



COURSE DATASHEET

SEMESTER	I	BATCH	2026-2029
COURSE NAME	Essential Mathematics: Algebra and Differential Calculus	COURSE CODE	26UMAGE1D01
COURSE UNITS	5	COURSE TYPE	Generic Elective Theory I
CONTACT HOURS (L-T-P)	4-2-0	CREDITS	5

COURSE OBJECTIVES

	To provide fundamental skills of differentiation and concrete foundation of differential calculus
	To learn various techniques to solve different types of asymptotes
	To recognize the appropriate tools of calculus to solve applied problems

COURSE OUTCOMES: On completion of the course the students will be able to...

	CO Statement	Cognitive Level
CO1	Acquire knowledge on successive differentiation and its properties	K1-K6 (Understand, Apply, Analyze, Evaluate and Create)
CO2	Describe and learn the concept of Jacobians, successive differentiation and solving Problems related to maxima, minima of two variables, and Lagrange's method of multipliers.	K1-K6 (Understand, Apply, Analyze, Evaluate and Create)
CO3	Describe and evaluate the problems in the concept of Envelopes, Radius of curvature in Cartesian coordinates and its applications	K1-K6 (Understand, Apply, Analyze, Evaluate and Create)
CO4	Acquire adequate knowledge on the concept of Evolutes, and Radius of curvature in polar coordinates and applying the same to solve the related problems.	K1-K6 (Understand, Apply, Analyze, Evaluate and Create)

CO5	The learner will gain proficiency in understanding the concept of linear asymptotes and solving the problem	K1-K6 (Understand, Apply, Analyze, Evaluate and Create)
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1-6 Pages

SYLLABUS

UNIT	TOPICS	HOURS
1	Summation of Series: Binomial, Exponential and Logarithmic series (without proof) - Problems Chapter 2- Sections: 2.1-2.1.3, 2.2-2.2.1, 2.3-2.3.3	15
2	Matrices : Symmetric Matrix, Skew-Symmetric Matrix, Hermitian Matrix, Skew-Hermitian Matrix, Orthogonal Matrix, Unitary matrix, Eigen Values and Eigen vectors - Problems Chapter 4 : Sections– 4.1, 4.5	15
3	Matrices: Cayley-Hamilton theorem, Verification of Cayley Hamilton theorem, Finding inverse using Cayley Hamilton theorem- Problems Chapter 4: Sections– 4.5.2	15
4	Successive Differentiation- n^{th} derivative, Standard results, Leibnitz Theorem (without proof) - Problems. Volume II: Chapter 1: Sections: 1.1, 1.1.1, 1.1.2.	15
5	Jacobian, Maxima and Minima of functions of 2 variables, Necessary and Sufficient conditions (without proof), Lagrange's method of multipliers (without proof) - Problems. Volume II: Chapter 1: Sections: 1.2, 1.3, 1.3.1, 1.3.2	15
Note (if any)	Definitions and simple problems from all units may be asked in section A	Total Hours 75

TEXT/REFERENCE BOOKS/E-RESOURCES:

Text Books	Duraipandian P., Udayabaskaran S., Allied Mathematics – volume I & II, S. Chand, 2014
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BooksFor Reference	1. VittalP.R.,MaliniV.,Reprint2007,Calculus,Margham Publications. 2. KandasamyP.,ThilagavathyK.,Reprint:2004,Mathematics–I,II, S.Chand &Company Pvt. Ltd. 3. Dr.S.Arumugam,Prof.A.ThangapandiIsaac,ClassicalAlgebra(2003),Newgamma Publishing House, Palayamakottai.. 4. SingaraveluA.,Reprint:2018, AlliedMathematics,Meenakshi Agency. 5. Sudha,Calculus,FirstEdition(199810,EmeraldPublishers, Chennai.
E-Learning Resources	1. https://www.khanacademy.org/math/differential-calculus 2. https://www.studocu.com/en-us/document/northern-illinois-university/calculus-for-business-and-social-science/lecture-notes/lecture-notes-lecture-asymptotes-and-optimization/818149/view 3. https://www.youtube.com/@SAURABHDAHIVADKAR 4. http://loja.nproducoes.com.br/cgibin/content/view.php?q=differential+and+integral+calculus+vol+2&filetype=pdf&id=a3bcd7b5a639e08b0d042c748ba25c1 5. https://www.youtube.com/@pradeepgiriacademy

PEDAGOGY (TEACHINGMETHODOLOGY):

- ChalkandTalk
- OnlineCoaching
- LCD
- Assignment
- Seminar
- Groupdiscussion
- Referencematerialand videos
- Web resources

CO-POANDCO-PSOMAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6		PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1		3	3	1
CO2	3	2	2	2	2	1		3	2	2
CO3	3	2	2	2	2	1		3	2	1
CO4	3	3	2	2	2	1		3	2	1
CO5	3	2	2	2	2	1		3	2	1
Average (Useonlyfilled incellsforcalcula tion)	3	2	2	2.2	2	1		3	2.2	1.2



**SHRIMATHI DEVKUNVAR NANALAL BHATT
VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)**

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Correlation Level: 1-Low 2-Moderate 3-Strong

Rubrics for Continuous Assessment

Assignment	Content Quality, Originality, Organization, references, Timely Submission
Seminar	Knowledge, Communication, Presentation, Q&A Handling, Confidence
Field visit	Observation Skills, Report writing, Analysis, Participation
Participatory Learning	Engagement, Collaboration, Creativity, Reflection
Group Discussion	Communication, Teamwork, Analytical ability, Leadership
Flipped/Blended Learning	Pre-Class preparation, Online participation, In-class engagement, Application of knowledge