BIJU PATNAIK INSTITUE OF IT & MANAGEMENT STUDIES

1ST SEMESTER MBA (BATCH 2019-21)

CLASS TEST - II

Decision Science (18 MBA 105)

Total Marks : 30 **Time:1½ Hours**

Q1. All Questions are compulsory each questions carry 1 mark (1x10=10)

a) Customer arrives at a booking counter being manned by a single man at a rate of 25 per hour. The time required to serve a customer with a mean of 120 seconds. Find the expected waiting time of a customer in queue.

b) What is unbalanced transportation problem and How to solve it?

c) Define Slack variables.

d) Find the best strategy from the following pay-off table by using minimax regret criterion (Where E=Event & S= Strategy)

	E1	E2
S1	2	0
S2	-3	6

e) What is Simulation? Write down its Application.

f) Using Dominance rule, Find the value of the following game between P &Q

		P	
Q	7	8	6
	3	9	2

g) Define Saddle Point with example.

h) What do you mean by Degeneracy in TP?

i) What do you mean by Payoff matrix in Decision Theory?

j) Write-down all the Assumption of Markov Process.

Q2. Answers two questions each questions carry 5 marks (2 x 5=10)

a) Obtain an Initial BFS to the following Transportation problem using VAM method?

Origin	Destination				Supply
	A	B	C	D	
A	20	22	17	4	120
B	24	37	9	7	70
C	32	37	20	15	50
Demand	60	40	30	110	

b) The payoff of three acts **A, B & C.** The state of nature **P, Q & R** are given below

State of Nature	Acts		
	A	B	C
P	-25	75	-85
Q	95	-65	85
R	120	185	200

The probabilities of state of nature are 0.3, 0.6 and 0.1. State which act can be chosen as the best act by using EMV methods.

c) A market survey is made on two Brands of breakfast foods A & B. Every time a customer purchases, he/she may buy the same brand or switch to another brand. The transition probabilities are given in table

To → / From ↓	**Brand-A**	**Brand-B**
Brand-A	0.8	0.2
Brand-B	0.6	0.4

At present, it is estimated that 60% of the people buy Brand-A and 40% buy Brand-B. Determine the market share of the brands after one time period, after two time periods.

Q3. Answer one question out of two questions (1 x 10=10)

(a) Use the Simplex method to find the maximum value of

$$\mathbf{Z= 2X_1-X_2+2X_3}$$

Subject to

$$2X_1+X_2 \leq 10$$
$$X_1+2X_2-2X_3 \leq 20$$
$$X_2+2X_3 \leq 5$$

Where $X_1 \geq 0$, $X_2 \geq 0$ and $X_3 \geq 0$.

(b) A company manufacturer 30 units per day. The sale of these items depends upon demand which has following distribution;

Sales (Units)	**Probability**
27	0.10
28	0.15
29	0.20
30	0.35
31	0.15
32	0.05

The production cost and sale price of each unit are Rs. 40/- and Rs. 50/- respectively. Any sold product is to be disposed of at a loss of Rs. 15/- per unit. There is a penalty of Rs. 5/- per unit if the demand is not met. Using the following random number, estimate the total profit/loss for the company for the next ten days:

10, 99, 65, 99, 95, 01, 79, 11, 16, 20

If the company decide to produce 29 units, What is the advantage or disadvantage of the Company?

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BIJU PATNAIK INSTITUE OF IT & MANAGEMENT STUDIES

1ST SEMESTER (BATCH 2018-20)

CLASS TEST - II

Decision Science (18 MBA 105)

Total Marks : 30 **Time:1½ Hours**

Q.1. **Answer all the questions** **[10x1=10]**

a) Define feasible solution with example.
b) How to differentiate unbalanced T.P. & unbalanced A.P. ?
c) Define Game by properties.
d) Define 2-person zero-sum game.
e) What are the environments used in Decision theory ?
f) Write all the phases used in simulation.
g) Write the inputs and outputs used in Markov Process.
h) What are the assumptions underlying Markov analysis ?
i) Name the service discipline used in Queuing System.
j) How to define decision making process ?

Q.2. Answer any **Two** of the following : **[2x5=10]**

A company manufactures 30 units of a product every day. The sale of these items depends on the demand, which is shown below :

Sales (units)	:	27	28	29	30	31	32
Prob.	:	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sales price of each unit are Rs.40/- and Rs.50/- respectively. Any unsold product is to be disposed of at a loss of Rs.15/- per unit. There is a penalty of Rs.5/- per unit, if the demand is not met. Using the following random numbers, estimate the total profit of the company in the next 10 days.

78 82 15 35 46 49 53 16 92 83

Q.3. A computer centre has five (5) expert programmers. The centre wants three application programs to be developed. The head of the computer centre after carefully studying the program to be developed, estimate the time (in minutes) required by the expert for developing the application program as given in the following table.

Assign the programmers to the programs in such a way that the minimum total time is taken for developing the program.

Programmer

Program	A	B	C	D	E
I	120	100	80	90	130
II	80	90	110	70	110
III	110	140	120	130	160

Q.4. A newspaper boy has the probabilities of selling a magazine as shown below :

No. of copies sold	9	10	11	12	13	14
Probability	0.05	0.1	0.15	0.3	0.25	0.15

The cost of a copy sold is Rs.30/- and sale price of the magazine is Rs.40/-. The unsold copies fetch a salvage value of Rs.5/- in the second sale market. How many copies should be ordered, according to Laplace criterion and Savage criterion?

Q.5. Answer any **One** of the following : **[1x10=10]**

Suppose that the new razor blades were introduced in the market by their companies at the same time. When they were introduced each company had an equal share of the market, but during the year the following changes took place.

a) Company A retained 90 % of its customers and lost 5% to Company B and 7% to company C.
b) Company B retained 70% of its customers and lost 10% to company A and 20% to company C.
c) Company C retained 80% of its customers and lost 10% to company A and 10% to Company B.

Assuming that no changes takes place in the buying habits of the customers, find the following :

i) What are the market shares of the three companies at the end of first year and the second years ?
ii) What are the long run market shares of these companies ?

Q.6. Solve the following L.P.P.

$$\begin{aligned} \text{MAX } Z &= 6x_1 + 11x_1 + 9x_3 \\ \text{Stc} &= 3x_1 + 5x_2 + 2x_3 \leq 90 \\ &\quad 5x_1 + 5x_2 + 5x_3 \leq 100 \\ &\quad 2x_1 + 4x_2 + 5x_3 \leq 120 \\ &\quad \text{and } x_1, x_2, x_3 \geq 0 \end{aligned}$$

-Best of Luck-

BIJU PATNAIK INSTITUE OF IT & MANAGEMENT STUDIES

1ST SEMESTER (BATCH 2017-19)

CLASS TEST - II

Statistics and Decision Science (MNG-101)

Total Marks : 30 **Time:1½ Hours**

Q.No.1 & 2 are compulsory. Answer any two from the remaining.

Q.No.1 **[5x1 = 5]**

a) What are the assumption underlying L.P.P. ?
b) Write down all the assumption used in Markov Process ?
c) Define mesokurtic.
d) What is degeneracy is T.P ?
e) What is 2 person zero sum game ?

Q.No.2 **[5x1 = 5]**

a) A.M. x G.M. = (_____)^2.
b) If $Q_3 = 7.29$, $Q_1 = 3.21$, $Q_2 = 5.0$ the SK_B = _____.
c) The number of B.F.S. in a balanced T.P. Is _____.
d) Pay off matrix is the combination of _____ and _____ in decision theory.
e) If mean = 5, variance = 2.5 in binomial distribution, then q = _____ & p=_____.

Q.No.3. **[2 x 10=20]**

A College department Chairman has to provide teachers for all courses offered by his department at the highest possible level of educational quality. He has three professors and one teaching assistant (TA). Four courses can be offered and after appropriate inspection and evaluation, he has arrived at the following rates regarding the ability of each instructor to teach each of the course.

Staff	**Course (Hr.)**			
	1	2	3	4
Prof. A.	75	55	75	85
Prof. B.	35	75	65	85
Prof. C.	35	45	55	75
T.A.	45	25	45	55

Find the optimal allocation. Is it giving optimal solution ?

Q.No.4. A company has 4 factories manufacturing the same commodity, which are required to be transported to four Warehouses. The supply and demand besides the cost of transportation from the factory to the warehouses is given below :

Factory	**Warehouse**				**Supply**
	W	X	Y	Z	
A	60	25	55	40	60
B	40	35	30	50	140
C	66	36	45	26	150
D	50	35	30	41	50
Demand	140	90	100	120	

Derive an optimal strategy of transportation of goods from factories to warehouse and assess the optimal cost.

Q.5. Solve the game and find the strategy of both players.

Group – B

Group - A	0.50	0.60	-0.50
	0.40	0.20	-0.60
	0.60	-0.60	-0.50

Q.6.

From	**To**		
	Brand – A	**Brand – B**	**Brand – C**
Brand – A	0.75	0.10	0.15
Brand – B	0.10	0.70	0.20
Brand – C	0.30	0.40	0.30

Find out the long run market share for each of these brand ?

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BIJU PATNAIK INSTITUE OF IT & MANAGEMENT STUDIES

1ST SEMESTER (BATCH 2016-18)

CLASS TEST - II

Statistics and Decision Science (MNG-101)

Total Marks : 30 **Time:1½ Hours**

Answer all the question of Group – A and Group – B and any one from Group – C.

Group – A **[10x1=10]**

1. a) Define saddle point.
   b) What is 2 person zero sum game.
   c) What are the method used to convert any order matrix to 2x2 matrix.
   d) Name the criterion used in Decision under uncertainty.
   e) Define monte-carlo simulation.
   f) What are the assumptions in Markov Process ?
   g) What are the service disciplines used in Queuing theory ?
   h) How to find the number of B.F.S in a balanced T.P ?
   i) What is limitation of graph method ?
   j) How to convert an unbalanced T.P to balanced T.P ?

GROUP – B **[2x5=10]**

2. A computer centre has five expert programmers. The centre wants three application programs to be developed. The head of the computers centre after carefully studying the programs to be developed, estimate the time (Minutes) required by the experts for developing the application programs as given below.
   Assign the programmers to the programs in such a way that the minimum total time is taken for developing.

Programmer	A	B	C	D	E
Program					
I	120	100	80	90	130
II	80	90	110	70	110
III	110	140	120	130	160

Time (in minutes) required by the programmer for each program.

3. A co. has two plants to manufacture scooters. Plant I manufactures 70% of the scooters and Plant – II, of manufacture 30%. At plant – I, 80% of scooters are rated standard quality and at Plant – II, 90% of scooters are rated stand and quality. A scooters is picked up at random and is found to be of standard quality. What is the chance that it has come from plant – II ?

GROUP – C [1x10=10]

4. Solve the T.P.

Warehouse	Market				
	A	B	C	D	Supply
X	13	7	19	0	200
Y	17	18	15	7	500
Z	11	22	14	5	300
Demand	180	320	100	400	

Determine the best allocation such that these allocation maximize the profit.

5. A bakery keeps stock of a popular brand of cake. The daily demand based on the past experience is given below.

Daily Demand	:	0	15	25	35	45	50
Probability	:	0.01	0.15	0.2	0.5	0.12	0.02

Consider the following sequence of random number: 48, 78, 09, 51, 56, 77, 15, 14, 68 and 09.

a) Using the sequence, simulate the demand for the next 10 days.
b) Find the stock situation if the owner of the bakery decides to make 35 cakes every day. Also estimate the daily average demand for the cakes on the basis of simulated date.

6. In a small metro, 3 brands of cola are sold AA, BB and CC. If the buyer bought cola AA last time there is a 0.5 prob. that he would buy the same cola again, 0.3 & 0.2 prob. that be would switch to cola BB and CC respectively. If the buyer bought cola BB last time, there is a 0.3 and 0.4 probability that he would switch to AA & CC respectively. If the buyer bought cola CC last time, there is 0.3 and 0.1 probability that he would switch to cola AA & BB respectively.

Calculate the prob. of 3 time periods from now a customer shall buy cola AA, given that the current market shore is 40%, 40% and 20%, for the cola brands AA, BB and CC respectively. Calculate the steady state market share of all the 3 brands.

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BIJU PATNAIK INSTITUE OF IT & MANAGEMENT STUDIES

1ST SEMESTER (BATCH 2015-17)

CLASS TEST - II

Statistics and Decision Science (MNG-101)

Total Marks : 30 **Time:1½ Hours**

(Answer any two from Group-A and two from Group-B *(No. *4 is compulsory)*

GROUP – A *(2 x 5 = 10 marks)*

1. The following data of marks obtained by 11 students in statistics in the tests. One before and other after special coaching:

First Test *(Before coaching)*	23	20	19	21	18	20	18	20	18	17	23	16	19
Second Test *(After coaching)*	24	19	22	18	20	22	20	22	20	20	23	20	17

Do the marks indicate that the special coaching has benefited the students?

2. The incidence of occupational disease in an industry is such that the workers have 20% chance of suffering from it. What is the probability that out of six workers 4 or more will come in contact of the disease?

3. Data of rejected items during a production process are as follows:

No. of rejects *(per operator)*	21-25	26-30	31-35	36-40	41-45	46-50	51-55
No. of operators	5	15	28	42	15	12	3

Calculate the Mean, SD and Co-efficient of skewness and comment on the result.

GROUP – B *(2 x 10 = 20 marks)*

***4.** Solve the following transportation problem, where the transportation costs, availabilities, and suppliers are as given below Table.

Transportation cost

To → / From ↓	**D**	**E**	**F**	**G**	**H**	**Availability**
A	4	1	2	6	9	100
B	6	4	3	5	7	120
C	5	2	6	4	8	120
Demand	40	50	70	90	90	340

5. In 1996 a firm began downsizing in order to reduce its costs. One of the results of these cost cutting measures has been a decline in the percentage of private industry jobs that are managerial. The following data show the percentage of females, who are managers from 1996 to 2005.

Years	1996	1997	1998	1999	2000	2001	2002	2003
Percentages	6.7	5.7	4.3	6.1	5.6	7.9	5.8	6.1

(a) Develop a linear trend line for this time series through 2001 only.

*(b) Use this trend to estimate the **%** of females, who are managers in 2004.*

6. In a Bolt factory machines, **A**, **B** & **C** Manufacturer 25%, 30% & 40% of the total output respectively. Of the total of their output 5, 4 & 2% defective bolts. A bolt is drawn at random from the lot and is found to be defective:

*(i) What is the Probability that it was Manufactured by machine – **A** ?*

*(II) Also **A** or **B** or **C**.*

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