LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **STATISTICS**

THIRD SEMESTER – NOVEMBER 2017

16PST3ES02 - NON-PARAMETRIC METHODS

Date: 10-11-2017   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

SECTION - A

Answer all the questions.   (10 X 2 = 20)

1. Write down the assumptions of Non parametric Methods.

2. Differentiate between parametric and non parametric methods.

3. Define Nominal and Ordinal data with an example.

4. State the assumptions on Kolmogrov Smirnov one sample test.

5. State the situation for using Moses test.

6. State the applications of ordered alternative test for two way layout.

7. Name few Dispersion non parametric test can be used.

8. When do we use Theil's test?

9. Which test is more appropriate for two Regression lines? And write the test statistic.

10. Write a short note on kernel density estimation.

SECTION- B

Answer any five questions.   (5 X 8 = 40)

11. A quality control study is conducted on a machine that pours milk into containers. The amount of milk (in liters) dispensed by the machine into 21 consecutive containers follows:
    1.90, 1.99, 2.00, 1.78, 1.77, 1.76, 1.98, 1.90, 1.65, 1.76, 2.01, 1.78, 1.99, 1.76, 1.94, 1.78, 1.67, 1.87, 1.91, 1.91, 1.89.
    Are the successive increments and decrements in the amount of milk dispensed random?

12. Explain the Binomial test in detail.

13. The data based on nine patients who received tranquilizer T were taken from a double blind clinical traial involving two tansquilizer. The measure used was the Hamilton depression scale factor the x value was taken at the first patient visit after initiation of therapy, the y value at the second visit after initiation of therapy. The patients had been diagnosed as having mixed anxiety and depression.

Patient	1	2	3	4	5	6	7	8	9
X	1.83	0.5	1.62	2.48	1.68	1.88	1.55	3.06	1.3
Y	0.878	0.647	0.598	2.05	1.06	1.29	1.06	3.14	1.29

Test the data involving tranquilizers, an improvement would correspond to lower factor values.

14. Explain in detail Millers asymptotic test.

15. Consider the effect in terms of breaking strength of cotton fibers of the level of potash in the soil. Five levels of potash were applied in a randomized block pattern with three blocks.

Potash Replications	144	108	72	54	36
1	7.46	7.17	7.76	8.14	7.63
2	7.68	7.57	7.73	8.15	8
3	7.21	7.8	7.74	7.87	7.93

Test the species a trend of decreasing breaking strength with increasing levels of potash.

16. Write the data layout, assumptions and test procedure of Friedman Rank sum test.

17. To investigate the effects of a particular method of cloud seeding on the amount of rainfall. In one experiment that took place in the snowy mountains, two areas served as target and control, respectively, and during any one period a random process was used to determine whether clouds over the target area should be seeded. The effect of seeding was measured by the double ratio.

Years seeded(X)	1	2	3	4	5
Double Ratio(Y)	1.26	1.27	1.12	1.16	1.03

Test the hypothesis that the double ratio does not change with time.

18. Explain Gibbs sampling.

SECTION- C

Answer any two questions. (2 X 20 = 40)

19. i) Explain the applications and procedure of chi -square test. (8)

ii) In order to assess the efficacy of a new antidepressant drug, ten clinically depressed patients are randomly assigned to one of two groups. Five patients are assigned to Group 1, which is administered the antidepressant drug for a period of six months. The other five patients are assigned to Group 2, which is administered a placebo during the same six-month period. Assume that prior to introducing the experimental treatments, the experimenter confirmed that the level of depression in the two groups was equal. After six months elapse all ten subjects are rated by a psychiatrist (who is blind with respect to a subject's experimental condition) on their level of depression. The psychiatrist's depression ratings for the five subjects in each group follow (the higher the rating, the more depressed a subject): **Group 1**: 11, 1, 0, 2, 0; **Group 2**: 11, 11, 5, 8, 4.
Test for median if the data indicates that the antidepressant drug is effective? (12)

20. i) In order to assess the effect of two antidepressant drugs, 12 clinically depressed patients are randomly assigned to one of two groups. Six patients are assigned to group 1 the other six patients are assigned to group2. The psychiatrist's depression ratings for the six subjects in each group follow

Group 1	10	10	9	1	0	0
Group 2	6	6	5	5	4	4

Do the data indicate there is a significant difference between the variance of the two groups? (14)

ii) State the applications of various test for dispersion parameter. (6)

21. In a National league baseball team, considered three methods of rounding first base. the best method is defined to be the one that, on the average, minimizes the time to reach second base. the three methods, "round out," "narrow angle," and "wide angle," are given in the following table

	Players	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Meth	Round Out	5.4	5.85	5.2	5.55	5.9	5.45	5.4	5.45	5.25	5.85	5.25	5.65	5.6	5.05	5.5
	Narrow Angle	5.50	5.7	5.6	5.5	5.85	5.55	5.4	5.5	5.15	5.8	5.2	5.55	5.35	5	5.5
	Wide Angle	5.55	5.75	5.5	5.4	5.7	5.6	5.35	5.35	5	5.7	5.1	5.45	5.45	4.95	5.4

Test whether the methods are different and if the methods are different find which pairs of methods are different.

22. i) Write the assumptions, procedure and interpretation for testing parallelism of two regression lines. (12)

   ii) Write a short note on a) EM algorithm (4+4)

                     b) Method of generating a random sample from a mixture distribution

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