Reg. No. : ....

Name : ....

K16U 0703

IV Semester B.Sc. Degree (CBCSS – 2014 Admn. Regular)
Examination, May 2016
COMPLEMENTARY COURSE IN STATISTICS FOR MATHEMATICS/ COMPUTER SCIENCE CORE
4C04STA : Statistical Inference

Time : 3 Hours Max. Marks : 40

PART – A

(Short answer)

Answer **all** the **6** questions : **(6×1=6)**

1. Define standard error.
2. Write the probability density function (p.d.f.) of F distribution.
3. What are the desirable properties of a good estimator ?
4. Distinguish between simple and composite hypotheses.
5. Define power of a test.
6. What is a contingency table ?

PART – B

(Short essay)

Answer **any 6** questions : **(6×2=12)**

7. Obtain the mean of a Chi-square random variable with n degrees of freedom.
8. Establish the interrelationship between t-statistic and chi-square statistic.
9. State Fisher Neymann factorisation criterion and find a sufficient statistic for the parameter λ of a Poisson distribution.

P.T.O.

10. Derive the maximum likelihood estimator of the parameter θ, when a random sample of size n is taken from $f(x, \theta) = \theta e^{-\theta x}, 0 < x < \infty, \theta > 0$.

11. Define the terms :
    i) Type I error
    ii) Type II error
    iii) Critical region.

12. Obtain an unbiased estimator for $e^{-\lambda}$ where λ is a parameter of a Poisson distribution.

13. Explain paired t-test.

14. Write the test statistics for testing mean of a Normal population based on a random sample of size n, under the cases the standard deviation is
    i) Known and ii) Unknown.

PART – C
(Essay)

Answer **any 4** questions : **(4×3=12)**

15. If F~F(m,n), derive the distribution of $\frac{1}{F}$.

16. State and prove a sufficient condition for the consistency of an estimator.

17. Obtain 95 percent confidence limits for the population mean, when samples are taken from $N(\mu, \sigma^2)$, when σ known.

18. For testing $H_0 : p = \frac{1}{4}$ against $H_1 : p = 3/4$, a random sample of 4 observations are taken from Bernoulli (1, p). H_0 is rejected if we get 4 successes. Compute significance level.

19. Construct the test for equality of two population proportions.

20. Describe the method of testing independence of qualitative characteristics.

PART – D
(Long Essay)

Answer **any 2** questions : **(2×5=10)**

21. Derive the sampling distribution of the sample variance S^2 when we take samples from a Normal distribution.

22. Explain the method of moments in estimation. Obtain the estimators of the parameters of Beta (m, n) distribution, using method of moments.

23. A random sample of size 7 brand X light bulbs yielded, $\overline{X} = 891$ hours and $s^2 = 9201$. A random sample of size 10 brand Y light bulbs yielded $\overline{Y} = 592$ hours and $s^2 = 4856$. Test for equality of population variances at 0.05 significance level, stating the necessary assumptions.

24. A hospital administrator wishes to test the null hypothesis that emergency admissions follow a Poisson distribution with $\lambda = 3$. Over a period of 90 days, the numbers of emergency admission were as follows :

No. of emergency admissions in a day	Number of days (frequency)
0	5
1	14
2	15
3	23
4	16
5	9
6	3
7	3
8	1
9	1
10 or more	0
