



मेडी-केप्स विश्वविद्यालय, इंदौर

Medi-Caps University, Indore

## Syllabus

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
EN3BS01	Engineering Mathematics-I	3	1	0	4	4

### Course Objectives.

- 1 To impart analytical ability of using concepts of matrices in various fields of engineering
- 2 To equip the students with the knowledge of Differential Calculus.
- 3 To equip the students with the knowledge of Integral Calculus.
- 4 To impart analytical ability in solving Ordinary Differential Equations of first and Higher order.
- 5 To impart analytical ability in solving Second Order Differential Equations and to understand the concept of series solution about an ordinary point.

**Pre-requisites: Basic knowledge of Differentiation, Integration and Matrices.**

**Co-requisites : Basic Mathematical Skills**

### Curriculum:

#### Unit I Matrices and Linear Systems

Rank and Nullity of a Matrix by reducing it into Echelon & Normal Forms, Solution of Simultaneous equations by elementary transformation methods, Consistency and Inconsistency of Equations, Eigen Values and Eigen Vectors, Cayley- Hamilton Theorem, Applications in Translation and Rotation.

#### Unit II Differential Calculus

Geometrical interpretation of first order derivative, Rolle's theorem, Meanvalue theorem, Leibnitz theorem, Taylors and Maclaurin's series expansions. Functions of Several variables, Partial differentiation, Geometrical interpretation of partial derivatives, Total Derivative, Differentiation of Composite and Implicit functions, Euler's Theorem, Maxima and Minima of function of two variables.

### **Unit III Integral Calculus**

Definite Integrals as a limit of a sum, its application in summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta and Gama Functions). Curve tracing (curves in Cartesian and polar form with standard curve). Multiple Integral (Double and Triple Integrals), Change the Order of Integration, Applications of Multiple Integral in Area, Volume, Surfaces and Volume of Solid of Revolution about X-Axis and Y-Axis.

### **Unit IV Ordinary Differential Equations**

First order differential equations (Separable, Exact, Homogeneous, Linear), Linear differential Equations of second and higher order with constant coefficients, Homogeneous linear differential equations, Simultaneous linear differential equations.

### **Unit V Second-Order Linear Differential Equations with Variable Coefficients**

Solution by method of undetermined coefficients, by known integral, Removal of the first derivative, Change of independent variable and Variation of parameters. Series Solution about ordinary point.

#### **Case Studies:**

Not Applicable.

#### **List of Practical's:**

Not Applicable.

#### **Project:**

Optional.

#### **Course Outcomes:**

- A. The students will be able to apply the tools of matrices in solving the system of simultaneous equations and apply the knowledge in translation and rotation of matrices.
- B. The students will be able to apply the tools of differential calculus to relevant fields of engineering and understand the concept of several variables
- C. The students will be able to apply the tools of integral calculus to relevant fields of engineering and understand the concept of multiple integrals in finding area of regions and volume of solids
- D. The students will be able to solve Ordinary Differential Equations using different methods.

- E. The students will be able to solve Second order differential equations using different methods and will be able to find series solution about an ordinary point.

**Text Books:**

- 1 B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, New Delhi.
- 2 H.K. Dass, *Higher Engineering Mathematics*, S. Chand & Company Pvt LTD., New Delhi

**Reference Books:**

1. B.V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons .
3. R.K. Jain and S.K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publishing House, New- Delhi.

**Web Source:**

1. <http://nptel.ac.in/courses/111108066/>
2. <http://nptel.ac.in/courses/111104085/>

**Open Learning Source:**

1. <https://swayam.gov.in/courses/public>
2. <http://nptel.ac.in/course.php>