

Total No. of Questions : 5]

SEAT No. :

PC3038

[6380]-3002

S.Y.M.B.A.

302-GC-12: DECISION SCIENCE
(Revised 2019 Pattern) (Semester - III)

[Total No. of Pages : 3

Time : 2½ Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Each question carries 10 marks.*
- 2) *Graph paper will not be provided.*
- 3) *Use of non-scientific calculator is allowed.*

Q1) Solve ANY FIVE of the following:

[5×2=10]

- a) Give two real-life examples of Poisson distribution.
- b) What is infeasibility in Linear Programming Model?
- c) What are the assumptions of single server queuing model?
- d) Enlist any three methods to get the initial feasible solution to the transportation model.
- e) Write conditions for basic assignment models.
- f) Define critical path in network diagram.
- g) State the any four applications of Markov Chains in functional areas of business.
- h) What is Pure Strategy Game?

Q2) Solve ANY TWO of the following:

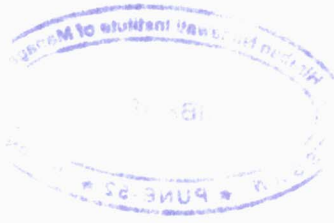
[2×5=10]

- a) A management - consulting firm has 4 contracts. Three project leaders are available for assignment of these contracts. Because of the varying work experience of the project leaders, the profit to consulting firm will vary on the assignment as shown below:

| Project Leader | Contract | | | |
|----------------|----------|----|----|----|
| | 1 | 2 | 3 | 4 |
| A | 13 | 10 | 9 | 11 |
| B | 15 | 17 | 13 | 20 |
| C | 6 | 8 | 11 | 7 |

Find the optimal assignment and total profit.

P.T.O.



- b) Explain the role of quantitative techniques in decision making.
- c) At an ATM center arrivals occur according to Poisson distribution with a rate of 5 per hour. Service time per customer is exponentially distributed with mean 5 minutes.
- Find the expected number of customers in service.
 - What is the percentage of time the facility is idle.

Q3) Solve ANY ONE of the following:

[1×10=10]

- a) A furniture manufacturing company plans to make two products - chairs and tables, from its available resources which consist of 400 board feet of mahogany timber and 450 man-hours of labour. It knows that to make a chair requires 5 board feet and 10 man-hours and yields a profit of Rs. 45, while each table uses 20 board feet and 15 manhours and has a profit of Rs. 80. The problem is to determine how many chairs and tables the company can make keeping within its resources constraints so that it maximizes the profit. Formulate a linear programming model and provide its graphical solution.
- b) Solve the following Transportation Problem

| | D1 | D2 | D3 | D4 | Supply |
|--------|----|----|----|----|--------|
| S1 | 16 | 17 | 11 | 12 | 20 |
| S2 | 9 | 15 | 12 | 15 | 50 |
| S3 | 13 | 14 | 7 | 13 | 30 |
| Demand | 22 | 15 | 38 | 25 | |

Q4) Solve ANY ONE of the following:

[1×10=10]

- a) A film distributor is faced with the problem of selecting one of the two films for distribution. The profit depends upon the market acceptability of the films, 'which is uncertain. But it has been broadly classified into four categories as - Excellent, Good, Fair and Poor. The profits expected from the release of these films at different levels of market acceptability are as follows:

| Market Acceptability | Profit (in Rs. Per day) | |
|----------------------|-------------------------|---------|
| | Film-A | Film-B |
| Excellent | 60,000 | 78,000 |
| Good | 28,000 | 30,000 |
| Fair | 18,000 | 8,000 |
| Poor | 8,000 | -12,000 |

Using various Criteria, suggest the film to be distributed. Let $\alpha = 0.7$

- b) Market survey is made on two brands of breakfast foods A and B. Every time a customer purchases, he may buy the same brand or switch to another brand. The transition matrix is given as:

| From | To | |
|------|-----|-----|
| | A | B |
| A | 0.8 | 0.2 |
| B | 0.6 | 0.4 |

At present 60% of people buy brand A and 40% buy brand B. Determine market shares of brands A and B in the steady state

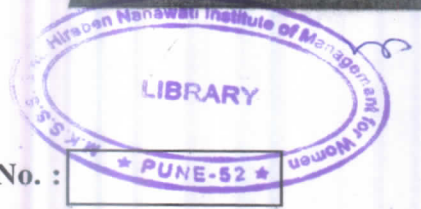
Q5) Solve ANY ONE of the following:

[1×10=10]

- a) A committee of four has to be formed from among 3 economists, 4 engineers, 2 statisticians and 1 doctor.
- What is the probability that each of four professions is represented in the committee?
 - What is the probability that the committee consists of the doctor and at least one economist?
- b) Solve the following game:

| | | B | | |
|---|----|----|----|----|
| | | B1 | B2 | B3 |
| A | A1 | 2 | 7 | 6 |
| | A2 | 6 | 7 | 2 |
| | A3 | 6 | 6 | 1 |





Total No. of Questions : 5]

SEAT No. :

* PUNE-52 *

PB2075

[Total No. of Pages : 3

[6201]-302

S.Y.M.B.A.

**302 - GC - 12 - Decision Science
(2019 Revised Pattern) (Semester - III)**

Time : 2½ Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicated full marks.
- 3) Each question carries 10 marks
- 4) Graph paper will not be provided
- 5) Use of non-scientific calculator is allowed

Q1) Solve any Five

[5×2=10]

- a) Define dependent event
- b) Define mean arrival rate
- c) Define critical path
- d) Define saddle point
- e) Define pure strategy
- f) List techniques of initial solution for Transportation problem.
- g) State unbalance transportation problem.
- h) State full form of NWCM & MODI.

Q2) Solve any two out of three questions:

[10]

- a) Slove the following LPP by Graphical Method

$$\text{Maximize } Z = 15x_1 + 10x_2$$

$$4x_1 + 6x_2 \leq 360$$

$$3x_1 \leq 180$$

$$5x_2 \leq 200$$

$$x_1, x_2 \geq 0$$

- b) Find the initial solution by using Least Cost Method (LCM)

| | W_1 | W_2 | W_3 | W_4 | Supply |
|--------|-------|-------|-------|-------|--------|
| P_1 | 190 | 300 | 500 | 100 | 90 |
| P_2 | 700 | 300 | 400 | 600 | 90 |
| P_3 | 400 | 100 | 400 | 200 | 180 |
| Demand | 50 | 80 | 70 | 140 | 340 |

P.T.O.

c) Discuss the dependent and independent event with suitable examples.

Q3) Solve any one of the following: [10]

- a) Solve the following assignment problem by using Hungarian method.
A Computer center has three experts' programmers. The center wants three application programmes to be developed. The head of the computer center, after studying carefully the programmes to be developed, estimates the computer time in minutes by the experts for the application programmes as follows:

| | Programmers | | | |
|------------|-------------|-----|-----|-----|
| | | A | B | C |
| Programmes | 1 | 120 | 100 | 80 |
| | 2 | 80 | 90 | 110 |
| | 3 | 110 | 140 | 120 |

Assign the programmers to the programmes in such a way that the total computer time is minimized.

- b) A bakery keeps stock of a popular brand of cakes. Previous experience shows the daily demand pattern for the cakes with associated probabilities as given below

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

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

Random Numbers: 25, 39, 65, 76, 12, 05, 73, 89, 19, 49

Q4) Solve any one of the following: [10]

- a) Draw a network diagram from the following data

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

- i) Draw a network Diagram for this project
ii) Identify the critical path

- b) For the game with payoff matrix

| | | Player B | | |
|----------|----|----------|----|----|
| | | B1 | B2 | B3 |
| Player A | A1 | -1 | 2 | -2 |
| | A2 | 6 | 4 | -6 |

Determine the optimal strategies for players A and B. Also determine the value of game.

Q5) Solve any one of the following.

[10]

- a) Find the optimal strategies by using
- Maximin Criterion
 - Maximix Criterion
 - Maximun Regret Criterion
 - Laplace Criterion

| Strategies | States of Nature | | |
|------------|------------------|--------|--------|
| | N_1 | N_2 | N_3 |
| S_1 | 700000 | 300000 | 150000 |
| S_2 | 500000 | 450000 | 0 |
| S_3 | 300000 | 300000 | 300000 |

- b) A departmental store had a single cashier. During the rush hours, customers arrive at a rate of 20 customers per hour. The cashier takes on an average 2.5 minutes per customer for processing.
- What is the probability the cashier is idle?
 - What is the average number of customers in the queuing system?
 - What is average queue length?
 - What is the average waiting time system?

Total No. of Questions : 5]

SEAT No. :

P-7899

[Total No. of Pages : 4]

[6118]-3002

M.B.A.

302-GC-12 : DECISION SCIENCE
(Revised 2019 Pattern) (Semester - III)

Time : 2½ Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *All questions are compulsory.*
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- 3) *Each question has an internal option.*
- 4) *Use of simple calculator is allowed.*

Q1) Solve any five questions :

[10]

- a) What is Pure Strategy Game?
- b) Explain CPM and PERT.
- c) What is Flood's Technique! Hungarian Method?
- d) Explain Principal of Dominance
- e) Explain Modified Distribution Method
- f) What is Hurwicz Alpha Criterion?
- g) What is Single Server Queuing Model?

Q2) Solve any two out of the three questions :

[10]

- a) Elaborate with suitable example any five applications of Markov-chain in Management field.
- b) Describe Network crashing and various components of project cost.
- c) Describe Importance of Decision Science in Organisational Decision Making Process.

P.T.O.

Q3) Solve Any One :

[10]

- a) Solve the following LPP graphically :

Maximise $Z = 120x + 100y$

Subject to; $10x + 5y \leq 80$

$6x + 6y \leq 66$

$4x + 8y \geq 24$

$5x + 6y \leq 90$

$x \geq 0, y \geq 0$

- b) A company manufactures around 150 mopeds. The daily production varies from 146 - 154 depending upon the availability of raw materials and other working conditions.

| | | | | | | | | | |
|--------------------|------|------|------|------|------|------|------|------|------|
| Production Per Day | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 |
| Probability | 0.04 | 0.09 | 0.12 | 0.14 | 0.11 | 0.10 | 0.20 | 0.12 | 0.08 |

The finished mopeds are transported in a specially arranged lorry accommodating only 150 mopeds. Using following random numbers : 80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57. Simulate the process to find out :

- What will be the average number of mopeds waiting in the factory?
- What will be the average Number of empty spaces on the lorry?

Q4) Solve Any One :

[10]

- a) A self-service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming poisson distribution for arrival rate and exponential distribution for service rate find :

- Average number of customers in the system.
- Average number of customers in the queue or average queue length
- Average time a customer spends in the system
- Average time a customer waits before being served.

b) The following information is gathered for a project :

| Activity | Preceding Activity | Duration (Week) |
|----------|--------------------|-----------------|
| A | - | 1 |
| B | A | 3 |
| C | A | 4 |
| D | A | 3 |
| E | D | 2 |
| F | B,C,E | 4 |
| G | D | 9 |
| H | D | 5 |
| I | H | 2 |
| J | F,G,I | 2 |

- i) Draw the network diagram.
- ii) Determine critical path and project Duration.
- iii) What is the Effect on the project duration if :
 - 1) D is changed to 6 weeks.
 - 2) F is changed to 8 weeks.

Q5) Solve Any One :

[10]

- a) Two breakfast food manufacturing firms A and B are competing for an increased market share. To improve its market share both the firms decide to launch the following strategies.

A_1B_1 = Give coupons

A_2B_2 = Decrease price

A_3B_3 = Maintain Present strategy

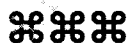
A_4B_4 = Increase Advertising

The pay-off matrix shown in the following table describes the increase in the market share for firm A and decrease in the market share for firm B.

| Firm A | Firm B | | | |
|--------|--------|-------|-------|-------|
| | B_1 | B_2 | B_3 | B_4 |
| A_1 | 35 | 65 | 25 | 5 |
| A_2 | 30 | 20 | 15 | 0 |
| A_3 | 40 | 50 | 0 | 10 |
| A_4 | 55 | 60 | 10 | 15 |

Determine the optimal strategies for each firm and the value of the Game.

- b) Four cards are drawn at random from a pack of 52 cards, Find the probability that :
- They are a king, a queen, a jack and an ace
 - Two are kings and two are jacks.
 - All are clubs
 - All are red or all are blacks



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P-7899

[6118]-3002

M.B.A.

302-GC-12 : DECISION SCIENCE
(Revised 2019 Pattern) (Semester - III)

SEAT No. :

LIBRARY

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* PUNE-52 *

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