

**College of Engineering, Pune-5.**  
**Department of Mathematics**  
**(MA ) Vector Calculus and Partial Differential Equations**  
**S.Y. B. Tech. Semester IV (All Branches)**

Teaching Scheme  
Lectures : 2 hrs / week  
Tutorials : 1hr/week

Examination Scheme  
Internal Test 1: 20 marks  
Internal Test 2: 20 marks  
End Sem. Exam: 60 marks

**Objectives :** Basic necessity for the foundation of Engineering and Technology being mathematics, the main aim is, to teach mathematical methodologies and models, develop mathematical skills and enhance thinking power of students.

**Unit I :** Laplace Transforms, its properties , Unit step function, Dirac delta functions, Convolution Theorem, periodic functions, solving differential equations using Laplace transform. **[07 Hrs]**

**Unit II :** Vector differentiation, gradient, divergence and curl, line and surface integrals, path independence, statements and illustrations of theorems of Green, Stokes and Gauss, arc length parameterization, applications. **[09 Hrs]**

**Unit III :** Partial differential equations with separation of variables, boundary value problems: vibrations of a string, heat equation, potential equation, vibrations of circular membranes. **[10 Hrs]**

**Text Books :**

Advanced Engineering Mathematics (10<sup>th</sup> edition ) by Erwin Kreyszig, Wiley eastern Ltd.

**Reference Books :**

1. Thomas' Calculus (12<sup>th</sup> edition) by Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education
  2. Advanced Engineering Mathematics by C.R. Wylie, McGraw Hill Publications, New Delhi. Functions of several variables by Wendell Fleming, Springer-Verlag, New York.
  3. Partial Differential Equations (4<sup>th</sup> edition) by Fritz John, Springer.
  4. Advanced Engineering Mathematics (7<sup>th</sup> edition ) by Peter V. O' Neil, Thomson.Brooks/ Cole, Singapore.
  5. Advanced Engineering Mathematics (2<sup>nd</sup> edition) by Michael D. Greenberg, Pearson Education.
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**Outcomes :** Students will be able to

1. know and recall core knowledge of the syllabus. ( To measure this outcome, questions may be of the type- define, identify, state, match, list, name etc.)
2. understand basic concepts. ( To measure this outcome, questions may be of the type- explain, describe, illustrate, evaluate, give examples, compute etc.)
3. analyze the problem and apply the appropriate concept. ( To measure this outcome, questions will be based on applications of core concepts)
4. give reasoning. ( To measure this outcome, questions may be of the type- true/false with justification, theoretical fill in the blanks, theoretical problems, prove implications or corollaries of theorems, etc.)
5. apply core concepts to new situations. ( To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen passages.)
6. organize and present thoughts. (To measure this outcome, questions may asked to write summaries and short notes on a given topic.)

Note:

All the Course outcomes 1 to 3 will be judged by 75% of the questions and outcomes 4 and 5 will be judged by 25 % of questions.