CALCULUS AND LINEAR ALGEBRA (18MAT11)
(Common to all Branches)
(Effective from the academic year 2018-19)

Topics	Topics To be Covered	Hours
MODULE - I		
DIFFERENTIAL CALCULUS – 1		
1. Review of elementary differential calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation (for polar curves only)	Discussion restricted to derivation and problems as suggested in Article No.4.7(1, 2) and 4.8 of Text Book 1 *(No Question to be set on Review of elementary Differential Calculus)*	**3L**
2.Curvature and radius of curvature-Cartesian and polar forms ,Centre and circle of curvature (All without proof-formulae only)	Discussion restricted to problems as suggested in Article No.4.10,4.11 (1,4) and 4.12(1) of Text Book 1	**4L**
3. Applications to evolutes and involutes. (RBT Levels: L1 & L2)	Applications of evolutes and involutes restricted to conic sections 4.12(2) of Text Book 1	**1L**
Tutorials	Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module.	**2T**
	Total	**10**
MODULE - II		
DIFFERENTIAL CALCULUS – 2		
1. Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms - L'Hospital's rule.	(i)Discussion restricted to problems on Article No.4.4 of Text book 1 (*No question to be set on Taylor's series*) (ii)Discussion restricted to $0^0, \infty^0, 1^\infty$ only, Article No.4.5 of Text Book 1.	**3L**
2. Partial differentiation: Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables; Method of Lagrange multipliers with one subsidiary condition. Applications of maxima and minima with illustrative examples. 3. Jacobians**-** Simple problems. (RBT Levels: L1 & L2)	(i)Discussion and coverage of contents as suggested in article 5.1 (Introduction only), 5.5(1),5.11 and 5.12 of Text Book 1. Discussion and problems restricted to article No.5.7 (1) of Text Book 1.	**4L** **1L**
Tutorials	Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module. .	**2T**
	Total	**10**

MODULE - III		
INTEGRAL CALCULUS		
1. Review of elementary integral calculus. Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals- change of order of integration and changing into polar co-ordinates.	(i)Review of Integral Calculus Article No.6.2 &6.3 of Text Book 1. (ii)Discussion and Problems as suggested in Article No.7.1-7.5 of Text Book 1. *(No Question to be set on Review of elementary Integral Calculus)*	**4L**
2.Applications to find area, volume and center of gravity(Using double integration only)	Application oriented problems restricted to article No.7.6, 7.7(1),7.8 & 7.10 of Text Book 1.	**2L**
3.Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems. (RBT Levels: L1 & L2)	Discussion and problems restricted to Article No.7.15 & 7.16 of Text Book 1.	**2L**
Tutorials	Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module. .	**2T**
	Total	**10**
MODULE - IV		
ORDINARY DIFFERENTIAL EQUATIONS (ODE'S) OF FIRST ORDER		
1. Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits.	(i) In the case of reducible to exact equations, I.F. is restricted to $\frac{1}{M}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ & $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ only, Article No.11.11,11.12(4) of Text Book 1 (ii) Discussion and Problems restricted to Article No. 11.10 of Text Book 1 (iii) Application oriented problems restricted to article no.12.3(1,2), 12.5 & 12.6 of Text Book 1	**5L**
2. Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equation only. (RBT Levels: L1, L2 & L3)	Discussion and problems restricted to Article No.11.13(Case 1) & 11.14 of Text Book 1.	**3L**
Tutorials	Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module.	**2T**
	Total	**10**

MODULE - V		
LINEAR ALGEBRA		
1. Rank of a matrix-echelon form. Solution of system of linear equations – consistency. 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 Text Book 1**.**	**4L**
2. Eigen values and eigen vectors- Rayleigh's power method. Diagonalization of a square matrix of order two. (RBT Levels: L1, L2 & L3)	Discussion and problems as suggested in Article No. 4.0, 20.8, 8.4 of Text Book 2.	**4L**
Tutorials	Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module.	**2T**
	Total	**10**

Text Books:-

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.

2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books:-

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.

2. James Stewart : "Calculus –Early Transcendentals", Cengage Learning India Private Ltd., 2017.

3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.

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

5. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt. Ltd., 2015.

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/
4. VTU EDUSAT PROGRAMME - 20