Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject Code: 171901 **Date: 01/05/2015**

Subject Name: Operations Research

Time: 02.30pm-05.00pm **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)** State the general rules for formulating a dual LP problem fro it's primal. **07**

(b) Nachiketa corporation manufactures two products A1&A2.The profit per unit of the two products is Rs.50& Rs.60 respectively. Both the products require processing in three machines. Below table indicates the available machine hours per week & time require on each machine for one unit of A1 &A2.Formulate as linear programming problem. **07**

Q.2 **(a)** Explain significance of any two assumptions of LPP. **07**

(b) Use graphical method to solve the following LPP . **07**

Maximize $Z=17X_1+15X_2$

Subject to: $15X_1+25X_2 \leq 375$

$24X1+11X2 \leq 265$

All $X_1, X_2 \geq 0$

OR

(b) Solve the following game whose payoff matrix is given below. **07**

	Player B		
Player A		I	π
	I	1	8
	π	6	2

Q.3 **(a)** Distinguish between transportation & transshipment problems in detail. **07**

(b) Company has factories A_1, A_2 & A_3 which supply to warehouses at W_1 ,W_2 & W_3.Weekly factory capacities are 240,200&130 units respectively. Weekly warehouses requirements are 190,150&110 units respectively. Unit transportation in costs Rs. As follows:- Find I.B.S. BY VAM method & Optimum solution BY MODI method. **07**

	W_1	W_2	W_3	SUPPLY
A_1	16	20	12	240
A_2	14	8	18	200
A_3	26	24	16	130
DEMAND	190	150	110	450

OR

Q.3 **(a)** Give different practical applications of transportation problem. **07**

(b) Obtain an I.B.F.S. to the following transportation problem using N-W Corner method.& Optimum solution BY STEPPING STONE method. **07**

	Q_1	Q_2	Q_3	Q_4	SUPPLY
P_1	1	3	2	4	8
P_2	5	4	2	0	10
P_3	0	3	3	1	12
DEMAND	4	5	8	5	

Q.4 **(a)** The production department for a company requires 3500kg.of row material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs.35& the cost of carrying inventory is 25 percentage of the investment in the inventories. The price is Rs.10 per kg.The purchase manager wishes to determine an ordering policy for raw material. Calculate (1)The optimal lot size(2)The minimum yearly variable inventory cost(3)The optimal order cycle time(4)The minimum yearly total inventory cost. **07**

(b) **07**

Solve the following assignment problem by minimization method.

	I	II	III	IV	V
M1	12	5	9	18	11
M2	13	7	6	12	14
M3	3	2	3	4	5
M4	18	9	12	16	15
M5	12	6	14	19	10

OR

Q.4 **(a)** A Project is represented by the Network shown below & has the following data. Determine(1)Expected Time &Variance(2)Earliest & Latest times to reach each event.(3)The critical path **07**

Task	A	B	C	D	E	F	G	H	I
Optimistic time	5	18	26	16	15	6	7	7	3
Pessimistic time.	10	22	40	20	25	12	12	9	5
Most likely time.	8	20	33	18	20	9	10	8	4

(b) On an average 95 patients per 24 hrs.day require the service of an emergency clinic. Also on the average, a patient requires 12 minutes of an active attention. Assume that the facility can handle only one emergency at a time.Suppoce that it cost the clinic Rs.100 per patient treated to obtain an average servicing of 10 minutes & that minute of decreasing in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from one to one third patients to half a patient. **07**

Q.5 **(a)** What is dynamic programming? Discuss the similarities between dynamic & linear programming. How it differs from linear programming? **07**

(b) A firm is considering replacement of a machine whose cost price is Rs.12200& the scrap value Rs.200.The running costs are found from experience to be as follows. When should the machine be replaced? **07**

Year	1	2	3	4	5	6	7	8
Running costRs.	200	600	700	1000	1200	1800	2500	4000

OR

Q.5 **(a)** Explain steps in Monte Carlo simulation process. **07**

(b) Explain definition & scope of operation research. **07**

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