



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc.DEGREE EXAMINATION – STATISTICS

THIRD SEMESTER – APRIL 2018

16PST3ES02- NON-PARAMETRIC METHODS

Date: 05-05-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

SECTION - A

Answer all the questions.

(10 X 2 = 20)

1. When do we use Non parametric Methods?
2. Define Nominal and Ordinal data with an example.
3. Define i) Parameter ii) Statistic
4. In which situation we can use the run test for serial randomness?
5. State the situation for using Fishers test
6. State the applications of ordered alternative test for two way layout.
7. Name two non parametric tests will be used to compare more than two populations.
8. When do we use slope coefficient test?
9. State the applications of Hollander Test.
10. Write a short note on kernel density estimation.

SECTION- B

Answer any five questions.

(5 X 8 = 40)

11. Explain the test procedure for Kolmogorov-Smirnov test for two independent samples.
12. The following table gives the number of air craft accidents that occurred during the various days of the week. Find whether the accidents are uniformly distributed over the week.

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No.of Accidents	14	16	8	12	11	9	14

13. Explain in detail Wilcoxon signed rank test.
14. A survey is conducted to test the difference between two alternative methods of teaching. A sample of 20 students is selected at random. Two groups of 10 students each of equal ability are formed, and taught by different methods. A standardized test is given to both the groups and the following marks are scored by the 10 students in each group.

Group A	40	45	48	46	52	58	72	85	67	73
Group B	42	68	45	64	85	78	87	62	84	90

Using U test, test the significance of difference between the performance of the two groups.

15. Do the J test with the following data

Control	40	35	38	43	44	41
Rough	38	40	47	44	40	42
Accurate	48	40	45	43	46	44

Use ordered alternative test and draw the inferences.

16. Write the data layout, assumptions and test procedure of Kruskal wallis 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 Binomial test in detail. (8)

ii) Each person in a random sample of $n = 10$ employees was asked about , the daily time wasted at work doing non-work activities(X), such as surfing the internet and emailing friends. The resulting data in minutes are as follows:

108 112 117 130 111 131 113 113 105 128

Verify whether these data come from a normal distribution with mean 120 and standard deviation 10. (12)

20. Explain and write the test procedure for various two sample dispersion tests.

21. Consider twelve patients getting three different treatments Test whether the Treatment is different using Fried Rank sums test and find which pairs of Treatments are different.

Patient	Treatment 1	Treatment 2	Treatment 3
1	209	88	109
2	412	388	142
3	315	451	155
4	389	325	121
5	210	126	75
6	136	118	49
7	178	227	101
8	228	98	49
9	240	205	142
10	113	88	45
11	178	194	55
12	321	349	121

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
