

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII • EXAMINATION – SUMMER • 2015

Subject Code: 173405**Date: 06/05/2015****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)** What is OR? What are the characteristic and limitations of OR techniques? **07**
 Explain with suitable example.
- (b)** Find the starting solution of the following transportation model **07**

| | | | |
|----|----|----|----|
| 1 | 2 | 6 | 7 |
| 0 | 4 | 2 | 12 |
| 3 | 1 | 5 | 11 |
| 10 | 10 | 10 | |

Using Least cost method.

- Q.2 (a)** Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows: **07**

| | | | | | | | |
|--------|---|-----|---|---|---|---|---|
| | | Job | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | |
| Person | A | (| 8 | 4 | 2 | 6 | 1 |
| | B | | 0 | 9 | 5 | 5 | 4 |
| | C | | 3 | 8 | 9 | 2 | 6 |
| | D | | 4 | 3 | 1 | 0 | 3 |
| | E | | 9 | 5 | 8 | 9 | 5 |
| | |) | | | | | |

Determine the optimum assignment schedule.

- (b)** Explain, in brief, with examples **07**
- a) North West Corner rule
 - b) Lowest Cost entry method
- For solving the transportation problem.

OR

- (b)** Use simplex method to **07**

$$\text{Min } Z = x_2 - 3x_3 + 2x_5$$

Subject to

$$\begin{aligned} 3x_2 - x_3 + 2x_5 &\leq 7 \\ -2x_2 + 4x_3 &\leq 12 \\ -4x_2 + 3x_3 + 8x_5 &\leq 10 \\ \text{and } x_2, x_3, x_5 &\geq 0 \end{aligned}$$

- 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) Discuss the functions and types of inventory control. Also discuss advantages of ABC analysis to the management. **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 assumptions and limitations 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 cost of a machine is Rs. 6100 and its scrap value is Rs. 100. The maintenance cost found from experience is as follows: **07**

| | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|------|------|------|
| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Main cost (Rs.) | 100 | 250 | 400 | 600 | 900 | 1200 | 1600 | 2000 |

When should the machine be replaced?

- (b) Why is replacement of items required? Distinguish between individual replacement and group replacement policy. **07**

- Q.5 (a)** Explain (a) mixed strategy (b) pure strategy (c) 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. | | | |
|------------------------|-----|--------------------------|----|-----|----|
| | | I | II | III | IV |
| Competitors Strategies | 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) A project consists of the following activities and time estimates: **07**

| Activity | Least time (days) | Greatest time (Days) | Most likely time (days) |
|----------|-------------------|----------------------|-------------------------|
| 1-2 | 3 | 15 | 6 |
| 2-3 | 2 | 14 | 5 |
| 1-4 | 6 | 30 | 12 |
| 2-5 | 2 | 8 | 5 |
| 2-6 | 5 | 17 | 11 |
| 3-6 | 3 | 15 | 6 |
| 4-7 | 3 | 27 | 9 |
| 5-7 | 1 | 7 | 4 |
| 6-7 | 2 | 8 | 5 |

- (a) Draw the network.
 (b) What is the probability that the project will be completed in 27 days?
