



MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :.....

Name :.....

Fourth Semester B.Sc. Degree Examination, June 2016

First Degree Programme under CBCSS

Complementary Course: Statistics – IV (for Mathematics)

AUST431.2c: Testing of Hypotheses and Analysis of Variance

Time: 3 Hours

Max. Marks: 80

SECTION – A

Answer ALL questions / problems in one or two sentences.

1. Distinguish between Null and Alternative hypothesis.
2. What are the two types of errors that a data analyst is liable to commit in testing a hypothesis ?
3. Define power of a test.
4. Which result in Probability theory justifies the large sample methodology in testing hypothesis ?
5. Distinguish between one sided and two sided tests.
6. What is the difference between Type I error and significance level ?
7. Distinguish between S.D and S.E by giving suitable examples.
8. Obtain the standard error of mean of a large sample of size n from a population with variance σ^2 .
9. What is the importance of normal distribution in large sample tests ?
10. What do you mean by analysis of variance ?

(10 × 1 = 10 Marks)

SECTION – B

Answer any EIGHT questions / problems, not exceeding a paragraph.

11. What is meant by ‘critical region’ in testing of hypothesis and what considerations are given to determine it ?

12. State Neyman – Pearson lemma.
13. What is the need of paired t – test ?
14. Distinguish between simple and composite hypothesis. Give one example each.
15. Why do you use different methods for testing the same hypothesis when samples are small and large ?
16. Distinguish between assignable causes of variation and random causes of variation. Give example of an experiment in which both the causes are influencing the observations.
17. Explain any two differences between one-way and two – way analysis of variances.
18. The continuous random variable X has the frequency function $f(x, \theta) = 1/\theta$ for $0 \leq x \leq \theta$ and 0 elsewhere. It is desired to test the hypothesis $H_0: \theta = 1$ Vs $H_1: \theta = 2$ using a single observation X . $X \geq 0.95$ is used as the critical region. Evaluate Type I and Type II errors.
19. Discuss briefly the different applications of Chi – square as a test statistic.
20. How is the degrees of freedom of the Chi – square for goodness of fit determined ?
21. Explain what do you mean by testing of homogeneity.
22. What are the assumptions made for the application of student's t test ? Discuss the use of t in comparing two samples.

(8 × 2 = 16 Marks)

SECTION – C

*Short essay type problems : Answer any **SIX** questions.*

23. Two samples of sizes 11 and 8 have means 61 and 53, standard deviations 6 and 7 respectively. Use this data to test whether the samples are from populations with same variance.
24. Explain the method of testing the significance of the difference between a large sample mean and population mean.
25. From the data given below, test whether inoculation against typhoid has any significant effect on immunity from attack:

	Attacked	Not Attacked
Inoculated	48	92
Not Inoculated	112	88

26. Samples of sizes 10 and 14 were taken from two normal populations with standard deviations 3.5 and 5.2 and the sample means were found to be 20.3 and 18.6. Test whether the means of the two populations are the same at 5% level.
27. Explain one – way analysis of variance with the help of an example. Give the ANOVA table.
28. Random samples of sizes 500 and 400 are found have means 11.5 and 10.9 respectively. Can the samples be regarded as random samples drawn from the same population whose standard deviation is 5 ?
29. State the form of the χ^2 for testing independence of attributes in contingency tables and obtain its expression in the special case of 2×2 table.
30. Weights in kg of 10 students are given below:
38, 40, 45, 53, 47, 43, 55, 48, 52, 49
Can we say that variance of the distribution of weights of all students from which the above sample of 20 students was drawn is equal to 20 square kg ?
31. A random sample of pigs fed on diet A over a period gave the following values, mean = 6, s.d. = 3.8, n = 8. Another sample fed on diet B gave the following values, mean = 9, s.d. = 4.15, n = 5. Test whether the diets A and B differ significantly in their variances.

(6 × 4 = 24 Marks)

SECTION – D*Long essay type problems : Answer any TWO questions.*

32. In the accounting department of a bank 100 accounts are selected at random and examined for errors. Suppose the following results have been obtained.

No. of errors:	0	1	2	3	4	5	6
No. of accounts:	35	40	19	2	0	2	2

On the basis of this information can it be concluded that the errors are distributed according to the Poisson probability law ?

(15 Marks)

33. i). A sample of 400 men from South India has a mean height of 68.85 inches and standard deviation of 2.50 inches while a sample of 100 men from North India has a mean height of 66.20 inches with a standard deviation of 2.52 inches. Do

the data indicate that North Indians are on the average taller than the South Indians ? **(8 Marks)**

- ii). In a cross between red flowered and white flowered plants, it was found that of the 452 flowers obtained 119 were white and the rest red. Is this consistent with the hypothesis that red and white flowers are in the ratio 3:1. **(7 Marks)**

34. i). State the assumptions involved in F – Test for testing the equality of two sample variances. **(3 Marks)**

- ii). Two random samples were drawn from two normal populations and their values are

A: 66 67 75 76 82 84 88 90 92

B: 64 66 74 78 82 85 87 92 93 95 97

Test whether the two populations have the same variance at the 5% level of significance. **(12 Marks)**

35. i). The following table gives the yields of wheat in 30 test plots which are given 3 different fertilizers.

Fertilizer I: 50, 60, 60, 65, 70, 80, 75, 80, 85, 75

Fertilizer II: 60, 60, 65, 70, 75, 80, 70, 75, 85, 80

Fertilizer III: 40, 50, 50, 60, 60, 60, 65, 75, 70, 70

Test whether the fertilizers are equal in their effects. **(10 Marks)**

- ii). Give the analysis of Variance table for two way – classification. **(5 Marks)**

(2 × 15 = 30 Marks)

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