**College of Engineering Pune**

**Probability and Statistics**

**F.Y.B. Tech. Semester (Computer Branch) 2023-24**

**Assignment 5: Testing of hypothesis using R (Z-Test, T-Test, F-Test)**

Q1. During the economic boom , a researcher believes that the economic recession may have an adverse impact on the average monthly salary of I.T professionals. To verify his belief , a random sample of 12 I.T professionals gave the following average monthly salary.

70000, 78000, 62000, 66000, 61000, 72000, 58000, 64000, 60000, 73000, 74000, 76000

Test whether the average monthly salary has gone below Rs 73000

Q2. The time in minutes taken by complete a job by machine I and machine II is given below.

Machine I: 20, 16, 26, 27, 23, 22, 25

Machine II: 27, 33, 42, 35, 32, 34, 38, 29, 40

Can we conclude that the variability in time distribution of population is less than that of population II? Use α=0.05

Q3. The heights of 10 female students in a college are found to be 57, 60, 54, 52, 58, 61, 59, 54, 57, 62 inches. Is it reasonable to believe that average height of female is greater than 52 inches? Use 5% level of significance.

Q4. A machine part was designed to withstand an average pressure of 120 units. A random sample of size 100 from a large batch was tested and it was found that the average pressure with these parts can withstand is 105 units with a standard deviation of 20 units. Test whether the batch meets the specification.

Q5. A random sample of 10 boys had the following Intelligent Quotients (IQ)

70,120,110,101,88,83,95,89,107,125

Do these data support the assumption that the population mean IQ is 100?

Q6. A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance. (Hint Using Z-test)

Q7. A manufacturer of sports equipment has developed a new synthetic fishing line that the company claims has a mean breaking strength of 8 kilograms with a standard deviation of 0.5 kilogram. Test the hypothesis that *μ* = 8 kilograms against the alternative that *μ* = 8 kilograms if a random sample of 50 lines is tested and found to have a mean breaking strength of 7.8 kilograms. Use a 0.01 level of significance.



Q8.The time in minutes taken by two experts to respond the queries is as follows:

Expert I: 6,9,4,1,9,9,3,4,10

Expert II:5,7,4,1,8,7,4,3,9

Test at 5% level of significance whether the variability in time taken by expert I is greater than that of expert II

Q9.A researcher claims that the average salary of assistant professors is more than $42,000. A sample of 30 assistant professors has a mean salary of $43,260. At ɑ= 0.05, test the claim that assistant professors earn more than $42,000/year (on average). The standard deviation of the population is $5230.

Q10. Using the following data (Take α=0.05)(Hint Using F -test)

Sample I: 13, 15, 18, 20, 22, 9, 16

Sample II: 21, 18, 20, 16, 9

Test the hypothesis Ho: H1:

