

Nov – Dec 2025		
B. Tech Program: All Branches - Honors	Scheme I/II/IIB/III:III	
Regular Examination: TY	Semester: V	
Course Code: HDSC501/ HAIMLC501 and Course Name: Mathematics for Data Science/Mathematics for AI & ML		
Date of Exam: 05/12/2025	Duration: 02.5 Hours	Max. Marks: 60

Instructions:				
(1) All questions are compulsory.				
(2) Draw neat diagrams wherever applicable.				
(3) Assume suitable data, if necessary.				
Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any two questions out of three: (05 marks each)	10		
a)	A standard fertilizer has been shown to cause a species of plants to grow by an average of 10 inches. One botanist applied the new fertilizer to a simple random sample of 15 plants and found that average growth is 11.4 inches with standard deviation 2.5 inches. Can it be concluded that new fertilizer causes this species of plants to grow by an average of greater than 10 inches? (Take t-value = 1.761 at 5%LOS for 14 degrees of freedom)		CO2	Ap
b)	Find the root of the following polynomial function using the bisection method: $x^2 - x - 1$ up to 5 iterations only.		CO5	Ap
c)	Explain any two types of pie charts with examples.		CO3	U
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Using Newton's method, find root of $f(x) = x^3 - 2x - 5 = 0$ starting with $x_0 = 2$		CO5	Ap
b)	What is outlier detection? Explain any three methods to handle outliers		CO4	U
c)	Define dot plot and mention two types of dot plots.		CO3	U
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Find bases and the dimensions of four fundamental spaces of $A = \begin{bmatrix} 1 & 2 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{bmatrix}$		CO1	Ap
b)	According to a theory the proportion of a commodity in the four classes A,B,C,D should be 9:4:2:1. In a survey of 1600 items of this commodity the number in four classes were 882,432, 168 and 118. Does the survey support the theory?		CO2	Ap

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c)	Find the real root of the equation $f(x) = x^3 - 3x - 1 = 0$ in the interval $[1,2]$ using the Regula Falsi method.		CO5	Ap												
Q.4	Solve any two questions out of three. (10 marks each)	20														
a)	A school conducted a survey to find out how students travel to school. The data collected from 400 students is shown below: <table border="1"><thead><tr><th>Mode of Transport</th><th>Number of Students</th></tr></thead><tbody><tr><td>Walking</td><td>120</td></tr><tr><td>Bicycle</td><td>80</td></tr><tr><td>Bus</td><td>140</td></tr><tr><td>Car</td><td>40</td></tr><tr><td>Other</td><td>20</td></tr></tbody></table> 1) Convert the above data into angles for a pie chart.(03M) 2) Draw a neat pie chart using the calculated angles. (03M) 3) What percentage of students travel by bus? (02M) 4) Which is the least preferred mode of transport? (02M)		Mode of Transport	Number of Students	Walking	120	Bicycle	80	Bus	140	Car	40	Other	20	CO3	Ap
Mode of Transport	Number of Students															
Walking	120															
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b)	Explain the major data cleaning operations used in data preprocessing	CO4	.U													
c)	1. Explain different steps involved in LDA 2. Apply Linear Discriminant Analysis (LDA) projection for the following two-dimensional dataset consisting of two classes. (06M) Class C1: (4,1), (2,4), (2,3), (3,6), (4,4) Class C2: (9,10), (6,8), (9,5), (8,7), (10,8)	CO6	Ap													
