21U369 (Pages: 2) Name: .....

Reg.No: .....

THIRD SEMESTER B.Voc. DEGREE EXAMINATION, NOVEMBER 2022

(CBCSS - UG)

CC21U SDC3 PT08 - PROBABILITY THEORY

(Information Technology)

(2021 Admission - Regular)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Define equally likely events.
2. State the a priori definition of probability.
3. What are the axioms of probability?
4. Define probability mass function.
5. Define probability density function.
6. Define monotone increasing function.
7. State mathematical expectation.
8. Define central moments.
9. Write a short note on skewness.
10. Define joint probability mass function
11. Define marginal distributions.
12. If X and Y are two r.v.s, write the expression for its correlation coefficient

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Given $P(A) = 0.30, P(B) = 0.78$ and $P(A \cap B) = 0.16$.
    Find (i) $P(A \cup B)$ (ii) $P(A^c \cap B)$ (iii) $P(A \cup B)^c$.
14. State the probability conditions for which three events A, B and C are mutually independent.
15. Let X be the number of years before a certain kind of pump needs replacement. Let X have the probability function $f(x) = kx^3;\ \ x = 0, 1, 2, 3, 4$.Find k.

16. If the cumulative distribution function of X is $F(x)$, find the cumulative distribution function of $Y = X^3$.

17. Find the mgf of $X$with pdf $f(x) = \frac{1}{2}e^{-|x|}, -\infty < x < \infty$.

18. Explain characteristic function with its properties.

19. If the joint p.d.f of X and Y is $f(x, y) = kxy, 0 < x < 1, 0 < y < x$, find the value of k.Examine if X and Y are independent.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. (i) State and prove Baye's theorem.

    (ii) The probability that a doctor will diagnose a particular disease correctly is 0.6. The probability that a patient will die by his treatment after correct diagnosis is 0.4 and the probability of death by wrong diagnosis is 0.7. A patient of the doctor who had the disease died. What is the probability that his disease was not correctly diagnosed.

21. Let X and Y have the joint p.d.f $f(x, y) = x + y; 0 < x < y < 1$. Then find $E(X^2Y^3)$ and $E(X + Y)^2$.

(1 × 10 = 10 Marks)

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