QP CODE: 24020104

24020104

Reg No : ....

Name : ....

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, MAY 2024

Second Semester

B.Sc Mathematics Model II Computer Science

Complementary Course - ST2CMT62 - STATISTICS - RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS

2017 ADMISSION ONWARDS

1D36CDDF

Time: 3 Hours | Max. Marks : 80

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Part A

*Answer any **ten** questions.*

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

1. Define Continuous random variable.
2. A continuous variable has pdf f(x) = 2x ;if 0 < x ≤ 1 and zero elsewhere. Find P[X ≤ 0.5] and P[0.25 ≤ X ≤ 0.75].
3. What are the properties of joint p.d.f?
4. Find E(x) if f(x) = 30 x^4 (1-x); 0 < x< 1 and 0 elsewhere.
5. Write down the properties of characteristics function.
6. Define discrete uniform distribution.
7. If the mean and variance of a binomial distribution are 4 and 3, find its mode.
8. Find the value of k if $P[|X| > k] = 0.97$, where $X \sim N(15, 7^2)$.
9. If $P[X > p] = 0.72$ and $P[X < q] = 0.36$,find $P[p < X < q]$,where $X \sim N(0, 1)$.
10. For two pairs of observations, $(x_1, y_1), (x_2, y_2)$,what will be Pearson's coefficient of correlation.
11. Show that $-1 < r < +1$where r is the Pearson's coefficent of correlation.
12. Write the normal equations for fitting a polinomial of the form $y = ax^2 + bx + c$.

(10×2=20)

Part B

*Answer any **six** questions.*

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

13. If 10 unbiased coins are tossed and a random variable X denote the number of heads appeared, write down the probability mass function of X.

14. f (x) = x/15, where x=1,2,3,4,5
    = 0 elsewhere
    is the density function of the random variable X. Find its distribution function. Also find P(X =1 or 2) and P(1/2 <X<5/2)

15. Show that pairwise independence does not imply mutual independence.

16. Given the pdf f(x) = 1/θ ; 0 < x < θ and zero elsewhere. Find mgf and hence the v ariance.

17. Define conditional expectation of two random variables.

18. Find the mean deviation about mean of rectangular distribution.

19. Show that binomial distribution with parameters n and p tends to Poisson distribution as $n \to \infty$.

20. How will you resolve tied ranks to find Spearman's rank correlation coefficient. Explain with examples.

21. Fit a curve of the type $Y = ab^X$ to the following data.

X	2	3	4	5	6
Y	144	171.5	210	253	301.5

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. f(x,y) = (2x+3y)/72 , x=1,2 and y=1,2,3 is the joint pdf of (X,Y).
    (1) Find the distribution of X+Y
    (2) Find the conditional distribution of X given X+Y=3
    (3) Examine whether Xand Y are independent

23. The following table gives the distribution of a random variable. Find its first four raw moments and central moments.

x	0	1	2	3
f(x)	1/2	1/8	1/8	1/4

24. (i) Derive the moment generating function of normal distribution and hence find its mean and variance.

(ii) State and prove the additive property of normal distribution.

25. (i)Explain the principle of least squares and derive the normal equations for fitting a straight line.

(ii) Fit a straight line of the form $y = ax + b$ to the following data and find the value of y when x=40.

x	14	19	24	30	38	42	45	49	55	58
Y	49	38	40	33	36	21	27	24	19	14

(2×15=30)