QP CODE: 20101178

20101178

Reg No : .....

Name : .....

B A/B.SC DEGREE (CBCS) EXAMINATION, NOVEMBER 2020

Second Semester

Complementary Course - ST2CMT02 - STATISTICS - PROBABILITY THEORY

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

2017 ADMISSION ONWARDS

2AD938A2

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Define sample space. Write the sample space when three unbiased coins are tossed together.
2. Let sample space S = (H, T). Let B = { ϕ, S, {H}, {T}}. Check whether B is a sigma field of events.
3. Give two examples for mutually exclusive events.
4. Consider the random experiment of throwing an unbiased die and observing the face coming up.Let the event A = {2, 5} and B ={2, 4, 6}. Obtain P(A | B).
5. Define discrete random variable. Give an example.
6. Let the pmf of X be f(x) = $\frac{m^x}{x!}\, e^{-m}$; $x = 0, 1, 2, \ldots$ Find the pmf of $Y = X^2$
7. Mention the properties of joint pdf of a pair of continuous random variables.
8. Find the value of k if the joint pdf is f(x,y) = k(xy + 2x + 3y +6) ; $0 < x < 1$, $0 < y < 1$ and 0 elsewhere.
9. The coefficient of correlation between two variables x and y is 0.28. Their covariance is 7.6. If the variance of x is 9, then obtain the standard deviation of y .
10. State the principle of least squares.
11. If the two regression equations are 3x + 12y - 10 = 0 and 3y + 9x - 46 = 0, find the means of x and y.
12. Find the regression coefficient b_{yx} if 2x + 4y - 5 = 0 is the regression equation of y on x.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. If P(A) = 0.3, P(B) = 0.2, P(A∩B) = 0.1 then find the probability of (1) at least one of the events occur (2) exactly one of the events occur (3) none of the events occur.

14. Mention any two advantages and any two limitations of frequency definition of probability.

15. The probabilities that a husband and wife will be alive 20 years from now is given by 0.8 and 0.9 respectively. Find the probabilities that in 20 years (1) both of them will be alive (2) neither of them will be alive (3) at least one will be alive.

16. Consider the pmf of X, $f(x) = \frac{x}{15}$; x = 1, 2, 3, 4, 5 and zero elsewhere. Find its distribution function. Also obtain $P(1 \leq x \leq 2)$ and $P(\frac{1}{2} \leq x \leq \frac{5}{2})$

17. Given the pdf $f(x) = e^{-x}$; x > 0 and 0 elsewhere, find the pdf of (1) $Y = X^3$ (2) Y = 3X + 4.

18. Two unbiased coins are tossed . Let X = 1 if the first coin shows head and X = 0 if it shows tail and let Y denotes the number of heads obtained. Obtain the joint probability mass function of (X, Y) .

19. Explain marginal distributions and conditional distributions.

20. Prove that change of origin and scale does not affect correlation coefficient.

21. Find the rank correlation coefficient for the data

x	70	48	58	55	54	50
y	62	47	53	60	55	68

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. 1) If two dice are thrown together, what is the probability that the sum of the numbers on the faces is (a) greater than 8 (b) neither 7 nor 11.
2) A, B and C in order toss a coin. The first one to throw a head wins. What are their respective chances of winning?

23. Let the joint pdf be f(x,y) = k xy (1-y) ; 0 < x < 1, 0 < y < 1 and 0 elsewhere. Find the conditional pdf of y given x and x given y. Examine whether X and Y are independent.

24. Examine whether the following is a pdf.
$f(x) = \frac{x}{2}$; 0 < x < 1

$= \frac{1}{2}$; 1 < x < 2

$= \frac{1}{2}(3 - x)$; 2 < x < 3

= 0 elsewhere

If yes, obtain its distribution function and P(|X| < 1.5)

25. (1) Explain the fitting of curve of the form $y = a e^{bx}$
(2) Fit a curve of the form $y = a e^{bx}$ to the following data

x	1	2	3	4	5	6
y	1.6	4.5	13.8	40.2	125	300

(2×15=30)