1212-15-505-002

Code No. 6377

FACULTY OF SCIENCE

M.Sc. III-Semester Examination, December 2016

Subject : Mathematics / Applied Mathematics

Paper - III (C)
Operations Research

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

Note : Answer all questions from Part-A and Part-B. Each question carries 4 marks in Part-A and 12 marks in Part-B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 Define slack and surplus variables as involved in the LPP. How are these variables useful in solving a LPP.

2 What are artificial variables? Why do we need them?

3 State dual problem and primal problem.

4 Obtain the dual of the following LPP.

Max $Z = 3x_1 + x_2 + x_3 - x_4$

STC $x_1 + 5x_2 + 3x_3 + 4x_4 \leq 5$

$x_1 + x_2 = -1$

$x_3 - x_4 \geq -5$

$x_1, x_2, x_3, x_4 \geq 0$

5 What is unbalanced assignment problem. How to modify it?

6 Discuss the algorithm of North-west corner rule to find IBFS to a transportation problem.

7 Explain the concepts in dynamic programming.

a) principle of optimality b) state and stage

8 Find the value of max $(y_1\ y_2\ y_3)$ subject to $y_1 + y_2 + y_3 = 5$ and $y_1, y_2, y_3 \geq 0$.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 a) Solve the following LPP by simplex method.

Max $Z = 8x_1 + 19x_2 + 7x_3$

STC $3x_1 + 4x_2 + x_3 \leq 25$

$x_1 + 3x_2 + 3x_3 \leq 50$

$x_1, x_2, x_3 \geq 0$

OR

b) Solve the following LPP by two phase method.

Max $Z = 5x_1 + 8x_2$

STC $3x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$x_1 + x_2 \leq 5$

$x_1, x_2 \geq 0$

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10 a) Apply simplex method to solve the following by the principle of duality.

Max $Z_x = 30x_1 + 23x_2 + 29x_3$

STC $6x_1 + 5x_2 + 3x_3 \leq 26$

$4x_1 + 2x_2 + 6x_3 \leq 7$

$x_1, x_2, x_3 \geq 0$

OR

b) Use dual simplex method to solve the following LPP :

Min $Z = x_1 + x_2 + 3x_3$

STC $2x_1 - x_2 + x_3 \geq 4$

$x_1 + x_2 + 2x_3 \geq 8$

$x_2 - x_3 \geq 2$

$x_1, x_2, x_3 \geq 0$

11 a) Solve the Assignment Problem :

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

OR

b) Determine the optimum solution to the following transportation problem.

	D_1	D_2	D_3	D_4	Supply
O_1	23	27	16	18	30
O_2	12	17	20	51	40
O_3	22	28	12	32	53
Demand	22	35	25	41	

12 a) Use the principle of optimality to find the maximum value of $Z = b_1 x_1 + b_2 x_2 + \ldots\ldots + b_n x_n$ when $x_1 + x_2 + \ldots + x_n = C$ and $x_1, x_2, \ldots, x_n \geq 0$ and $b_1, b_2, \ldots\ldots, b_n > 0$.

OR

b) Solve the following problem using dynamic programming

Min $Z = y_1^2 + y_2^2 + \ldots + y_n^2$

STC $y_1\, y_2\, y_3 \ldots\ldots y_n = b$

and $y_1, y_2, \ldots\ldots, y_n \geq 0$

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