SE – 170

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)**

Answer **any ten** sub-divisions from the following. **(10×2=20)**

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.

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 :

   i) $E(aX + b) = aE(X) + b$

   ii) $V(aX + b) = a^2V(X)$

   iii) $E(X - a) = E(X) - a$, 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)**
