Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1721205   **Date: 02-01-2013**
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 Use the Simplex method to find the maximum value of,   **14**

$Z = 2x_1 - x_2 + 2x_3$ Subject to constraints

$2 x_1 + x_2 \leq 10$
$x_1 + 2 x_2 - 2 x_3 \leq 20$
$x_2 + 2 x_3 \leq 5$

Where $x_1 \geq 0$, $x_2 \geq 0$ and $x_3 \geq 0$.

Q.2 **(a)** Define : i) Basic feasible solution   **07**
         ii) Degenerate solution
         iii) Slack and surplus Variables.

(b) Discuss the Assumptions made in Linear programming.   **07**

OR

(b) Explain Dynamic Programming and it's characteristics with merits and   **07**
         demerits.

Q.3 A furniture manufacturer makes two types of furniture – chairs and sofas. **14**
         The production of the sofas and chairs requires three operations –
         carpentry, finishing and upholstery. Manufacturing a chair requires 3
         hours of carpentry, 9 hours of finishing and 2 hours of upholstery.
         Manufacturing a sofa requires 2 hours of carpentry, 4 hours of finishing
         and 10 hours of upholstery. The factory has allocated at most 66 labors for
         carpentry, 180 labors for finishing and 200 labors for upholstery. The
         profit per chair is $90 and the profit per sofa is $75. How many chairs and
         how many sofas should be produced each day to maximize the profit? Use
         graphical method.
                                      OR
Q.3 **(a)** Obtain the dual of   **07**

         Minimize $Z = 16x_1 + 9x_2 + 21x_3$
         Subject to $x_1 + x_2 + 3x_3 \geq 16$
                       $2 x_1 + x_2 + x_3 \geq 12$
                         $x_1, x_2, x_3 \geq 0.$

	(b)	Explain the Primal-Dual concept of dual LP-model.	**07**
Q.4	**(a)**	Explain the concept of system and applications of system Engineering in the field of water resources.	**07**
	(b)	Write short note on 'Simulation Modeling'.	**07**

OR

Q.4	**(a)**	Write short note on Modified method for optimum solution of transportation problem.	**07**
	(b)	Discuss the limitations of linear programming.	**07**
Q.5	**(a)**	Discuss use of space and peck rule for reservoir operation.	**07**
	(b)	Classify the models by nature of environment, behavior and method of solution.	**07**

OR

Q.5	**(a)**	Discuss the Objective Function of water resources project.	**07**
	(b)	Define: Local Maximum, Local Minimum, Global Maximum and Global Minimum	**07**

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