M 9826

Reg. No. : ....

Name : ....

V Semester B.Sc. Degree (CCSS – Reg./Sup./Imp.) Examination, November 2015
CORE COURSE IN STATISTICS
5 B06 STA : Statistical Inference – I

Time : 3 Hours | Max. Weightage : 30

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

PART – A

Answer **any 10** questions. **(Weight 1)**

1. Define standard error and degrees of freedom.
2. Define F statistic and its probability density function.
3. Define consistency state sufficient conditions for consistency.
4. Define sufficient estimators.
5. State Rao-Blackwell theorem.
6. Define efficiency and most efficient estimator.
7. State properties of maximum likelihood estimates.
8. Define method of minimum variance.
9. State $(1-\alpha)$ 100% confidence interval for difference of population proportions.
10. Define confidence interval and confidence coefficient.
11. Define prior and posterior distributions. **(10×1=10)**

P.T.O.

PART – B

Answer **any 6** questions. **(Weight : 2)**

12. Derive mode of chi square distribution.

13. In usual notations, show that, if $F \sim F_{(m,n)}$ then $\frac{1}{f} \sim F_{(n,m)}$.

14. Define unbiasedness. Show that, if T is unbiased for θ, T^2 is not in general unbiased for θ^2.

15. Define MVB estimate. Derive MVB estimate of θ of exponential distribution with pdf

$$f(x;\theta) = \begin{cases} \frac{1}{\theta} e^{-x/\theta}; & x > 0 \\ & \theta > 0 \\ 0 & ; \text{ Otherwise} \end{cases}$$

16. Explain method of moments. Obtain estimates of α and β using method of moments of

$$f(x) = \begin{cases} \frac{\beta^{\alpha}}{\Gamma\alpha} e^{-\beta x} x^{\alpha-1}; & x > 0 \\ & \alpha, \beta > 0 \\ 0 & ; \text{ Otherwise} \end{cases}$$

17. A random sample is taken from a population having pdf

$$f(x) = \begin{cases} (\theta+1)x^{\theta}; & 0 \le x \le 1, \theta > -1 \\ 0 & ; \text{ Otherwise} \end{cases}$$

given by 0.2, 0.4, 0.8, 0.5, 0.7, 0.9, 0.8, 0.6. Estimate θ by the method of maximum likelihood.

18. Derive $(1-\alpha)$ 100% confidence limits for σ^2 of $N(\mu, \sigma^2)$ distribution assuming μ is (i) known and (ii) μ is unknown and sample is small.

19. Briefly explain Bayesian estimation.

20. Explain the procedure of finding confidence limits for parameter of exponential distribution for large samples. **(6×2=12)**

PART – C

Answer **any 2** questions : **(Weight : 4)**

21. Define students t distribution and state its important properties. Obtain an expression for even ordered moments of t distribution. Also show that, t^2 follows F distribution.

22. State and prove Cramer Rao inequality. Derive MVB estimate of σ^2 of N (0, σ^2) distribution.

23. i) Show that, if exists MVUE is unique.

    ii) Show that, the Best linear unbiased estimate of population mean is sample mean.

24. Show that for a Normal Population N (μ, σ^2), sample variance (s^2) is consistent and m.l.e of σ^2, but biased estimate of σ^2. **(2×4=8)**

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