KT-5714

M. A. / M. Sc. (Sem.-III) Examination
December-2024

MATHEMATICS

PAPER - MATH 303

Mathematical Statistics-I

Time Allowed : **Three Hours**

Maximum Marks : **100**

*This question paper contains **two** sections as under:*

https://pyqdelo.com

Section - A **Max. Marks 20**

This section will have 10 questions, having 02 questions from each unit with no internal choice. Answer in about 20 words. All questions will have equal marks. (02×10=20)

Section - B **Max. Marks 80**

This section will have 10 questions, having 02 questions from each unit, one question to be attempted from each unit. Words limit approximately 400-500 words. Questions may have sub divisions. All questions will have equal marks. (16×05=80)

SECTION - A

1 (i) State Central limit theorem.

(ii) State Markov's inequality.

(iii) Define conditional distribution in multivariate case.

(iv) Show that the coefficient of correlation is the geometric mean of the coefficient of regression.

(v) Define multinomial distribution.

(vi) Define geometric distribution.

(vii) Find the M.G.F. of rectangular distribution.

(viii) Define Gamma distribution.

(ix) Explain C chart.

(x) What are the advantage of attribute control chart ?

SECTION - B

UNIT - I

2 State and prove Chebyshev inequality.

OR

State and prove weak law of large numbers.

UNIT - II

3 Two variates X and Y have zero means, the same variance σ^2 and zero correlation. Show that $U = x\cos\alpha + y\sin\alpha$ and $V = x\sin\alpha + y\cos\alpha$ have same variance σ^2 and zero correlation.

OR

If the relation $ax_1 + bx_2 + cx_3 = 0$ holds for all sets of values of x_1, x_2 and x_3 what must be the partial correlations ?

UNIT - III

4 If m and μ denote the mean and r^{th} central moment of a Poisson distribution, then prove that

$$\mu_{r+1} = rm\mu_{r-1} + m\frac{d\mu_r}{dm}$$

and hence find β_1 and β_2 of Poisson distribution.

OR

Find mean and variance of Hypergeometric distribution.

UNIT - IV

5 Find characteristic function of standard Cauchy distribution.

OR

Find mean, median and mode of a normal distribution and show that it is symmetrical.

UNIT - V

6 Discuss purpose and advantages of control chart for process control.

OR

Explain the following terms and their significance in maintaining product or service quality :

(a) Statistical quality control

(b) Variation (distinguish between common cause and assignable cause)

(c) Control limits

(d) Process capability
