M 2001

Reg. No. : ....

Name : ....

V Semester B.A./B.Sc./B.Com./B.B.A./B.B.A.T.T.M./B.B.M./B.C.A./B.S.W./ B.A. Afsal Ul Ulama Degree (CCSS – Reg./Supple./Improv.) Examination, November 2012

CORE COURSE IN STATISTICS

5B06 STA : Statistical Interference – I

Time: 3 Hours Max. Weightage : 30

***Instruction : Use** of calculators and statistical tables are **permitted**.*

PART – A

Answer **any ten** questions (Weightage **1 each**) :

1. Define t distribution.
2. If X ~ N(0, 1) find the distribution of $y = X^2$.
3. Define minimum variance unbiased estimator.
4. What is a complete sufficient statistic ?
5. State Rao Blackwell theorem.
6. Define consistency of an estimator.
7. What are the merits and demerits of the method of moments ?
8. If a random sample is taken form a population with p.d.f. $F(x) = \frac{1}{\theta}; 0 < x < \theta$, find the M.L.E. of θ.
9. Define confidence interval.

P.T.O.

10. Let $X_1, X_2, \ldots X_n$ be a random sample from a population with p.d.f.

$F(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}}$; $x > 0$. Find an unbiased estimation of θ.

11. Define Bayes risk. **(10×1=10)**

PART – B

Answer **any six** question. Weightage **2 each.**

12. State Chi-square distribution. Specify its uses.

13. IF $X \sim F(n_1, n_2)$ find the distribution of $\frac{1}{X}$.

14. Let $X_1, X_2 \ldots X_n$ be a random sample from a Bernoulli population with parameter θ.

Examine whether $\sum_{i=1}^{n} X_i$ is sufficient for θ.

15. Let X_1, X_2 and X_3 be a sample from a population with mean μ and variance σ^2. Consider the statistics $t_1 = \frac{X_1 + X_2 + X_3}{3}$ and $t_2 = \frac{2X_1 - X_2 + X_3}{2}$. Compare the efficiency of estimators.

16. State and prove a sufficient condition for consistency.

17. Compare the properties of maximum likelihood estimator and the estimator obtained by the method of moments.

18. A random sample of size n is taken from a normal population with parameters μ and σ. Find the minimum variance unbiased estimator of μ when σ is know.

19. A sample of 900 members have a mean 3.4 cm and S.D. 2.61 cm. Find 98% confidence interval for true mean.

20. Derive the 100 $(1 - \alpha)$% confidence interval for the population proportion, based on a large sample. **(6×2=12)**

PART – C

Answer **any two** questions. Weightage **4 each** :

21. State and prove Cramer-Rao inequality.

22. a) Derive the sampling distribution of the mean of the sample from a Normal population.

    b) A sample of size 16 is taken from a normal population with mean 1 and S.Q. 1.5 . Find the probability that the sample mean is negative.

23. Explain the method of moments. Given a random sample of size n from a population with p.d.f.

$$f(x) = \frac{1}{\beta^{\alpha} \lceil\alpha} e^{-\frac{x}{\beta}} x^{\alpha - 1} \quad x > 0, \alpha, \beta > 0$$

$$= 0 \qquad \text{otherwise}$$

Find the estimates of α and β using the method of moments.

24. a) Derive $100\,(1 - \alpha)\,\%$ confidence interval for the mean of a normal population $N(\mu, \sigma)$ when σ is known.

    b) The mean of a sample of size 20 from a normal population $N(\mu, 8)$ was found to be 81.2. Find 90% confidence interval for μ. **(2×4=8)**

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10. Let $X_1, X_2, \ldots X_n$ be a random sample from a population with p.d.f.

$$F(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}}; x > 0.$$ Find an unbiased estimation of θ.

11. Define Bayes risk. **(10×1=10)**

PART – B

Answer **any six** question. Weightage **2 each**.

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