College of Engineering, Pune
(An Autonomous Institute of Government of Maharashtra, Pune-411005)
Department of Mathematics
(EM-19001) Applied Mathematics
PG Diploma in Electric Mobility (PG-DEM) Semester I

Teaching Scheme

Lectures : 2 hrs / week

Tutorial : 1 hr / week

Examination Scheme

Internal Test 1: 20 marks

Internal Test 2: 20 marks

End Sem. Exam: 60 marks

Objectives : The basic necessity for the foundation of Engineering & Technology being mathematics, the main aim is, to teach mathematical methodologies & models, develop mathematical skills & enhance thinking power of students. To give a very strong base of Mathematics to do quality research in Engineering is the main objective.

Unit I: Matrices and linear equations, Applications to systems of linear equations, vector spaces, subspaces, linear independence and dependence of vectors, bases, dimensions. Row and Column spaces, rank. Linear mappings, representation by matrices, rank-nullity theorem, Eigen values, Eigen vectors, Inner product spaces, orthogonality, Gram-Schmidt process, Diagonalization of special matrices.   **[12 Total Hrs]**

Unit II: Laplace and Fourier Transforms and their applications.   **[8 Total Hrs]**

Unit III: Runge-Kutta methods, stiffness and multistep methods, boundary value and eigen value problems, Finite difference methods for elliptic and parabolic equations.   **[6 Total Hrs]**

Text Book :

- Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc., 10th edition.

Reference Books :

- Introduction to Linear Algebra (2nd edition) by Serge Lang, Springer

- Elementary Linear Algebra (10th edition) by Howard Anton and Chris Rorres, John Wiley and sons.

- Schaum's outlines of Linear Algebra (5th edition) by Seymour Lipschutz, Marc Lipson, McGraw-Hill Education (India) Private Limited, New Delhi.

- Linear Algebra and its applications (4th edition) by Gilbert Strang, Cengage Learning (RS).

- Advanced Engineering Mathematics by Chandrika Prasad and Reena Garg, Khanna Publishing Company Private Limited, New Delhi.

- Numerical Methods for Engineers by Steven C. Chapra, Raymond P. Canale, McGraw-Hill (special Indian edition), 5th edition 2010.
- Higher Engineering Mathematics by Dr B S Grewal, Khanna Publication, 40th edition 2007.
- Introductory methods in Numerical Analysis by S S Sastry, PHI, Latest Edition.
- Computed Oriented Numerical Methods, (5th edition) by R.S. Salaria, Khanna Publishing Company Private Limited, New Delhi.

Outcomes : Students will be able to

1. recall matrices and types of solutions to system of linear equations , state vector space, subspace, inner product space , know row and column spaces, bases, dimension. (To measure this outcome, questions may be of the type- define, identify, state, match, list, name etc.)

2. understand concept of Linear mappings, representation by matrices, rank-nullity theorem, Eigen values, Eigen vectors, Inner product spaces, orthogonality, Gram-Schmidt process, Diagonalization of special matrices. (To measure this outcome, questions may be of the type- explain, describe, illustrate, evaluate, give examples, compute etc.)

3. evaluate Laplace transform, Fourier transform of a function, apply transform techniques to solve ordinary differential equations. (To measure this outcome, questions will be based on applications of core concepts)

4. analyze and apply appropriate numerical method to solve ordinary and partial differential equations. (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 concepts to various applications including real life problems. (To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen passages.)

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.