

19U238

(Pages: 2)

Name

Reg.No :

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2020

(CBCSS - UG)

CC19U STA2 CO2 : PROBABILITY THEORY

(Statistics - Complementary)

(2019 Admission - Regular)

Time: 2.00 Hrs

Max. Marks: 60

Credit: 3

(Draw diagram wherever necessary. The students can answer all questions in sections A & B)

A. Short answer questions. Each question carries 2 marks.

1. Define axiomatic approach to probability.
2. What are the limitations of classical definition of probability?
3. Given $P(A) = 0.30$, $P(B) = 0.78$ and $P(A \cap B) = 0.16$. Find
(i) $P(A^c \cap B^c)$ (ii) $P(A^c \cup B^c)$ (iii) $P(A \cap B^c)$.
4. Obtain the probability distribution of the number of heads when three coins are tossed together?
5. Define probability density function.
6. Define mathematical expectation of a random variable X .
7. Define central moments.
8. List any two properties of moment generating function..
9. Define characteristic function.
10. If X has variance 3, what is the variance of Y where $Y = 3X - 2$.
11. Explain conditional probability density functions.
12. Define conditional variance.

(Ceiling: 20 Marks)

B. Short essay questions (Paragraph). Each question carries 5 marks.

13. What is a sample space? What are events?
14. If A, B and C are independent, show that (i) $A^c \cap B^c$ are independent (ii) $A^c \cup B$ are independent.
15. What are the properties of probability distribution functions?
16. If X has the pdf $f(x) = \begin{cases} 1, & 0 \leq x \leq 1; \\ 0, & \text{elsewhere.} \end{cases}$

Find the pdf of $Y = -2 \log X$.

17. Let X be a random variable with pmf

x	0	1	2	3
$f(x)$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{24}$	$\frac{1}{8}$

Find the expected value of $Y = (X - 1)^2$.

18. Distinguish between skewness and kurtosis.
19. 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.

(Ceiling: 30 Marks)

C. Essay questions. Answer any one question.

20. (i) State and prove Baye's theorem.
(ii) Two urns I and II contain respectively 3 white and 2 black balls, 2 white and 4 black balls. One ball is transferred form urn I to urn II and then one is drawn from the latter. It happens to be white. What is the probability that the transferred ball was white.
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)
