

23U241

(Pages: 2)

Name:

Reg.No:

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U STA2 C02 - PROBABILITY THEORY

(Statistics - Complementary Course)

(2019 Admission onwards)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

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

1. Define exhaustive events.
2. Mention the classical definition of probability.
3. State the multiplication theorem.
4. Define independent events.
5. Distinguish between discrete and continuous random variables.
6. State the properties of probability density function.
7. Define mathematical expectation.
8. Mention any two properties of variance.
9. State any two properties of mgf.
10. Define characteristic function of a random variable.
11. Define kurtosis.
12. Define joint probability mass function.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Let A and B be two events in a sample space.
Show that $P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$.
14. 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) $P(A \cup B)^c$.

15. If the cumulative distribution function of X is $F(x)$, find the cumulative distribution function of $Y = X^2$.
16. Let X be a continuous random variable with pdf $f(x)$. Let $Y = X^2$. Find the pdf and the distribution function of Y .
17. Given the joint pdf $f(x, y) = \frac{1}{3}(x + y), 0 < x < 2; 0 < y < 1$. Obtain the marginal pdf's of X & Y .
18. If (X, Y) has the joint pdf $f(x, y) = \frac{3}{2}x^2y, 0 < x < 1$ and $0 < y < 2$, show that X and Y are independent.
19. State and prove the addition theorem on expectation of two random variables.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. State and establish Baye's theorem for a countable number of events.
21. If X and Y have the joint pdf given by $f(x, y) = \frac{x+y}{21}, x = 1, 2, 3$ and $y = 1, 2$. Obtain
 - (i) The correlation coefficient ρ_{xy}
 - (ii) $E(X/Y = 2)$ and $V(X/Y = 2)$.

(1 × 10 = 10 Marks)
