

END SEMESTER EXAMINATION : MARCH 2023
SEMESTER 4 : INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE
COURSE : 21UP4CPSTA02 : PROBABILITY DISTRIBUTIONS AND STATISTICAL INFERENCE
(For Regular - 2021 Admission)

Time : Three Hours

Max. Weightage: 30**PART A****Answer Any 8 Questions**

1. Derive a general test procedure for testing a simple hypothesis H_0 against a simple alternative H_1 .
2. Write down the test statistic and critical region for testing the mean of a normal population $H_0: \mu = \mu_0$ when the population variance is unknown.
3. Define efficiency?
4. 2% of hooks manufactured by a firm are found to be defective. Find the probability that a box containing 100 hooks have
 - (i) exactly 4 defectives
 - (ii) More than one defective
5. Write the confidence interval for the difference between proportion of two populations?
6. A sample of size 9 from a normal population give mean = 15.8 and variance = 10.3. Find 99% confidence limits for the population mean.
7. Show that a linear combination of independent normal variates is also a normal variate.
8. Define hyper geometric distribution.
9. Give the relationship between chi square, 't', 'F' distributions?
10. Explain the terms acceptance and rejection region.

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

11. Show that sample variance is a consistent estimator for the population variance when samples are taken from a normal population
12. Explain briefly the procedure followed in tests of statistical hypothesis
13. Derive m.g.f. of a normal distribution with parameters μ and σ .
14. Define normal distribution. Find its mean?
15. Explain the applications of Z-test.
16. Define sufficiency. Obtain a sufficient estimator of parameter λ of a Poisson distribution.
17. If X denotes the number of failures preceding the r^{th} success in an infinite series of independent trials with constant probability 'p' of success for each trial, then identify the distribution and obtain $E(X)$
18. State 'Lack of memory' property. Show that Geometric distribution possess the lack of memory property?

(2 x 6 = 12 Weight)

PART C
Answer Any 2 Questions

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

20.

Distinguish between point estimation and interval estimation. A random sample of 16 observations is taken 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, and 22.2. Determine (i) a point estimate of μ (ii) a 99% confidence interval for μ

21. **Below are given the number of vacancies of lecturers occurring in a college over a period of 100 years.**

Number of vacancies	0	1	2	3	4 and more
Number of years	29	50	15	6	0

Fit a Poisson distribution and obtain expected frequencies.

22. 1000 students at college level are graded according to their I.Q. and their economic conditions. Test whether there is any association between economic conditions and the level of I.Q.

		IQ Level		
		poor	average	good
Income Level	Poor	150	100	50
	Average	200	150	150
	good	50	100	50

(5 x 2 = 10 Weight)