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MASTER OF COMPUTER APPLICATIONS
(Specialization in Artificial Intelligence & Machine Learning) / (Specialization in Data Science)
EXAMINATION :MAY - 2024
SEMESTER - II
Sub: Inferential Statistics (MCAI 23-201/ MCDS23-201)

Date :22/05/2024	Total Marks :60	Time: 10.00 am to 12.30 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 null hypothesis.

4. In large sample test (z-test), how you decide to reject null hypothesis?

5. Define critical value.

6. Define sample proportion.

7. What is ANOVA?

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 z-test (large 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 are equal.

4. 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)

5. The mean weekly sales of an item in departmental stores was150items per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 160 and showed a standard deviation of 20. 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)

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

		Heart Rate		
		Low	High	Row Total
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 types of car. Use level of significance, α = 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. The collected data on type of movie and snacks purchase from a sample of 660 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	60	80
Comedy	130	180
Family	100	40
Horror	50	20

3. For the following data conduct z-test for equality of two means at 5% significance level (Take tabulated critical value of Z as 1.96).

	Sample 1	Sample 2
Sample means	70.7	80.5
Standard Deviation	3.65	4.16
Sample Size	800	1000

4. Below are given the gain in weights (in lbs.) of pigs fed on two diets A and B.
   Gain in weight
   Diet A : 25, 32, 30, 34, 24, 14, 32, 24, 30, 31, 35, 25
   Diet B : 44, 34, 22, 10, 47, 31, 40, 30, 32, 35, 18, 21, 35, 29, 22

   Test if the two diets differ significantly as regards their effect on gain in weight.
   At 5% level of significance, take tabulated value of t as 2.06 for 25 dof.

5. Determine a 99 percent confidence interval for the average resting pulse of the members of a health club if a random selection of 15 members of the club yielded the data 54, 63, 58, 72, 49, 92, 70, 73, 69, 104, 48, 66, 80, 64, 77. (take $z_{\alpha/2} = 2.58$)