19101798

QP CODE: 19101798

Reg No : .....

Name : .....

B.SC DEGREE (CBCS) EXAMINATION, MAY 2019

Second Semester

Complementary Course - **ST2CMT02 - STATISTICS - PROBABILITY THEORY**

(Common for B.Sc Computer Applications Model III Triple Main,B.Sc Mathematics Model I,B.Sc Physics Model I)

2017 ADMISSION ONWARDS

002F54E5

Maximum Marks: 80 **Time: 3 Hours**

Part A

Answer any **ten** questions.

Each question carries **2** marks.

1. Distinguish between sample space and event of a random experiment.
2. Give two examples for mutually exclusive events.
3. Mention any two disadvantages of frequency definition of probability.
4. From a pack of 52 cards one card is drawn at random. Find the probability that it is (1) a black king (2) a red card.
5. Distinguish between discrete random variable and continuous random variable.
6. Find out the p.m.f of $Y= X^2$, where X is with p.m.f

x	-2	-1	0	1	2
f(x)	1/5	1/5	1/5	1/5	1/5

7. Define joint probability mass function of a pair of discrete random variables.
8. The joint pmf of X and Y is given by $f(x,y) = kxy^2$; x = 1, 2, 3 ; y = 1, 2 and 0 elsewhere. Find k .
9. What do you mean by curve fitting?

10. Distinguish between direct correlation and inverse correlation.

11. Define Spearman's correlation coefficient.

12. Define scatter diagram.

(10×2=20)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Two dice are rolled together. Let A be the event that the sum of the numbers on the faces is odd and B be the event that there is at least one 3 shown. Find P(AUB).

14. For any three events A, B and C, P(A∪B | C) = P(A |C) + P(B |C) – P(A∩B |C).

15. There are 4 boys and 2 girls in a room No.1 and 5 boys and 3 girls in room No. 2. A girl from one of the rooms laughed loudly. What is the probability that the girl who laughed loudly was from room No.2 ?

16. A random variable has the pdf f(x) = $A\,e^{\frac{-x}{5}}$; x > 0 and zero elsewhere. (1) find A (2) Show that for any two positive numbers s and t, P(x > s+ t | x > s) = P(x > t)

17. If the p.d.f. of X is f(x) = $\frac{1}{2}$; -1 ≤ x ≤ 1 and 0 elsewhere, find the pdf of Y = X^2

18. Explain marginal distributions and conditional distributions.

19. Let the joint pmf be f(x,y) = $\frac{x+2y}{18}$; x = 1, 2 ; y = 1, 2 and 0 elsewhere. Are the variables X and Y independent?

20. Find Pearson's correlation coefficient for the following data

x	7	8	9	6	5
y	8	6	7	9	10

21. The regression lines are given by 4y = 9x + 15 and 25x = 6y + 7.Identify the two regression lines. Also obtain the mean values of x and y.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. 1) If A and B are independent events, then show that (a) A and B^c are independent (b) A^c and B are independent (c) A^c and B^c are independent.
2) Two dice are rolled together and the number on each die is recorded. Let A be the event that the first die shows either 2 or 5 or 6 and B be the event that the sum of the numbers on the two dice is 9. Examine whether the events A and B are independent.

23. (1) Define pmf and distribution function of a discrete random variable. What are their properties?
(2) The following table gives the probability mass function of a random variable X

x	1	2	3	4	5	6	7
f(x)	c	2c	2c	3c	c^2	$2c^2$	$7c^2 + c$

Find c, P(x>5), P(x < 3). If P(x $\leq$ k) > $\frac{1}{2}$, find the minimum value of k.

24. Let the joint pdf be f(x,y) = k x(1-y) ; 0 < x < 1, 0 < y < 1 and 0 elsewhere. Find (1) k (2) P ($0 < x < \frac{1}{2}$) (3) P ($0 < x < \frac{1}{3}$ | $0 < y < \frac{1}{3}$).

25. Using the following data, (1) find y on x regression line (2) obtain the regression coefficients of y on x and x on y regression lines

x	1	4	5	8	10	12
y	16	18	14	12	19	17

(2×15=30)