

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-II Examination July 2010****Subject code: 721205****Subject Name: Hydro system Engineering and Management****Date: 08 /07 /2010****Time: 11.00am – 1.30pm****Total Marks: 60****Instructions:**

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

Q.1 Maximize $Z = 3A + 5B + 4C$ Subject to constraints **12**

$$\begin{aligned} 2A + 3B &\leq 8 \\ B + 5C &\leq 10 \\ 3A + 2B + 4C &\leq 15 \\ A, B, C &\geq 0 \end{aligned}$$

Solve the problem by Simplex Method

Q.2 (a) Define : i) Basic feasible solution **06**

- ii) Degenerate solution
- iii) Slack and surplus Variables.

(b) Explain the Primal-Dual concept of dual LP-model **06**

OR

(b) Explain Big-Method for solution of LPP **06**

Q.3 **12**

Table given below shows the types of crops can be grown in a particular irrigation area each year. Unit selling price and requirement of resources of each crop are given in table

Requirement per unit of crop			
Resources	Crop-A	Crop-B	Maximum Available Resource
Water	2	3	60
Land	5	2	80
Fertilizer	3	2	60
Labour	1	2	40
Unit Price	30	25	

Formulate the problem as Linear programming problem to maximize Income. Solve the problem graphically as linear programming problem.

OR

Q.3 (a) Write the dual of the given LP model **06**

Maximize $Z = 3A + 5B + 4C$ Subject to constraints

$$\begin{aligned} 2A + 3B &\leq 8 \\ B + 5C &\leq 10 \\ 3A + 2B + 4C &\leq 15 \\ A, B, C &\geq 0 \end{aligned}$$

(b) Explain Dynamic Programming and it's characteristics with merits and demerit **06**

- Q.4 (a)** Find the Initial basic feasible solution of the given transportation problem **06**

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 Requirement	5	8	7	14	34

- (b)** Write short note on ANN (Artificial Neural Network) **06**

OR

- Q.4 (a)** Write short note on Modified method for optimum solution of transportation problem **06**

- (b)** Write short note on 'Simulation Modeling'. **06**

- Q.5 (a)** Obtain the set of necessary conditions for the non-linear programming problem; **06**

$$\text{Maximize } Z = X_1^2 + 3X_2^2 + 5X_3^2 \quad \text{Subject to Constraints:}$$

$$X_1 + X_2 + 3X_3 = 2, \quad 5X_1 + 2X_2 + X_3 = 5 \quad \text{and } X_1, X_2, X_3 \geq 0$$

- (b)** Explain Kuhn-Tucker conditions and Lagrangian multiplier **06**

OR

- Q.5 (a)** How the Non linear programming can be made linear? **06**

- (b)** Explain the concept of 'System' and applications of System Engineering in the field of water resources. **06**
