

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAVI
SYLLABUS FOR 2018 -2020

I Semester M.Tech(E&C)
Advanced Engineering Mathematics

Course Code : 18ELD11
Contact Hours/Week : 04
Total Hours: 50
Semester : I

CIE Marks : 40
SEE Marks: 60
Exam Hours: 03
Credits: 04 (4:0:0)

- To learn principles of advanced engineering mathematics through linear algebra and calculus of variations.
- To understand probability theory and random process that serve as an essential tool for applications of electronics and communication engineering sciences..

MODULE	No.of Hrs
<p><u>MODULE – I</u> <u>Linear Algebra-I</u> Introduction to vector spaces and sub-spaces, definitions, illustrative example. Linearly independent and dependent vectors- Basis-definition and problems. Linear transformations-definitions. Matrix form of linear transformations-Illustrative examples (Text Book:1) (RBT Levels: L1 & L2).</p>	10 Hrs
<p><u>MODULE –II</u> <u>Linear Algebra-II</u> Computation of eigen values and eigen vectors of real symmetric matrices-Given’s method. Orthogonal vectors and orthogonal bases. Gram-Schmidt orthogonalization process.(Ref. Book:1) (RBT Levels: L1 & L2)</p>	10 Hrs
<p><u>MODULE – III</u> <u>Calculus of Variations : -</u> Concept of functional-Eulers equation. Functional dependent on first and higher order derivatives, Functional on several dependent variables. Isoperimetric problems-variation problems with moving boundaries. (Ref.Book:3) (RBT Levels: L1 & L2)</p>	10 Hrs
<p><u>MODULE – IV</u> <u>Probability Theory:-</u> 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. Poisson, Gaussian and Erlang distributions-examples. (Text Book: 3 & Ref.Book:4) (RBT Levels: L1 & L2)</p>	10 Hrs
<p><u>MODULE-V:</u> Engineering Applications on Random processes:- Classification. Stationary, WSS and ergodic random process. Auto-correlation function-properties, Gaussian random process. (Text Book: 3 & Ref.Book:4) (RBT Levels: L2, L3 & L4)</p>	10 Hrs

Course Outcomes: At the end of the course, students are able to:

- CO-1 : Understand vector spaces, basis, linear transformations and the process of obtaining matrix of linear transformations arising in magnification and rotation of images.
- CO-2 : Apply the technique of singular value decomposition for data compression, least square approximation in solving inconsistent linear systems.
- CO-3 : Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.
- CO-4 : Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models arising in control systems and system communications.
- CO-5 : Analyze random process through parameter-dependent variables in various random processes.

Question Paper pattern:

- **The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.**
- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **16** marks.
There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. David C.Lay, Steven R.Lay and J.J.McDonald: Linear Algebra and its Applications, 5th Edition, Pearson Education Ltd., 2015
2. E. Kreyszig, “Advanced Engineering Mathematics”, 10th edition, Wiley, 2015.
3. Scott L.Miller,Donald G.Childers: “Probability and Random Process with application to Signal Processing”, Elsevier Academic Press, 2nd Edition,2013.

Reference Books:

1. Gilbert Strang: Introduction to Linear Algebra, 5th Edition, Wellesley-Cambridge Press., 2016
2. Richard Bronson: “Schaum’s Outlines of Theory and Problems of Matrix Operations”, McGraw-Hill, 1988.
3. Elsgolts, L.:”Differential Equations and Calculus of Variations”, MIR Publications, 3rd Edition, 1977.
4. T.Veerarajan “Probability, Statistics and Random Process“, 3rd Edition, Tata Mc-Graw Hill Co.,2016.

Web links:-

1. <http://nptel.ac.in/courses.php?disciplineId=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://ocw.mit.edu/courses/mathematics/>
4. www.wolfram.com