

Total No. of Questions : 5]

PD-2706

SEAT No. : LIBRARY

[Total No. of Pages : 3

[6430]-42

M.B.A.

GC - 12 - 302 : DECISION SCIENCE

(Revised 2019 Pattern) (Semester - III)

Time : 2½ Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) All questions are compulsory.
- 2) Each question carries 10 marks.
- 3) Each question has an internal option.
- 4) Use of simple calculator is allowed.

Q1) Solve Any Five questions :

[10]

- a) Explain PERT.
- b) Enlist various criteria of decision making under uncertainty.
- c) State the condition for case of degeneracy in transportation models.
- d) What is Pure strategy Game?
- e) Define the term Markov Chain.
- f) Explain Trail and Event.
- g) What are the assumptions of single server queuing model?

Q2) Solve Any Two out of the three questions :

[10]

- a) Explain role of quantitative techniques in management decision making process.
- b) With suitable example elaborate difference between CPM and PERT.
- c) Describe Elements of Queuing system in detail.

P.T.O.

Q3) Solve Any One :

[10]

- a) An airline Co. has drawn-up a new flight schedule involving five flights. To assist in allocating five pilots to the flights it has asked them to state their preference scores by giving each flight a number out of 10. The higher the number, the greater is the preference. Certain of these flights are unsuitable to some pilots owing to some domestic reasons. These have been marked with x. What should be the allocation of the pilots to flights in order to meet as many preferences as possible.

	Flight Number					
Pilot		1	2	3	4	5
	A	8	2	x	5	4
	B	10	9	2	8	4
	C	5	4	9	6	x
	D	3	6	2	8	7
	E	5	6	10	4	3

- b) A Company produces two special types of soaps X and Y for which the following data is available :

Per Unit	X	Y
Selling Price	Rs.18	Rs.25
Direct Material		
A	2 units @ Rs 2/unit	3 units @ Rs 2/unit
B	1 unit @ Rs 4/unit	2 units @ Rs 4/unit
C		1 unit @ Rs 1/unit
Direct Labor	1 Man hour @ Rs 2.5/hr	1 Man hour @ Rs 2.5/hr
Variable overhead	Rs.1	Rs.1.5

The fixed Overheads are Rs.1500 per month. The quantities of materials A,B,C available for the production are 500, 400 and 200 respectively per month. There are 2 workers who work for 8 hours a day for 25 days in a month. The per month market demand for X and Y is at least 200 and 150 units respectively. Formulate this as a LPP.

Q4) Solve Any One :

[10]

- a) Find the value of the game and the optimal actions for the players :

Player A	Player B	
	B ₁	B ₂
A ₁	11	7
A ₂	9	10

b) Obtain the initial solution of the following transportation problem using

i) NWCM

ii) LCM

iii) VAM

	D_1	D_2	D_3	D_4	Supply
O_1	10	20	5	7	10
O_2	13	9	12	8	20
O_3	4	15	7	9	30
O_4	14	7	1	0	40
O_5	3	12	5	19	50
Demand	60	60	20	10	

Q5) Solve Any One from the following :

[10]

- a) We have five jobs, each of which must go through the two machines A and B in the order AB. The Processing times in hours are given below. Determine an optimal sequence for these five jobs which will minimize the total elapsed time. Find the total time elapsed. If cost of unused machine is Rs. 50 and Rs. 40 per hour for A and B respectively. How much is the total machine idle time cost?

Job Number	1	2	3	4	5
Machine A	10	2	18	6	20
Machine B	4	12	14	16	6

- b) An urn contains 8 white and 3 red balls. If two balls are drawn at random, what is chance that :

- Both are white
- Both are red
- One is of each color
- Both are red or both are white



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

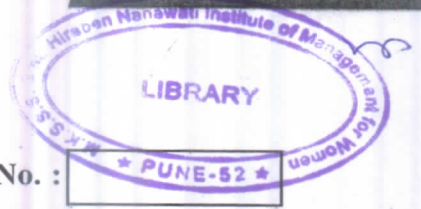
Q5) Solve ANY ONE of the following:

[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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- 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

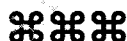
A_4B_4 = Increase Advertising

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
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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

- Draw the network diagram.
- Determine critical path and project Duration.
- What is the Effect on the project duration if :
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