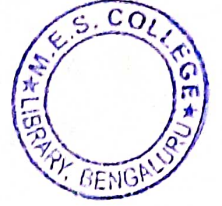




SE – 171

**Fourth Semester B.Sc. Examination, September 2020  
(CBCS) (Fresh+Repeaters) (2018-19 and Onwards)  
STATISTICS – IV  
Statistical Inference – II**



Time : 3 Hours

Max. Marks : 70

**Instructions :** i) Answer **any ten** sub-questions from Section – A and **five** questions from Section – B.  
ii) Scientific calculators are **allowed**.

**SECTION – A (20 marks)**

I. Answer **any ten** of the following questions :

**(10×2=20)**

- 1) a) Define simple and composite hypothesis with examples.
- b) Define the terms :
  - i) Critical region.
  - ii) Critical function of a test.
- c) Explain normal test of significance.
- d) Write the test statistic for testing the equality of two proportions.
- e) State the conditions for the validity of Chi-square test for goodness of fit.
- f) Define Yule's coefficient of association.
- g) Distinguish between parametric and non parametric test.
- h) Define a RUN. Write the number of runs in the following sequence  
XXYYYXXXYYXXYYXXYYXXYY  
i) Define Mann Whitney U-test statistic.
- j) Explain the test for randomness.
- k) Write the test statistic for Spearman's rank correlation coefficient in non-parametric test.
- l) Write the expression for stopping bounds in a sequential probability ratio test.

P.T.O.



## SECTION – B (50 marks)

II. Answer **any five** questions from the following : (5×10=50)

- 2) a) Let  $X_1, X_2, X_3$  be a random sample from Poisson  $P(\lambda)$  distribution. It is required to test  $H_0 : \lambda = 2$  V/s  $H_1 : \lambda = 4$  and  $H_0$  is rejected if  $\sum_{i=1}^3 X_i \geq 3$ . Obtain probabilities of type – I and type II errors.
- b) Distinguish between randomized and non-randomized tests.
- c) It is required to test a certain null hypothesis by using the test function
- $$\phi(x_1, x_2) = \begin{cases} 1 & \text{if } \bar{x} > 2.5 \\ 0 & \text{if } \bar{x} < 2.5 \end{cases} \text{ If}$$
- i)  $x_1 = 1.5$  and  $x_2 = 2.5$ .
- ii)  $x_1 = 3.5, x_2 = 5.5$  and  $x_3 = 2.5$  are random samples from continuous distribution, then what is your decision. (4+2+4)
- 3) a) Derive most powerful (MP) test of level  $\alpha$  for testing  $H_0 : \lambda = \lambda_0$  against  $H_1 : \lambda = \lambda_1 (>\lambda_0)$  based on a random sample of size  $n$  from Poisson population with parameter  $\lambda$ .
- b) Obtain an MP test of level  $\alpha$  for testing  $H_0 : \mu = \mu_0$  against  $H_1 : \mu = \mu_1 (>\mu_0)$  based on a random sample of size 'n' from normal population  $N(\mu, 1)$ . Also obtain the power function. (5+5)
- 4) a) Explain the test procedure for testing  $H_0 : P = P_0$  against  $H_1 : P \neq P_0$ , where  $P$  is the binomial population proportion.
- b) Describe the large sample test procedure for testing  $H_0 : \mu_1 = \mu_2$  against  $H_1 : \mu_1 \neq \mu_2$  where  $\mu_1$  and  $\mu_2$  are the population means of normal population. (5+5)
- 5) a) Explain paired t-test.
- b) Explain the Chi-square test for testing population variance. (5+5)
- 6) a) Explain the test procedure for testing the hypothesis  $H_0 : \rho = \rho_0$  where  $\rho$  is the population correlation coefficient.
- b) Explain Chi-square test for independence of attributes. (5+5)
- 7) a) Discuss the test procedure for testing regression coefficient.
- b) Illustrate the procedure for Chi-square test for goodness of fit. (5+5)
- 8) a) Describe sign test for two independent samples.
- b) Explain Median test. (5+5)
- 9) a) Describe Sequential Probability Ratio Test (SPRT).
- b) Derive the SPRT for testing  $H_0 : \mu = \mu_0$  V/s  $H_1 : \mu = \mu_1 (\mu_1 > \mu_0)$  in  $N(\mu, \sigma^2)$  distribution ( $\sigma^2$  is known). (5+5)