First Semester B.E.
MATHEMATICS-I FOR ELECTRICAL AND ELECTRONICS ENGINEERING STREAM(22MATE11)
(Effective from the academic year 2022-23)

Topics	Topics To Be Covered	Hours
Module-I: Calculus		
Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, pedal equations.	Discussion restricted to derivation and problems as suggested in Article No.4.7(1,2) and 4.8 (for polar curves only) of Textbook 1	**2L**
Curvature and radius of curvature- Cartesian, parametric, polar and pedal forms. Problems.	Discussion restricted to problems as suggested in Article No.4.10, 4.11 (1,2,4) (Proof for Cartesian and polar only) of Textbook 1	**2L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module-Communication signals, Manufacturing of microphones and Image processing.** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-study: Centre and Circle of Curvature, Evolutes and Involutes	**Article No. 4.10 (3)(4), 4.12 of Textbook 1.** 1. **No Question to be set for SEE** 2. **20% weightage shall be given to CIE from self-study topics**	
(RBT Levels: L1, L2 & L3) **Total**		**8**
Module-II: Series Expansion and Multivariable Calculus		
Taylor's and Maclaurin's series expansion for one variable (statements only). Problems. Indeterminate forms - L'Hospital's rule problems.	(i) Discussion restricted to problems on Article No.4.4 of Textbook1 (*No question to be set on Taylor's series*) (ii)Discussion restricted to $0^0, \infty^0, 0^\infty, 1^\infty$ only, Article No.4.5 of Textbook1	**2L**
Partial differentiation, Total derivatives-differentiation of composite functions. Jacobian, problems. Maxima and minima for a function of two variables. Problems.	(i) Discussion and coverage of contents as suggested in articles 5.1, 5.2, 5.5(1), 5.11 of Textbook 1 (ii) Discussion and problems restricted to article No.5.7(1) of Textbook 1	**2L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module-Series expansion in communication signals, errors and approximations, Concepts of partial derivatives and their usefulness in Vector Calculus.** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-Study: Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.	**Article No. 5.4 and 5.12 of Textbook 1** 1. **No Question to be set for SEE** 2. **20% weightage shall be given to CIE from self-study topics**	

(RBT Levels: L1, L2 & L3)	**Total**	**8**
Module-III: Ordinary Differential Equations of First Order		
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations integrating factors on $\frac{1}{M}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)\&\frac{1}{N}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. Orthogonal trajectories, L-R and C-R circuits. Problems.	(i) Discussion and problems restricted to article no.11.9 (only for introduction No questions to be set for SEE) and 11.10 of Textbook 1. (ii) In the case of reducible to exact equations, I.F. is restricted to $\frac{1}{M}\left(\frac{\partial M}{\partial Y}-\frac{\partial N}{\partial X}\right)$ & $\frac{1}{N}\left(\frac{\partial N}{\partial X}-\frac{\partial M}{\partial Y}\right)$ only. article no.11.11, 11.12(4) of Textbook 1. (iii) Application-oriented problems restricted to article no.12.3(1, 2, 3) & 12.5(4) of Textbook1	**3L**
Non-linear Differential Equations: Introduction to general and singular solutions; Solvable for p only, Clairaut's equations, reducible to Clairaut's equations**.** Problems.	Discussion and problems are restricted to articles No.11.13 (case I only), and 11.14 of Textbook 1.	**1L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module-Rate of growth or decay, conduction of heat**. iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-study: **Applications of ODE, Solutions of nonlinear ODEs-Solvable for x and y.**	**Article no. 11.13(Case II and Case III), 12.5 of Textbook 1** **1. No Question to be set for SEE** **2. 20% weightage shall be given to CIE on self-study topics**	
(RBT Levels: L1, L2 & L3)	**Total**	**8**
Module-IV: Integral Calculus		
Multiple Integrals: Evaluation of double and triple integrals, Evaluation of double integrals by change of order of integration, Changing into polar coordinates. Applications to find Area and volume by double integral. Problems.	Discussion of problems Article No.7.1 to 7.5 of Textbook 1 Application-oriented problems restricted to article No.7.6(1), 7.7 of Textbook 1	**2L**
Beta and Gamma functions: Definitions, properties, Relation between Beta and Gamma functions. Problems	Discussion of problems Article No. 7.14, 7.15 & 7.16 of Textbook1	**2L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module- Antenna and wave propagation, calculation of optimum power in electrical circuits and field theory**. iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-study: Volume by triple integration, center of gravity.	**Article no. 7.6(2), 7.10 of Textbook 1.** **1. No Question to be set for SEE** **2. 20% weightage shall be given to CIE from self-study topics**	
(RBT Levels: L1, L2 & L3)	**Total**	**8**

Module-V: Linear Algebra		
Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of a system of linear equations. Gauss elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method**.**	Discussion and problems as suggested in Article No. 2.7, 2.10, 28.6(1,2) and 28.7(2) of Textbook 1.	**3L**
Eigenvalues and eigenvectors, Rayleigh's power method to find the dominant eigenvalue and eigenvector. Problems.	Discussion and problems as suggested in article no. 4.0, 8.1 and 20.8 of Textbook 2	**1L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module-Network analysis, Markov analysis, critical point of a network system and optimum solution**. iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-study: Solution of a system of equations by Gauss-Jacobi iterative method. **Inverse of a square matrix by Cayley-Hamilton theorem.**	**Article no. 28.7(1).4 and 2.15 of Textbook 1** **1. No Question is to be set for SEE** **2. 20% weightage shall be given to CIE from self-study topics**	
(**RBT Levels: L1, L2 & L3**)	**Total**	**8**

Textbooks:-
1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed.,2021.

2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed. 2018.

Reference Books:-
1. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill,2017.

2. Srimanta Pal & Subodh C Bhunia: "Engineering Mathematics", Oxford University Press,3rd Reprint,2016.

3. N.P. Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed.,2022
4. C. Ray Wylie, Louis C Barrett: "Advanced Engineering Mathematics" McGraw-Hill, Book Co., New York, 6th edition, 2017
5. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt. Ltd.,2015.
6. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publications, 3rd Ed.,2014.
7. James Stewart: "Calculus–Early Transcendentals", Cengage Learning India Private Ltd., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. Gareth Williams: "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4th Ed., 2022.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111

2. http://www.class-central.com/subject/math(MOOCs)

3. http://academicearth.org/

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