6 a. Use Revised simplex method to solve the LPP,

Maximize $Z = 6x_1 - 2x_2 + 3x_3$

Subject to $2x_1 - x_2 + 2x_3 \leq 2$

$x_1 + 4x_3 \leq 4$ *and* $x_1, x_2, x_3 \geq 0$ 12

b. Find the dual of LPP,

Maximize $Z = x_1 + 2x_2$

Subject to $2x_1 + 3x_2 \geq 4$

$3x_1 + 4x_2 = 5$ *and* $x_1 \geq 0$ *and* x_2 *is restricted.* 8

UNIT - IV

7 a. Define feasible solution, basic feasible solution, non –degenerate solution and optimal solutions in transportation problem. 10

b. Obtain the Initial feasible solution using VAM and find the optimal solution to the following transportation problem.

	S_1	S_2	S_3	S_4	Supply
D_1	21	16	25	13	11
D_2	17	18	14	23	13
D_3	32	17	18	41	19
Demand	6	10	12	15	

10

8 a. Write different steps in Hungarian algorithm to solve an assignment problem. 8

b. A marketing manager has 5 sales man and there are 5 sales districts. Considering the capacities of sales and the nature of districts, the estimates made by the marketing managers for the sales per months (in 1000 rupees) for each salesman in each district is 12

Contd…3

$$\begin{bmatrix} 32 & 38 & 40 & 28 & 40 \\ 40 & 24 & 28 & 21 & 36 \\ 41 & 27 & 33 & 30 & 37 \\ 22 & 38 & 41 & 36 & 36 \\ 29 & 33 & 40 & 35 & 39 \end{bmatrix}$$

Find the assignment of salesman to the districts that will results in maximum sales.

UNIT - V

9 a. Solve the following game graphically ; 8

$$\begin{array}{cc} & \text{Player B} \\ \text{Player A} & \begin{pmatrix} 1 & 2 \\ 5 & 4 \\ -7 & 9 \\ -4 & -3 \\ 2 & 1 \end{pmatrix} \end{array}$$

b. Reduce the following game by dominance property : 8

1	3	2	7	4
3	4	1	5	6
6	5	7	6	5
2	0	6	3	1

c. Define the following with respect to the Game theory :

(i) Pure Strategy 4

(ii) Mixed strategy

10. Explain briefly :

a. Metaheurishtics its nature, advantage and disadvantage

b. Tabu search algorithm 20

c. Simulated annealing algorithm

d. Genetic algorithm.

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