TB144500C **Reg. No.: ....**

Name: ....

B. Sc. DEGREE (C.B.C.S.S) EXAMINATION, APRIL 2018

(2014 Admission Supplementary)

SEMESTER IV- COMPLEMENTARY COURSE (STATISTICS)

STA4SI – STATISTICAL INFERENCE

(For B. Sc. Mathematics, Physics and Computer Applications)

Time: Three Hours **Maximum Marks: 80**

PART A

I Answer all questions. Each question carries 1 mark.

1. Distinguish between estimator and estimate.
2. Define unbiasedness of an estimate.
3. What are the desirable properties of a good estimate?
4. What is Neyman's condition for sufficiency?
5. Obtain the M.L.E. of Θ in the population given by f(x,) = $\frac{1}{\theta} e^{-x/\theta}$, x ≥ 0, Θ ≥ 0
6. Write any two properties of M.L. estimates.
7. What are the two types of errors in testing?
8. Define null hypothesis and alternative hypothesis.
9. Distinguish between one sided and two sided tests.
10. What are the assumptions used for tests based on t- statistics?

(10x1=10)

PART B

II Answer any eight questions. Each question carries 2 marks.

11. Show that sample mean is an unbiased estimate of the population mean.
12. Define consistency of an estimate. Give the sufficient condition for consistency of an estimate.
13. Distinguish between point estimation and interval estimation.
14. Explain the method of moments for the estimation of parameters of a distribution.
15. State Crammer- Rao inequality for the variance of any unbiased estimate of a parameter.
16. Explain the method of maximum likelihood estimation.
17. Obtain the large sample test for the equality of two population proportions.
18. Define best critical region.
19. What are the uses of standard error in testing of hypothesis?
20. Explain the terms (i) significance level (ii) power of a test.
21. What do you mean by additive model in ANOVA technique?
22. How do you test for the homogeneity of variances?

(8x2= 16)

PART C

III Answer any six questions. Each question carries 4 marks.

23. Let $X_1, X_2, ...X_n$ be a random sample from a population following $N(\Theta, \sigma^2)$ where σ^2 is known. Show that Y = $\frac{X_1+X_2}{2}$ is an unbiased estimate of Θ. Find the variance of Y.
24. A sample drawn from a population with p.d.f. f(x,Θ) = $\Theta e^{-\Theta x}, x \geq 0$ is 7,1,5,6,2,1,4,5,4. Obtain a 95 % confidence interval for Θ.
25. Obtain the method of estimating parameters a and b of a rectangular distribution over (a,b) by the maximum likelihood estimation method..

26. In a sample of 400 men from city A 140 are diabetic patients, while in a sample of 320 men from city B 95 are suffering from diabetics. Do the data indicate that the cities are significantly different with respect to the prevalence of diabetes?
27. Explain the χ^2 test of independence of two attriutes.
28. A sample from a population is 7, 4, 6, 11, 20, 8, 10, 6, 13, 11 and 9. Can it be regarded as a sample from a normal population with standard deviation 3?
29. Explain the procedure to carry out ANOVA.
30. The lengths in inches of 5 screws made by a machine are 2.0, 2.1, 1.9, 2.2, and 2.3. Examine whether the average length of screws produced by the machine is 2 at 5% level of significance.
31. Explain how will you test the equality of means of two normal populations using small samples with (1).known population standard deviation (2).unknown standard deviation.

(6x4=24)

PART D

IV Answer any two questions. Each question carries 15 marks.

32. Obtain an unbiased estimate of the population variance of $N(\mu,\sigma^2)$. Find its value for the following sample of values 11, 26, 18, 31, 23, 15, 9, 0, 13, and 19.

33. 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

34. (a) Derive an expression of χ^2 statistic for testing independence in 2x2 contingency table.
(b) Examine whether there is influence of sex in preference of coffee.

	Male	Female
Like coffee	42	33
Do not like coffee	18	17

35. Examine whether the following two samples are from populations with the same variance.

Sample A : 11 26 18 31 23 15 9 0 13 19

Sample B : 67 53 61 88 73 56 49

(2x15=30)