Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC)

Hingna Road, Wanadongri, Nagpur - 441 110

Odd Term 2022-2023 | III Semester B.Tech. | Mid Semester Exam II

AIDS2202: Statistics for Data Science

Time: 1:30 Hr | Date: 16-01-2023 | Max Marks: 30

Instructions to examinees:

1. **Figures in bracket to the right indicate the marks for questions.**
2. **Attempt all questions and assume suitable data wherever necessary.**

Que. No.	Sub Question	Question and Description	Max Marks	CO Bloom's Level
1	A	Explain Sampling and different sampling types.	4	CO3
	B	Farmer Braun, who sells grain to Germany, owns 60 acres of wheat fields. Based on past experience, he knows that the yield from each individual acre is normally distributed with mean 120 bushels and standard deviation 12 bushels. Help Farmer Braun plan for his next year's crop by finding (a) The expected mean of the yields from Farmer Braun's 60 acres of wheat. (b) The standard deviation of the sample mean of the yields from Farmer Braun's 60 acres. (c) The probability that the mean yield per acre will exceed 123.8 bushels. (d) The probability that the mean yield per acre will fall between 117 and 122 bushels.	6	CO3
2	A	Oscar T. Grady is the production manager for Citrus Groves Inc., located just north of Ocala, Florida. Oscar is concerned that the last 3 years' late freezes have damaged the 2,500 orange trees that Citrus Groves owns. In order to determine the extent of damage to the trees, Oscar has sampled the number of oranges produced per tree for 42 trees and found that the average production was 525 oranges per tree and the standard deviation was 30 oranges per tree. (a) Estimate the population standard deviation from the sample standard deviation. (b) Construct a 98 percent confidence interval for the mean per-tree output of all 2,500 trees.	4	CO3
	B	Gwen Taylor, apartment manager for WillowWood Apartments, wants to inform potential renters about how much electricity they can expect to use during August. She randomly selects 61 residents and discovers their average electricity usage in August to be 894 kilowatt hours (kwh). Gwen believes the variance in usage is about 131 $(kwh)^2$. (a) Establish an interval estimate for the average August electricity usage so Gwen can be 68.3 percent certain the true population mean lies within this interval. (b) Repeat part (a) with a 99.7 percent certainty. (c) If the price per kwh is \$0.12, within what interval can Gwen be 68.3 percent certain that the average August cost for electricity will lie?	6	CO3

3	A	For the following situations, state appropriate null and alternative hypotheses. (a) The Census Bureau wants to determine whether the percentage of homeless people in New York City is the same as the national average. (b) A local hardware store owner wants to determine whether sales of garden supplies are better than usual after a spring promotion. (c) The Weather Channel wants to know whether average annual snowfall in the 1980s was significantly different from the 8-inch average recorded over the past 100 years. (d) A consumer-products investigative magazine wonders whether the fuel efficiency of a new subcompact car is significantly less than the 34 miles per gallon stated on the window sticker.	4	CO4
	B	The average commission charged by full-service brokerage firms on a sale of common stock is $144, and the standard deviation is $52. Joel Freelander has taken a random sample of 121 trades by his clients and determined that they paid an average commission of $151. At a 0.10 significance level, can Joel conclude that his clients' commissions are higher than the industry average? What happens to the power of the test for μ. = $140, $160, and $175 if the significance level is changed to 0.05?	6	CO4