TB144500B **Reg. No……………………**

Name……………………

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017

(Supplementary/Improvement – 2014 Admission)

SEMESTER IV - COMPLEMENTARY COURSE (STATISTICS)

STA4SI - STATISTICAL INFERENCE

(Complementary course for Mathematics & Physics, Core course for CA)

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

Use of Scientific calculators and Statistical tables are permitted.

PART A

I Answer all questions. Each question carries 1 mark.

1. Distinguish between point estimation and interval estimation.
2. Define sufficiency.
3. Give an example of an estimator which is biased and consistent.
4. If t is an unbiased estimate of ¯ , is t^2 an unbiased estimate of $¯^{2}$? Why?
5. What is meant by confidence coefficient?
6. What is the method of moments?
7. Define the significance level.
8. What are the two types of errors in testing?
9. Define the power of a test.
10. Distinguish between null and alternative hypotheses.

(10x1=10)

PART B

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

11. Write a necessary and sufficient condition for sufficiency.
12. Distinguish between the parameter and a statistic.
13. Show that the sample is an unbiased estimate of the population mean.
14. Obtain confidence interval for the mean of a normal population when the standard deviation is unknown.
15. What are the properties of maximum likelihood estimates?
16. Explain the method of minimum variance.
17. State Neyman Pearson lemma.
18. Distinguish between simple and composite hypotheses.
19. Develop the large sample test for testing the equality of means of two populations.
20. How do you test the significance of proportion of a population?
21. What are the assumptions made for testing the equality of means of two normal populations using t distribution.
22. Write the mathematical model for one way classification.

(8x2=16)

PART C

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

23. What do you mean by efficient estimates? If X_1, X_2, X_3 are 3 independent observations from a population with mean μ and variance σ^2. If $t_1 = X_1 - X_2 + X_3$ and(t_2 = $2X_1 - 4X_2 + 3X_3$) compare the efficiencies of t_1 and t_2.

24. Explain the method of maximum likelihood. Obtain the M.L.E. of p for a Binomial population B(N,p).
25. Find the Cramer Rao lower bound for the variance of an unbiased estimator of the parameter λ of Poisson distribution.
26. (a) Explain how will you construct the confidence interval for the proportion of a Binomial population.
(b) A random sample of 500 oranges from a box, 65 were found to be bad. Find 95% confidence limits for the proportion of bad oranges.
27. Obtain the best critical region of size α for testing $H_0 : \mu = \mu_0$ against the alternative $H_1 : \mu = \mu_1$ in a normal population $N(\mu,1)$.
28. Explain the chi – square test for goodness of fit.
29. The standard deviation of a sample of size 15 from a normal population was found to be 7. Examine whether the hypothesis that the S.D. is 7.6 is acceptable.
30. Explain Chi – square test for variance of a normal population.
31. Explain the procedure to carry out ANOVA.

(6x4=24)

PART D

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

32. (a) Show that for the normal population N (μ, σ2), σ^2 is known, the sample mean $\bar{X}$ is a minimum variance estimator.
b) A random sample of size 11 from a normal population is found to have variance 12.3. Find 95% confidence interval for the population variance.
33. 100 students were classified according to their brilliance level and community. B_1 and B_2 denote two levels of brilliance and A_1, A_2, A_3 denote three communities. Examine whether there is any relation between community and brilliance.

	B_1	B_2
A_1	215	135
A_2	325	175
A_3	60	90

34. In a sample of 600 men from a certain city 400 are found to be smokers. In a sample of 900 from another city 450 are smokers. Do the data indicate that the cities are significantly different as far as smoking habits of people are concerned. (α = 0.05)
35. The following data gives the marks obtained by a sample of 10 students before and after a period of training. Assuming normality test whether the training was of any use.

Before training	91	95	81	83	76	88	89	97	88	92
After training	79	101	85	88	81	92	90	99	97	87

(2x15=30)