3323—III S STA (N)—December 2019

THIRD SEMESTER M.A./M.Sc. DEGREE (C.B.C.S.) EXAMINATION, DECEMBER 2019

Statistics

STCP 3.2—PRACTICALS BASED ON STCT 3.2

Time : Two Hours Maximum : 30 Marks

Answer any **three** *of the following.*
Each question carries 10 *marks.*

1. (a) A sample of size 1 is taken from a population distribution, $P(\lambda)$. To test $H_0 : \lambda = 1$ against $H_1 : \lambda = 2$, consider the non-randomized test

$$\phi(x) = \begin{cases} 1, & \text{if } x > 3 \\ 0, & \text{if } x \leq 3. \end{cases}$$

Find the probabilities of type-I error and type-II error. Also find power of the test.

(b) If $X_1, X_2, \ldots, X_{20}$ is i.i.d. random variables from $N(0, \sigma^2)$. Find the MP test of size $\alpha = 0.01$ for testing $H_0 : \sigma = 10$ against $H_1 : \sigma = 12$. Also obtain the power of the test.

(4 + 6 = 10 marks)

2. Let $X_1, X_2, \ldots, X_{10}$ be a random sample of size 10 from exponential distribution with mean θ. Obtain a UMP test of level $\alpha = 0.05$ for testing $H_0 : \theta \geq 3$ against $H_1 : \theta < 3$. Obtain power of the test at $\theta = 1$ and draw power curve.

3. Let $X_1, X_2, \ldots, X_{15}$ be a sequence from N(θ, 1). Describe Wald's SPRT forting $H_0 : \theta = 0$ against $H_1 : \theta = 2$ with strength ($\alpha = 0.05$, $\beta = 0.05$) using the following data :

X : 1.4, 1.2, – 2.3, 0.8, 1.9, 2.4, – 1.6, 2.7, – 2.0, 2.4, 1.0, – 1.8, 3.2, 2.0, 1.7.

Obtain OC and ASN functions. Draw OC and ASN curves.

4. (a) Let X and Y respectively be the readings on a test unit 1st and 2nd measuring devices. The readings are given below :

X :	71	108	72	140	81	97	90	127	101	114
Y :	77	105	71	152	108	117	93	130	112	105

Apply Wilcoxon signed-rank test at $\alpha = 0.05$.

(b) To compare the variability of two brands of tires, the following mileages were obtained for tires of each kind :

Brand A :	32.1	20.6	17.8	28.5	19.9	23.8	19.1	30.0
Brand B :	20.1	26.5	31.2	29.2	34.2	20.8	21.0	25.0

Apply Kolmogorov-Smirnov test at $\alpha = 0.05$.

(5 + 5 = 10 marks)