

Subject : Computer Oriented Decisions Models

Day : Tuesday
Date : 14/06/2016



Time : 10.00 AM TO 1.00 PM
Max Marks : 80 Total Pages : 2

N.B.:

- 1) Attempt **ANY FIVE** questions from Section – I and attempt **ANY TWO** questions from Section – II.
- 2) Answers to both the sections should be written in the **SAME** answer book.
- 3) Figures to the right indicate **FULL** marks.

SECTION – I

Q.1 Define Operations Research. Discuss its applications and limitations. **[10]**

Q.2 A manufacturer produces bicycles and tricycles each of which must be processed through two machines A and B. Machine A has maximum of 120 hours available and machine B has a maximum of 180 hours available. Manufacturing of tricycle requires 6 hours on machine A and 3 hours on machine B. Manufacturing a bicycle requires 4 hours on machine A and 10 hours on machine B. Profits are Rs. 445/- for a tricycle and Rs. 465/- for a bicycle. Formulate LPP and solve graphically. **[10]**

Q.3 A bakery keeps stock of popular brand of cake. Previous experience shows the daily demand pattern for the item with associated probabilities, as given below: **[10]**

| | | | | | | |
|--------------|------|------|------|------|------|------|
| Daily demand | 0 | 10 | 20 | 30 | 40 | 50 |
| Probability | 0.01 | 0.20 | 0.15 | 0.50 | 0.12 | 0.02 |

Simulate the demand for next 10 days by using the following sequence of random numbers:

25, 39, 65, 76, 15, 05, 73, 89, 19, 49.

Also estimate the daily average demand for the cakes.

Q.4 What is decision making process? Briefly describe decision making under certainty and risk. **[10]**

Q.5 Solve the following assignment problem for minimization: **[10]**

| | I | II | III | IV |
|---|----|----|-----|----|
| A | 11 | 14 | 16 | 13 |
| B | 19 | 17 | 11 | 19 |
| C | 14 | 15 | 11 | 17 |
| D | 18 | 17 | 18 | 15 |

Q.6 Find initial basic feasible solution by Vogel's Approximation Method for the following transportation problem: **[10]**

| | D ₁ | D ₂ | D ₃ | D ₄ | D ₅ | Availability |
|----------------|----------------|----------------|----------------|----------------|----------------|--------------|
| O ₁ | 3 | 4 | 6 | 8 | 8 | 20 |
| O ₂ | 2 | 10 | 1 | 5 | 30 | 30 |
| O ₃ | 7 | 11 | 20 | 40 | 15 | 15 |
| O ₄ | 2 | 1 | 9 | 14 | 13 | 13 |
| Demand | 40 | 6 | 8 | 18 | 5 | |

P.T.O.

Q.7 Find the sequence that minimizes the total time required in performing the following jobs on three machines A, B and C. Processing time in hours are given in the following table: [10]

| Job | 1 | 2 | 3 | 4 | 5 |
|-----------|---|----|---|---|----|
| Machine A | 8 | 10 | 6 | 7 | 11 |
| Machine B | 5 | 6 | 2 | 3 | 4 |
| Machine C | 4 | 9 | 8 | 6 | 5 |

SECTION – II

Q.8 Solve the following LPP by simplex method: [15]
Maximum $z = 2x_1 - x_2 + x_3$
Subject to $x_1 + x_2 - 3x_3 \leq 8$
 $-4x_1 + x_2 - x_3 \leq 2$
 $-2x_1 - 3x_2 + x_3 \leq 4$
 $x_1, x_2, x_3 \geq 0$

Q.9 Solve the following transportation problem by using MODI method: [15]

| | D ₁ | D ₂ | D ₃ | Supply |
|----------------|----------------|----------------|----------------|--------|
| O ₁ | 1 | 2 | 6 | 7 |
| O ₂ | 0 | 4 | 2 | 12 |
| O ₃ | 3 | 1 | 5 | 11 |
| Demand | 10 | 10 | 10 | |

Q.10 An established company has decided to add a new product to its line. It will buy the product from a manufacturing concern, package it, and sell it to a number of distributors selected on a geographical basis. The steps shown in the following table are to be planned. [15]

| Activity | Predecessors | Duration (days) |
|----------|--------------|-----------------|
| A | --- | 6 |
| B | A | 4 |
| C | B | 7 |
| D | A | 2 |
| E | D | 4 |
| F | E | 10 |
| G | --- | 2 |
| H | G | 10 |
| I | J, H | 6 |
| J | --- | 13 |
| K | A | 9 |
| L | C, K | 3 |
| M | I, L | 5 |

- a) Draw network diagram.
- b) Indicate the critical path.

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