



M.Sc. DEGREE EXAMINATION – STATISTICS

THIRD SEMESTER – NOVEMBER 2018

17PST3ES02 – NON-PARAMETRIC METHODS

Date: 31-10-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

SECTION - A

Answer all the questions.

(10 X 2 = 20)

1. Define categorical data with an example.
2. Differentiate between parametric and nonparametric inference.
3. State the assumptions on which Binomial sign test is based.
4. Write the large sample test statistic for Run test.
5. Name any two non-parametric tests that can be used to test the variances of two populations.
6. State the situation for using Mann-Whitney U test.
7. Write the test statistic for Jonckheere's test.
8. Name two nonparametric test which can be used to compare more than two populations.
9. State the assumptions of slope coefficient test.
10. Write a short note on Gibbs sampler.

SECTION- B

Answer any five questions.

(5 X 8 = 40)

11. Forty people were selected at random in the following order MMFFF FMFFM MFMMM MFFMM FMFFM MMMF FMFMM FFMMM. Assuming the population has 50% men and 50% women, is true that the people were selected at random?
12. Explain the Kolmogrov Smirnov one sample test in detail.
13. A total of 8 children with autism enroll in the study and the amount of time that each child is engaged in repetitive behavior during three hour observation periods are measured both before treatment and then again after taking the new medication for a period of 1 week. The data are shown below.

Child	1	2	3	4	5	6	7	8
Before treatment	85	70	40	65	80	75	55	20
After 1 week of Treatment	75	50	50	40	20	65	40	25

Test is there any improvement in the treatment.

14. Write the test procedure for Mann-Whitney U test.
15. A shoe company wants to know if three groups of workers have different salaries:
Women: 23K, 41K, 54K, 66K, 78K.
Men: 45K, 55K, 60K, 70K, 72K
Minorities: 18K, 30K, 34K, 40K, 44K.
 Test whether the three groups of workers have different salaries.
16. State the applications and test procedure of Kendalls test for independence.
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 the method of generating a random sample from a mixture distribution.

SECTION- C

Answer any two questions.

(2 X 20 = 40)

19. a) State the Merits and Demerits of Non Parametric Methods. (8)

b) Determine whether the samples for Italy and France come from the same normal distribution.(12)

Italy	3	2	3	5	8	9	8
France	2	8	2	4	4	3	6

20. a) 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)

b) Explain in detail Rank test (Ansari Bradley). (6)

21. 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) Describe kernel density estimation. (8)

ii) Write the data layout, assumptions and test procedure of Millers asymptotic test. (12)
