ROLL No. .

G—4016

IV SEMESTER EXAMINATION, 2014

M. Sc.

MATHEMATICS

Paper IV

[Operations Research-II]

Time : Three Hours] **[M. M. : 80**

*Note : Attempt any **two** parts from each questions. All questions carry equal marks.*

UNIT – I

1. (a) Divide a positive quantity C into n parts in such a way that their products is a maximum.

(b) Find the minimum value of

$$x_1^2 + 2x_2^2 + 4x_3,$$

subject to the constraints :

$$x_1 + 2x_2 + x_3 \geq 8,$$

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

by dynamic programming approach.

P. T. O.

(c) Use dynamic programming to solve the linear programming problem :

Maximize $Z = x_1 + 9x_2$

subject to the constraints :

$$2x_1 + x_2 \leq 25,$$

$$x_2 \leq 11;$$

$$x_1, x_2 \geq 0.$$

UNIT – II

2. (a) Explain the term : Pure strategy, saddle point, competitive games, Payoff matrix.

(b) Solve the following 2 × 2 game graphically :

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	2	1	0	−2
	A_2	1	0	3	2

(c) Use matrix oddment method to solve the following 3 × 3 game :

$$\begin{bmatrix} 0 & 1 & 2 \\ 2 & 0 & 1 \\ 1 & 2 & 0 \end{bmatrix}$$

UNIT – III

3. (a) Find the optimum solution to the Integer programming problem :

Maximize $Z = x_1 - 2x_2$

subject to the constraints :

$$4x_1 + 2x_2 \leq 15,$$

$$x_1, x_2 \geq 0$$

and are integers.

(b) Solve the following mixed-integer programming problems, using Gomory's cutting plane method :

Maximize $Z = x_1 + x_2,$

subject to the constraints :

$$3x_1 + 2x_2 \leq 5$$

$$x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

and x_1 is an integer.

(c) Describe the branch and bound method for the solution of integer programming problem.

UNIT – IV

4. (a) Write a short notes on optimal product mix and activity levels.

(b) Discuss economic interpretation of dual linear programming problems.

(c) Explain Petrolium Refinery operation as a L. P. P.

UNIT – V

5. (a) Use the Kuhn-Tucker conditions to solve the following non-linear programming problems :

Max $Z = 2x_1 - x_1^2 + x_2$

subject to the constraints :

$$2x_1 + 3x_2 \leq 6$$

$$2x_1 + x_2 \leq 4$$

and $x_1, x_2 \geq 0.$

(b) Use Wolfe's method in solving the following quadratic programming problems :

Max $Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$

subject to the constraints :

$$x_1 + 2x_2 \leq 2,$$

$$x_1, x_2 \geq 0.$$

(c) Describe briefly the Beale's method for solving quadratic programming problem.

—— A ——