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# B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE / MERCY CHANCE EXAMINATIONS, FEBRUARY 2025

# **Sixth Semester**

B.Sc Statistics Model I

## **CORE COURSE - ST6CRT09 - TESTING STATISTICAL HYPOTHESES**

2017 Admission Onwards

A0DCDCBA

Time: 3 Hours

Max. Marks: 80

#### Part A

Answer any **ten** questions. Each question carries **2** marks.

- 1. Given the frequency function  $f(x, \theta) = \frac{1}{\theta}$ , if  $0 < x < \theta$  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. If 1 < x < 1.5 is the C.R, obtain the size of type II error.
- 2. Distinguish between one tailed and two tailed tests.
- 3. What do you mean by UB critical region and UB test?
- 4. Define uniformly most powerful test.
- 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. What is the chi square statistic for testing goodness of fit?
- 8. Write the assumptions regarding the t test.
- 9. How will you test the equality of means of two dependent samples ?
- 10. What are the basic assumptions in non parametric tests ?
- 11. Briefly explain the ordinary sign test.
- 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. Briefly explain different steps in a statistical test procedure.
- 14. Explain the terms (i) critical region (ii) acceptance region (iii) level of significance (iv) power of the test.
- 15. Given the frequency function f (x, θ) = 1/θ, 0 < x < θ : θ > 0 and that you are testing the null hypothesis H<sub>0</sub>: θ = 2 against H<sub>1</sub>: θ = 1 ,by means of a single observed value of x. What would be the probabilities of type I and type II errors , if you choose the interval .5 < x < 1.5 as the C.R. Also obtain the power function of the test.</li>
- 16. Briefly explain the likelihood ratio test.
- 17. Briefly explain the test of significance for the difference of proportions.
- 18. Obtain the chi square statistic for testing the independence of attributes in a 2x2 contigency table .
- 19. Briefly explain the test of significance for the difference in correlation coefficients in large samples.
- 20. Discuss the procedure of the test of randomness.
- 21. Distinguish between sign test and signed rank test.

(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. Explain the likelihood ratio test for the mean of a normal population.
- 24. (a) Briefly explain the test of equality of means of two normal populations with given variances

(b) The weight of boys and girls of age 15 are assumed to be normaly distributed with s.ds. 4 kgs and 3 kgs. . A sample of 10 boys was found to have mean weight 40 kgs. and a sample of 8 girls was found to have mean weight 36 kgs. Is the belief that the mean weight of boys and girls are the same is justifiable?



25. The following are the numbers of tickets issued by two persons on 20 days:

l Person : 7,10,14,12,6,9,11,13,7,10,8,9,10,8,10,15,12,6,11,8

II Person : 8,10,14,13,9,7,11,13,10,10,14,9,10 14,10,16,12,11,12,8

Use the median test at 5% level of significance to test the null hypothesis that on the average the two persons issue equal numbers of tickets against the alternative hypothesis that on the average the II person issues more tickets than the I person

(2×15=30)