Parshvanath Charitable Trust's
A. P. SHAH INSTITUTE OF TECHNOLOGY
(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)
(Religious Jain Minority)

DEPARTMENT OF DATASCIENCE

UNIT TEST-I

Class: TE **Semester: V** **Subject: Statistics for AI&DS**

Date: 09-09-2023 **Time: 10:00am - 11:30am** **Max marks: 40**

Note the following instructions

1. **Attempt all questions.**
2. **Draw neat diagrams wherever necessary.**
3. **Write everything in Black ink (no pencil) only.**
4. **Assume data, if missing, with justification.**

Q.N	Questions	MARKS	CO	Blooms Taxonomy Level	PO2
Q.1.	**Attempt any two.**				
	a) Illustrate in detail the Central limit theorem.	[5]	CO2	L2	
	b) Define Confidence Interval and Calculate the range of heights (95% confidence level) for the given population. The mean = 175cm, SD = 20cm, sample size = 40 and z=1.960.	[5]	CO2	L2	
	c) Describe Normal Distribution.	[5]	CO2	L2	
	d) Discuss Bootstrapping algorithm.	[5]	CO2	L2	
Q.2.	a) Find Q1, Q2 and Q3 for the following dataset. Identify the outliers and draw a box and whisker plot. {5, 40, 42, 46, 48, 49, 50,50, 52, 53, 55,56, 58, 75,102}.	[10]	CO1	L3	PO1, PO12
	OR				

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>b) Calculate the adjoining distribution of marks of 100 students in the examination by a histogram.
<table>
<tr><th>Marks</th><th>Obtained</th><th>Number of students</th></tr>
<tr><td>Less than</td><td>10</td><td>4</td></tr>
<tr><td>Less than</td><td>20</td><td>6</td></tr>
<tr><td>Less than</td><td>30</td><td>24</td></tr>
<tr><td>Less than</td><td>40</td><td>46</td></tr>
<tr><td>Less than</td><td>50</td><td>67</td></tr>
<tr><td>Less than</td><td>60</td><td>86</td></tr>
<tr><td>Less than</td><td>70</td><td>96</td></tr>
<tr><td>Less than</td><td>80</td><td>99</td></tr>
<tr><td>Less than</td><td>90</td><td>100</td></tr>
</table></td><td>[10]</td><td>CO1</td><td>L3</td><td>PO1, PO12</td></tr>
<tr><td></td><td>AND</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>c) Consider two data set A={4,6} and B={1,9}. Calculate the variance and justify the need of variance.</td><td>[5]</td><td>CO1</td><td>L3</td><td>PO1, PO12</td></tr>
<tr><td></td><td>OR</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>d) Consider the below given data and calculate the mode.
<table>
<tr><th>Marks</th><th>Frequency</th></tr>
<tr><td>0-10</td><td>2</td></tr>
<tr><td>10-20</td><td>5</td></tr>
<tr><td>20-30</td><td>6</td></tr>
<tr><td>30-40</td><td>5</td></tr>
<tr><td>40-50</td><td>2</td></tr>
</table></td><td>[5]</td><td>CO1</td><td>L3</td><td>PO1, PO12</td></tr>
<tr><td>Q.3.</td><td>a) Solve the following:

A drug X claimed to be effective in curing colds. In an experiment on 500 persons with cold, half of them where given placebo (sugar pills). The patients' reactions to the treatment are recorded in the following table:</td><td>[10]</td><td>CO3</td><td>L3</td><td>PO1, PO12</td></tr>
</table>

	<table><tr><td>Treatment</td><td>Helped</td><td>Reaction</td><td>No Effect</td></tr><tr><td>Drug</td><td>150</td><td>30</td><td>70</td></tr><tr><td>Placebo</td><td>130</td><td>40</td><td>80</td></tr></table>(Critical Value: 3.84)				
	OR				
	b) Illustrate in detail about Two – way Hypothesis and Test the following: Two random samples were drawn from two normal populations and their values are: A: 16,17,25,26,32,34,38, 40,42 B: 14,16,24,28,32, 35, 37, 42,43, 45,47 Test whether the two populations have the same variance at 5% level of significance. (Critical Value = 3.35)	[10]	CO3	L3	PO1, PO12
	AND				
	c) The length of life X of certain computers is approximately normally distributed with mean 800 hours and standard deviation 40 hours. If a random sample of 30 computers has an average life of 788 hours, test the null hypothesis that μ =800 hours against the alternate that μ != 800 hours at 15% level of significance.(Critical Value : 1.44)	[5]	CO3	L3	PO1, PO12
	OR				
	d) Write the difference between null hypothesis and alternate hypothesis. A researcher wants to know if the height of students at school differs from the national average of 5.5 feet. State null and alternative hypothesis.	[5]	CO3	L3	PO1, PO12