March-2015

B.Sc (Sem. VI) Examination

Statistics : ST - 602

4626 **Statistical Inference-II**

Time : 2Hours] **[Total Marks : 70**

Q1 (a) Explain the following:

i) Confidence interval and confidence coefficient 4

ii) Two type of errors

(b) Describe the method of constructing a 100(1-α)% confidence interval for the mean of a normal population when (i) variance is known(ii) variance is unknown **10**

OR

Q1 (a) (a) Giving suitable illustration explain the following terms:

(i) Null hypothesis (ii) Simple hypothesis

(iii) Composite Hypothesis **6**

(b) Explain the procedure fully to construct a 100(1-α)% confidence interval for μ_1 -μ_2 based on a r.s. of size n from a Bivariate Normal Population BNV $(\mu_1, \mu_2, \sigma_1, \sigma_2, \rho)$. **8**

Q2(a) Explain the following terms:

(i) critical region (ii) power of the test (iii) size of the test (iv) p value of a test. 4

(b) *Given X_1 , X_2, ... X_n is a r.s. from a N(μ_1 ,σ_1^2) and y_1 , y_2, ... y_n is a r.v. from N(μ_2 ,σ_2^2) , explain the procedure to construct* 100(1-α)% confidence interval of ratio of variances of two normal populations. 10

OR

Q2 (a) *Let X_1 , X_2, ... X_n* is a r.s. from a N(10 ,σ_1^2) Find BCR for testing $H_0 : \sigma^2 = 64$ Vs $H_1 : \sigma^2 = 36$ further find its power function. 8

(b) Find a MP test with size α *to test* $H_0 : \theta = \theta_0$ Vs $H_1 : \theta < \theta_1$ on a r.s of size n from Binomial $(3, \theta)$ $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ (where $\theta_1 < \theta_o$) based on a r.s. of size n from a Poisson distribution with mean θ.

6

Q3(a)*State and prove the Neyman-Pearson Theorem to obtain a best critical region of size* α *to* test a simple null hypothesis versus simple alternate hypothesis. 8

(b) Apply Nyman Pearson Theorem to a obtain a most powerful test of size α to test $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ (where $\theta_1 < \theta_o$) based on a random sample of size n from Poisson Distribution with mean θ

6

OR

Q3(a) Describe the Wilcoxon Sign Rank test covering purpose, statistical hypotheses, nature of data, method, test statistic and decision. **8**

(b) Explain the difference between parametric and non-parametric tests. 6

Q4 (a) Find a UMP size α test to test $H_0 : \theta = \theta_0$ against $H_1 \colon \theta_1 < \theta_o$ based on a random sample of size 'n' from

$$f(^{x}/_{\theta}) = 1/\theta\, e^{-x/\theta}$$

$$0 \quad ,o < x < \alpha , o < \theta \leq \theta_0, \theta > o$$

8

(b)*Explain the advantages and disadvantages of non-parametric method.* 6

OR

Q4 (a)*Give the definition of UMP test size of* α to test $H_0 : \theta \epsilon \omega_0$ against $H_1 : \theta \epsilon \omega_1$ Further show that there is no UMP test for testing $H_0 : \mu = \mu_0$ against $H_0 : \mu \neq \mu_0$ based on a random sample of size 'n' from $N(\mu, \sigma^2)$ where σ^2 is known from past experience. **10**

(b) *Given the following paired sample observations:*

(1,4),(2,6),(3,8),(5,10),(7,12), (9,13),(11,14),(18,15).

Test the hypothesis that these paired samples have come from same populations by using:

(1) Sign test

(2) Wilcoxon test

4

Q5

(a) Explain Mann Whitney test for two samples covering:

(1) statistical hypothesis (2) nature of samples (3) procedure (4) test statistic

(5) decision (6) normal approximation .

8

(b) Let $X_1, X_2 \ldots . X_n$ be a random sample of size n from an exponential distribution with pdf.

$$f(x,\theta)=\begin{cases}\theta \cdot e^{-\theta x} & ,x>0\\ 0 & ,othrewise\end{cases}$$

Where, $0<\theta<\infty$. Find the MP test of size α for testing $H_0:\theta=1$ against $H_0:\theta=2$.

6

OR

Q5(a) *Let* $x_1, x_2, x_3, \ldots x_n$ be a random sample from $N(\mu, 16)$. Find BCR for testing $H_0: \mu=16$ against $H_1: \mu=10$.

7

(b) Explain Kolmogorov Smirnov test for one sample of goodness of fit . 7