Reg. No .... Name **26U4216**

END SEMESTER EXAMINATION - MARCH 2026

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

COURSE : 21UP4CPSTA02 : PROBABILITY DISTRIBUTIONS AND STATISTICAL INFERENCE

(For Regular 2024 Admission and Improvement /Supplementary 2023/ 2022/2021 Admissions)

Time : Three Hours Max. Weightage: 30

(Use of scientific calculator and statistical tables are permitted)

PART A

Answer any 8

1. A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used.
2. A sample of 12 specimen taken from a normal population is expected to have a mean =50. The sample has mean 64 with a variance 25. Write the test statistic for testing, H_0: $\mu = \mu_0$ against H_1:$\mu \neq \mu_0$
3. Write the confidence interval for the difference between proportion of two populations.
4. Define chi-square statistic? Write the p.d.f. of chi-square distribution.
5. The diameter of cylindrical rod is assumed to the normal with a variance of 0.04 cm. A sample of 50 rods has a mean diameter of 4.5 cm. Find the 95% confidence limits for population mean.
6. A random sample of 500 pineapples was taken from a large consignment and 65 of them were found to be bad. Find 99% confidence interval for the proportion of bad pineapples.
7. What are the two types of errors in testing of hypthesis?
8. Define ‘t’ statistic? Write the p.d.f. of ‘t’ distribution.
9. What is ANOVA and write the assumptions?
10. Obtain the m.g.f. of a binomial distribution with parameters n and p.

(1 x 8 = 8 Weight)

PART B

Answer any 6

11. Explain the concept of sufficiency and efficiency. Obtain the sufficient estimator for the parameter λ in a Poisson distribution.
12. If X and Y are independent Poisson variate such that P(X=1)=P(X=2) and P(Y=2)=P(Y=3). Find the Variance of X-2Y.
13. Define exponential distribution.Explain its memory less property.
14. Explain the test procedure for testing H0:$\mu=\mu_0$ when (i) the population variance is known (ii) the population variance is unknown.
15. Define normal distribution. Find the moment generating function of Normal distribution.
16. Six observations 8, 6, 9, 12, 5 and 11 are taken from a normal population. Obtain (a)95% (b) 99% confidence interval for the population variance.
17. Define Poisson distribution.Derive Poisson distribution as a limiting case Binomial distribution.
18. A sample of size 400 was drawn and the sample mean was found to be 99. Test wheter this sample could have come from a normal population with mean 100 and variance 64 at 5% level of significance.

(2 x 6 = 12 Weight)

PART C

Answer any 2 (5 marks each)

19. (i) Give an example of an estimate which is consistent but biased (ii) Derive the 95% confidene limit for the proportion of binomial population.

20. Fit a binomial distribution to the following data and obtain the theoretical frequencies.

x	0	1	2	3	4	5
f	6	18	28	25	14	9

21. (i) Explain paired t-test (ii)Ten students were given a memory test by being asked to see a picture for one minute and write down the articles seen by them in the picutre. They were given two weeks training and at the end they were given the same test. The results are given below. Has the training give any significant effect in improving their memories?

Student	A	B	C	D	E	F	G	H	I	J
Test- I	10	8	7	9	8	10	9	6	7	8
Test- II	12	8	8	10	8	11	9	8	9	9

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

(5 x 2 = 10 Weight)