

MAY 2014

**P/ID 77602/PBE1B/
PBEXB**

Time : Three hours

Maximum :100 marks

PART A — (5 × 6 = 30 marks)

Answer any FIVE questions.

1. Explain the applications of operations research.
2. Explain the steps in decision theory approach.
3. What are the advantages and disadvantages of the sampling method?
4. What is the importance of hypothesis testing in validating findings?
5. What are the steps in Hungarian assignment methods?
6. What is CPM? What are the rules of network construction?
7. What are the limitations of correlation analysis and how does regression overcome them?
8. What are the various kinds of target audience for research reports?

PART B — ($5 \times 10 = 50$ marks)

Answer any FIVE questions.

All questions carry equal marks.

9. Five employees are required to operate a chemical process and the process cannot be started until all 5 workstations are manned. Employee records indicate that there is 0.3 chance of any one employee being late and we know that they all come to work independently of each other. Management is interested in knowing the probabilities of 0, 1, 2, 3, 4 or 5 employees being late, so that a decision concerning the number of backup personnel can be made. Draw the probability distribution illustrating this situation.
10. A pair of fair dice is rolled once. Let x be the random variable whose value for any outcome is the sum of the two numbers on the dice
- Find the probability function of x . Construct the probability table and a probability chart
 - Find the probability that x is an odd number
 - Find $P(3 \leq x_i \leq 9)$ and $P(0 \leq x_i \leq 4)$.

2 **P/ID 77602/PBE1B/
PBEXB**

11. Solve the following problems by simplex method

$$\text{Maximize } z = 2x_1 + x_2$$

Subject to

$$x_1 + 2x_2 \leq 10$$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1 - 2x_2 \leq 1$$

$$x_1, x_2 \geq 0.$$

12. The following data relate to two variables X and Y . It is required to be ascertained whether there is any relationship between the two variables.

$$X: 2 \quad 5 \quad 4 \quad 6 \quad 9$$

$$Y: 3 \quad 4 \quad 4 \quad 8 \quad 9$$

13. Describe the various steps involved in the sampling process.
14. Discuss the significance and scope of operations research in modern management.
15. Calculate the earliest start, earliest finish, latest start, latest finish of each activity of the project given below and determine the critical path of the project. Draw the network.

Activity : 1-2 1-3 1-5 2-3 2-4 3-4 3-5 3-6 4-6 5-6

Duration (in weeks) : 8 7 12 4 10 3 5 10 7 4

16. Explain the important principles of writing report.

3 **P/ID 77602/PBE1B/
PBEXB**

PART C — (20 marks)

Compulsory.

17. An investigation into the demand for television sets in seven towns has resulted into the following data.

| Town | Population (‘000) | Demand for T.V. sets (No.) |
|------|----------------------|-------------------------------|
| | X | Y |
| A | 11 | 15 |
| B | 14 | 27 |
| C | 14 | 28 |
| D | 17 | 30 |
| E | 17 | 34 |
| F | 21 | 38 |
| G | 25 | 46 |

Fit a linear regression of Y on X and estimate the demand for television sets for a town with a population of (a) 20000 and (b) (32000).