



CB – 174

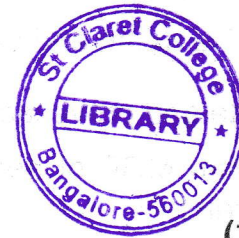
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Second Semester B.Sc. Examination, Aug./Sept. 2023
(CBCS) (Repeaters) (2017-18 and Onwards)
STATISTICS (Paper – II)
Basic Statistics

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

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

(10×2=20)

1. a) Define discrete random variable and probability mass function (p.m.f.).
- b) Define mathematical expectation of a random variable.
- c) Show that $M_{a+X}(t) = e^{at} M_X(t)$.
- d) If X is a random variable with p.m.f. $f(x) = ax$, $x = 0, 1, 2, 3$. Find constant 'a' and mean.
- e) Write any two properties of Poisson distribution.
- f) Define hyper geometric distribution.
- g) Define rectangular distribution and write its mean and variance.
- h) Define joint probability distribution of a random variables.
- i) Show that $\text{cov}(aX, bY) = ab \text{cov}(X, Y)$, where 'a' and 'b' are constants.
- j) If X and Y are independent random variables then show that $E(XY) = E(X).E(Y)$.
- k) The joint probability density function of a random variables X and Y is given by $f(x) = 4xy$, $0 < x < 1$, $0 < y < 1$. Find marginal distribution of Y.
- l) Mention the applications of central limit theorem.

P.T.O.



SECTION – B

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

2. a) Define MGF and explain the methods of generating moments from MGF.
b) If 'X' is continuous random variable with p.d.f. $f(x) = 4x^3$, $0 < x < 1$ then find mean and variance. (5+5)
 3. a) Obtain m.g.f. of binomial distribution and examine whether additive property holds good.
b) Derive mean and variance of Poisson distribution. (5+5)
 4. a) State and prove lack of memory property of geometric distribution.
b) Obtain MGF of negative binomial distribution and hence find mean and variance. (4+6)
 5. a) Obtain r^{th} moment about origin of two parameter gamma distribution and hence find mean and variance.
b) Compute MGF of rectangular distribution. (6+4)
 6. a) Obtain MGF of exponential distribution and hence find mean.
b) Define beta distribution of first kind and find its mean and variance. (4+6)
 7. a) Show that normal distribution $\mu_{2r} = 1.3.5 \dots (2r - 1) \sigma^{2r}$ and hence find β_2 .
b) Show that a linear combination of independent normal variate is also a normal variate. (6+4)
 8. a) The joint pdf of random variables X and Y is $f(x, y) = (4x - 3y^2)$, $0 < x < 1$, $0 < y < 1$. Find $E(X)$, $E(Y)$, $V(X)$ and $V(Y)$.
b) State and prove the addition theorem of mathematical expectations. (6+4)
 9. a) State and prove the Chebyshev's inequality.
b) Explain the convergence of Binomial distribution to normal distribution. (5+5)
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