**QP CODE: 24000587**

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**Reg No :** .....

**Name :** .....

# B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024

## Sixth Semester

B.Sc Statistics Model I

## CORE COURSE - ST6CRT09 - TESTING STATISTICAL HYPOTHESES

2017 Admission Onwards

1A2AC2A9

Time: 3 Hours Max. Marks : 80

**Part A**

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Distinguish between simple and composite hypotheses.
2. Distinguish between critical region and acceptance region.
3. What do you mean by UB critical region and UB test?
4. Distinguish between MP and UMP tests.
5. Write the test statistic obtained in the LR test for the equality of means of two normal populations having same variances.
6. Write the test statistic obtained in the LR test for the equality of variances of two normal populations.
7. Distinguish between large and small sample tests.
8. Write down the test statistic used for the test of equality of variances of two normal populations.
9. How will you test the equality of means of two dependent samples ?
10. Define non parametric test.
11. Which non parametric test is used to test the median? What is the distribution of the test statistic ?
12. Define run ? What is the length of a run?

(10×2=20)

**Part B**

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Explain the terms (i) Type I error (ii) Type II error (iii) level of significance (iv) power of the test.

14. Explain the terms (i) critical region (ii) acceptance region (iii) level of significance (iv) power of the test.

15. Let p be the probability that a coin will fall head in a single toss in order to test $H_0$ : p = 1/2 against $H_1$ : p = 3/4 . The coin is tossed 5 times and $H_0$ is rejected if more than 3 heads are obtained. Find the probability of type I error and power of the test.

16. If $\lambda$ is the likelihood ratio for testing a simple hypotheses $H_0$ and if U = $\Phi(\lambda)$ is a monotonic increasing (decreasing) function of $\lambda$ , then prove that CR for the test based on U is $\Phi(0) \leq U \leq \Phi(\lambda_0)$ ( $\Phi(\lambda_0) \leq U \leq \Phi(0)$ )

17. Explain the large sample test for the equality of means.

18. Discuss the large sample test for the proportion.

19. From the following data test whether the colour of son's eye is associated with that of father.

| | | Eye colour of son | |
|---|---|---|---|
| | | black | brown |
| eye colour in father | black | 230 | 148 |
| | brown | 151 | 471 |

20. Distinguish between sign test and signed rank test.

21. Briefly explain Kolmogorov Smirnov test for one sample.

(6×5=30)

**Part C**

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. (a) Explain the terms (i) Significance level (ii) power of the test (iii) unbiasedness

(b) Given the frequency function f (x , $\theta$ ) = $\frac{1}{\theta}$ , 0 < x < $\theta$ and 0 elsewhere and that you are testing the null hypothesis $H_0$ : $\theta$ = 1 against $H_1$ : $\theta$ = 2 , by means of a single observed value of x. What would be the sizes of type I and type II errors , if you choose the interval ( i) x> .6 (ii) .8 $\leq$ x $\leq$ 1.2 as the C.Rs . Check the unbiasedness of the two tests.

23. Given a random sample $x_1, x_2, ...., x_n$ from the distribution with p.d.f. $f(x, \theta) = \theta e^{-\theta x}$, $x > 0$, $\theta > 0$. Show that there exists no UMP test for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta \neq \theta_0$.

24. (a) Briefly explain the small sample test of significance of mean.
(b) Nine observations taken from a normal population are 93 , 97 , 99 , 101 , 86 , 79 , 83 , 102 , 77. Based on this sample can you conclude that the population mean is greater than 94.

25. Using Mann- Whitney U test, test the equality of distributions of the populations from which the following two samples are drawn

first group : 15 , 77 , 01 , 65 , 69 , 69 , 58 , 40 , 81 , 16 , 16 , 20 , 00 , 84 , 22

second group : 28 , 26 , 46 , 66 , 36 , 86 , 66 , 17 , 43 , 49 , 85 , 40 , 51 , 40 , 10

(2×15=30)