Set A

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Jan-Feb 2026
~~Nov – Dec 2025~~

B. Tech Program: All Branches - Honors Scheme I/II/IIB/III:III
Supplementary ~~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~~ 09/02/26 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)	The CEO of a car tire manufacturing company claims that the average lifespan of their is 50,000 miles. An independent researcher randomly selects 20 tires for testing. The sampled tires last an average of 48,000 miles, with a standard deviation of 5000 miles. Assuming the CEO's claim to be true, what's the probability that 20 randomly selected tires would have an average life of no more than 48,000 miles. (Take P-value = 0.0448)		CO2	Ap
b)	Find the root of the following polynomial function using the bisection method: $x^3 - 4$.		CO5	Ap
c)	Differentiate between discrete and continuous data with example		CO3	U
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Using Newton's iterative method, find the root of f(x) = x3 - 6x + 4 with $x_0 = 1$ correct to two decimal places.		CO5	Ap
b)	List the steps involved in preparing data for model training.		CO4	U
c)	Explain stem and leaf plot and explain its components.		CO3	U
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Find the singular value decomposition of $A = \begin{bmatrix} 1 & 2 \\ 1 & 2 \end{bmatrix}$		CO1	Ap
b)	Based on the following below data determine if there is a relation between literacy and smoking. (Take X^2-table value at 5% level of significance for 1 degree of freedom as 3.841)		CO2	Ap

Seat No.:

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Jan-Feb ~~Nov-Dec 2025~~ 2026
B. Tech Program: All Branches - Honors Scheme I/II/IIB/III:III
Supplementary ~~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~~ 09/02/26 Duration: 02.5 Hours Max. Marks: 60

		Smokers	Non Smokers		
	Literates	83	57		
	Illiterates	45	68		
c)	Find the root of the equation $x^3 - 4x - 9 = 0$ by False position method lying between 2 and 3.			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:			CO3	Ap
	Mode of Transport	**Number of Students**			
	Walking	120			
	Bicycle	80			
	Bus	140			
	Car	40			
	Other	20			
	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)				
b)	Describe different types of EDA with examples and techniques			CO4	U
c)	1. Explain the concept of Principal Component Analysis (PCA) (04M) 2. Demonstrate its application by performing PCA on the given 2-dimensional dataset to reduce it from 2 dimensions to 1 dimension. (06M) Use the data in the table below to illustrate each step of the PCA process.			CO6	Ap

Feature	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6
Systolic BP	126	128	128	130	130	132
Diastolic BP	78	80	82	82	84	86

****

Seat No.: