

Quantitative Analysis for Business Decisions

Time: 3 Hours

Max. Marks: 75

Answer any FIVE Questions One Question from Each Unit
All Questions Carry Equal Marks

UNIT-I

1. a There 30 females and 35 males in the junior class while there are 25 females and 20 males in senior class. In how many ways can a committee of 10 be chosen so that there are exactly 5 females and 3 juniors on the committee. 6M
- b number of arrangements of letters in the word “MISSISSIPPI”? 6M

OR

2. a If $A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 7 \end{bmatrix}$, find A^3 and A^{-1} 6M
- b Show that $\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix} = 1 + a + b + c$ 6M

UNIT-II

3. a The mean weight of a student in a group of students is 119 lbs. the individual weight of 5 of them are 115, 109, 129, 117 & 114 lbs. What is the weight of the 6th student? 6M
- b From the following data calculate rank coefficient of correlation. 6M

X	50	35	42	11	18	18	67	26	18	59
Y	15	15	26	8	17	6	22	11	8	21

OR

4. a One card is drawn at random from a pack of 52 cards. What is the probability that it is either an ace or a jack? 6M
- b A person is known to hit the target in 3 out of 4 shots, where as another person is known to hit the target in 2 out of 3 shots. Find the probability of the targets being hit at all when they both try. 6M

UNIT-III

5. a What are different environments in which decision is made? 6M
- b Explain clearly the following terms: 6M
- (i) Action space, (ii) State-of-nature, (iii) Payoff table, and (iv) Opportunity loss.

OR

6. A grocery receives its weekly supply of eggs every Thursday morning. This shipment must last until the following Thursday when a new shipment is received. Any eggs left unsold by Thursday are destroyed. Eggs sell for \$10 per hundred and cost \$8 per hundred. The weekly demand for eggs at this grocery varies from week to week. From past experience, the following probability distribution is assigned to weekly demand: 12M

Demand (hundreds of eggs):	10	11	12	13	14
Probability:	0.1	0.2	0.4	0.2	0.1

This pattern of demand remains stable throughout the year the demand for eggs is not seasonal, and the trend is flat. The problem is: How many eggs should be ordered for delivery every Thursday?

UNIT-IV

7. a A Psychologist measures the reaction times of a sample of 6 individuals to certain stimulus. The measures are given by 0.53, 0.46, 0.50, 0.49, 0.52, 0.53 seconds. Determine an unbiased estimate of the population mean. 6M
- b A machine produces a component of a product with a standard deviation of 1.6 cm in length. A random sample of 64 components was selected from the output and this sample has a mean length of 90 cm. The customer will reject the part if it is either less than 88 cm or more than 92 cm. Does the 95% confidence interval for the true mean length of all the components produced ensure acceptance by the customer? 6M

OR

8. a An ambulance service claims that it is taken on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and variance of 16 minutes. Test the claim at 0.10 level of significance. 6M
- b A sample of 26 electric bulbs have a mean life of 990 hours and a S.D of 20 hours. The manufacturer claims that the mean life of electric bulbs is 1000 hours. Is the sample not upto the standard? 6M

UNIT-V

9. a The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 inches? 6M
- b In a sample of 600 students of a certain college, 400 are found to use ball pens. In another college from a sample of 900 students, 450 were found to use ball pens. Test whether two colleges are significantly different with respect to the habit of using ball pens. 6M

OR

10. a Three processes A, B and C are tested to see whether their outputs are equivalent. The following observations of outputs are made: 12M

A	10	12	13	11	10	14	15	13
B	9	11	10	12	13			
C	11	10	15	14	12	13		

Carry out the analysis of variance and state your conclusion.

Case Study

- 11 **Arthur D Little Inc.** estimates that approximately 70% of mails received by a household are advertisements (Time, July 14, 1997). A sample of 20 households shows the following data for the number of advertisements received and the total number of mails received during one week 15M

Household	Advertisements	Total mails	Household	Advertisements	Total mails
1	24	35	11	13	19
2	9	14	12	16	28
3	18	30	13	20	27
4	9	12	14	17	22
5	15	28	15	21	24
6	23	33	16	21	33
7	13	20	17	15	25
8	17	20	18	15	24
9	20	23	19	18	24
10	30	25	20	12	16

Do the point and interval estimates with 95% confidence agree with the statement that approximately 70% of mailings are advertisements?