Reg. No…….. Name……

B.Sc. DEGREE END SEMESTER EXAMINATION - JULY 2021

SEMESTER **–4: STATISTICS (COMMON FOR MATHEMATICS & COMPUTER APPLICATION)**

COURSE: **U4CPSTA4-U4CRCST4: STATISTICAL INFERENCE**

(Supplementary for 2014 admission)

Time: Three Hours Max. Marks: 75

(Use of Scientific Calculators and Statistical tables are permitted)

PART A

1. Explain the term Statistical Inference.
2. Explain: Estimation of parameters.
3. Population mean is ……. while sample mean is …….
4. What are the different methods of estimation?
5. Significance level of a test lies between …… and ……
6. What do you mean by Analysis of Variance (ANOVA) test?
7. Define confidence coefficient?
8. Distinguish between Standard Deviation and Standard Error by giving suitable examples.
9. $Write\ down\ the$ test statistic for testing $H_0 : \sigma = \sigma_0$.
10. Distinguish between a parameter and a statistic (1 x 10 = 10)

PART B

Answer any eight questions. Each question carries 2 marks

11. What are the desirable properties of a good estimator?
12. Explain interval estimation
13. *t* is an unbiased estimator of *q* . Can we say *t* is an unbiased estimator of *q* .
14. Give two tests based on F-distribution
15. State the Cramer – Rao inequality.
16. Explain Type I error and Type II error in testing.
17. What are the general properties of a *MLE*?
18. Define significance level and power of a test.
19. Explain one- tail and two- tailed tests with the help of examples.
20. Write down the test statistics and critical region for taking the mean of a population $H_0 : \mu = \mu o$, when the population variance is unknown. (2 x 8 = 16)

PART C

Answer ***any five*** questions. Each question carries **5** marks.

21. A population follows uniform distribution over $(0, \theta)$. It is decided to test $H_0 : \theta = 1$ against $H_1 : \theta = 2$ based on a single sample observation X_1. Find the probabilities of Type I and Type II errors if the critical region of the test is $X_1 > 0.5$
22. Explain the Neyman's condition for sufficiency.

23. The length of 5 screws (in inches) made by a machine are 2.0, 2.1, 2.2, 1.9, and 2.3. Examine whether the average length of the screws produced by this machine is 2 at 5% level of significance.
24. A Random sample of 7 envelops is taken from a letterbox of a post office. Their weights are found to be 12.1, 11.9, 12.4, 12.3, 11.0, 12.4 and 12.1 grams. Does the sample indicate that the average weight of envelops received at the post office is 12.30 grams.
25. Exlain the method of paired *t* test
26. Let *P* be the proportion of tea drinkers in Kerala. If a random sample of 1234 Keralites yielded 789 tea drinkers, find 95% confidence interval of *P*.
27. Explain chi-square test of independence

(5 x 5 = 25)

PART D

Answer any two questions. Each question carries 12 marks

28. Distinguish between point estimation and interval estimation. A random sample of 16 observations is taken from a normal population with mean *m* 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 *m* (2) a 99% *C. I.* for *m*.
29. What do you mean by a confidence interval? Derive a confidence interval for the difference of the means of two normal populations with known standard deviations
30. Explain how you will test the equality of the means of two normal populations using small samples. A group of seven week old chicken fed on high protein diet weigh 12, 14, 15, 16, 14and 16 ounces. A second group of five chickens on ordinary diet weigh 8, 10, 14, 10 and 13 ounces. Test whether additional protein has increased the weight of chicken.
31. Explain the *F* test for equality of variances. A botanist is interested in comparing the growth response of pea stems to two different levels of hormone solutions. Test whether the variances of the growth are equal under the two different levels.

Level 1	0.8	1.8	1.0	0.1	0.9	1.7	1.0	0.9	1.2	0.5
Level 2	1.0	0.8	1.6	2.6	1.3	1.1	2.4	1.8	2.5	1.4
	1.9	2.0	1.2							

(12 x 2 = 24)

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