

Total No. of Questions : 5]

PD-2768

SEAT No. : LIBRAT

[Total No. of Pages : 3

[6430]-302

M.B.A.

GC - 12 : 302 : 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) *Each question has an internal options.*
- 4) *Use of simple calculator is allowed.*

Q1) Solve Any Five questions :

[10]

- a) What is the formula for Combination in Probability?
- b) Define balanced assignment problem & unbalanced assignment problem.
- c) What are the uses of Markov's chain?
- d) What is Mixed strategy Game?
- e) Define baling & jockeying.
- f) What is CPM & PERT?
- g) List techniques of initial solution for Transportation problem.
- h) List the drawbacks of graphical solution in LPP.

Q2) Solve Any Two out of the Three questions :

[10]

- a) What are the assumptions of Single Server Queuing Model?
- b) The company wants to purchase new shelves for keeping records of office files. Two producers gave their quotations. Shelf X costs Rs. 10 per unit, requires six square feet carpet area, and holds eight cubic feet of files. Shelf Y costs Rs. 20 per unit, requires eight square feet of carpet area, and holds twelve cubic feet of files. The company has a provision of Rs. 140 for this purchase. The office has room for no more than 72 square feet of cabinets. Formulate LPP to maximize storage volume?
- c) Explain Expected time, Variance & standard deviation in terms of PERT.

P.T.O.

Q3) Solve Any One :

[10]

- a) Maximize $Z = 50x + 30y$

Subject to $2x + y \geq 18$

$$x + y \geq 12$$

$$3x + 2y \leq 34$$

$$x, y \geq 0$$

Solve the LPP by Graphical Method.

- b) The cost (Rs. Lakh) of locating of machines to the places is estimated as follows. find the optimum assignment schedule.

Machines	Places				
	A	B	C	D	E
M1	19	21	25	20	21
M2	27	24	-	25	24
M3	-	24	27	24	20
M4	22	16	20	15	16

Q4) Solve Any One :

[10]

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

Player A	Player B			
	I	II	III	IV
I	2	-2	4	1
II	6	1	12	3
III	-3	2	0	6
IV	2	-3	7	1

- b) A single card is drawn at random from a standard deck of 52 playing cards. Find the probability that
- The card is a red king
 - The card is either a red or an ace
 - The card is a king or queen

Q5) Solve Any One :

[10]

- a) Draw the network diagram for the given below. Find critical path and expected project duration of the project.

Activity	Immediate Predecessor activity	Duration (days)
A	-	4
B	A	6
C	A	5
D	B	3
E	C	7
F	D	2
G	E	6
H	F,G	2

OR

- b) Dr. Kelkar has been thinking about starting his own independent nursing home. The problem is to decide how large the nursing home should be. The annual returns will be depending on both size of nursing home and number of marketing factors. after a careful analysis, Dr. Kelkar developed following table:

Size of Nursing home	Good market (Rs.)	Fair market (Rs.)	Poor market (Rs.)
Small	50,000	20,000	-10,000
Medium	70,000	35,000	-25,000
Large	90,000	35,000	-45,000
Very Large	2,00,000	25,000	-1,20,000

Find optimal strategy using

- Maximax
- Maximin
- Laplace
- Hurwicz ($\alpha=0.8$)



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PC2968

SEAT No. :

[Total No. of Pages : 3

[6380]-42

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) 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) Explain Monte - Carlo simulation in brief.
- b) Differentiate between decision making under risk and decision making under uncertainty.
- c) Name the criteria for decision making under uncertainty.
- d) Write condition for Saddle point in Game theory.
- e) Define EVPI (Expected Value of Perfect Information).
- f) Write the format of a typical LPP (Linear Programming Problem).
- g) What is 2x2, Zero Sum Game?
- h) State the drawbacks of Graphical Solution in LPP.

Q2) Answer any two from the following.

[10]

- a) Four different machines have four different jobs. The following matrix gives the costs in rupees of jobs on machines. The set up and time down costs are assumed to be prohibitively high for changeovers. How should the jobs be assigned to various machines so that the total cost is minimized?

Jobs	Machines			
J ₁	5	7	11	6
J ₂	8	5	9	6
J ₃	4	7	10	7
J ₄	10	4	8	3

- b) Describe briefly the basic steps to be followed in developing a PERT/CPM Programme.
- c) Describe the concept of Network and explain the terms EST, LST, EFT and LFT.

P.T.O.

Q3) Answer any one of the following.

[10]

- a) Find the optimal strategies for A and B in the following game. Also obtain the value of the game.

	B_1	B_2	B_3
A_1	9	8	-7
A_2	3	-6	4
A_3	6	7	7

- 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) Solve the following sequencing problem.

Machines	Jobs					
	1	2	3	4	5	6
A	8	3	7	2	5	1
B	3	4	5	2	1	6
C	8	7	6	9	10	9

- b) The profit of organized retail outlet is approximately normally distributed with the mean of 4,400 Rs. and standard deviation of 620 Rs. Find the associated probabilities of the profit :

- More than Rs. 3,300/-
- Less than Rs. 3,300/-
- Between Rs. 3,500/- and Rs. 4,400/-

Q5) Answer any one from the following.

[10]

a) Draw the network diagram for following activity.

Activity	Immediate Predecessor	Activity	Immediate Predecessor
A	-	L	K
B	A	M	K
C	B	N	K
D	C	O	D
E	D	P	O
F	E	Q	B
G	E	R	N
H	C	S	L, M
I	C, F	T	S
J	G, H, I	U	P, Q
K	J	V	U

b) Patients arrive at the clinic according to poisson distribution at the rate of 20 patients per hour. Examination time per patient is exponential with mean rate 30 per hour.

Find :

- The traffic intensity
- The probability that new arrival does not have to wait
- The average waiting time of patient before he leaves the clinic



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PB2129

SEAT No. :

[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.

	Destination				
Sources	D ₁	D ₂	D ₃	D ₄	Supply
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.
- More than nine
 - 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

- Draw a network for above project
 - 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:

- Probability that system is busy.
- Average number of customers in bank.



Total No. of Questions : 5]

P-7946

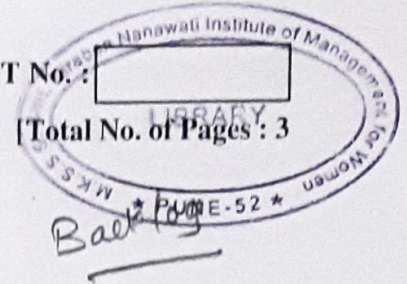
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M.B.A.

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

SEAT No. :

[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 :

[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.

Destination					
Sources	I	II	III	IV	Capacity
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.



21 Feb 23

Total No. of Questions : 5]

SEAT No. :

LIBRARY

PA-3623

[5946]- 302

[Total No. of Pages : 3

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.

Destinations					
Sources	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
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

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 Days	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.



Total No. of Questions : 5]

P8034

[5860]-302

M.B.A. - II

302-GC-12 : DECISION SCIENCE

(2019 Pattern) (Semester - III)

SEAT No. :

[Total No. of Pages : 3]

LIBRARY

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:

[5×2=10]

- a) Define Probability.
- b) List techniques of initial solution for Transportation problem.
- c) Enlist various methods of decision making under uncertainty.
- d) What is 2×2 zero sum game?
- e) Enumerate any two quantitative techniques for optimal decision in business.
- f) List the drawbacks of graphical solution in LPP.
- g) Define total float in Network diagram.
- h) Define (M/M/I, Infinite, FIFO) in Queuing theory.

Q2) Solve any two of the following:

[2×5=10]

- a) Discuss the use of CPM & PERT in Project Management.
- b) Explain the role of quantitative techniques in decision making.
- c) Describe the steps in Solving Assignment Problem.

PTO.

Q3) Solve any one of the following:

[1×10=10]

- a) A small bank is allocating maximum 0%. Rs. 21,00,000/- for personal & car loans. The interest rates per annum are 11% for car loan & 13% for personal loans. The loans are repaid at the end of one year period. The amount of personal car cannot exceed 40% of the car loans. Past experience has shown that bad debts to 1.2% of all personal loans. Formulate & solve the above problem to find the optimum loan allocations.
- b) Following is the distribution of defective pieces in a manufacturing process of a MNC in Pune.

No. of defective items	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Consider the following sequence of random numbers.

38, 58, 19, 51, 66, 15, 24, 78, 42, 08

Using this sequence, simulate the number of defective items for next 10 days.

Q4) Solve any one of the following:

[1×10=10]

- a) In a group of 1000 customers, there are 650 who uses Jio connection, 400 uses Airtel connection and 150 uses both connections, Jio & Airtel. If a customer is selected at random, what is the probability that he uses :
- Jio only
 - Airtel only
 - Only one of the two connection and
 - At least one of the two connections.
- b) A repairman is to be hired to repair machines which breakdown at an average rate of 6 per hour. The breakdown follow poisson distribution. The productive time of a machine is considered to cost Rs. 20 per hour. Two repairman Mr. X & Mr. Y have been interviewed for this purpose Mr. X charged Rs. 100 per hour. and he services breakdown machines at rate of 8 per hour. Mr. Y demand Rs. 140 per hour and he services at an average rate of 12 per hour. Which repairmen should be hired? (Assumes 8 hours shift per day).

Q5) Solve any one of the following:

[1×10=10]

a) Given the following:

Activity	1-2	2-3	2-4	2-5	3-7	4-5	4-7	5-6	6-7
Duration (in days)	3	4	4	5	4	2	2	3	2

Construct the project network. Calculate project duration & determine critical path.

b) Determine the optimal strategies for A & B in the following game. Obtain value of game.

		B's Strategy		
		B1	B2	B3
A's Strategy	A1	9	8	7
	A2	3	6	4
	A3	6	7	7

