Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

Subject code: 1721205 **Date: 05-06-2013**

Subject Name: Hydro System Engineering and Management

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Maximize $Z = 27x_1 + 29x_2 + 25x_3$ **14**

Subject to the constraints :

$$27x_1 + 12x_2 + 12x_3 \text{ Ò } 162$$

$$27x_1 + 15x_2 + 25x_3 \text{ Ò } 189$$

$$3x_2 \text{ Ò } 5$$

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

Q.2 **(a)** Explain Kuhn-Tucker conditions for optimizing nonlinear problem. **07**

(b) Explain dynamic programming & its characteristics with merits and demerits. **07**

OR

(b) Define: Slack variable, Surplus variable, Objective function, Degenerate solution **07**

Q.3 A diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 calories. Two foods A and B are available at a cost of Rs.4/- and Rs.3/- per unit respectively, If one unit of A contains 200 units of vitamins, 1 unit of mineral and 40 calories and one unit of food B contains 100 units of vitamins, 2 units of minerals and 40 calories, find by graphical method, what combinations of foods be used to have least cost? **14**

OR

Q.3 **(a)** Write the dual of given problem. **07**

Minimize $Z = 2x_2 + 5x_3$

Subject to

$$x_1 + x_2 \text{ Ó } 2$$

$$2x_1 + x_2 + 6x_3 \text{ Ò } 6$$

$$x_1 - x_2 + 3x_3 = 4$$

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

(b) Discuss application of system engineering in field of water resources. **07**

Q.4 **(a)** Find the initial basic feasible solution of the given transportation problem. **07**

Ware house Factory	W1	W2	W3	W4	Factory capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Warehouse Requirements	5	8	7	14	34

(b) Discuss the objective function of water resources project. **07**

OR

Q.4 **(a)** Explain Big M method in detail. **07**

(b) Discuss limitations of linear programming. **07**

Q.5 **(a)** Write short note on óSimulation Modelingô. **07**

(b) Explain Gomoryôs cutting plane method. **07**

OR

Q.5 **(a)** Write short note on modified method for optimum solution of transportation problem. **07**

(b) Explain Bellmanôs principle of optimality. **07**

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