B.Sc. (Honours) Examination, 2019
Semester-VI
Statistics
Course : BSC-63
(Testing of Hypotheses-II)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions

1. (a) Determine the SPR test for testing $H_0 : \lambda = \lambda_0$ and $H_1 : \lambda = \lambda_1 (\lambda_1 > \lambda_0)$ where a random sample $X_1, X_2, \cdots, X_n$ is taken from $Poisson(\lambda)$.
   (b) Find the OC function for the above set-up.
   (c) Also find the ASN function. 5+3+2=10

2. Let $X \sim N(\theta, 1), \theta_0 = 0, \theta_1 = 2, \alpha = .05, \beta = .10$. We are testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$.
   (a) Under the above set-up find the expression of OC function when $\theta = 1$ and $\theta = .5$ respectively.
   (b) For which θ, OC value is higher?
   (c) For a single X calculate the average sample number under H_0 and H_1. 4+2+4=10

3. (a) Define Wilcoxon signed rank test statistic T^+ under one sample problem. Hence find the mean and variance of the statistic.
   (b) Show that T^+ and T^- are identically distributed. 6+4=10

4. (a) What do you mean by run?
   (b) Propose a nonparametric test based on runs used for two-population homogeneity problem. Also deduce the probability distribution of test statistic.
   (c) In case of test on location of two distributions, which one do you prefer– the above mentioned run test or median test? Justify. 2+5+3=10

5. (a) Suggest an alternative test to Pearson's goodness of fit test.
   (b) How do you perform goodness of fit test by your proposed test statistic?
   (c) Deduce the asymptotic probability distribution of the test statistic under sign test? 2+5+3=10

6. (a) Elucidate the distribution free property of Mann-Whitney U statistic through the calculation of its mean and variance.
   (b) It is given that two distributions are different by their respective measure of dispersion. What is the two sample test procedure you adopt in this regard? Write down the expression of the concerned test statistic. 6+4=10