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23BSS202

**UG PROGRAM (4 YEARS HONOURS) WITH SINGLE MAJOR
AT THE END OF SECOND SEMESTER
STATISTICS-RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS
(B.Sc HONOURS-MAJOR)**

(w.e.f. Admitted Batch 2023-24)

Time: 3 Hours

Maximum: 70 marks

SECTION - A

Answer any FIVE questions. Each question carries 4 marks

5 x 4 = 20 M

1. Explain Discrete and Continuous Random variables.
2. Explain the Joint distribution function and marginal distributions.
3. If X and Y are independent random variables, then $E(XY) = E(X)E(Y)$
4. The probability distribution of a discrete random variable is given below. Find mean and variance.

X	-2	-1	0	1	2	3
P(X)	0.1	K	0.2	2K	0.3	K

5. Explain properties of moment generating function.
6. State and prove additive property of cumulants.
7. Define central limit theorem.
8. Obtain standard error of sample proportion p.

SECTION - B

Answer all the questions. Each question carries 10 marks

5 x 10 = 50 M

- 9.a. Find binomial distribution m.g.f. through mean and variance and also write properties.

Or

- b. What are the discrete and continuous distribution functions? A random variable X has the following probability function: Determine $P(X < 3)$ and find k value?

X=x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k ²	2k ²	7k ² + k

- 10.a. What are the properties of joint distribution function?

Or

- b. From the given bivariate probability distribution, obtain:
- i. Marginal distribution of X and Y
 - ii. Conditional distribution of X given Y=2

Y/X	-1	0	1
0	$1/15$	$2/15$	$1/15$
1	$3/15$	$2/15$	$1/15$
2	$2/15$	$1/15$	$2/15$

11.a. State and prove multiplication theorem of expectation on 'n' random variables.

Or

b. State and prove Weak law of large numbers.

12.a. Define cumulants generating function and hence first four central moments.

Or

b. State and prove Chebyshev's inequality.

13.a. State and prove Lindeberg-levy theorem.

Or

b. State and prove Liapounoff's central limit theorem.