



MANDSAUR UNIVERSITY, MANDSAUR
By-pass Square, Rewas Dewra Road, SH-31, Mandsaur (M.P.)- 458001

DEPARTMENT OF MATHEMATICS
MAT 010 Introduction to Engineering Mathematics with Applications– I
Syllabus to be offered at B.Tech. Sem – I (CSE, ME, CE, EEE)

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3 1 0 4

Course Objective: The objective of this course is to increase student retention, motivation and success in engineering through an application-oriented, hands-on introduction to engineering mathematics.

- To provide the students with sufficient knowledge in Differential Calculus, Integral Calculus and Vector Calculus this can be used in their respective fields.
- Compare and contrast the ideas of limits continuity and differentiability.
- To find maxima and minima, critical points and inflection points of functions and to determine the concavity of curves.
- Apply Stokes' theorem to compute line integrals along the boundary of a surface.
- Use Stokes' theorem to give a physical interpretation of the curl of a vector field.

Course Outcomes (COs)

On completion of course the students are able:		
COs	COs statements	Bloom's Level
CO1	Understand the concept of real functions and types of functions, and apply Rolle's and Mean value theorem for continuity and differentiability of functions.	Understand, Apply
CO2	Remember the concept of differentiation for successive differentiation and understand the concept of real functions and types of functions and create curve tracing	Remember, Understand, Create
CO3	Apply the concepts of partial differentiation to evaluate Maxima and minima	Apply, Analyze
CO4	Remember the concept of Beta and Gamma function and Analyze area and volume	Remember, Analyze
CO5	Apply the concept of vector calculus to analyze and evaluate directional derivative line surface and volume integrals	Apply, Analyze, Evaluate

Articulation Matrix

(Program Articulation Matrix is formed by the strength of correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	1	1	2	-	-	-	-	-	1	-	1	1	-
CO3	2	3	2	2	1	1	-	-	-	-	1	1	2	1	-
CO4	1	3	2	2	1	1	-	-	-	1	1	1	1	2	1
CO5	1	3	2	2	2	1	-	-	-	1	1	1	2	1	1

High-3 Medium-2 Low-1

Unit I: Elementary Calculus

10 Hours

Introduction of Functions, Concept of real function, types of functions, Composite functions, Continuity of function of one variable and its Properties, Differentiability, Rolle's theorem, Mean value theorems.

Unit II: Differential Calculus

10 Hours

Successive differentiation, Leibnitz theorem, Expansion of functions (Maclaurin and Taylor series), Maxima and Minima of functions of one variable, Asymptotes, Curvature.

Unit III: Differential Calculus (Functions of several variables)

15 Hours

Limit, continuity and differentiability of functions of several variables, partial derivatives and their geometrical interpretation, Euler's theorem on homogeneous functions, Differentiation of implicit functions, Total differential coefficient, Transformations of independent variables, Jacobians.

Unit IV: Integral Calculus

15 Hours



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Basics of Definite Integral and its properties, Definite Integrals as a Limit of a sum, Application in summation of series, Beta Gamma function. Double and triple integrals, computations of area, surfaces and volumes, change of variables in double integrals - Jacobians of transformations, integrals dependent on parameters - applications.

Unit V: Vector Calculus

10 Hours

Scalar and vector fields, level surfaces, directional derivative, Gradient, Curl, Divergence, theorems of Green, Gauss and Stokes

Total: 60 Hours

Reference Books:

1. G.B. Thomas and R.L. Finney, *Calculus*, Pearson Education, 2007.
2. Kreyszig E., *Advanced Engineering Mathematics*, John Wiley, New York, 1999
3. Grewal B.S., *Higher Engineering Mathematics*, Khanna, New Delhi, 2000
4. Dass H.K., *Advance Engineering Mathematics*, S.Chand, NewDelhi, 200

List of e-Learning Resources:

1. <https://nptel.ac.in/>
2. <https://www.coursera.org/>
3. https://www.youtube.com/watch?v=tfrrtzUhmw&list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv
4. https://www.youtube.com/watch?v=ksS_yOK1vtk&list=PLbRMhDVUMngflrZCNOyPZwHUU1pP66vQW



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