

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 171901

Date: 26/12/2012

Subject Name: Operation Research

Time: 10.30 am - 01.00 pm

Total Marks: 70

Instructions:

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

Q.1 (a) Do as directed: 08

- (i) What is the degeneracy in simplex method? How it can be resolved?
- (ii) Illustrate graphically;
(a) No-feasible solution (b) Unbounded solution.
- (iii) Classify the Assignment problems in detail.
- (iv) Explain the following term in the context of game theory
(a) Saddle point (b) Two persons Zero-sum game

(b) (i) Find the maximum value of following LPP using graphical approach 04

$$\begin{aligned} Z &= -x_1 + 2x_2 \\ S / t, & -x_1 + 3x_2 \leq 10 \\ & x_1 + x_2 \leq 6 \\ & x_1 - x_2 \leq 2 \\ & x_1 \text{ and } x_2 \geq 0 \end{aligned}$$

(ii) Write down the dual of above LPP 02

Q.2 (a) Write note on scope of Operation research in the various sector. 04

(b) Solve following LPP using Penalty method 10

$$\begin{aligned} \text{Maximize } Z &= 3x_1 - x_2 \\ S / t, & 2x_1 + x_2 \leq 2 \\ & x_1 + 3x_2 \geq 3 \\ & x_2 \leq 4 \\ & x_1 \text{ and } x_2 \geq 0 \end{aligned}$$

OR

- (b)** A firm manufactures two product A & B on which the profit earned per unit are Rs. 3 and Rs.4, respectively. Each product is processed on two machines M1 and M2. Product A requires one minute of processing time on M1 and two minutes on M2, while product B requires one minute of processing time on M1 and one minute on M2. Machine M1 is available for not more than 7 hrs and 30 minutes, while machine M2 is available for 10hrs during any working day. Find

- (i) Formulate the problem as LPP **04**
- (ii) Solve the above LPP using Simplex method **06**

- Q.3 (a)** State the name of method which divides inventories into three classes and describe it in detail. **05**
- (b)** Find the optimal solution of the following Transportation problem using MODI method. Use VAM to find IBFS. **09**

	M1	M2	M3	M4	Supply
F1	3	2	4	1	20
F2	2	4	5	3	15
F3	3	5	2	6	25
F4	4	3	1	4	40
Demand	30	20	25	25	

OR

- Q.3 (a)** A machine cost Rs 500. Operation and maintenance cost are zero for the first year and increases by Rs. 100 every year. If money is worth 5% every year, determine the best age at which the machine should be replaced. The resale value of the machine is negligibly small. What is the weighted average cost of owning and operating the machine? **07**

- (b)** The following information is provided for an item: **07**
 Annual usage = 1200, Ordering cost = Rs 60 per order, Carrying costs 10%, Unit cost of item = Rs 10, and lead time 10 days.
 Find (i) EOQ (ii) Number of order per years (iii) Average usage if there are 300 working days per year (iv) Safety stock if highest usage rate is 70 units per day (v) R. O. L (vi) Average inventory (vii) Inventory carrying cost per year.

- Q.4 (a)** A chemical company distributes its products by trucks loaded at its only loading station and loading station is working 24 hours, continuously. Both company's trucks and contractor's trucks are used for this purpose. It was find out that on an average 10 minutes one truck arrived and average loading time was 6 minute. If 50% trucks are contractor's trucks find (i) Traffic intensity factor, (ii) Weighting time of trucks in system, (iii) The expected weighting time of contractor's trucks per day. **06**
- (b)** The captain of cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows: **08**

Batsmen	Batting position				
	I	II	III	IV	V
P	40	40	35	25	50
Q	42	30	16	25	27
R	50	48	40	60	50
S	20	19	20	18	25
T	58	60	59	55	53

Find the assignments of batsmen to positions which would give the maximum number of runs.

OR

Q.4 (a) Solve the following game by using Dominance method **07**

		Player B		
		B1	B2	B3
Player A	A1	4	5	8
	A2	6	4	6
	A3	4	2	4

(b) Explain the various elements of queuing system **07**

Q.5 (a) The details of activity in project management are given below.

Activity	Normal		Crash	
	Time (Days)	Cost (Rs.)	Time (Days)	Cost (Rs.)
1-2	3	300	2	400
2-3	6	480	4	520
2-4	7	2100	5	2500
2-5	8	400	6	600
3-4	4	320	3	360
4-5	5	500	4	520

Find (i) Critical path & Project duration **03**

(ii) Optimum project cost with considering indirect cost is 100 Rs.er day. **05**

(b) What is the simulation? Classify the simulation model? Explain the general Simulation methodology. **06**

OR

Q.5 (a) (I) The details of activity and duration are shown below.

Activity	Immediate predecessor activity	Duration (Days)
A	-	10
B	A	5
C	A	4
D	A	7
E	B, C	6
F	C, D	4
G	E, F	7

Find

(i) Draw a network **02**

(ii) Find the critical path **02**

(iii) Project duration **01**

(II) What is the meaning float in project management? State the various types float. **02**

(b) Do as directed with reference to dynamic programming

(i) Explain the terms: State, Stage and Policy **03**

(ii) Explain Bellman's Principle of Optimality **02**

(iii) Explain: Transformation function and Return function **02**
