Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code: 173405 **Date: 03-12-2013**

Subject Name: Operations Research

Time: 10:30 TO 01:00 **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)** What is O.R.? Write note on scope of operation research in the various sectors. **07**

(b) Find the initial basic feasible solution for the following transportation problem by Least Cost method. **07**

	To				Supply
From	1	2	1	4	30
	3	3	2	1	50
	4	2	5	9	20
Demand	20	40	30	10	

Q.2 **(a)** The processing times in hours for the jobs when allocated to the different machines are indicated below. Assign the machines for the jobs so that the total processing time is minimum **07**

	Machines					
Jobs		M1	M2	M3	M4	M5
	J1	9	22	58	11	19
	J2	43	78	72	50	63
	J3	41	28	91	37	45
	J4	74	42	27	49	39
	J5	36	11	57	22	25

(b) Explain, in brief, with examples **07**

a) North West Corner rule

b) Lowest Cost entry method

For solving the transportation problem.

OR

(b) Solve the following LPP by simplex method: **07**

Maximize $Z = 15x_1 + 6x_2 + 9x_3 + 2x_4$

subject to $2x_1+x_2 + 5x_3 + 6x_4 \leq 20$

$3x_1+ x_2 + 3x_3 + 25x_4 \leq 24$

$7x_1 +x_4 \leq 70$

and $x_1, x_2, x_3, x_4 \geq 0$.

Q.3 **(a)** About 50 items are required every day for a machine. A fixed cost of Rs.50 per order is incurred for placing an order. The inventory carrying cost per item amounts to Rs. 0.02 per day. The lead period is 32 days, compute **07**

1.Economic Order Quantity (EOQ)

2.Reorder Level

3.No.of orders per year

4. Time Lag between two purchases

5. Associated Cost.

(b) What do mean by Inventory? What are the various prices associated with Inventory? Write a brief note on various Inventory control techniques. **07**

OR

Q.3 **(a)** A Belt snapping for a conveyor in an open cast mine occurs at the rate of 2 per shift. There is only one hot plate available for vulcanizing, and it can vulcanize on an average 5 belts snap per shift. **07**

1. What is the probability that when a belt snaps, the hot plate is readily available?
2. What is the average number of belts in the system?
3. What is the waiting time for an arrival?
4. What is the average waiting time plus vulcanizing time?

(b) Explain in brief the main characteristics of a Queuing Model **07**

Q.4 **(a)** Star bakery keeps stock of a popular brand of cake. Daily demand based on past experience is given below: **07**

Daily Demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of the random numbers:-
Random Numbers: 48, 78, 09, 51, 56, 77, 15, 14, 68, 09
Using the Monte Carlo Queuing sequence, simulate the demand for the next 10 days. Find out the stock situation if the owner of the bakery decides to make 35 cakes every day. Also estimate the daily average demand for the cakes on the basis of the simulated data.

(b) Define the geometric and goal programming and explain its application. **07**

OR

Q.4 **(a)** The Data collected in running a machine the cost of which is Rs.60,000 are given below : **07**

Year	1	2	3	4	5
Resale Value (Rs)	42,000	30,000	20,400	14,400	9,650
Cost of Spares (Rs)	4,000	4,270	4,880	5,700	6,800
Cost of Labour (Rs)	14,000	16,000	18,000	21,000	25,000

Determine the optimum period for replacement of the machine.

(b) Discuss the application of Replacement theory in business situations. **07**

Q.5 **(a)** Explain (a) Saddle Point (b) mixed strategy (c) pure strategy (d) Zero sum game in relation to game theory. **07**

(b) Looking at the present market condition Star company's managing director and their competitors are proposing following 4 pricing strategies each of these are : **07**
I: Rapid Penetration Pricing.
II: Skimming Pricing.
III: Market Oriented Pricing.
IV: Time Based Pricing.

The various overheads for the Star Company and their competitor company after adopting above mentioned pricing policy are given for every pair of strategy choice.

Star Company Strategies.

Competitors Strategies	I	II	III	IV
I	20	15	12	35
II	25	14	8	10
III	40	2	10	5
IV	-5	4	11	0

What strategy will the two sides adopt? Also determine the value of the game.

OR

Q.5 **(a)** Distinguish between PERT and CPM **07**

(b) The following table indicates the details of a project. The durations are in days. 'a' refers to optimistic time, 'm' refers to most likely time and 'b' refers to pessimistic time duration. **07**

Activity	1-2	1-3	1-4	2-4	2-5	3-5	4-5
a	2	3	4	8	6	2	2
m	4	4	5	9	8	3	5
b	5	6	6	11	12	4	7

a) Draw the network and
b) Find the critical path.

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