Master of Commerce 1ˢᵗ Semester
(2123)
QUANTITATIVE METHODS FOR BUSINESS
(Same for USOL Candidates)
Paper : MC-102

Time Allowed : Three Hours]   [Maximum Marks : 80

Note :—Students are required to attempt **FIVE** questions in all, selecting at least **ONE** question from each unit. All questions carry equal marks.

UNIT—I

1. (a) Explain Binomial distribution and its properties.

   (b) A manufacturing firm produces steel pipes in three plants with daily production volumes of 500, 1000, 2000 units respectively. According to past experience, it is known that the fractions of defective output produces by three plants are respectively 0.005, 0.008, 0.010. If a pipe is selected from day's total production and found to be defective, find the probability that it came from the first plant.

2. (a) Explain Poisson distribution and its uses and properties.

   (b) As a result of tests on 20,000 electric bulbs manufactured by a company it was found that the life time of a bulb was normally distributed with an average life of 2040

hours and standard deviation of 60 hours. On the basis of the information, estimate the number of bulbs that is expected to burn for (i) more than 2150 hours, and (ii) less than 1960 hours.

3. (a) Explain normal distribution and its properties.

   (b) Fit a binomial distribution of the following data :

x	0	1	2	3	4
f	28	62	46	10	4

UNIT—II

4. (a) Explain point estimates and interval estimates with suitable example.

   (b) Explain standard error and level of significance with graph and example.

5. (a) Explain central limit theorem and its utility.

   (b) A population consists of five values :

   3, 4, 5, 6 and 7. List all possible samples of size 3 without replacement from this population and calculate the mean $\bar{x}$ of each sample. Verify that sample mean $\bar{x}$ is an unbiased estimate of the population mean.

6. (a) Explain estimation theory and properties of a good estimator.

   (b) A random sample of 900 workers in a steel plant showed an average height of 67 inches with a standard deviation of 5 inches.

   (i) Establish a 95% confidence interval estimate of the mean height of all the workers at the steel plant.

   (ii) Establish a 99% confidence interval estimate of the mean height of all the workers at the steel plant.

UNIT—III

7. (a) A coin is tossed 100 times under identical conditions independently yielding 30 heads and 70 tails. Test at 1% level of significance whether or not the coin is unbiased.

   (b) A random sample of 9 boys had heights (inches) : 45, 47, 50, 52, 48, 47, 49, 53 and 51. In the light of the data, discuss the suggestion that the mean height in the population is 47.5.

   (Given the table value of t for 8 d.f. at 5% level = 2.306).

8. (a) A certain medicine given to each of the 9 patients resulted in the following increase in blood pressure : 7, 3, −1, 4, −3, 5, 6, −4, −1.

   Can it be concluded that the medicine will, in general, be accompanied by an increase in blood pressure ? (Given $t_{.05}(8) = 2.0306$)

   (b) A company appoints four salesmen A, B, C and D and observes their sales in three seasons in summer, winter and monsoon. The figure (in lakhs) is given in the following tables :

Seasons	Salesmen			
	A	B	C	D
Summer	36	36	21	35
Winter	28	29	31	32
Monsoon	26	28	29	29

   Do the salesmen differ significantly in their performance ?

UNIT—IV

9. (a) Explain the following terms in the context of SQC :

   (i) Control unit

   (ii) Decisions tree analysis.

(b) A machine is set to deliver packet of a given weight. 10 samples of size 5 each were recorded in the data given below :

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean $\bar{x}$	15	17	15	18	17	14	18	15	17	16
Range	7	7	4	9	8	7	12	4	11	5

Construct the mean chart and Range Chart and comment on state of control. (Conversion Factors for n = 5 are A_2 = 0.577, D_3 = 0, D_4 = 2.115)

10. (a) Explain Mean and Range charts and their assumption. Use suitable examples to justify your answer.

(b) The number of defective needles of sewing machine has been given in the following table on the basis of daily inspection. Prepare "p-chart" and state whether the production process is in control.

Day	No. of needles inspected	No. of defective needles
1	90	5
2	60	12
3	70	7
4	100	3
5	120	6
6	50	5
7	100	10
8	110	6
9	100	8
10	100	25