

SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD
M.Tech in Digital Electronics (E&CE)
Applied Mathematics

Course Code: 18PDEC100
Contact Hours/Week: 04
Total Hours: 52
Semester: I

CIE Marks: 50
SEE Marks: 100
Exam Hours: 03
Credits: 04

Course Learning Objectives: This course will enable students to:
Acquaint with principles of Linear Algebra, Calculus of Variations, Probability theory, Random process and apply the knowledge in the applications of Electronics and Communication Engineering Sciences.

Course Outcomes: At the end of this course, students should meet the learning objectives through following observable and measurable outcomes by undergoing various tests planned by the course teacher as a part of course plan.

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|-------------|--|
| CO-1 | Apply the techniques of QR and singular value decomposition for data compression, least square approximation in solving inconsistent linear systems. |
| CO-2 | Utilize the concepts of functionals and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits. |
| CO-3 | Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models arising in control systems and system communications. |
| CO-4 | Apply transform method to solve one-dimensional wave equation, one-dimensional heat equation, Laplace equation, Poisson equation. |
| CO-5 | Solve system of linear and non-linear equation. |

Course content

CHAPTER-I

Linear Algebra

Computation of Eigen values and Eigen vectors of real symmetric matrices-Given's method. Orthogonal vectors and orthogonal bases. Gram-Schmidt orthogonalization process. QR decomposition, singular value decomposition, least square approximations. **10 hrs**

CHAPTER-II

Calculus of Variations

Concept of functional-Eulers equation. functional dependent on first and higher order derivatives, functional dependent variables. Isoperimetric problems-variation problems with moving boundaries. **10 hrs.**

CHAPTER-III

Probability Theory

Review of basic probability theory. Definitions of random variables and probability distributions, probability mass and density functions, expectation, moments, central moments, characteristic functions, probability generating and moment generating functions-illustrations. Binomial, Poisson, Exponential, Gaussian and Rayleigh distributions-examples. **10 hrs.**

CHAPTER-IV

Transform Methods

Laplace transform methods for one dimensional wave equation – Displacements in a string – Longitudinal vibration of a elastic bar.

Fourier transform methods for one dimensional heat conduction problems. Fourier transform methods for Laplace equation and Poisson equation. **10 Hrs**

CHAPTER-V

Linear and Non Linear Programming

Simplex Algorithm- Two Phase and Big M techniques – Duality theory- Dual Simplex method. Non Linear Programming –Constrained extremal problems- Lagranges multiplier method- Kuhn- Tucker conditions and solutions. **12 Hrs**

Reference Books:

1. Richard Bronson, "*Schaum's Outlines of Theory and Problems of Matrix Operations*", McGraw-Hill, 1988.
2. Venkataraman M K, "Higher Engineering Mathematics", National Pub. Co, 1992.
3. Elsgolts, L., "Differential Equations and Calculus of Variations", Mir, 1977.
4. Sneddon, I.N., "Elements of Partial differential equations", Dover Publications, 2006.
5. Sankara Rao, K., "Introduction to partial differential equations", Prentice – Hall of India, 1995
6. Taha H A, "Operations research - An introduction", McMilan Publishing co, 1982.

| COs | Description of the course outcomes | Mapping to Pos (1-6) | | |
|------|--|----------------------|---------------|-------------------|
| | | Mastering 3 | Moderate 2 | Introductory 1 |
| CO-1 | Apply the techniques of QR and singular value decomposition for data compression, least square approximation in solving inconsistent linear systems. | | | |
| CO-2 | Utilize the concepts of functionals and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits. | | | |
| CO-3 | Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models arising in control systems and system communications. | | | |
| CO-4 | Apply transform method to solve one-dimensional wave equation, one-dimensional heat equation, Laplace equation, Poisson equation. | | | |
| CO-6 | Solve system of linear and non-linear equation. | | | |

| POs | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------|-----|---|---|---|---|---|
| Mapping Level | 2.5 | | | | | |

1. Introductory (Slight); 2. Reinforce (Moderate); 3. Mastering (Substantial)