**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**II B.Sc. –Statistics / Semester- IV (2018-19)**

**Statistics paper- IV Course: TESTING OF HYPOTHESIS**

**Total Hrs. of Teaching: 52 @ 4 h / Week Total Credits: 03**

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**Objective:** After studying this semester, one should know how to able to define null and alternate hypothesis, to calculate probabilities using an appropriate model and to test a null hypothesis, to test mean based on a sample, understand when to use a one or two tailed tests.

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**Module -1 (12h)**

1. **Concepts of statistical hypothesis:** Null & alternate hypothesis, procedure for testing of hypothesis, critical region, two types of errors, one & two tailed tests, level of significance, power of a test.
2. **Large sample tests:** Test for single mean

Test for difference of means

Test for single proportion

Test for difference of proportions

 Test for difference of standard deviations

Problems on large sample tests.

**Module-2 (8h)**

1. Randomized tests
2. Non Randomized tests.
3. Neman- Pearson’s Lemma for most powerful critical region and test.
4. Examples in case of binomial, poisson, exponential, normal distributions.

**Module-3 (16h)**

 **Small Sample Tests**

1. **Chi -square test:** chi-square test for variance, goodness of fit, independence of attributes & Problems based on chi-square test.
2. **T-test:**test for single mean, test for difference of means, paired t -test **,** test for sample correlation coefficient & problems.
3. **F-test:** Test for equality of variances & problems**.**

**Module-4 (16h)**

 **Non Parametric Tests**

1. **Non Parametric tests:** comparison with parametric tests, advantages & dis advantages of NP tests, assumptions of NP tests.
2. **Sign test:**one sample sign test, two sample sign test procedures & problems.
3. Mann-Whitney wilcoxon U test: procedure & problem
4. **Run test:** procedure & problem
5. Wilcoxon Rank test forone&two simple tests: procedure & problem.

 **List of Text Books:**

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi

**List of Reference Books:**

2. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press

Pvt.Ltd., Kolakota.

3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing hous.

**Paper –IV: TESTING OF HYPOTHESIS**

**Model blue print for the Question Paper setter**

**Max. Marks: 60 Time : 2 ½ Hrs.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unit / Chapter name** |  | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **Unit – 1** |
| **Concepts of statistical hypothesis**  |  | **2** | **2** | **25** |
| **Unit – 2** |
| **Module-2** |  | **1** | **2** | **30** |
| **Unit – 3** |
| **Small Sample tests** |  | **1** | **2**  | **30** |
| **Unit – 4** |
| **Non parametric tests** |  | **2** | **2** | **25** |
| **Any of the above Units (i.e., 1-4)** |
| - |  |  |  |  |
| **Total No. of Questions including choice (14)** |  | **6** | **8** | **-** |
| **Total marks allotted to all questions including choice =** | **110** |

**Note :** It is mandatory to provide the table value(s) along with the numerical problems, where they are necessary.

**P. R. Government College (Autonomous), Kakinada**

**II year B.Sc., Degree Examinations-IV Semester**

**Statistics Paper –IV: Testing of Hypothesis**

**Model Paper**

**Time: 2 ½ Hrs. Max. Marks: 60**

**Section –A 4X5 = 20 M**

 **Answer any four questions**

1. Define null hypothèses, alternative hypothèses ,simple and composite hypothèses .
2. Define type-I and type-II errors.
3. Write about randomised and non randomised tests.
4. Write procedure of test for single mean for large sample.
5. Distinguish between parametric and non parametric tests.
6. Write run test procedure ?

**Section – B 2x10 = 20 M**

 **Answer Any Two of the following questions.?**

1. Explain the large sample test for testing the difference of two means. Random samples drawn from two countries gave the following data relating to the heights of adult males. Country A Country B

 Mean Height (in inches) 67.42 67.25

 S.D(in inches) 2.58 2.50

 No.of samples 1000 1200

 Is the difference between means significant at 1% los. ( Table value = 2.576 )

1. Explain procedure for testing of hypothesis and also explain large sample test for difference of standard deviation.
2. State and prove Neymann -Pearson Lemma
3. What are the advantages and disadvantages of Non -Parametric methods.

 **Section – C**

 **Answer Any Two questions 2X10=20M**

1. Explain (i) Chisquare test for goodness of fit.

 (ii) Chisquare test for independence of attributes.

 12. Two random samples gave the following results:

 Sample size Sample mean Sum Squares of Deviations from the Mean

 1 10 15 90

 2 12 14 108

Test where the samples come from the same normal population at 5% level of significance. (Table values: t(5%,20)=2.08, F(5%,9,11)=2.90, F(5%,11,9)=3.10)

13. Explain Mann Whitney Wilcoxon U test.

14. Discuss about Wilcoxon Signed Rank test for one sample and two sample tests.

B.Sc. II Year: Statistics Practical-III & IV

Semester III & IV

**(With Mathematics Combination)**

1.Fitting of straight line and parabola by the method of least squares.

2.Fitting of straight line and parabola by the method of least squares using MS Excel**.**

3.Fitting of power curves of the type y= a xb, y=a bx and y=a ebx by the method of least

 squares.

4.Fitting of power curves of the type y= a xb, y=a bx and y=a ebx by the method of least

 squares using MS Excel.

 5.Computation of correlation coefficient and regression lines for ungrouped data.

6.Computation of correlation coefficient, forming regression lines for ungrouped data.

7.Computation of correlation coefficient, forming regression lines for grouped data.

8.Computation of correlation coefficient, forming regression lines using MS Excel**.**

9.Computation of multiple and partial correlation coefficients.

10.Computation of multiple and partial correlation coefficients using MS Excel.

11.Computation of correlation ratio.

12.Large sample tests for mean(s), proportion(s), Standard deviation(s) and correlation

 coefficient.

13.Small sample tests for single mean and difference of means and correlation coefficient.

14.Paired t-test.

15.Small sample tests for mean(s), paired t-test and correlation coefficient using MS Excel.

16.Small sample test for single and difference of variances.

17.Small sample test for single and difference of variances using MS Excel.

18. χ2 – test for goodness of fit and independence of attributes.

19. χ2 – test for goodness of fit and independence of attributes using MS Excel.

20.Nonparametric tests for single and related samples (sign test and Wilcoxon signed rank

 test) and one sample runs test.

21. Nonparametric tests for two independent samples (Median test,Wilcoxon Mann Whitney -

 U test, Wald - Wolfowitz’s runs test)

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MSWord for writing inferences.

**Question paper pattern.** odd sem

**Theory:** Five Questions will be given.

 The Student has to answer three questions**. 3x12=36 M**

**Record: 10M**

 **Viva: 4M**

**TOTAL: 50M**

Question paper pattern: even sem

**Theory:** Five Questions will be given.

 The Student has to answer three questions**. 3x12=36 M**

 Record: 10M

 Viva: 4M

TOTAL: 50M