

BLOW UP SYLLABUS

First Semester B.E.

Mathematics-I for Computer Science and Engineering Stream (22MATS11)

(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 the two curves, pedal equations.	Discussion restricted to derivation and problems as suggested in articles 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-Computer graphics, Image processing. iii) Guidance to the students for self-study topics through illustrative examples.	4T
Self-Study: Centre and Circle of Curvatures, 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 (statement only). Indeterminate forms-L'Hospital's rule. Problems.	(i) Discussion restricted to problems on article no. 4.4 of Textbook 1 (No question to be set on Taylor's series) (ii) Discussion restricted to 0^0 , ∞^0 , 0^∞ & 1^∞ only, article no. 4.5 of Textbook 1.	2L
Partial differentiation, Total derivative, differentiation of composite functions. Jacobian and 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) and 5.11 of Textbook 1. (ii) Discussion and problem 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 computer programming, computing errors and approximations. iii) Guidance to the students for self-study topics through illustrative examples.	4T
Self-Study: Euler's theorem, 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 (ODEs) of First Order		
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Integrating factors on	(i) Discussion and problems are restricted to article no.11.9 (only for introduction No questions to be set for SEE) and 11.10 of Textbook 1.	3L

$\frac{1}{M} \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right) & \frac{1}{N} \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right)$. Orthogonal trajectories, L-R & C-R circuits. Problems.	(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 are restricted to articles no.12.3 (1, 2 & 3) & 12.6 of Textbook 1.	
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 restricted to article no. 11.13 (case 1 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 from self-study topics	
(RBT Levels: L1, L2 & L3)	TOTAL	8
Module-IV: Modular Arithmetic		
Introduction to Congruences, Linear Congruences, The Remainder theorem (statement only), Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences.	Articles 4.2, 4.4, 2.5 of Textbook 3 (Similar types of problems given in the exercise at the end of respective articles, are to be discussed)	2L
Euler's Theorem(statement only), Wilson's Theorem(statement only) and Fermat's little theorem(statement only).	Articles 7.2, 7.3, 5.3, 5.2 of Textbook 3 (Similar types of problems given in the exercise at the end of respective articles, are to be discussed)	1L
Applications of Congruences-RSA algorithm.	Article 10.1 of Textbook 3 (restricted to simple problems)	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- Cryptography, encoding and decoding, RSA applications in public key encryption. iii) Guidance to the students for self-study topics through illustrative examples.	4T
Self-study: Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.	Article no. 2.2, 2.3 & 3.1 of Textbook 3 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 (8 hours)		
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	Discussion and problems as suggested in article no. 2.7, 2.10, 28.6(1, 2)and 28.7(2) of Textbook 1.	3L

and approximate solution by Gauss-Seidel method		
Eigenvalues and Eigenvectors-Rayleigh's power method to find the dominant eigenvalue and eigenvector.	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- Boolean matrix, Network analysis, Markov analysis, Critical point of a network system, Optimum solution. iii) Guidance to the students for self-study topics through illustrative examples.	4T
Self-study: Solution of a system of linear equations by Gauss-Jacobi method. Inverse of a square matrix by Cayley-Hamilton theorem.	Article no. 28.7(1) and 2.15 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

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.
3. **David M Burton:** "Elementary Number Theory" Mc Graw Hill, 7th Ed., 2017.

Reference Books:

1. **B.V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017.
2. **Srimanta Pal & Subodh C. Bhunia:** "Engineering Mathematics" Oxford University Press, 3rd Ed., 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 Ed., 2017.
5. **Gupta C. B, Sing S. R and Mukesh Kumar:** "Engineering Mathematics for Semesters I and II", McGraw Hill Education (India) Pvt. Ltd. 2015.
6. **H K Das and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. **James Stewart:** "Calculus" Cengage publication, 7th Ed., 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.
11. **William Stallings:** "Cryptography and Network Security" Pearson Prentice hall, 6th Ed., 2013.
12. **Kenneth H Rosen:** "Discrete Mathematics and its Applications" McGraw-Hill, 8th Ed., 2019.
13. **Ajay Kumar Chaudhuri:** "Introduction to Number Theory" NCBA Publications, 2nd Ed., 2009.
14. **Thomas Koshy:** "Elementary Number Theory with Applications" Harcourt Academic Press, 2nd Ed., 2008.

Web links and Video Lectures:

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://academicearth.org/>
4. VTU EDUSAT PROGRAMME -20