



K24U 3589

Reg. No. :

Name :

III Semester B.Sc. Degree (C.B.C.S.S. – O.B.E.-Regular) Examination,
November 2024
(2023 Admission)

**COMPLEMENTARY ELECTIVE COURSE IN STATISTICS FOR B.Sc.
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
3C03STA – AIML : 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 6 questions.

(6×1=6)

1. Define equally likely events.
2. State the frequency definition of probability.
3. What is the probability that a leap year selected at random will contain 53 Sundays ?
4. Write the probability density function of Exponential distribution.
5. Define standard error.
6. Define chi-square distribution.

**PART – B
(Short Essay)**

Answer any 6 questions.

(6×2=12)

7. Define sample space. A coin is tossed until two heads or a tail released. Specify the sample space of the experiment.
8. State and prove multiplication theorem of probability.
9. Give an example of three events which are pairwise independent but not mutually independent.
10. Find the value of k when the probability density function of X is $f(x) = k(x + 2)$, $1 < x < 5$?
11. Distinguish between discrete and continuous random variable.

P.T.O.



12. Define Poisson distribution. Also find its mean.
13. Write any four properties of Normal distribution.
14. Define statistic and parameter.

PART – C
(Essay)

Answer any 4 questions.

(4×3=12)

15. If two events are independent, show that their complements are independent.
16. State and prove addition theorem for two events.
17. A problem in statistics is given to three students A, B and C whose chances of solving it is $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved ?
18. Define mathematical expectation of a random variable. State and prove any two properties of expectation.
19. Find mean and variance of Binomial distribution with parameters n and p ?
20. Explain the relationship between chi-square, Student's t and F distribution ?

PART – D
(Long Essay)

Answer any 2 questions.

(2×5=10)

21. a) State and prove Baye's theorem.
b) The contents of the three urns are given below.
Urn I 4 black balls, 4 red balls
Urn II 3 black balls, 5 red balls
Urn III 5 black balls, 3 red balls.
An urn is chosen at random and a ball is drawn from it. If the chosen ball is red find the probability that it is from urn III ?
22. Define probability density function and distribution function of continuous random variable. Also state the properties of them ?
23. Fit a Poisson distribution to the following data

No. of accidents	:	0	1	2	3	4	5
No. of men	:	95	75	44	18	2	1
24. Derive the sampling distribution of sample mean.