## MATHEMATICS – I
(Common to all branches)

Instruction                                                   4 periods per week
                                                              (3 Theory + 1 Tutorial)
Duration of University Examination             3 hours
University Examination                         70  Marks
Sessional                                      30 Marks

Course objectives:
  ➢ To introduce the concepts of sequences, series and their properties
  ➢ To provide the knowledge of curve sketching
  ➢ To introduce the concepts of functions of several variables and multiple integrals
  ➢ To study vector differential and  integral calculus

Outcomes:  After completing this course, the students will able to
  • find the nature of sequences and series
  • sketch the graphs of given curves
  • use the knowledge of multiple integrals in finding the area and volume of any region bounded by given curves
  • 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, D'Alembert's ratio test, Raabe's test, Cauchy's root test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

## UNIT – II
**Differential Calculus:**
Rolle's theorem, Lagrange's and Cauchy's mean value theorems, Taylor's series, Curvature, Circle of curvature, Radius of curvature, Center of circle of curvature,   Envelope of a family of curves, Asymptotes to a curve, Curve sketching.

## UNIT – III
**Functions of Several Real Variables:**
Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives  of composite and implicit functions (Chain rules), Change of variables, Jacobian , Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum values of functions  two variables, Lagrange's method of multipliers.

## UNIT – IV
**Multiple integrals:**
Double integrals,Change of order of integration, Triple integrals, Change of variables in integrals and applications-areas and volumes.

## 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 proof).

**Suggested Reading:**

1. R.K.Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition 2014.
2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, , 2012.
4. G.B.Thomas , Maurice Weir and Joel Hass, *Thomas' Calculus* , Peterson, 12th Edition,2010.