



K20U 1307

Reg. No. : .....

Name : .....



III Semester B.Sc. Degree (CBCSS – Sup/Imp.) Examination, November 2020  
(2014 – '18 Admns.)

**COMPLEMENTARY COURSE IN STATISTICS FOR GEOGRAPHY/  
PSYCHOLOGY CORE**

**3C03STA : Probability and Distribution Theory**

Time : 3 Hours

Max. Marks : 40

**Instruction :** Use of Calculators and Statistical Tables are **Permitted**.

PART – A

**(Short Answer)**

Answer **all** the questions.

**(6×1=6)**

1. State addition theorem of probability.
2. Define a random variable and give an example.
3. If variance of  $X$  is 3, what is  $\text{var}(2X-3)$  ?
4. What do you mean by standard Normal distribution ?
5. Define Exponential distribution.
6. If  $X \sim N(\mu, \sigma^2)$ , what is the distribution of  $\bar{X}$ , the sample mean ?

PART – B

**(Short Essay)**

Answer **any six** questions.

**(6×2=12)**

7. Show that  $P(A^c) = 1 - P(A)$ .
8. Write the axiomatic definition of probability.
9. State the multiplication theorem probability.
10. Discuss the properties of a probability density function of a random variable both in discrete and continuous cases.

P.T.O.



11. Is  $f(x) = x$  where  $x = \frac{1}{16}, \frac{3}{16}, \frac{1}{4}, \frac{1}{2}$  a probability density function ? Why ?
12. Find the mean and variance of the Binomial distribution with parameters  $n = 3$  and  $p = 1/3$ .
13. What are the conditions under which binomial distribution tends to Poisson ?
14. Define students t distribution.

## PART – C

## (Essay)

Answer **any four** questions.

(4×3=12)

15. If A, B and C are any three events, write down the expressions for the events
- i) Only A occurs
  - ii) All the three occurs
  - iii) None occurs.
16. Find the expectation of X, if x has the probability mass function.

X	-1	-2	0	1	2
P(X=x)	0.15	0.3	0.2	0.1	0.25

17. Seven coins are tossed simultaneously. Find the probability of getting maximum of 3 heads.
18. Show that exponential distribution possesses the lack of memory property.
19. List any six properties of Normal distribution.
20. State any four applications of Chi-square distribution.

## PART – D

## (Long Essay)

Answer **any two** questions.

(2×5=10)

21. In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 45% of the total of their output 5, 4 and 2 percent are defectives. A bolt is drawn at random and found to be defective. What are the probabilities that it was manufactured by machines A, B and C ?



22. If  $f(x) = \frac{1}{8}$  where  $x = 1, 2, 3, 4, 5, 6, 7, 8$

- i) Derive the distribution function
- ii) Calculate  $P(X \geq 5)$  and
- iii)  $P(X = \text{even number})$ .

23. Four coins are tossed 80 times. The distribution of the number of heads is given below. Fit a Binomial distribution.

No. of heads	Frequency
0	4
1	20
2	32
3	18
4	6

24. a) Define Chi-square distribution and F distribution.

b) Establish the interrelationship between t, F and  $\chi^2$  distributions.

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