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MASTER OF COMPUTER APPLICATIONS
(Specialization in Artificial Intelligence & Machine Learning) /
(Specialization in Data Science)
EXAMINATION : JANUARY - 2025
SEMESTER - II
Sub:Inferential Statistics (MCAI 23-201/ MCDS23-201)

Date :09/01/2025

Total Marks :60

Time: 02.00 pm to 04.30 pm

Instruction:

1. All questions are compulsory unless and otherwise stated.
2. Bold figures to the right of every question are the maximum marks for that question.
3. Candidates are advised to attempt questions in order.
4. Answers written illegibly are likely to be marked zero.
5. Use of scientific calculators, Log tables, Mollier Charts is allowed.
6. Draw neat and labelled diagram wherever necessary.

Q.1. Answer the following in 2-3lines. (Any 5) (10)

1. Define point estimation and interval estimation.
2. What is type I error in hypothesis testing?
3. Define alternate hypothesis.
4. In large sample test (z-test), how you decide to reject null hypothesis?
5. State the assumptions in ANOVA.
6. Define sample proportion.
7. Define critical region.

Q. 2. Answer the following in short. (Any 4) (20)

1. The mean of 7.25 kg with standard deviation 1.4 kg is observed in a sample of size 120. Find 95% confidence limits for the population mean (take $z_{\alpha/2} = 1.96$).
2. Write the procedure for t-test (small sample test).
3. In a survey of buying habits 400 women shoppers are chosen at random in super market 'A' located in a certain section of the city. Their average weekly food expenditure is Rs. 250 with a standard deviation of Rs. 40. For 400 women shoppers chosen at random in super market 'B' in another section of the city, the average weekly food expenditure is Rs. 220 with a standard deviation of Rs. 55. Calculate the value of test statistic (z) in testing whether the average weekly food expenditure of the two populations of shoppers is equal.
4. The mean weekly sales of soap bars in departmental stores were 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful? Test at 5% level of significance (Critical value of t from table at 5% level of significance and 21 dof is 1.72).
5. In a random sample of 400 persons, 120 are females, can it be said that males and females are in the ratio 5:3 in the population at 1% level of significance. (Take critical value of z at 1% level of significance for two tailed test is 2.58)

6. The observed values of baby gender and heart rate are given below. Calculate the value of chi-square (χ^2)

		Heart Rate		Row Total
		Low	High	
Gender	Girl	11	7	18
	Boy	17	5	22
Column Total		28	12	Total = 40

Q. 3. Answer the following in detail. (Any 3)

(30)

1. The company wants to examine the safety of car A, car B, and car C types. It collects a sample of three for each of the treatments (cars types). Using ANOVA, test whether the mean pressure applied to the driver's head during a crash test is equal for each type of car. Use level of significance, $\alpha = 5\%$ (Use ANOVA) (Take critical value of F as 5.14)

Car A	Car B	Car C
650	470	490
660	430	460
710	530	410

2. Random samples drawn from two countries gave the following data relating to the heights of adult males. Test whether the difference in mean heights is significant at 5% level. (Take tabulated critical value of Z as 1.96).

	Country A	Country B
Mean Height (inches)	67.42	67.25
Standard Deviation (Inches)	2.58	2.50
Sample Size	1000	1200

3. A random sample of 10 boys had following IQ's 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do this data support the assumption that population mean IQ is 100? Test at 5% level of significance (Take critical value of t as 2.262 at 5% and 9 DOF)
4. Determine a 95 percent confidence interval for the mean of following sample values 54, 63, 58, 72, 49, 92, 70, 73, 69, 104, 48, 66, 80, 64, 77. (take $z_{\alpha/2} = 1.96$)
5. The collected data on type of movie and snacks purchase from a sample of 600 randomly selected people are given below. Test whether movie type and snack purchases are independent at 5% level of significance. (From table, take critical value of chi-square as 7.815)

Type of movie	Snacks	No snacks
Action	50	75
Comedy	125	175
Family	90	30
Horror	45	10
