19U369 (Pages: 2) Name……………………

Reg. No……………………

THIRD SEMESTER B.Voc. DEGREE EXAMINATION, NOVEMBER 2020

(Regular/Supplementary/improvement)

CC18U GEC3 ST08 - PROBABILITY DISTRIBUTIONS

(Information Technology)

(2018 Admission onwards)

Time: Three Hours Maximum: 80 Marks

Section A (One word questions)

Answer ***all*** questions. Each question carries 1 mark.

Fill up the blanks:

1. The characteristic function lies between ………….. and …………..
2. If X and Y are two random variables with bivariate distribution function F(x,y), then the value of $F(-\infty, y)$ is …………..
3. If two random variables X and Y are independent, Then E(XY)= …………..
4. A binomial random variable has mean=4 and variance =3, then its third central moment is …………..
5. Bernoulli's law of large number is a particular case of …………..

Write true or false:

6. If X is a random variable, $E(e^{tx})$ is known as probability generating function.
7. The cumulative distribution function F(x, y) lies between zero and one.
8. The mean and variance of Poisson distribution are same.
9. Kurtosis of a standard normal distribution is 3.
10. Convergence in probability is also known as weak convergence.

(10 × 1 = 10 Marks)

Section B (One Sentence questions)

Answer any ***eight*** questions. Each question carries 2 marks.

11. Define expectation of a random variable.
12. Give any two properties of MGF of a random variable.
13. Define joint probability density function and state its properties.
14. If x and y are independent random variables, show that Cov(x,y) = 0.
15. Define discrete uniform distribution.
16. State additive property of normal distribution
17. Explain the term convergence in probability.
18. Find the first four moments about the mean of the numbers 2, 3, 7, 8, 10.

19. Prove any two properties of variance.
20. State and prove addition theorem on expectation.
21. Define binomial distribution. Obtain its mean and variance
22. State the weak law of large numbers and central limit theorem.

(8 × 2 = 16 Marks)

Section D (Short Essay questions)

Answer any ***six*** questions. Each question carries 4 marks.

23. Derive the relationship between raw and central moments.
24. Define moment generating function of a distribution. Show how it generates moments.
25. Define marginal distributions and conditional distributions of two random variables. Explain how you can get the joint pdf from the marginal and conditional pdf's.
26. Find K so that f(x,y) = Kx(y-x), $0 \leq x \leq 4, 4 \leq y \leq 8$ will be a bivariate probability density function.
27. If the mean of a Poisson distribution is 4, find (i) standard deviation (ii) β_1 (iii) β_2 (iv) μ_3 and μ_4
28. State and prove lack of memory property of exponential distribution.
29. Define gamma distribution and derive its mean and variance.
30. If E(X) = 3, $E(X)^2=13$, use Chebyshev's Inequality to find a lower bound for P(-2 < X < 8).
31. State and prove Chebychev's inequality.

(6 × 4 = 24 Marks)

Section E (Essay questions)

Answer any ***two*** questions. Each question carries 15 marks.

32. Given the following table:

x	-3	-2	-1	0	1	2	3
p(x)	0.5	0.10	0.30	0	0.30	0.15	0.10

Compute (i) E(X), (ii) $E(2X+3)$, (iii) $E(4X+5)$, (iv) $E(X^2)$, (v) $V(X)$ (vi) $V(2X+3)$.

33. If $f(x,y) = K(x+y-3xy^2)$; $0 \leq x \leq 1$; $0 \leq y \leq 1$, Find
    i) The constant K
    ii) The marginal p.d.fs of X and Y
    iii) The conditional p.d.fs of X and Y
    iv) Are X and Y independent?
34. Derive the moment generating function of a normal random variable with mean μ and standard deviation σ.
35. State and prove Bernoulli law of large numbers. What are its assumptions?

(2 × 15 = 15 Marks)

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