

2031  
M.Com.-1<sup>st</sup> Semester  
MC-102: Quantitative Methods for Business  
(Same for USOL Candidates)

Time allowed: 3 Hours

Max. Marks: 80

**NOTE:** Attempt five questions in all, selecting atleast one question from each Unit.

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**UNIT - I**

- I. (a) What do you mean by Binomial distribution and discuss its properties?  
(b) 8 unbiased coins are tossed 256 times. Find the expected frequencies of success (getting a head) and tabulate the result obtained. Calculate the mean and standard deviations of the number of heads. (8+8)
- II. (a) What is the probability that a leap year selected at random will have 53 Sundays?  
(b) A card is drawn at random from standard pack of cards. What is the probability that:  
(i) it is either a king or queen card  
(ii) it is either a king or a black card (8+8)
- III. (a) State and prove Bayes' theorem.  
(b) In a fruit shop, 50% of the fruits are mangoes, 30% oranges and 20% apples. 2 percent of the mangoes, 1 percent of oranges and 0.5 percent of the apples are bad. One of the three different fruits was taken at random from the shop and was found to be bad. What is the probability that the fruit taken was an orange? (8+8)

**UNIT - II**

- IV. (a) Explain, with illustrations, the concept of: -  
(i) Point estimation  
(ii) Interval estimation  
(b) Describe the important properties of a good estimator. (8+8)
- V. (a) Differentiate the following pairs of concepts: -  
(i) Parameter and statistics  
(ii) Critical region and region of acceptance  
(iii) Type-I and Type-II errors  
(iv) One tailed and two tailed test  
(b) A quality control expert is required to estimate the mean thickness of aluminum sheet used in the production of airframes. A sample of 100 sheets reveals a mean of 0.048 inches with a standard deviation of 0.01 inches. Construct 99 percent confidence interval. (8+8)

**P.T.O.**

(2)

- VI. (a) What is the purpose of hypothesis testing?  
 (b) What is standard error of a statistics? What does it measure? Name two fields where it is used. (8+8)

**UNIT - III**

- VII. (a) A sample of heights of 6400 soldiers has a mean of 67.85 inches and a standard deviation of 2.56 inches while a sample of 1600 sailors has a mean of 68.55 inches and a standard deviation of 2.52 inches. Do the data indicate that sailors are on the average taller than the soldiers? Use 5% level of significance (Given  $Z_{0.05}=1.64$ ).  
 (b) A certain medicine is given to each of the 9 patient resulted in the following increase in blood pressure

7	3	-1	4	-3	5	6	-4	-1
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Can it be concluded that the medicine will, in general, be accompanied by a increase in blood pressure? (Given  $t_{0.05(8)}=2.0306$ ) (8+8)

- VIII. Describe the technique of analysis of variance (ANOVA). Write down the analysis of variance for one-way classified data for testing the homogeneity of "K" classes. (16)

**UNIT - IV**

- IX. (a) Explain clearly the basis and working of control charts for mean and range. Also state the assumptions on which mean and range charts are developed.  
 (b) The following data provides the values of sample mean by range for 10 samples of size 5 each. Calculate the control limit for mean chart and range chart and determine the process is in control or not:

Sample No.:	1	2	3	4	5	6	7	8	9	10
Mean:	11.2	11.8	10.8	11.6	11	9.6	10.4	9.6	10.6	10
Range:	7	4	8	5	7	4	8	4	7	9

(8+8)

- X. (a) What do you mean by statistical quality control (SQC)? State clearly theoretical assumptions behind the control chart technique.  
 (b) Explain the following terms in the context of SQC:  
 (i) Tolerance limits  
 (ii) Specification limits (8+8)