5\. (A) (i) State and prove necessary and sufficient condition for every similar test to have Neyman structure.

(ii) Define :

(a) Unbiased test

(b) Completeness

(c) Bounded completeness. 10+6

OR

(B) (i) If $X \sim b(n, p)$ construct UMPU test of size α for testing $H_0 : p = p_0$ against $H_1 : p \neq p_0$.

(ii) Define :

(a) Similar test

(b) Test with Neyman structure

(c) Boundary set. 10+6

AQ–910

M.A./M.Sc. (Semester—II) (CBCS Scheme) Examination

STATISTICS

Paper—VI

(Testing of Hypothesis)

Time—Three Hours] [Maximum Marks—80

Note :— Answer either (A) or (B) from each question.

1\. (A) (i) How many possible decisions are there in testing of hypothesis ? Define two types of errors and power of the test.

(ii) State Neyman-Pearson fundamental lemma and prove its existence part. 8+8

OR

(B) (i) Describe p-value concept in testing of hypothesis. Compare it with critical value concept.

(ii) State importance of N-P lemma in testing of hypothesis.

(iii) Construct MP test of size α for testing the hypothesis $H_0 : \lambda = \lambda_0$ against $H_1 = \lambda = \lambda_1$

on the basis of a random sample of size n from Poisson distribution with parameter λ.
6+3+7

2. (A) (i) Define Monotone likelihood ratio (MLR) property; along with its importance. Also give example of family of distribution belonging and not belonging to it.

(ii) Show that UMP test does not exist for testing $H_0 : \theta_1 \leq \theta \leq \theta_2$ against $H_1 : \theta < \theta_1$ or $\theta > \theta_2$ even in one parameter exponential family.
8+8

OR

(B) (i) Let $X_1, X_2, \ldots, X_n$ be a random sample from $N(0, \sigma^2)$. Obtain UMP test for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 > \sigma_0^2$.

(ii) Describe method of obtaining UMP test for one sided hypothesis against one sided alternative, in case of one parameter exponential family.
8+8

3. (A) (i) Define LR test. State only its asymptotic properties.

(ii) Write condition for validity of χ^2 test of goodness of fit.

(iii) Construct LR test when a random sample of size n has been drawn from $N(\theta, \sigma^2)$ for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$.
4+4+8

OR

(B) (i) Show that for a given α, $0 \leq \alpha \leq 1$ if a non-randomized NP test and likelihood ratio test for simple hypothesis against simple alternative exist, they are equivalent.

(ii) Describe Rao's score test.
8+8

4. (A) (i) Describe how sequential test procedure differs from traditional test procedure. Define Average sample number and SPRT.

(ii) Define OC function and state its usefulness.

(iii) Establish relationship between parameters of sequential test.
5+5+6

OR

(B) (i) Prove that SPRT terminates with probability one.

(ii) Let X be a Poisson variate with parameter λ. Define SPRT for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1$.
8+8