

END TERM EXAMINATION

FIRST SEMESTER [MBA] NOVEMBER - DECEMBER 2017

Paper Code: MS-103

Subject: Decision Sciences

[Batch 2017 onwards]

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions. All questions carry equal marks.

- Q1 (a) In a bolt factory, machine A, B and C manufacture respectively 25%, 35% and 40%. Of the total of their output 5, 4 and 2 percent are defective bolts, A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C?
- (b) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $1/7$ and that of wife's selection is $1/5$. What is the probability that both of them will be selected.
- (i) Only one of them will be selected, and
(ii) None of them will be selected.
- Q2 (a) The number of defects per unit in a sample of 330 units of manufactured product was found as follows:

No. of Defects:	0	1	2	3	4
No. of Units:	214	92	20	3	1

Fit a Poisson distribution to the data and test for goodness of fit.
(give $e^{-0.439} = 0.6447$)

- (b) The results of a particular examination are given below in summary form:

Serial	Result	% of candidates
1	Passed with distinction	10
2	Passed	60
3	Failed	30

It is known that a candidate gets plucked if he obtains less than 40 marks (out of 100) while he must obtain at least 75 marks in order to pass with distinction. Determine the mean and standard deviation of the distribution of marks assuming this to be normal.

- Q3 A company possesses two manufacturing plants, each of which can produce three products X, Y and Z from a common raw material. However, the proportions in which the products are produced are different in each plant and so are the plant's operation cost per hour. Data on production per hour and costs are given below, together with current orders in hand for each product.

	Products			Operating cost per hour
	X	Y	Z	Rs.
Plant A	2	4	3	9
Plant B	4	3	2	10
Orders on hand	50	24	60	

You are required to use the simplex method to find the number of production hours needed to fulfil the orders in hand at minimum cost.

P.T.O.

- Q4 Five salesman are to be assigned to five territories. Based on the past performance, the following table shows the annual sales (in rupees lakhs) that can be generated by each salesman in each territory. Find the optimum assignment.

Salesman	Territory				
	T ₁	T ₂	T ₃	T ₄	T ₅
S ₁	26	14	10	12	9
S ₂	31	27	30	14	16
S ₃	15	18	16	25	30
S ₄	17	12	21	30	25
S ₅	20	19	25	16	10

- Q5 (a) A producer of boats has estimated the following distribution of demand for a particular kind of boat:

No. of demanded:	0	1	2	3	4	5	6
Probability	0.14	0.27	0.27	0.18	0.09	0.04	0.01

Each boat cost him Rs. 7,000 and he sells them for Rs. 10,000 each. Any boat that are left unsold at the end of the season must be disposed off for Rs. 6,000 each. How many boats should be in stock so as to maximize his expected profit?

- (b) Growfast company is evaluating four alternative single period Investment opportunities whose returns are based on the state of the economy. The possible states of the economy and the associated probability distribution is as follows?

State:	Fair	Good	Great
Probability:	0.2	0.5	0.3

The returns for each investment opportunity and each state of the economy are as follows:

Alternative	State of Economy		
	Fair (Rs.)	Food (Rs.)	Great (Rs.)
W	1000	3,000	6,000
X	500	4,500	6,800
Y	0	5,000	8,000
Z	-4,000	6,000	8,500

Using the decision- tree approach, determine the expected return for each alternative. Which alternative investment proposal would you recommend if the expected monetary value criterion is to be employed?

- Q6 (a) Solve the game for the pay-off matrix:

Player A	Player B			
	B ₁	B ₂	B ₃	B ₄
A ₁	19	6	7	5
A ₂	7	3	14	6
A ₃	15	8	18	4
A ₄	8	7	13	-1

- (b) Explain the following terms used in Game Theory:
- Pure Strategy and Mixed strategy games
 - Two person zero sum game
 - Saddle point
 - Maximum and minimax principles
 - Principle of Dominance