

28/05/24

Total No. of Questions : 5]

SEAT No. :

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	70
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	I, 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.
- 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) 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

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

Q5) Solve Any One :

[10]

- 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

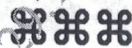
A_4B_4 = Increase Advertising

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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Total No. of Questions : 5]

SEAT No. :

P-7946

[Total No. of Pages : 3

[6118]-42

M.B.A.

302-GC-12 : DECISION SCIENCE

(2019 Pattern) (Semester - III)

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 : [10]

- a) Differentiate between PERT and CPM.
- b) Define Mutually Exclusive Events and Collectively Exhaustive Events.
- c) Define Total Float in Network Diagram.
- d) Define (M/M/1, Infinite, FIFO) in Queuing Theory.
- e) Define Critical Path in Network Diagram.
- f) Enlist the different elements of Queuing System.
- g) List the different Probability Distributions.
- h) Define Discrete Random Variable.

Q2) Answer any two from the following : [10]

- a) Find the initial basic feasible solution of following transporting problem for minimizing using Vogel's approximation method.

Sources	Destination				Capacity
	I	II	III	IV	
A	20	6	25	15	50
B	17	13	16	17	50
C	5	21	19	23	100
	30	40	60	70	

- b) Explain the role of Quantitative Techniques in Decision Making.
- c) Describe the Process of Simulation and state the advantages and disadvantages of Simulation.

P.T.O.

Q3) Answer any one from the following :

[10]

- a) A farmer wants to decide which of the 3 crops he should plant. The farmer has categorized the amt. of rainfall as high, medium and low. Estimated 1000 fit is given below.

Rainfall	Estimated profit (in Rs.)		
	Crop A	Crop B	Crop C
High	8000	3500	5000
Medium	4500	4500	4900
Low	2000	5000	4000

Farmer wishes to plant one crop. Decide the best crop using :

- Hurwickz Alpha criterion
 - Laplace Criterion
 - Mini-max Regret criterion
- b) The rainfall distribution in monsoon is as follows :

Rain in cm.	0	1	2	3	4	5
Frequency	50	25	15	5	3	2

Simulate the rainfall for 10 days using the following random numbers:

67, 63, 39, 55, 29, 78, 70, 06, 78, 76 and also find average rainfall.

Q4) Answer any one from the following :

[10]

- a) It is observed that if a student works hard then chances' of passing an exam is 80%. A random sample of 10 students is selected. What are the chances that :
- No student will pass is examination.
 - All the students will pass the examination.
- b) Mr. Rao the owner of readymade garments shop wishes to publish advertisement in two local daily newspapers, one in local language and one in English. The expected coverage through the advertisement is 1000 people and 1500 people per advertisement respectively. Each advt. in local newspaper costs Rs. 3000 and Rs. 5000 in English newspaper. He decides not to publish more than 10 advt. in local newspaper and wants to place at least 6 in English daily. The total advt. budget is Rs. 50000. Formulate the problem as LPP model.

Q5) Answer any one from the following :

[10]

- a) The activities of a project and estimated time in days for each activity is given below.

Activity	Duration
1-2	3
2-3	4
2-4	4
2-5	5
3-7	4
4-5	2
4-7	2
5-6	3
6-7	2

- i) Draw network diagram.
 ii) Calculate project duration and determine critical path.
- b) Player A and B are playing with following matrix :

Player A	Player B				
	1	2	3	4	5
I	1	3	2	7	4
II	3	4	1	5	6
III	6	5	7	6	5
IV	2	0	6	3	1

Solve the following game by using dominance rule.



July 2023

Total No. of Questions : 5]

SEAT No. :

P-3765

[Total No. of Pages : 4

[6025]-42

M.B.A.

302 : GC-12 : DECISION SCIENCE

(2019 Pattern) (Semester - III)

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) Define optimistic time estimate in PERT.
- b) Enlist different queue discipline in queuing theory.
- c) What is saddle point in Game theory?
- d) Define Markov Chain.
- e) Mention assumptions underlying Linear Programming Problem (LPP).
- f) Write different methods of initial solution to transportation problem.
- g) Write condition for balanced assignment problem.
- h) What do you mean by optimal solution in solving transportation problem?

Q2) Solve any two of the following :

[2 × 5 = 10]

- a) Solve the following LPP by graphical solution

$$\text{Max } Z = 9x_1 + 3x_2$$

Subject to

$$2x_1 + 3x_2 \leq 13$$

$$2x_1 + x_2 \leq 5$$

$$x_1 + x_2 \geq 0$$

P.T.O.

- b) Explain the steps in solving transportation problem.
- c) Explain the use of various tools of decision theory in today's business environment.

Q3) Solve any one of the following : [1 × 10 = 10]

- a) Three brands of product P, Q and R having market share as 30%, 30% and 40% respectively. Customers shift their brands. Brand switching matrix every quarter is given below.

	To		
From	P	Q	R
P	50%	30%	20%
Q	20%	70%	10%
R	20%	20%	60%

Apply concept of Markov Chain to find market share at the end of First & Second quarter.

- b) Using the following cost matrix determine i) Optimal job assignment
ii) Optimal cost assignment.

Machinist	Cost ('000 Rs.)				
	Job				
	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

Q4) Solve any one of the following :

[1 × 10 = 10]

- a) XYZ company is considering three options for managing its data processing operations: continue with own staff, outsourcing or the use of combination. The annual profit of each option depends on demand as follows :

Staffing option	Demand			Profit ('000 Rs.)
	High	Medium	Low	
Own staff	650	650	600	
Outsourcing	900	600	300	
Combination	800	650	500	

Determine Optimal strategy for

- Maxi-min
 - Laplace
 - Hurwicz ($\alpha = 0.6$) &
 - Regret criterion.
- b) The machine operator has to perform two operations, turning and threading on a number of different jobs. The time required to perform these operation on these machines is given below.

Determine sequencing of jobs to minimize the total time. Also find idle time of operations on both machines.

Jobs	1	2	3	4	5	6
Turning time (in min)	03	12	05	02	09	11
Threading time (in min)	08	10	10	06	03	01

Q5) Solve any one of the following :

[1 × 10 = 10]

- a) Vijay has started new retail outlet in the mid of the market. In market there is business & competition, therefore survival of new outlet is very rare chance of survival is almost 5%. Vijay has started such 7 new retail outlet. Find out the probability i) no shop will survive and ii) exactly 5 shops will survive.

b) The three estimates for activities of a project are given below :

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Pessimistic duration	7	7	12	15	1	8	7
Most likely duration	6	1	4	6	1	2	4
Optimistic duration	5	1	2	3	1	2	1

Draw network diagram. Find out Critical path & Project duration. Estimate expected Standard deviation of critical path.



Total No. of Questions : 5]

SEAT No. :

PA-3623

[Total No. of Pages : 3

[5946]- 302

M.B.A.- II

302 -GC-12 : DECISION SCIENCE

(2019 Pattern) (Semester - III)

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.

[2×5=10]

- a) Define transition probability in Markov Chain.
- b) Mention condition for balanced transportation problem.
- c) Define independent events in probability.
- d) Write condition for saddle point in game theory.
- e) Define EVPI (Expected value of perfect Information).
- f) Write format of LPP (Linear Programming Problem).
- g) Define critical path in network diagram.
- h) List elements of queuing system.

Q2) Solve any two of the following.

[2×5=10]

- a) Discuss different decision environment in Decision Theory.
- b) Describe role of linear programming problem (LPP) in managerial decision making.
- c) Determine the initial solution of following transportation problem using North West Corner Method.

Sources \ Destinations					Supply
	D1	D2	D3	D4	
S1	19	30	50	10	4
S2	40	8	15	18	9
S3	30	20	20	25	18
Demand	05	08	07	14	

P.T.O.

Q3) Solve any One of the following.

[1×10=10]

- a) Solve the following game by using principle of dominance.

		Player B			
		B1	B2	B3	B4
Player A	A1	14	4	8	12
	A2	8	3	2	12
	A3	8	7	-6	16
	A4	6	5	12	10

- b) Following data is related to frequency of student absenteeism in a class

No. of students Absent	0	5	10	15	20	25
Frequency	4	22	16	42	10	06

Simulate the students absenteeism for next 10 weeks. Also find out average absenteeism. Use the following random numbers.

87, 05, 30, 53, 89, 61, 19, 55, 23, 58

Q4) Solve any one of following.

[1×10=10]

- a) A computer centre has got four expert programmes The centre needs four application programmes to be develop. The head of computer centre after studying carefully programmes to be developed estimates computer time (in hrs) required by the respective experts to develop the application programmes as follow.

		Programmes			
		A	B	C	D
Programmers	1	120	100	80	90
	2	80	90	100	70
	3	120	140	120	100
	4	90	90	80	90

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

- b) The profit of organized retail outlet is approximately normally distributed with mean Rs. 4400 & standard deviation Rs. 620

Find associated probability of profit

- i) More than 3300
- ii) less than 5400
- iii) between 3500 & 4400

$$\text{Given } P[0 < Z < 1.77] = 0.4616$$

$$P[0 < Z < 1.61] = 0.4463$$

$$P[0 < Z < 1.45] = 0.4263$$

Q5) Solve any One of following.

[1×10=10]

- a) A project has been defined to contain the following list of activities along with their required time of completion.

Activity	A	B	C	D	E	F	G	H	I
Time in Dasy	1	4	3	7	6	2	7	9	4
Immediate predecessor	–	A	A	A	B	C	E,F	D	G,H

Draw network diagram. Identify Critical Path.

- b) In a bank on an average every 15 minutes one customer arrives for cashing the cheque. The staff at the only payment counter takes 10 minutes for serving a customer on an average.

Find

- i) average queue length.
- ii) Increase in arrival rate for justifying a second counter.



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Total No. of Questions : 5]

SEAT No. :

PB2129

[Total No. of Pages : 3

[6201]-3002

S.Y.M. B. A.

302 : GC - 12 : DECISION SCIENCE
(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) Figures to the right indicate full marks.
- 4) Graph Paper will be provided.
- 5) Use of non-scientific calculator is allowed.

Q1) Solve any Five of the following.

[10]

- a) Write a short note on Hungarian method/Flood's Technique to solve assignment problem.
- b) Explain in brief Vogel's Approximation Method.
- c) What do you understand as the Feasible Solution and Optimum Solution in case of an LPP?
- d) Define Transition Probability in Markov chain.
- e) State the condition for Balanced Transportation Problem.
- f) Define Independent Events in Probability.
- g) Define Probability.
- h) Enumerate the techniques of Initial Feasible solution for Transportation Problem.

Q2) Answer any two from the following:

[10]

- a) Determine the initial basis feasible solution to the following transportation problem by using NWCM.

P.T.O.

Sources	Destination				Supply
	D ₁	D ₂	D ₃	D ₄	
S ₁	19	30	50	10	7
S ₂	40	8	15	18	9
S ₃	30	20	20	25	18
Demand	5	8	7	14	

- b) Write a short note on Markov chain.
- c) Describe the steps in solving Assignment Problem

Q3) Answer any one from the following: [10]

- a) Maximize $z = 16x_1 + 8x_2$

Subject to:

$$6x_1 + 4x_2 \geq 24$$

$$4x_1 + 2x_2 \leq 16$$

$$3.5x_1 + 3x_2 \leq 21$$

$$x_1, x_2 \geq 0$$

- b) In a cricket season for a one day match a bowler bowled 50 balls. The frequency distribution of runs scored per ball is as given below.

Runs/balls:	0	1	2	3	4	5	6
Number of balls:	15	10	10	4	8	1	2

Simulate the system for 2 overs and find average runs given in 2 overs by him. Use the following random numbers: 88, 03, 05, 29, 28, 48, 65, 19, 55, 17, 37 and 82

Q4) Answer any one from the following: [10]

- a) A card is drawn from a well shuffled deck of 52 cards. Find the probability that
- It is not a spade card
 - It is a face card

b) A pair of dice is thrown. Find the probability of getting the sum.

i) More than nine

ii) Mutiple of three

Q5) Answer any one from the following:

[10]

a) Given is the following information regarding a project-

Activity	Preceding Activity	Duration
A	-	3
B	-	4
C	-	2
D	A,B	5
E	B	1
F	B	3
G	F,C	6
H	B	4
I	E,H	4
J	E,H	2
K	D,J	1
L	K	5

i) Draw a network for above project

ii) Determine the critical path and duration of the project.

b) In a bank on average every 15 minutes a customer arrives for cashing the cheques. The staff at payment counter on an average take 10 minutes to serve a customer.

Calculate:

i) Probability that system is busy.

ii) Average number of customers in bank.