**M.PHIL. DEGREE EXAMINATION, APRIL 2017.**

**(STATISTICS)**

**I YEAR — I SEMESTER**

**Major Paper II — ADVANCED STATISTICAL INFERENCE**

**Time : 3 hours Max. marks : 75**

**SECTION-A( 5 × 15 = 75)**

**Answer any *FIVE* questions.**

1. (a) State and prove Neyman-Fisher factorization theorem for finding sufficient

 statistics. (10)

 (b) Let X1, X2, …, Xn be iid B(n, p) random variables. Show that

 T =  is a complete sufficient statistic for ‘*p*’. (5)

 2. (a) Show that the minimum variance unbiased estimator is unique. (8)

 (b) State and prove Lehmann-Scheffe theorem. How does this

 theorem help in finding UMVUE? (7)

1. (a) Give an example where the variance of an UMVUE is greater than the

 Cramer-Rao lower bound. (10)

 (b) Show that a complete sufficient statistic is minimal sufficient if it exists. (5)

 4. State and prove the generalization of the fundamental Neyman-Pearson lemma. (15)

 5. (a) Explain the role of similarity and completeness in the theory of hypothesis

 testing. (5)

 (b) Let f(x;$θ$) = $e^{Q\left(θ\right)T\left(x\right)+ S\left(x\right)+ D(θ)}$, $θ ϵ$ , x $ϵ$.*X* . Derive UMPUT for testing

 H: $θ$ = $θ$o against K: $θ\ne θ$o. (10)

6. (a) Let X1, X2, …, Xn be iid with pdf f(x; $θ$) = $\frac{1}{θ}$ , 0 < x < $θ$. Show that the

 family of densities f(x; $θ$) has MLR property and hence derive the UMPT of

 level α for testing H: $θ$ $\leq θ$o versus K: $θ$ $\geq θ$o (10)

 (b) State and prove a necessary and sufficient condition for all similar tests to

 have Neyman structure. (5)

 7. (a) Define Linear Rank Statistics. State its distribution properties and usefulness.

 (7)

 (b) Describe Siegel-Tukey test for comparing two treatments. (8)

 8. (a) Explain Kruskal-Wallis test for comparison of more than two treatments. (10)

 (b) Explain testing against trend using Kendall’s statistic. (5)

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