2019

B.Sc. (Hons.)

2nd Semester Examination

STATISTICS

Paper—GE2T

Full Marks : 40 Time : 2 Hours

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Group-A

1. Answer any *five* out of *eight* questions : 5×2=10

   (a) State Lindberg Levy Central limit Theorem.

   (b) Give the axiomatic definition of probability.

   (c) What is the sufficient condition for existance of the expectation of a random variable? Define expectation. 1+1

   (d) Obtain the mean of a poisson distribution with parameter λ.

   (e) State the chebysher's inequality.

[Turn Over]

(f) Suppose $P(A) > 0$ and $P(B) > 0$. If A and B are independent, will they be mutually exclusive ?

(g) Mention two important properties of Moment Generating Function.

(h) What are the drawbacks of the classical definition of probability ?

Group-B

2. Answer any *four* out of *six* questions : $4 \times 5 = 20$

(a) State and prove Bayes' Theorem. 2+3

(b) A_1 and A_2 are two events related to an experiment E. Given $P(A_1) = \frac{1}{2}$, $P(A_2) = \frac{1}{3}$ and $P(A_1 \cap A_2) = \frac{1}{4}$, determine the following probabilities :

(a) $P(A_1^C \cup A_2^C)$, (b) $P(A_1^C \cap A_2^C)$,
(c) $P(A_1^C \cup A_2)$ 2+1+2

(c) Obtain mean and variance of a binomial distribution with parameters n an p. 2+3

(d) Determine the mode of a poisson distribution. 5

(e) Let $x_1, x_2, ..., x_n$ be iid random variables with finite mean μ and finite variance σ^2. Show that $\overline{X}_n \left(= \frac{1}{n}(x_1 + x_2 + ... + x_n)\right)$ converges in probability to μ. 5

(f) Show that all odd order central moments of normal distribution vanish. 5

Group-C

3. Answer any *one* out of *two* questions : 1×10=10

(a) (i) Obtain the moment generating function of a poisson distribution with paramater θ.

(ii) Find the mean and variance of the following continuous distribution :

$f(x) = \alpha \cdot e^{-\alpha x}$; $x \geq 0$ and $\alpha > 0$. 5+5

(b) (i) Show that the sequence of independent Binomial Random variables satisfies the De-Moivers Laplace limit theorem.

(ii) Show that conditional probability satisfies all the axioms of probability. 5+5
