DMC 013, Research Methodology, Sessional Exam - June 07, 2021, 12:01 pm to 2:00 pm
Max score = 20 (Q1 = 10, Q2 = 2x5 = 10)

Q1 In the following test of hypothesis, the population variance σ^2 is not known, and hence the standard Gaussian based Z statistic cannot be used. Devise an appropriate strategy for testing the hypothesis.

Let X (in mm) equal the growth in 15 days of a tumour induced in a mouse. Assume that the distribution of $X \sim N(\mu, \sigma^2)$. You have to test the hypothesis if the average tutor size is 4 mm or not. Use the level of significance of the test $\alpha = 0.10$ and the following data,

$$X = \{4.20, 4.90, 3.50, 2.40, 3.30, 3.75, 4.75, 5.95, 5.95\}$$

Clearly state the null and alternate hypothesis, the test statistic you are using for the test and your inference. You may use any of the following information:

$z_{0.1}(\sigma/\sqrt{9}) = 0.039$, $z_{0.05}(\sigma/\sqrt{9}) = 0.012$, $t_{0.05}(8) = 1.86$, $t_{0.1}(8) = 1.4$, $t_{0.05}(9) = 1.83$, $t_{0.1}(9) = 1.38$

Q2
i) State the Bayes' theorem.
ii) Name two sampling distributions. Which of them is used for ANOVA?
iii) State any two of the three axioms of probability.
iv) Name two discrete probability distributions.
v) Which probability distribution has the same value for expectation and variance?