College of Engineering Pune
Department of Mathematics
Ordinary Differential Equations and Multivariate Calculus
(MA-16001)
S.Y. B.Tech. Semester III (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 andenhance thinking power of students.

Unit I : Review of first order differential equations, Reduction of order, linear differential equations, homogeneous higher order linear differential equations, non-homogeneous higher order linear differential equations with constant coefficients and reducible to differential equations with constant coefficients (method of undetermined coefficients and method of variation of parameters), systems of differential equations, applications to orthogonal trajectories, mass spring systems and electrical circuits. [10 Hrs]

Unit II : Functions of several variables, level curves and level surfaces, partial and directional derivatives, differentiability, chain rule, local extreme values and saddle points, constrained optimization. [05 Hrs]

Unit III : Double integrals in Cartesian and polar co-ordinates, iterated integrals, change of variables, triple integrals in Cartesian, spherical and cylindrical co-ordinates, substitutions in multiple integrals, Applications to Area, Volume, Moments and Center of Mass. [11 Hrs]

Text Books :

1. Thomas Calculus (12^{th} edition) by Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education.
2. Advanced Engineering Mathematics (10^{th} edition) by Erwin Kreyszig, Wiley eastern Ltd.

Reference Books :

1. A Course in Multivariate Calculus and Analysis by Sudhir Ghorpade and Balmohan Limaye, Springer Science and Business Media.
2. Differential Equations with Applications and Historical notes by George Simmons, Tata Mc-Graw Hill publishing company Ltd, New Delhi
3. Advanced Engineering Mathematics by C.R. Wylie, McGraw Hill Publications,New Delhi.
4. Advanced Engineering Mathematics (7^{th} edition) by Peter V. O Neil, Thomson.Brooks/ Cole, Singapore.
5. Advanced Engineering Mathematics (2^{nd} edition) by Michael D. Greenberg, Pearson Education.

Outcomes :

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 be 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.