VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM

SYLLABUS FOR 2015 -2019

ENGINEERING MATHEMATICS-IV
(Common to all Branches)

Course Title: Engineering Mathematics - IV  Course Code : 15MAT41
Credits: 04  L-T-P : 4-0-0
Contact Hours/Week : 04  Total Hours: 50
Exam. Marks : 80  IA Marks : 20
Exam. Hours : 03

Course Objectives:
The purpose of this course is to make students well conversant with numerical methods to solve ordinary differential equations, complex analysis, sampling theory and joint probability distribution and stochastic processes arising in science and engineering.

<table>
<thead>
<tr>
<th>MODULE</th>
<th>RBT Levels</th>
<th>No. of Hrs</th>
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<tbody>
<tr>
<td>MODULE-I</td>
<td>L2 &amp; L3</td>
<td>10</td>
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<tr>
<td>MODULE-II</td>
<td>L2 &amp; L3</td>
<td>10</td>
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<tr>
<td>Numerical Methods:</td>
<td>Numerical solution of second order ordinary differential equations, Runge-Kutta method and Milne’s method. Special Functions:</td>
<td>Series solution-Frobenious method. Series solution of Bessel’s differential equation leading to $J_n(x)$-Bessel’s function of first kind. Basic properties, recurrence relations and orthogonality. Series solution of Legendre’s differential equation leading to $P_n(x)$-Legendre polynomials. Rodrigue’s formula, problems</td>
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<tr>
<td>MODULE-III</td>
<td>L2 &amp; L3</td>
<td>10</td>
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<tr>
<td>Complex Variables:</td>
<td>Review of a function of a complex variable, limits, continuity, differentiability. Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties and construction of analytic functions, Complex line integrals-Cauchy’s theorem and Cauchy’s integral formula, Residue, poles, Cauchy’s Residue theorem ( without proof) and problems. Transformations:</td>
<td>Conformal transformations, discussion of transformations: $w=z^2$, $w=e^z$, $w=z+(1/z)(z \neq 0)$ and bilinear transformations-problems.</td>
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<tr>
<td>MODULE-IV</td>
<td>L3</td>
<td>10</td>
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Course Outcomes: On completion of this course, students are able to:

1. Use appropriate single step and multi-step numerical methods to solve first and second order ordinary differential equations arising in flow data design problems.
2. Explain the idea of analyticity, potential fields residues and poles of complex potentials in field theory and electromagnetic theory.
4. Describe random variables and probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, information, coding theory and stability analysis of systems.
5. Apply the knowledge of joint probability distributions and Markov chains in attempting engineering problems for feasible random events.

Question paper pattern:
- 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.

Graduate Attributes (as per NBA)
1. Engineering Knowledge
2. Problem Analysis
3. Life-Long Learning
4. Accomplishment of Complex Problems

Text Books:

Reference books:

We links and Video Lectures: