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Roll No. :

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**M. B. A. (Fourth Semester) Examination,
April-May 2021**

(New Course)

(Specialization : General)

(Management Branch)

ECONOMETRICS and DECISION SCIENCE (New)

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 32

Note : Attempt all questions. All questions carry equal marks.

Unit-I

1. (a) What do you mean by Econometrics? Discuss the methodology of Econometrics with suitable example.

[2]

- (b) Explain the concept and features of Input-Output analysis. What conditions ensures system viability? 8

Or

An economy has the following input-output coefficient matrix

$$A = \begin{bmatrix} 0 & 0.5 & 0 \\ 0.2 & 0 & 0.5 \\ 0.4 & 0 & 0 \end{bmatrix}$$

The labor days required per unit of output of sectors are 0.4, 0.7 and 1.2 respectively and their output targets are 1000, 5000 and 4000 units respectively.

The wage rate is ₹ 10 per labor day. You are required to find :

- (i) Gross output of each sector
- (ii) Total labor days required
- (iii) Equilibrium prices
- (iv) Total value added 16

Unit-II

2. (a) Explain the pure and mixed strategy game with suitable example. 8

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[3]

- (b) Discuss the concept of Dominance in game theory. 8

Or

- (a) Find the optimum strategy/ies for P and Q and value of the Game :

| | | | |
|---|----|----|----|
| | Q | | |
| | -6 | 10 | 11 |
| P | -1 | -2 | -3 |
| | -1 | -2 | -4 |

- (b) Solve graphically the following game :

| | | |
|----------------|----------------|----------------|
| | Player B | |
| | B ₁ | B ₂ |
| A ₁ | 3 | 4 |
| A ₂ | -3 | 12 |
| A ₃ | 6 | -2 |
| Player A | A ₄ | -9 |
| | A ₅ | -3 |

Unit-III

3. What inputs are required in Markov Chain analysis? What predictions (output) Markov analysis provides? 8

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[4]

Or

(a) In a market, two brands of shampoos *ABC* and *XYZ* are sold. If a customer currently purchases brand *ABC*, there is 80% chance the he would buy the same brand in next purchase, while if a customer purchased *XYZ*, there is 90% chance that his next purchase would be *XYZ* again. Develop the transition probability matrix and calculate :

8

- (i) The probability that if a customer is currently a brand *ABC* purchaser, he will purchase brand *XYZ* two purchases from now.
- (ii) The probability that if a customer is a brand *XYZ* purchaser he will purchase brand *ABC* in the next purchase.

(b) If *A*, *B* and *C* having equal market share, what will be the long run market shares of the three companies? Given that :

| | <i>A</i> | <i>B</i> | <i>C</i> |
|----------|----------|----------|----------|
| <i>A</i> | 0.90 | 0.03 | 0.07 |
| <i>B</i> | 0.10 | 0.70 | 0.20 |
| <i>C</i> | 0.10 | 0.10 | 0.80 |

8

[5]

Unit-IV

4. (a) Explain and Illustrate the following principles of decision making :

(i) Laplace

(ii) Maximax

(iii) Maximin

(iv) Hurwicz

8

(b) What are decision trees? How and in what type of situations are they employed for decision making?

8

Or

(a) From the following profit matrix, obtain the decisions using :

(i) Maximax

(ii) Maximin

(iii) Laplace

(iv) Hurwicz ($\alpha = 0.6$)

| | a_1 | a_2 | a_3 | a_4 | a_5 |
|-------|-------|-------|-------|-------|-------|
| S_1 | 26 | 22 | 13 | 22 | 18 |
| S_2 | 26 | 22 | 34 | 30 | 20 |
| S_3 | 18 | 22 | 18 | 18 | 20 |
| S_4 | 22 | 22 | 18 | 18 | 18 |

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[6]

(b) A physician purchases a particular vaccine on Monday of each week. The vaccine must be used within the week, otherwise it becomes worthless. The vaccine costs ₹ 20 per dose and the physician charges Rs. 60 per dose. In the past 50 weeks, the physician has administered the vaccine in the following quantities :

Doses per week : 20 25 40 60

No. of weeks : 5 15 25 5

- (i) Draw up a payoff matrix
- (ii) Obtain a regret matrix
- (iii) Determine the optimum number of doses the physician should buy
- (iv) The maximum amount the physician would be willing to pay per week for a perfect information about the number of doses expected to be demanded in a week.

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Unit-V

5. (a) What is simulation? How it helps in decision making? 8
- (b) A shopkeeper keeps stock of a product. Previous

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[7]

experience shows the daily demand pattern for the item with associated probabilities, as given

| | | | | | | |
|-----------------------|------|------|------|------|------|------|
| Daily Demand (Nos.) : | 0 | 10 | 20 | 30 | 40 | 50 |
| Probability | 0.01 | 0.20 | 0.15 | 0.50 | 0.12 | 0.02 |

Use the following sequence of random numbers to simulate the demand for next 10 days. Also find average demand per day

Random Number : 25, 39, 65, 76, 12, 05

73, 89, 19, 49

8

Or

A bookstore has to decide the no. of copies of a particular tax law book to order. A book costs ₹ 60 and sold for ₹ 80. Since some of the laws change year after year, any copies unsold, must be returned at ₹ 30. From the past record, demand is as :

| | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|
| Demand : | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Proportion : | 0.05 | 0.08 | 0.20 | 0.45 | 0.10 | 0.07 | 0.03 | 0.02 |

Use the following random numbers generate data on demand for 10 years.

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14, 02, 93, 99, 18, 71, 37, 30, 12, 10

Calculate the profit obtainable if book-store keeps

18 or 21 copies. Which one is better? 16

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 18 | 21 | 18 | 21 | 18 | 21 | 18 | 21 |
|----|----|----|----|----|----|----|----|

The following table shows the profit obtainable if the book-store keeps 18 or 21 copies of the book. The demand for the book is given in the following table.

Profit obtainable if the book-store keeps 18 or 21 copies of the book.

A book-store has to decide the no. of copies of a particular book to stock. A book costs ₹ 50 and sells for ₹ 70. The stock-out cost is ₹ 10 per copy. The demand for the book is given in the following table.

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 18 | 21 | 18 | 21 | 18 | 21 | 18 | 21 |
|----|----|----|----|----|----|----|----|

The following table shows the profit obtainable if the book-store keeps 18 or 21 copies of the book.