

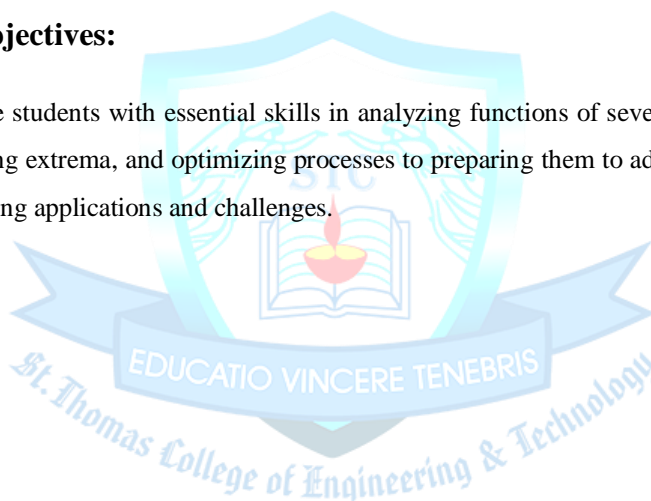
## SEMESTER S1

### MATHEMATICS FOR INFORMATION SCIENCE – 1

<b>Course Code</b>	<b>MATA101</b>	<b>CIE Marks</b>	40
<b>Teaching Hours/Week (L: T:P: R)</b>	3:0:0:0	<b>ESE Marks</b>	60
<b>Credits</b>	3	<b>Exam Hours</b>	2 Hrs.30Min.
<b>Prerequisites (if any)</b>	Basic knowledge in single variable calculus	<b>Course Type</b>	Theory

#### Course Objectives:

1. To provide students with essential skills in analyzing functions of several variables, identifying extrema, and optimizing processes to preparing them to address diverse engineering applications and challenges.



#### SYLLABUS

<b>Module No.</b>	<b>Syllabus Description</b>	<b>Contact Hours</b>
1	Limits of Function Values, Continuity at a point, Continuous Functions, Rates of Change: Derivative at a Point, Derivative as a Function, Second- and Higher-Order Derivatives, Instantaneous Rates of Change, Chain Rule, Implicit Differentiation, Tangents and Normal Lines, Linearization, Concavity: The Second Derivative Test for Concavity. <b>[Relevant topics from: Text 1 - sections 2.2, 2.5, 3.1, 3.2, 3.3, 3.4, 3.6, 3.7, 3.9, 4.4]</b>	9
2	Functions of Several Variables: Domains and Ranges, Level curves of two	

	<p>variables, Limits for functions of two variables, Continuity for functions of two variables, Partial derivatives of a function of more than two variables, Partial derivatives and continuity, Second-Order partial derivatives, The mixed derivative theorem, The Chain Rule: Functions of two variables</p> <p><b>[Relevant topics from: Text 1-sections 14.1, 14.2, 14.3, 14.4]</b></p>	9
3	<p>The Chain Rule: Functions of three variables, Directional Derivatives in the Plane, Interpretation of the Directional Derivative, Gradient, Properties of the Directional Derivative, Local Extreme Values for Functions of Two Variables: Relative extrema, First derivative theorem for local extreme values, Critical point, saddle point, Second Derivative Test for Local Extreme Values, Absolute Maxima and Minima on Closed Bounded Regions.</p> <p><b>[Relevant topics from: Text 1-sections 14.4, 14.5, 14.7]</b></p>	9
4	<p>Constrained Maxima and Minima, The Method of Lagrange Multipliers with one constraint, The Method of Lagrange Multipliers with two constraints, Method of Steepest Descent (only two variables), LPP- Formation, Solution of LPP using graphic method.</p> <p><b>[Relevant topics from: Text-1 section 14.8, Text-2 sections 22.1, 22.2]</b></p>	9

### Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

#### Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

#### End Semester Examination Marks (ESE)

*In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions*

<b>Part A</b>	<b>Part B</b>	<b>Total</b>
<ul style="list-style-type: none"> <li>• 2 Questions from each module.</li> <li>• Total of 8 Questions, each carrying 3 marks</li> </ul> <p>(8x3=24 marks)</p>	<ul style="list-style-type: none"> <li>• Each question carries 9 marks.</li> <li>• Two questions will be given from each module, out of which 1 question should be answered.</li> <li>• Each question can have a maximum of 3 sub divisions.</li> </ul> <p>(4x9=36 marks)</p>	60

### Course Outcomes (COs)

At the end of the course students should be able to:

<b>Course Outcome</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>C01</b>	Apply various concepts in calculus to linearize functions and to analyze concavity	<b>K3</b>
<b>C02</b>	Calculate the limits for functions of two variables and partial derivatives of multivariable functions	<b>K3</b>
<b>C03</b>	Interpret directional derivative and solve maxima and minima of multivariable functions.	<b>K3</b>
<b>C04</b>	Solve constrained maxima and minima, LPP and understand the method of Steepest Descent.	<b>K3</b>

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

### CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	-	-	-	-	-	-	-	2
CO2	3	3	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	2
CO4	3	3	-	1	-	-		-	-	-	2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

<b>Text Books</b>				
Sl No.	Title of the book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Thomas'Calculus	Maurice D. Weir, Joel Hass, ChristopherHeil,PrzemyslawBogacki	Pearson	15 <sup>th</sup> edition, 2023
2	AdvancedEngineering Mathematics	ErwinKreyszig	JohnWiley&Sons	10 <sup>th</sup> edition, 2016

<b>Reference Books</b>				
Sl No.	Title of the book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Calculus	Howard Anton, IrlBivens,StephensDavis	Wiley	10 <sup>th</sup> edition,2012
2	Optimization:Algorithmsand Applications	RajeshKumarArora	CRCPress	1 <sup>st</sup> edition, 2015
3	MultivariableCalculus	RonLarson,Bruce Edwards	Brooks/Cole,Cengage Learning	10 <sup>th</sup> edition,2014
4	Calculus&ItsApplications	Goldstein,Schneider, Lay, Asmar	Pearson	14 <sup>th</sup> edition,2018
5	Bird's Higher Engineering	JohnBird	Taylor&Francis	9 <sup>th</sup> edition, 2021

	Mathematics			
6	HigherEngineering Mathematics	B.V.Ramana	McGraw-Hill Education	39 <sup>th</sup> edition, 2023

**Video Links (NPTEL, SWAYAM...)**

<b>Module No.</b>	<b>Link id</b>
1	<a href="https://nptel.ac.in/courses/111106146">https://nptel.ac.in/courses/111106146</a>
2	<a href="https://nptel.ac.in/courses/111107108">https://nptel.ac.in/courses/111107108</a>
3	<a href="https://nptel.ac.in/courses/111107108">https://nptel.ac.in/courses/111107108</a>
4	<a href="https://nptel.ac.in/courses/111107108">https://nptel.ac.in/courses/111107108</a>

