Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014

Subject code: 731402   **Date: 27-11-2014**
Subject Name: Operation Research in Construction
Time: 02:30 pm - 05:00 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	**(a)**	Enlist and explain steps for solving problem by Operation Research approach.	**07**
	(b)	Describe steps involved in the process of decision making.	**07**
Q.2	**(a)**	Explain ISOPROFIT line and ISOCOST line. How do these help to obtain solution of LPP?	**07**
	(b)	How can regret table be derived from a payoff table.	**07**

OR

	(b)	Enlist and explain assumptions underlying linear programming model.	**07**
Q.3	**(a)**	A construction project requires 100 cum of concrete. To ensure hardening qualities, concrete must contain at least 60t of cement and no more than 50t of sand and coarse aggregates combined. There are 80t of cement and 40t of each of the material sand and coarse aggregate available. Cement, sand and coarse aggregate costs Rs.5000, Rs.1000 and Rs.2000 per t respectively. Only formulate LPP for the given data so as to minimize the total cost.	**07**

	(b)	Solve the following LPP by graphical method.
		Maximize $Z = 4x_1 + 4x_2$
		    Subject to $x_1 + 2x_2 \ddot{O} 10$
		                $6x_1 + 6x_2 \ddot{O} 36$
		                        $x_1 \ddot{O} 6$
		                    $x_1, x_2 \times 0$
		Give your comment on solution considering special cases like multiple solution, infeasibility etc.
			07

OR

Q.3	**(a)**	Following tableau is for a maximization type of LPP.	**07**

Basis	x_1	x_2	S_1	S_2	b_i
	1	1	1	0	6
	1	0	-1	1	2
cj	3	4	0	0	

Complete the tableau.
Is completed tableau optimal?
If no, find optimal solution.
Is optimal solution unique?
If no, find alternative solution.

	(b)	Write dual of given problem in Q.3 (b) above. Also discuss benefits of duality theory.	**07**
Q.4	**(a)**	Following matrix shows the payoffs in rupees of different strategies S_1, S_2 & S_3 against conditional events N_1, N_2 & N_3 Determine decision using Maximin , Maximax and Laplace principles.	**07**

	S_1	S_2	S_3
N_1	2000	3000	2500
N_2	1200	800	1000
N_3	1500	1000	1800

(b) Enlist and explain various methods to find out initial feasible solution of transportation problem. **07**

<div align="center">OR</div>

Q.4 **(a)** Describe step by step procedure to determine optimal solution of transportation problem by MODI method. **07**

(b) Five power shovels are to be used for five projects. The cost (in thousands) of shovel and project combinations are as per following table. Assign shovel to a project so as to minimize the cost. **07**

	Project I	Project II	Project III	Project IV	Project V
Shovel A	10	5	13	15	16
Shovel B	3	9	18	13	6
Shovel C	10	7	2	2	2
Shovel D	7	11	9	7	12
Shovel E	7	9	10	4	12

Q.5 **(a)** Discuss situations under which decision tree model is used for decision making. Also describe procedure to be followed for applying decision tree model for decision making. **07**

(b) What is game theory? State assumptions underlying it. Discuss application of game theory in construction industry. **07**

<div align="center">OR</div>

Q.5 **(a)** Explain 1.saddle point 2. Principles of dominance in theory of game. Also state rules to determine 1. Saddle point. **07**

(b) Explain 1. Utility function. 2. Utility measure. 3. Utility curve. **07**

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