

AICTE NEW/OLD ✓

MATHEMATICS-I

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BS 201 MT

Instruction: 3+1 periods per week

CIE: 30 marks

Credits : 4

Duration of SEE: 3 hours

SEE: 70 marks

Objectives:

1. To introduce the concepts of sequences, series and their properties
2. To introduce the concepts of functions of several variables and multiple integrals
3. To study vector differential and integral calculus

Outcomes:

The students will able to

1. Find the nature of sequences and series
2. Evaluate multiple integrals
3. Apply this knowledge to solve the curriculum problems

UNIT - I

**Sequences and Series:** Sequences, Series, General properties of series, Series of positive terms, Comparison tests, tests of Convergence D'Alembert's ratio test, Cauchy's  $n^{\text{th}}$  root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

UNIT - II

**Calculus of one Variable:** Rolle's theorem, Lagrange's, Cauchy's mean value theorems, Taylor's series, Curvature, Radius of curvature, Circle of curvature, Envelope of a family of curves, Evolutes and Involutives.

UNIT - III

**Multivariable Calculus (Differentiation):** Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT - IV

**Multivariable Calculus (Integration):** Double integrals, Change of order of integration, Change of Variables from Cartesian to plane polar coordinates, Triple integrals.

UNIT - V

**Vector Calculus:** Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and their verification.

Suggested Reading:

1. R.K. Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 2014.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9<sup>th</sup> Edition, 2012.
3. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43<sup>rd</sup> Edition, 2014.
4. G.B. Thomas, Maurice Weir and Joel Hass, *Thomas' Calculus*, Peterson, 12<sup>th</sup>

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Department of Ma  
Osmania Un  
Hyderabad-5

Edition, 2010.

5. B.V. Ramana, Higher Engineering Mathematics, 23<sup>rd</sup> reprint, 2015.

*B.V. Ramana*  
19/8/23

Head  
Department of Mathematics  
Osmania University  
Hyderabad-500 007.