

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting one question from each Unit. Candidates may ask for statistical tables from the Superintendent of the exam center.

$x-x-x$

I. Attempt any nine of the following :-

- a) Differentiate between Discrete and Continuous random variables.
- b) What do you mean by moments generating functions?
- c) Differentiate between multiple and partial correlation coefficients.
- d) Explain logistic growth curve.
- e) What is Chebychev's inequality?
- f) What is central limit theorem?
- g) Differentiate between H_0 and H_1 .
- h) Differentiate between small sample and large sample tests.
- i) What do you mean by quality control?
- j) Explain two way classification of ANOVA.
- k) What is maximum likelihood estimate?
- l) What do you mean by probability distribution? (9x2)

UNIT – I

- II. What are growth curves? Give the uses of growth curves? Explain the features of modified exponential, exponential and Gompertz growth curves. (18)
- III. The following data relates to three variables x_1 , x_2 and x_3 .

x_1	4	6	7	9	13	15
x_2	15	12	8	6	4	3
x_3	30	24	20	14	10	4

Obtain:

- a) Regression coefficients $b_{12.3}$ and $b_{13.2}$.
- b) The equation of the plane of regression of x_1 on (x_2, x_3)
- c) Estimate the value of x_1 , when $x_2 = 15$ and $x_3 = 30$. (12,3,3)

UNIT – II

- IV. a) The odds that A speaks the truth are 3:2 and the odds that B speaks the truth are 5:3. In what percentage of cases are they likely to contradict each other on an identical point?
- b) A car hire firm has two cars which it hires out day by day. The number of demands for which a car on each day is distributed as a Poisson variate with mean 1.5. Calculate the proportion of days on which:-

- i) neither car is used
 - ii) some demand is refused
- (Given $e^{-1.5} = 0.2231$) (2x9)

(2)

- V. a) Discuss the characteristics of normal distribution.
- b) In a class of 75 students, 15 were considered to be very intelligence, 45 as medium and the rest below average. The probability that a very intelligence students fails in a viva-voce examination is 0.005; the medium student failing has a probability 0.05; and the corresponding probability for a below average student is 0.15. If a student is known to have passed the viva-voce examination. What is the probability that he is below average? (2x9)

UNIT – III

- VI. Discuss the concepts of:-
- a) Two tailed and one tailed tests
- b) Types - I and Type - II errors
- c) Sampling distributions (3x6)
- VII. a) Explain the properties of point estimates.
- b) Out of 20000 customers ledger accounts, a sample of 600 accounts was taken to test the accuracy of posting and balancing wherein 45 mistakes were found. Assign limits within which the number of defective cases can be expected at 95% level. (2x9)

UNIT – IV

- VIII. a) In a sample of 8 observations, the sum of squared deviations of items from their mean was 94.5. In another sample of 10 observations, the value was found to be 101.7. Test whether the difference is significance at 5% level. You are given that $F_{0.05}(7,9) = 3.29$ at 9 degrees of freedom and $F_{0.05}(8,10) = 3.07$ at 10 degree of freedom.
- b) What is control chart? How we use control chart for statistical quality control. (2x9)
- IX. a) A random sample of size 16 has 53 as mean. The sum of squares of deviations from mean is 150. Can this sample be regarded as taken from population having 56 as mean?
- b) What are non parametric tests? A teacher claims that the median time to do a particular type of mathematics problem is at most 3 minutes, but her students believe that the median time is more than 3 minutes. A random sample of 10 students completed the problem in the following times (in minutes) 2.5, 2, 4, 4.5, 4, 2.5, 4.5, 3, 3.5, 5 use the sign test with a 0.05 level of significance to test the teacher's claim. (2x9)