LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

FIFTH SEMESTER – NOVEMBER 2011

ST 5505/ST 5501 - TESTING OF HYPOTHESES

Date : 02-11-2011
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

Part – A

Answer ALL Questions.   **(10 x 2 = 20 marks)**

1. What do you mean by Testing of hypothesis?

2. Define One-tail test and Two-tail tests.

3. Define Monotone likelihood ratio property.

4. Define Type I error and Type II error.

5. Define Power Function.

6. State the assumptions for large sample tests.

7. Obtain the number of runs in the sequence: x x x y x x y y y x y x y y.

8. Define UMP test.

9. State the advantages of Non-parametric tests.

10. Mention any two Non-parametric tests.

Part – B

Answer any FIVE Questions.   **(5 x 8 = 40marks)**

11. In a random sample of 500 persons from city X, 200 are found to be consumers of vegetable oil. In another sample of 400 persons from city Y ,200 are found to be consumers of vegetable oil. Discuss whether the data reveal a significant difference between two cities in consumption of vegetable oil.

12. Obtain the UMP Test for testing H_o: $\theta = \theta_o$ versus H_1: $\theta > \theta_o$ when the random sample is from $f(x,\theta) = \theta^x (1 – \theta)^{1 – x}$, x = 0, 1.

13. Explain the procedure for Sequential Probability Ratio Test.

14. The mean life of a sample of 10 bulbs was found to be 1456 hours with a standard deviation of 423 hours . A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with standard deviation 398 hours. Is there significant difference between the means of the two batches ?

15. Show that the family $f(x, \theta) = \theta e^{– \theta x}$, x > 0 , has Monotone Likelihood Ratio Property.

16. Differentiate between Parametric test and Non-Parametric tests.

17. What do you mean paired "t" tests? Explain with an example.

18. The following are the measurements of breaking strength of a certain kind of 2-inch
    cotton ribbon:

    163   165   160   189   161   171   158   151   169   162

    163   139   172   165   148   166   172   163   187   173

Use the Sign test to test the null hypothesis H_o: $\mu = 160$ against the hypothesis H_1: $\mu > 160$ at the 0.05 level
of significance.

Part – C

Answer any TWO Questions.   **(2 x 20 = 40marks)**

19. (a) State and prove Neymann-Pearson theorem.

    (b) Obtain the Best Critical Region for testing H_o: $\theta = \theta_o$ versus H_1: $\theta = \theta_1$ when the
        random sample is from $f(x, \theta) = \theta (1 - x)^{\theta - 1}$, $0 < x < 1$.

20. (a) Random samples are drawn from two populations and the following results were
        obtained:

        Sample X: 16   17   18   19   20   21   22   24   26   27

        Sample Y: 19   22   23   25   26   28   29   30   31   32   35   36

  Find variances of two populations and test whether the two samples have same variance

(b) Derive the LRT for equality of means of two independent normal populations with common
    unknown variance.   (6+14)

21. (a) To test the efficiency of a new drug a controlled experiment was conducted where
        300 patients were administered the new drug and 200 patients were not given the drug.
        Test the effect of the drug using the results given below:

	Cured	Condition worsens	No effect
Drug given	200	40	60
Drug not given	120	30	50

  (b) Explain the test of independence of attributes in contingency table.

22. (a) The potash contents in two types of fertilizers was found to be

        Type X: 2.1   4.0   6.3   5.4   4.8   3.7   6.1   3.3

        Type Y: 4.1   0.6   3.1   2.5   4.0   6.2   1.6   2.2   1.9   5.4

Use Mann-Whitney U-test to find whether the potash contents are equal in both types.

    (b) Explain the procedure for one sample Run test.

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