Reg. No ....   Name **25U472**

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END SEMESTER EXAMINATION - MARCH 2025

SEMESTER 4 : INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE - DATA SCIENCE

COURSE : **21UP4CPSTA02 : PROBABILITY DISTRIBUTIONS AND STATISTICAL INFERENCE**

(For Regular 2023 Admission and Improvement/Supplementary 2022/ 2021 Admissions)

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Time : Three Hours   Max. Weightage: 30

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(Use of scientific calculator and statistical tables are permitted)
PART A
Answer any 8 Questions

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1.   (X,Y) follow bivariate normal distributions with $\mu_{1=}\mu_2 = 0$, $\sigma_{1=}\sigma_2 = 4$ and $\rho = 0.8$. Write down the joint pdf.

2.   Define (i) confidence interval (ii) confidence coefficient

3.   What is point estimation?

4.   150 heads and 250 tails resulted from 400 tosses of a coin find 90% confidence interval for the proportion of head ?

5.   Define F statistic. Give an example of F Statistic.

6.   Distinguish between simple and composite hypothesis.

7.   Define (i) significance level and (ii) power of a test

8.   Explain the terms acceptance and rejection region.

9.   In a city on an average 12 accidents take place in 30 days. Find the number of days in a year in which
     (i) 2 accidents take place
     (ii) at least 3 accidents take place

10. Show that a linear combination of independent normal variates is also a normal variate.

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(1 x 8 = 8 Weight)

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PART B
Answer any 6 Questions

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11.   Define Poisson distribution? Find its mean and standard deviation?

12. Define Normal distribution. Obtain it's mean

13.
     A random sample of size 16 obtained from a normal population with mean μ and variance 6.25 is 23.6, 28.1, 27.2, 21.0, 27.8, 25.1, 22.5, 18.4, 31.1, 30.0, 26.3, 20.6, 24.4, 25.0, 19.6, 22.2 . Determine (1) a point estimate for μ (2) a 99% confidence interval for μ

14. Explain (i) simple and composite hypothesis (ii) critical and acceptance regions of a test
      (iii) significance level and power of a test

15. State the interrelation among Normal, Chi square 't' and 'F' distribution

16. Define negative binomial distribution. Obtain its mean

17. Explain briefly the procedure followed in tests of statistical hypothesis

18. Explain interval estimation. Obtain 95% confidence interval for the mean of a normal population based on the sample values 12,15,18,16,14,17,13,10 and 11.

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(2 x 6 = 12 Weight)

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PART C
Answer any 2 Questions

19. Fit a Poisson distribution to the following data and test for its goodness
    X :   0   1   2   3   4
    f : 17167   1861   124   2   1

20. Define 't' statistics and derive its sampling distribution? Give two examples of statistics follows students 't' distribution

21. (i) State and prove the sufficient condition for consistency of an estimator. (ii) If T is a consistent estimator for θ, then show that T^2 is also a consistent estimator for θ^2

22. Fit a Binomial distribution and obtain theoretical frequencies
    No. of defectives : 0   1   2   3   4
    No. of packets   : 46   28   18   6   2

(5 x 2 = 10 Weight)