

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 :

$$27x_1 + 12x_2 + 12x_3 \leq 162$$

$$27x_1 + 15x_2 + 25x_3 \leq 189$$

$$3x_2 \leq 5$$

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

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**

$$\text{Minimize } Z = 2x_2 + 5x_3$$

$$\text{Subject to } x_1 + x_2 \leq 2$$

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

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

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

(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	W1	W2	W3	W4	Factory capacity
Factory					
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 "Simulation Modeling" **07**
(b) Explain Gomory's cutting plane method. **07**

OR

- Q.5 (a)** Write short note on modified method for optimum solution of transportation problem. **07**
(b) Explain Bellman's principle of optimality. **07**
