



SE – 170

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Second Semester B.Sc. Examination, September 2020
(CBCS) (F + R) (2017-18 and Onwards)

STATISTICS – II
Basic Statistics – 2

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) Answer **ten** sub-divisions from Section **A** and **five** questions from Section **B**.
2) Scientific calculators are **permitted**.

SECTION – A (20 Marks)



(10×2=20)

Answer **any ten** sub-divisions from the following.

1. a) Distinguish between discrete random variable and continuous random variables.
- b) Define Probability Mass Function (P.M.F.). Mention its properties.
- c) Define expectation and variance of random variable 'X'.
- d) Mention the methods of obtaining moments using moment generating function.
- e) Define Bernoulli distribution. Write its mean.
- f) Define hyper-geometric distribution.
- g) Define Cauchy distribution.
- h) If X and Y are two r.v.'s and 'a' and 'b' are constants then show that $E(aX + bY) = aE(X) + bE(Y)$.
- i) Define correlation co-efficient of a bivariate random variable.
- j) Define conditional p.d.f. of X given Y=y.
- k) The joint p.d.f. of X and Y is given by $f(x, y) = 4xy, 0 < x < 1, 0 < y < 1$
find marginal p.d.f. of Y.
- l) State central limit theorem for i.i.d. r.v.'s.

P.T.O.



SECTION – B (50 Marks)

Answer **any five** questions from the following.

(10×5=50)

2. a) Define distribution function of a random variable. State its properties and prove any one of them.
- b) Prove the following :
- $E(aX + b) = aE(X) + b$
 - $V(aX + b) = a^2V(X)$
 - $E(X - a) = E(X) - a$, where 'X' is a r.v. and 'a' and 'b' are constants. (4+6)
3. a) State and prove additive property of Binomial distribution.
- b) Obtain recurrence relation for central moments of Poisson distribution. (4+6)
4. a) State and prove lack of memory property of geometric distribution.
- b) Obtain the m.g.f. of negative binomial distribution and hence find mean. (4+6)
5. a) Obtain mean and variance of continuous uniform distribution.
- b) Define Exponential distribution. Obtain its m.g.f. and mean. (5+5)
6. a) Obtain r^{th} moment about origin of Gamma (α, β) distribution and hence find mean.
- b) Obtain mean of Beta distribution of first kind. (6+4)
7. a) Define Normal distribution and mention its properties.
- b) Obtain an expression for even order central moments of Normal distribution. (4+6)
8. a) If X and Y are two random variables with joint p.m.f. given by
- $$P(x, y) = \frac{x + 2y}{18}, \quad x = 1, 2, \quad y = 1, 2$$
- Find correlation co-efficient between X and Y.
- b) State and prove addition theorem of expectation for two random variables X and Y. (7+3)
9. a) State and prove Chebychev's inequality.
- b) Establish the convergence of Poisson distribution to Normal distribution stating the necessary conditions. (5+5)