

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

B.Tech-IV Semester (CSE/IT/BI)

COURSE CODE (CREDITS): 25B1WCI431 (2)

MAX MARKS: 25

COURSE NAME: DATA ANALYTICS USING R and Python

COURSE INSTRUCTOR: ATA, RVS, AYS

MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required

For solving problems

(c) Use of calculator is allowed

Q.No	Question	C	Marks						
Q1	<p>An agricultural research station is testing two fertilizers on wheat yield. Ten plots of equal area are randomly assigned five to each fertilizer. The yields (in kg per plot) are recorded as:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Fertilizer</th> <th>Yield (Kg/Plot)</th> </tr> </thead> <tbody> <tr> <td>Fertilizer A</td> <td>45, 52, 48, 50, 47</td> </tr> <tr> <td>Fertilizer B</td> <td>55, 58, 150, 53, 57</td> </tr> </tbody> </table> <p>A. Perform the Wilcoxon Rank-Sum test at $\alpha = 0.05$ (two-tailed) to determine if there is a significant difference in yield between the two fertilizers. Show the ranking of all observations and compute the test statistic.</p> <p>B. Suppose the outlier value 150 is replaced with 56 (i.e., Fertilizer B becomes: 55, 58, 56, 53, 57). Without redoing the entire calculation, determine whether the Wilcoxon Rank-Sum test conclusion would change. Consider:</p> <p>$Z_{crit} = 1.96$ ($=0.05$) $F_{crit} = 5.318$ ($=0.05$) $U_{crit} = 2.0$ ($=0.05$)</p>	Fertilizer	Yield (Kg/Plot)	Fertilizer A	45, 52, 48, 50, 47	Fertilizer B	55, 58, 150, 53, 57	3	4+4
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Q2	<p>For the following questions, specify which statistical test you will apply. Also state the null and alternative hypotheses, and based on the calculations, conclude whether to reject or fail to reject the null hypothesis.</p> <p>A) A lightbulb manufacturer claims that the average life of their "LongLast" bulbs is 1,200 hours with a known population standard deviation of 60 hours. A consumer protection agency tests a random</p>	4	[3+3+3]						

	<p>sample of 36 bulbs and finds the sample mean to be 1,180 hours. At a 5% significance level, is there sufficient evidence to reject the manufacturer's claim? The critical value for a $\alpha = 0.05$ is ± 1.96.</p> <p>B) A fitness coach wants to test the effectiveness of a new 4-week explosive jump program. The vertical jump heights (in inches) of 10 athletes were measured before and after the program. The mean difference (After - Before) was found to be 2.5 inches, and the standard deviation of the differences was 1.2 inches. At a 1% significance level, does the program significantly increase jump height? Critical value = 2.82.</p> <p>C) A bakery claims they sell their four cookie flavors (Chocolate, Vanilla, Strawberry, Lemon) in equal proportions (25% each). You observe 100 customers and find: Chocolate: 35, Vanilla: 20, Strawberry: 20, Lemon: 25. At $\alpha = 0.05$, does the data fit the bakery's claim of equal proportions? (Critical Value for $df=3$ is 7.815)</p>														
Q3	<p>a. In a university ranking system, two committees ranked 8 colleges differently. Design a method using Spearman correlation to measure agreement.</p> <p>b. Prove that if two rankings are exactly opposite, Spearman's coefficient is -1.</p> <p>c. Explain the interpretation of correlation values in context with Pearson's Coefficient ($r=0$, $r=+1$ and $r=-1$)</p> <p>d. The marks of students in two subjects are given. Calculate Spearman's rank correlation coefficient.</p> <p>Given data:</p> <table border="1" data-bbox="271 1164 941 1568"> <thead> <tr> <th>X</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>20</td> </tr> <tr> <td>20</td> <td>25</td> </tr> <tr> <td>30</td> <td>30</td> </tr> <tr> <td>40</td> <td>35</td> </tr> <tr> <td>50</td> <td>40</td> </tr> </tbody> </table> <p>ALL THE BEST</p>	X	Y	10	20	20	25	30	30	40	35	50	40	4	[2+2+2+2]
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