| Programme: B.E. Electrical and Electronics Engineering | | | |
|---|---|---|---|
| **Additional Mathematics -I (Common to all Branches)** | | | |
| Course Code: | **1BMATDIP310** | CIE offline/Online Examination | 100 |
| Course Type | Theory | | |
| | | Total Marks | 100 |
| Teaching Hours/Week (L:T:P: S) | 3:0:0:0 | Exam Hours | - |
| Total Hours of Pedagogy | 42 hours | Credits | 00 (PP) |

**Course objectives (COS):** The goal of the course **1BMATDIP310 Additional Mathematics -I (Common to all Branches)** is to

**CO1**: **Provide** the requisite and relevant background necessary to understand the other important engineering mathematics courses offered for Engineers and Scientists

**CO2: Apply** the knowledge of the co-ordinate system to analyze the polar co-ordinate system.

**CO3: Familiarize** the importance of calculus associated with one variable and multivariable for all branches of the engineering.

**CO4: Analyze** the importance of the integral calculus and their application to real-world problems.

**CO5: Emphasize** the knowledge of the vector calculus to all branches of engineering.

**CO6: Develop** the knowledge of Linear Algebra to solve the system of equations.

## Module-1: Polar Curves and Curvature (8 hours)

Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Indeterminate forms: L'Hospital's rule ( $\frac{\infty}{\infty}, \infty - \infty, 0^0, 1^\infty$ ).

**(RBT Levels: L1, L2 and L3)**

## Module-2: Partial Differentiation (9 hours)

**Introduction:** Partial derivatives, total derivative - differentiation of composite functions, Jacobian and problems.

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems

**(RBT Levels: L1, L2 and L3)**

## Module-3: Integral Calculus (9 hours)

Statement of reduction formulae for $\sin^n(x), \cos^n(x)$ and $\sin^m(x)\cos^n(x)$ and illustrative problems. Evaluation of double integrals and triple integrals-Simple examples.

Applications: Area of the region.

**(RBT Levels: L1, L2 and L3)**

## Module-4: Vector Calculus (8 hours)

**Differentiation of vector functions:** Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence and Curl, Solenoidal and irrotational vector fields-Problems.

**(RBT Levels: L1, L2 and L3)**



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## Module-5: Linear Algebra (8 hours)

**Introduction to linear algebra:**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss Siedel method. Eigenvalues and Eigenvectors $(2 \times 2)$.

**(RBT Levels: L1, L2 and L3).**

**Suggested Learning Resources Textbooks:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2021
2. Gilbert Strang, Linear Algebra and its Applications, Cengage Publications, 4th Ed., 2022.
3. Erwin Kreyszig . Advanced Engineering Mathematics, wiley

**Reference Books:**

1. H K Das and Rajaneesh Varma, Higher Engineering Mathematics, S. Chand.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill.
3. Mangey Ram, Mathematics in Engineering Sciences, CRC Press
4. N. P. Bali, Manish Goyal - A Textbook of Engineering Mathematics, Laxmi Publications
5. David Poole, Linear Algebra, Cengage Learning India Pvt Ltd.

**Web links and e-Resources:**

- NPTEL (National Programme on Technology Enhanced Learning) – Mathematics: https://nptel.ac.in/..
- SWAYAM learning modules on Engineering mathematics .
- https://www.coursera.org/ Mathematics for Engineering Specialization

**Teaching-Learning Process (Innovative Delivery Methods):**

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

Suggested Innovative Delivery Methods may include (but are not limited to):

- Flipped Classroom
- Problem-Based Learning (PBL)
- Case-Based Teaching
- ICT-Enabled Teaching.

Assessment Structure:

For courses offered by the Department of Mathematics, the Continuous Internal Evaluation (CIE) shall be conducted by the concerned course teacher. The CIE may comprise tests, assignments, quizzes, seminars, or other academic activities, as decided by the concerned teacher. The distribution of marks among these activities shall be determined by the course teacher. The total marks awarded for all CIE activities shall be 100 marks.

The concerned teacher shall upload the CIE marks to the VTU web portal whenever notified by the University.

Online Mode of Offering for 1BMATDIP301 and 1BMATDIP401

The lecture sessions for 1BMATDIP301 shall also be made available through the vtu.online.ac.in platform.

1. If all the students admitted to the 3rd and 4th semesters of a college opt to pursue these courses in online mode, the entire course shall be offered online. In such cases, the Centre for Online Education, Mysuru shall

conduct the **Continuous Internal Evaluation (CIE)** for **100 marks** and submit the CIE marks to the University, with a copy to the concerned college.

2. Within the **same college/department**, all admitted students shall follow a single mode of learning for these courses. A situation where a part of the students opts for the online mode and the remaining students opt for the offline mode **shall not be permitted**.
3. A college intending to offer these courses through the online mode shall submit the **list of eligible students** to the Registrar, Visvesvaraya Technological University (VTU), Belagavi, for approval. Only after obtaining the approval of the University shall the students be permitted to enrol for the online course through the vtu.online.ac.in platform**.**

Notwithstanding the above, a student is considered to have **passed the course,** provided the total of **CIE online** examination is at least 40 out of 100 marks.





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