

END SEMESTER EXAMINATION - MARCH 2024**SEMESTER 4 - INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE****COURSE : 21UP4CPSTA02 - PROBABILITY DISTRIBUTIONS AND STATISTICAL INFERENCE***(For Regular 2022 Admission and Improvement / Supplementary 2021 Admissions)*

Time : Three Hours

Max. Weightage: 30

PART A**Answer any 8 Questions**

1. Write a statistic for testing the mean of a normal distribution with (i) known standard deviation (ii) unknown standard deviation.
2. 150 heads and 250 tails resulted from 400 tosses of a coin find 90% confidence interval for the proportion of head?
3. Compare and contrast a standard normal distribution and a student's 't' distribution.
4. 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.
5. Distinguish between null and alternative hypothesis.
6. A random sample of size 16 from a normal distribution $N(\mu, 25)$ yielded $\bar{X} = 73.8$. Find the 95% confidence interval for μ ?
7. Define binomial distribution. Determine the binomial distribution for which the mean is 4 and variance 3.
8. Define 't' distribution?
9. The mean and variance of binomial distribution with parameters n and p are 16 and 8. Find $P(X=0)$
10. 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 $H_1: \mu \neq \mu_0$

(1 x 8 = 8 Weight)**PART B****Answer any 6 Questions**

11. Two random samples are taken from normal populations resulting in the following statistic. Test whether the samples can be regarded as coming from the same normal population.

size	mean	s.d.
16	34	2.5
25	45	2.5

12. Show that the exponential distribution 'lacks memory'.
13. 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.
14. 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.
15. Define (1) simple random samplig (2) systematic sampling (2) stratified sampling.
16. Explain the method of paired t test.

17. In Poisson frequency distribution, frequency corresponding to 3 successes is $\frac{2}{3}$ times frequency corresponding to 4 successes. Find the mean and standard deviation of the distribution.
18. Give an example each of an estimator that is (i) both unbiased and consistent (ii) not unbiased but consistent.

(2 x 6 = 12 Weight)

PART C

Answer any 2 Questions

19. i) Define chi-square distribution and state its applications ii) Define 't' distribution and state its assumptions.
20. Give an example each of an estimator that is (i) not unbiased but consistent (ii) unbiased but not consistent.
21. Fit a Binomial distribution and obtain theoretical frequencies
 No. of defectives : 0 1 2 3 4
 No. of packets : 46 28 18 6 2
22. A certain drug is claimed to be effective in curing cold. In an experiment on 164 people with cold, half of them were given the drug and othe other half was given sugar pills. The patient reaction to the treatment are presented in the following table. On the basis of this data can it be concluded that there is a significant difference in the effect of the drug and sugar pills.

	Helped	Harmed	No effect
Drugs	52	10	20
Sugar pills	44	12	26

(5 x 2 = 10 Weight)