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Second Semester B.Sc. Examination, September/October 2021
(CBCS) (Repeaters) (2017 – 18 and Onwards)
STATISTICS – II
Basic Statistics – 2

Time : 3 Hours Max. Marks : 70

Instructions : *1) Answer* ***ten*** *subdivisions from Section* ***A*** *and* ***five*** *questions from Section* ***B****.*

2) Scientific calculators are ***permitted****.*

SECTION – A **(20 Marks)**

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

a) Define continuous random variable and give an example.

b) What do you mean by probability distribution ?

c) Give the expressions for μ_r' and μ_r of a probability distribution.

d) Define moment generating function and state a property of it.

e) Define Binomial distribution. Mention its mean and variance.

f) Define Hyper Geometric distribution and give an example.

g) Define uniform distribution. Write down its mean.

h) With usual notations prove that $E[ax \pm by] = a\,E(x) \pm b\,E(y)$.

i) Define Bivariate probability distribution.

j) What do you mean by marginal p.d.f. ?

k) Define conditional distribution of y.

l) State central limit theorem.

SECTION – B **(50 Marks)**

Answer **any five** questions from the following. **(5×10=50)**

2. a) Prove that

i) $F(-\infty) = 0$, $F(\infty) = 1$

ii) $P[a < x \leq b] = F(b) - F(a)$

b) With usual notations show that

i) $E(ax \pm b) = a\,E(x) \pm b$

ii) $V(ax \pm b) = a^2\,V(x)$

c) If $P(x) = \frac{x}{3}, x : 1, 2$ then find E(x). **(4+3+3)**

3. a) Obtain Moment Generating function of Binomial distribution.

b) Derive Mean and variance of Poisson distribution. **(5+5)**

4. a) Find μ_r' of Geometric distribution. Hence find the variance.

b) Obtain Moment Generating function of negative Binomial distribution. **(6+4)**

5. a) Derive Moment Generating function of Gamma distribution and hence find its mean.

b) State and prove additive property of exponential distribution. **(5+5)**

6. a) Find mean and variance of continuous uniform distribution.

b) Define Beta distribution of first kind and derive its mean and variance. **(5+5)**

7. a) Define normal distribution and state its properties.

b) If $X_1, X_2, X_3 \sim N(\mu, \sigma^2)$ then prove that $X_1 + X_2 + X_3 \sim N(3\mu, 3\sigma^2)$. **(6+4)**

8. a) The joint p.m.f. of (X, Y) is given by $p(x, y) = \frac{x+y}{8}$, x : 0, 1 and y : 1, 2. Find marginal distribution of X and find mean and variance of it.

b) State and prove additive property of expectation of continuous random variables. **(6+4)**

9. a) If $X \sim B(8, 0.5)$ then find $P[|x-4| \leq 1]$. Also find the lower bound for this probability.

b) Stating the necessary conditions establish the convergence of Gamma distribution to Normal distribution. **(5+5)**
