

Syllabus – Major Topics

Module	Title	Major Topics	Instructional Hours	
			L	T
Module I	Matrices and Determinants	Basic concept of a matrix, Types of matrices, Transpose, Algebra of matrices, Determinants, Minors, Cofactors, Adjoint and Inverse of second-order matrices, Solution of system of linear equations involving two and three unknowns using Cramer's rule.	11	4
Module II	Trigonometry	Angles, Trigonometric ratios, ASTC rule, Reduction formula, Pythagorean relations, Trigonometric ratios of compound angles.	11	4
Module III	Coordinate Geometry	Straight lines : Slope, Slope-point form, Angle between lines, Parallel and perpendicular lines Circles : Equation of a circle, Center and radius of a given circle.	11	4
Module IV	Differential Calculus	Limits, Basic concept of differentiation, Standard results, Rules of differentiation, Second derivatives	12	3

Detailed Syllabus

Subtopic	Student Learning Outcome	Mode of delivery (L/T)	Mapped CO	Taxonomy Level	Instructional Hours
Module I					
Basic concept of a matrix, special types of matrices	Define a matrix, identify its order, and recognize special types of matrices such as row, column, square, diagonal, triangular, identity, and zero matrices	L	CO1	Remember	1
Transpose of a matrix	Find the transpose of a given matrix	L	CO1	Understand	1
Algebra of matrices: Multiplication by a scalar, Equality, Addition, Subtraction, Matrix Multiplication	Perform algebraic operations on matrices	L	CO1	Understand	3
Determinants, Solution of system of linear equations involving two and three unknowns by Cramer's rule	Evaluate determinants of order upto three and solve a system of linear equations using Cramer's rule.	L	CO1	Apply	3
Minors, cofactors, adjoint and inverse of a 2 X 2 matrix	Compute minors and cofactors, find the adjoint of a matrix, and determine the inverse of a matrix (where it exists)	L	CO1	Understand	3
Problems	Solve problems involving matrices	T	CO1	Apply	4
Module II					
Angles	Identify angles such as acute, obtuse, right, straight, reflex, complete, positive, and negative angles	L	CO2	Remember	1
Trigonometric ratios of acute angle, Trigonometric ratios of standard angles	Evaluate trigonometric ratios of an acute angle	L	CO2	Understand	

Circles: Equation of a circle, center and radius of the circle $x^2+y^2+2gx+2fy+c=0$	Determine the equation of a circle when its center and radius are given, determine the center and radius from the general equation $x^2+y^2+2gx+2fy+c=0$	L	CO3	Understand	4
Problems		T	CO3	Apply	4
Module IV					
Concept of limit, Limits by substitution and factorisation	Evaluate limits using substitution and factorisation methods	L	CO4	Understand	2
Limits of the form $(x^n - a^n) / (x-a)$ and $\sin x / x$	Determine limits of functions	L	CO4	Apply	3
Basic concept of differentiation, standard results (derivatives of a constant k, x^n , e^x , $\log x$, $\sin x$, $\cos x$, $\tan x$, $\csc x$, $\sec x$, $\cot x$)	Understand the concept of differentiation and recall standard derivative formulas	L	CO4	Remember	1
Rules of differentiation (linearity, product, and quotient rules), second derivatives	Apply rules of differentiation to determine first and second derivatives of functions	L	CO4	Apply	6
Problems	Solve problems involving limits and differentiation	T	CO4	Apply	3

Suggested Student Activities for Self-Learning

Week	Self-Learning description	Hours
Module I		
1	Compute the transpose of a matrix, Perform matrix addition, subtraction, and scalar multiplication, matrix multiplication	4
2	Solve systems of linear equations using Cramer's rule	4
3	Calculate minors, cofactors, adjoint and inverse of matrices	4
4	Find the applications of matrices and determinants in respective engineering areas.	3
Module II		
5	Evaluate trigonometric ratios if any one t-ratio is given for an acute angle	4
6	Evaluate trigonometric ratios if any one t-ratio is given	4
7	Solve problems using compound angle formulas	4
8	Find the applications of trigonometry in respective engineering areas.	3
Module III		
9	Find slope of a line if two points or inclined angle is given. Write the equation of a line using slope-point form, Calculate the angle between two lines	4
10	Find equation of straight lines parallel/ perpendicular to a given line	4
11		

1	Schaum's outline of Linear Algebra	Seymour Lipschutz, Marc Lipson	Mc Graw Hill
2	Schaum's outline of Trigonometry	Robert E. Moyer	Mc Graw Hill
3	Schaum's outline of Geometry	Barnett Rich, Christopher Thomas	Mc Graw Hill
4	Schaum's outline of Calculus	Frank Ayres, Elliott Mendelson	Mc Graw Hill
5	Advanced Engineering Mathematics, 10th Ed.	Erwin Kreyszig	Wiley & Sons
6	A Textbook of Engineering Mathematics	N.P. Bali, Manish Goyal	University Science Press
7	Advanced Engineering Mathematics	B. S. Grewal	Mercury Learning & Information

WEB RESOURCES		
Sl. No.	URL	Modules Covered
	NIL	

Assessment Methodology - Theory

Mode	Attendance	CA1	CA2	CA3	CA4	CA5	CA6	ESE
		Self-learning activities (Module 1)	Self-learning activities (Module 2)	Self-learning activities (Module 3)	Self-learning activities (Module 4)	Series Exam (2 modules)	Series Exam (2 modules)	Written Exam (theory)
Duration						2 hours	2 hours	2.5 hours
Exam mark		15	15	15	15	50	50	60
Converted to						20	20	
Marks	5	15				20		60
Total		40						60
Tentative schedule	End of semester	By 4th week	By 7th week	By 11th week	By 14th week	8th week	15th week	End of semester

Series Examination Pattern- Theory

Time	Module	Part A	Marks	Part B	Marks
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