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D 91628 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2015

(CUCSS)

Statistics

STA 3C 12—TESTING OF STATISTICAL HYPOTHESIS

(2010 Admission onwards)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*
Each question carries 1 *weightage.*

1. Distinguish between Parametric and Non-parametric tests.
2. Define Power function and explain its use in testing.
3. When will you say that a family of distribution possesses MLR property ?
4. Define test with Neymann structure.
5. Is UMP tests exists always ? Justify your claim.
6. Show that Neyman-Pearson most powerful tests are unbiased.
7. Let $X_1, X_2, \ldots X_n$ be a sample from a distribution function F and let F_n^* be the corresponding empirical distribution function. Show that $D_n = \underset{n}{\text{Sup}}\left|F_n^*(x) - F(x)\right|$ is distribution free.
8. Give the properties of Kendall's correlation coefficient tax.
9. Discuss χ^2-test of independence of attributes.
10. Define O.C. function of SPRT.
11. Explain sequential estimation.
12. Justify the boundary points A and B of SPRT interms of the strength of the test.

(12 × 1 = 12 weightage)

Part B

Answer any **eight** *questions.*
Each question carries 2 *weightage.*

13. Find Neyman Pearson size α test if $H_0 : \beta = 1$ vs $H_1 : \beta = \beta_1 (> 1)$ based on a sample of size 1 from

$$f(x, \beta) = \beta x^{\beta-1} \quad 0 < x < 1$$
$$= 0 \quad \text{elsewhere.}$$

Turn over

14. Obtain the UMP test $H_0 : M \leq M_0$ against $H_1 : M > M_0$ based on observations from hypergeometri distribution with pmf $P_M(X = x) = \dfrac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$ $x = 0, 1, 2, \ldots M.$

15. Obtain the LR test for testing $H_0 : \mu = \mu_0$ *vs* $H_1 : \mu \neq \mu_0$ based on observations from $N(\mu, \sigma^2)$ σ^2 unknown.

16. Discuss briefly LMP and LMPU tests.

17. Derive the likelihood ratio test for testing $H_0 : \theta = 0$ *vs* $H_1 : \theta \neq 0$ in N (θ, 1). Further more sho that this test is unbiased and consistent.

18. Explain Wilcoxon signed rank test.

19. Explain Mann-Whitney U-test for two sample problem.

20. Explain K-S two sample test.

21. Develop the SPRT for testing $H_0 : \theta = 3$ against $H_1 : \theta = 7$ based on observations from exp (θ) wit strength (.05, .10).

22. Obtain the expressions for OC and ASN functions for testing $H_0 : \lambda = \lambda_0$ *vs* $H_1 : \lambda = \lambda_1$ based o observations from P(λ) with strength (α, β).

23. Describe Wald's SPRT. For aSPRT with stopping bounds A and B and strength (α, β), obtain th inequalities connecting the two.

(8 × 2 = 16 weightag

Part C

Answer any **two** *questions.*
Each question carries 4 *weightage.*

24. Define UMP unbiased test. Show that there exists a UMP unbiased test for testing $\mu = \mu_0$ again $\mu \neq \mu_0$ based on observations from $N(\mu, \sigma^2)$ with known σ^2.

25. What are similar region test ? State and prove the necessary and sufficient conditions for similar region tests to have Neyman's structure.

26. (a) Explain ordinary sign test.

    (b) Explain Median test.

27. Obtain the approximate expression of ASN function for testing $H_0 : \theta = \theta_0$ *vs* $H_1 : \theta = \theta_1$ wi strength (α, β) based on observations from N (θ, 1). In particular obtain the expression of AS when $\theta_0 = 2$ and $\theta_1 = -2$. Examine the nature of ASN function if $\alpha = \beta$ by giving a rough sketch the curve.

(2 × 4 = 8 weight