**B.Sc. DEGREE EXAMINATION, NOVEMBER 2015.**

**II YEAR — IV SEMESTER**

**Major Paper — OPERATIONS RESEARCH-I**

**Time : 3 hours Max. Marks : 60**

**SECTION A — (10 × 1 = 10 marks)**

**Answer any *TEN* questions.**

1. What is Operations Research?
2. Give a comprehensive explanation of the term “game theory”.
3. Write any two draw backs of Expected Monetary Value Analysis.
4. Define the term decision.
5. What is slack variable?
6. Define unbounded solution.
7. Write the procedure of Laplace criterion.
8. Write the rules for determining a saddle point.
9. What is a decision tree?
10. Mention the difference between pure and mixed strategy.
11. What is called sequencing?
12. Write the mathematical form of EOL**.**

**SECTION B — (5 × 4 = 25 marks)**

**Answer any *FIVE* questions.**

1. What are the different types of models used in Operations Research?
2. Solve graphically the following LPP

Maximum *Z = X1+ X2*

Subject to constraints:

*X1+ X2* ≤ 1

— 3 *X1+ X2* ≥3

*X1, X2* ≥ 0.

1. During risk management planning your team has identified three risks with probabilities of 10%, 50%, and 35%. If the first two risks occur, they will cost you 5,000 USD and 8,000 USD; however, if the third risk occurs it will give you benefit of 10,000 USD. Determine the expected monetary value of these risk events.
2. A businessman has the three alternatives open to him each of which can be followed by any of the four possible events. The conditional payoffs

(in `) for each action-event combination are given below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Alternative | Payoffs conditional on events | | | |
| A | B | C | D |
| X | 8 | 0 | -10 | 6 |
| Y | - 4 | 12 | 18 | -2 |
| Z | 14 | 6 | 0 | 8 |

Determine which alternatives should the businessman choose, if he adopts the (a) Maximin criterion (b) maximax criterion and

(c) Hurwicz riterion, his degree of optimism being 0.7.

[P.T.O.]

1. Solve the game whose payoff matrix is:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | B | |  |
|  |  | I | II | III |
| A | I | 1 | 7 | 2 |
|  | II | 6 | 2 | 7 |
|  | III | 5 | 1 | 6 |

1. Write the basic assumptions of sequencing problem.
2. What is the duality in LPP? write the dual of the LPP.

Min *Z = 4X1 + 6X2 + 18X3*

Subject to constraints:

*X1+ 3x33, X2+ 2X35; Xj0 ( j =1,2,3 ).*

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. A marketing manager wishs to allocate his annual adverting budget of `20,000 in two media vehicles A and B. The unit cost of a message in media A is `1,000 and that of B is `1,500. Media A is a monthly magazine and not more than one insertion is desired in one issue. Atleast 5 message should appear in media B. The expected effective audience for the unit message in media A is 40,000 and for media B is 55,000.
2. Develop a mathematical model.
3. Solve it for maximizing the total effective audience.
4. Explain the procedure for finding the optimum solution to the L.P.P. Using Simplex Method.
5. A business man has two independent investments A and B available to him but he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop or if A is successful than take B, or vice versa. The probability of success for A is 0.7 while for B it is 0.4. Both investments require an initial capital outlay of `2000; and both return nothing if the venture is unsuccessful. Successful competition of A will return `3000 (over cost), and successful completion of B will return `5000 (over cost). Draw the decision-tree and determine the best strategy.
6. Obtain the optimal strategies for both persons and the value of the game for zero-sum two person games whose payoff matrix is as follows:

|  |  |  |
| --- | --- | --- |
|  | Player B |  |
|  | 1 | -3 |
|  | 3 | 5 |
|  | -1 | 6 |
| Player A | 4 | 1 |
|  | 2 | 2 |
|  | -5 | 0 |

1. (a) Write the procedure of ‘*n*’ jobs and ‘*m*’ machines.

(b) Six jobs go first over machine I and then over machine II. The order of the completion of jobs has no significance. The following table gives the machines times in hours for six jobs and the two machines:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Job No | 1 | 2 | 3 | 4 | 5 | 6 |
| Time on Machine I (Ai) | 5 | 9 | 4 | 7 | 8 | 6 |
| Time on Machine II(Bj) | 7 | 4 | 8 | 3 | 9 | 5 |

Find the sequence of jobs that minimizes the total elapsed time to complete the jobs.