K25FY3613 Pages: 2 Reg No:.....
Name:.....

Third Semester FYUGP Degree (Reg) Examination November 2025

KU3DSCSTA221 - PROBABILITY DISTRIBUTIONS

2024 Admission onwards

Time : 1.5 hours Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. If X and Y are independent, find $E[X|Y]$.
2. Define the conditional variance of X given Y
3. What is the probability density function of an exponential distribution with mean 4?
4. Define exponential distribution with mean θ.
5. Given moment generating function of X as $(0.4 + 0.6e^t)^8$. Find $P(X > 0)$.
6. Define geometric distribution.
7. Define the mathematical expectation of a discrete random variable.
8. Show that the second central moment of random variable is its variance.

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Section B

Answer any 4 questions. Each carry 6 marks.

9. Derive the mean and variance of a binomial distribution.
10. $X \sim B(8, p)$ and $4P(X = 5) = P(X = 3)$, find p.
11. Find the m.g.f. of Poisson distribution. Find its mean and variance.
12. If a random variable X has p.d.f $f(x) = \lambda e^{-\lambda x}$; $x \geq 0$, $\lambda > 0$. Find $E(X)$.
13. (i) The mean of a distribution is 8 and variance is 6. Express these in terms of raw moments μ'_1 and μ'_1.
    (ii) The first raw moment of a distribution is 5 and the second raw moments is 30. Find the variance.
14. Explain the significance of the third and fourth central moments.

Section C

Answer any 1 questions. Each carry 14 marks.

15. Find the coefficient of correlation between X and Y, if $f(x, y) = x + y$; $0 < x < 1$, $0 < y < 1$.

16. (a) If X is uniformly distributed with mean 6 and variance 3, find $P(X < 5)$.
(b) If $X \sim U(0, 1)$, find the distribution of $-2log_e X$.

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