

**M.Sc. Sem -II Examination - OCT-2016**  
**Statistics paper - VI: Testing of Hypothesis - 2934**

1. (a). Define the terms with illustration: Hypothesis, Simple hypothesis, Critical region, Power of the test. What is testing of hypothesis? Describe it. 7
- (b). State and prove Neyman-Person lemma for testing simple versus simple hypothesis 7

OR

1. (a) State generalized NP lemma. Why it is required? Describe with illustration. 7
- (b) Derive MP test size- $\alpha$  to test  $H: \lambda = \lambda_0$  against  $K: \lambda \leq \lambda_1$  based on a random sample of size  $n$  taken from Poisson distribution with parameter  $\lambda$ . Also obtain power function of the test.
2. (a) Define a UMP test, and UMPU test. Comment on the existence of such tests with illustration. 7
- (b) Let  $(X_1, X_2, \dots, X_n)$  be a random sample of size  $n$  from an exponential distribution with mean  $\theta$ ,  $0 < \theta < \infty$ . Derive the UMP test of size  $\alpha$  for testing  $H_0: \theta \leq 1$  against  $H_1: \theta > 1$ . Obtain exact form of the power function of the test.

OR

- 2(a) Show that the test obtained by NP lemma is unbiased. 6
- (b) Derive size -  $\alpha$  UMP test to test  $H: p = p_0$  against  $K: p \leq p_0$  based on a random sample of size  $n$  taken from Bernoulli distribution with parameter  $p$ . Also obtain power function of the test. 8
- 3(a) What do you mean by non-parametric tests? State the differences between parametric and non-parametric tests. Why some times non parametric tests are known as distribution free tests? 8
- (b) Discuss one sample Kolmogorov - smirnov test. 6

OR

3. (a) Describe one sample sign test. Discuss its optimality. 7
- (b) Describe with example how confidence interval for quantile can be constructed from the sign test? 7
- 4(a) Describe test procedure of run test for testing randomness of the given sequence of two types of symbols 7.
- (b) Write note on Two sample Kolmogorov - Smirnov test. 7

OR

4. (a) Write not on Mann Whitney  $-U$  test. 6
- (b) Let  $X_1, X_2, \dots, X_n$  are  $n$  independent observations from exponential distribution with mean  $\theta$  and  $y_1, y_2, \dots, y_n$  are  $n$  independent observations from exponential distribution with mean  $\beta$ . Apply run test to test the hypothesis  $H: \theta = \beta$  versus  $K: \theta \neq \beta$ . 8
- 5(a) What is SPRT? Describe its procedure. How does it differ from the usual method of testing? 6
- (b) Obtain OC and ASN functions for normal  $N(\mu, 1)$  distribution using SPRT. 8

OR

5. (a) Define likelihood ratio test. Show that  $-2\log \lambda(x)$  follows chi square distribution with 1 d.f. for testing  $H: \theta = \theta_0$  versus  $K: \theta \neq \theta_0$  under certain conditions. 6
- (b) Let  $X_1, X_2, \dots$ , be observations from exponential distribution with mean  $\theta$ . Derive SPRT for testing  $H: \theta = \theta_0$  versus  $K: \theta = \theta_1$ . Discuss how do you obtain OC function of the test? 8