US – 361

IV Semester B.Sc. Examination, May 2017
(CBCS) (2015-16 and Onwards) (Fresh + Repeaters)
STATISTICS – IV
Testing of Hypotheses

Time : 3 Hours Max. Marks : 70

Instructions : *Answer* ***any five*** *sub-divisions from Section* ***A, any five*** *sub-divisions from Section* ***B*** *and* ***any five*** *questions from Section* ***C****. Scientific calculators may be* ***allowed****.*

SECTION – A (**10** Marks)

I. Answer **any five** sub-divisions from the following : **(5×2=10)**

1) a) Distinguish between simple and composite hypotheses.
b) Distinguish between Type – I and Type – II errors.
c) What is p-value ? Give its interpretation.
d) State the applications of central limit theorem.
e) Mention the need for Fisher's z-transformation technique.
f) What is Yate's correction ? State its necessity.
g) State monotone likelihood ratio property.
h) What are the demerits of non-parametric test ?

SECTION – B (**15** Marks)

II. Answer **any five** sub-divisions from the following : **(5×3=15)**

2) a) Let X_1, X_2, X_3 be a random sample from Poisson $P(\lambda)$ distribution. It is required to test $H_0 : \lambda = 2$ Vs $H_1 : \lambda = 4$ 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) If (i) $x_1 = 1.5$ and $x_2 = 2.5$ (ii) $x_1 = 3.5$, $x_2 = 5.5$, $x_3 = 2.5$ are random samples from continuous distribution. It is required to test a certain null hypothesis by using the test function $\Phi(x_1, x_2) = \begin{cases} 1, & \text{if } \bar{x} > 2.5 \\ 0, & \text{if } \bar{x} < 2.5 \end{cases}$. What is your decision ?

d) Describe the general procedure for normal test of significance.

e) Explain the test of significance for testing correlation coefficient when $\rho \neq 0$.

P.T.O.

f) Define co-efficient of association (Q) and co-efficient of colligation (Y).

Show that $Q = \frac{2Y}{1+Y^2}$.

g) Describe a test procedure of obtaining an MP test for testing a simple null hypothesis against a simple opposite hypothesis.

h) Explain the run test for randomness.

SECTION – C (45 Marks)

III. Answer **any five** questions from the following : **(5×9=45)**

3) a) Describe the large sample test for testing equality of two correlation coefficients through Fisher's z-transformation.

b) Explain the small sample test for testing population mean by assuming σ^2 is unknown. **(4+5)**

4) a) Find the chi-square test for goodness of fit in case of $2 \times k$ contingency table.

b) Discuss the test procedure for testing regression coefficient. **(4+5)**

5) a) Find most power full test and power of the test for testing

$H_0 : \theta = \theta_0$ Vs $H_1 : \theta = \theta_1 (\theta_0 < \theta_1)$ in Poisson $P(\theta)$ distribution.

b) Obtain the UMP test of lavel α for testing $H_0 : \theta = \theta_0$ Vs $H_1 : \theta > \theta_0$ in exponential distribution with mean θ. **(4+5)**

6) a) Obtain most power full test and power of the test for testing

$H_0 : \theta = \theta_0$ Vs $H_1 : \theta = \theta_1 (\theta_0 > \theta_1)$ in the distribution $f(x, \theta) = (1+\theta)x^{\theta}$, $0 < x < 1$ and $\theta > -1$.

b) Obtain UMP test of level α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu > \mu_0$ in normal $N(\mu, 1)$ distribution. **(4+5)**

7) a) Describe Wald Wolfowitz run test.

b) Explain sign test for (I) one and (II) two sample problems. **(5+4)**

8) a) State the relationship between the Mann-Whitney U-statistic and Wilcoxon's rank sum T-statistics and verify through an example.

b) Explain the test for Spearman's rank correlation coefficient. **(5+4)**

9) a) Describe S.P.R.T.

b) Derive the SPRT for testing $H_0 : \mu = \mu_0$ Vs $H_1 : \mu = \mu_1 (\mu_1 > \mu_0)$ in $N(\mu, \sigma^2)$ distribution (σ^2 is known). **(4+5)**
