GOVERNMENT POLYTECHNIC,PURI
DEPARTMENT OF MATHEMATICS AND SCIENCE

Discipline: **CIVIL / ELECTRICAL / MECHANICAL ENGINEERING**	Semester: **1st**	Name Of The Teaching Faculty: **SUMITRA PRADHAN** **LECTURER IN MATHEMATICS**
Subject: **ENGINEERING MATHEMATICS- I(TH-3)**	No. of days/week class allotted: **05+01**	Semester From date:**25/10/2021** To date:**31/01/2022** No. of weeks: **14**
PRE-REQUISITE	Basic knowledge about concept and application of Mathematics.	
COURSE OUTCOMES	**The students will be able to** **CO1:** Think Logically and Systematically. **CO2:** Learn the importance of accuracy and develop attitude of problem solving with diligence and perseverance. **CO3:** Use the basic principles of algebra to solve the engineering problems. **CO4:** Use the basic principles of trigonometric in various engineering practices. **CO5:** Apply Co-ordinate geometry principles in the design and practices in engineering tools.	

Week	Class Day	Theory Topics	Delivery Method
1st	1st	**A.ALGEBRA** **1: MATRICES AND DETERMINANTS** **DETERMINANTS:** Definition, Minors and cofactors, Expansion of Determinant of second and third order with examples	Whiteboard
	2nd	Properties of determinants with examples	Whiteboard
	3rd	Properties of determinants with examples(continues)	Whiteboard
	4th	Solving problems on minor, cofactor and evaluation of determinants without expanding.	Whiteboard
	5th	Cramer's Rule: Theory, Solving linear simultaneous equations by Cramer's rule(emphasis on two variables)	Whiteboard
	6th (Tutorial class)	**QUIZ & ASSIGNMENT-I**	Whiteboard
2nd	1st	**MATRICES:** Definition of a matrix, Element of a matrix, Row and column of matrix with examples, Types of matrices: Row matrix, Column matrix, Rectangular matrix, Square matrix, Null matrix or zero matrix with examples.	Whiteboard
	2nd	Types of matrices (continues): Diagonal matrix, Scalar matrix, Unit matrix or Identity matrix, Singular matrix, Regular matrix, Equality of two matrices with examples.	Whiteboard
	3rd	Transpose of a matrix with example, Algebra of matrices: Addition and subtraction of matrices with examples.	Whiteboard
	4th	Properties of matrix addition with examples	Whiteboard
	5th	Multiplication of matrices by a scalar: Definition and properties with examples	Whiteboard
	6th (Tutorial class)	Solving problems on matrix addition , subtraction and multiplication of matrices by a scalar	Whiteboard
3rd	1st	Matrix multiplication:	Whiteboard

		Definition, prefactor, postfactor with examples	
	2nd	Matrix multiplication (continues): some more examples on matrix multiplication, Properties of matrix multiplication with examples	Whiteboard
	3rd	Adjoint of a matrix : Definition and examples, Inverse of a matrix:Definition and examples(second and third order)	Whiteboard
	4th	Some more Examples on Inverse of a matrix.	Whiteboard
	5th	Solution of simultaneous equations by inverse matrix method: Theory and example	Whiteboard
	6th (Tutorial class)	Solving problems on inverse of matrix, adjoint of a matrix	Whiteboard
4th	1st	Solution of simultaneous equations by inverse matrix method: solving some more problems of two variables	Whiteboard
	2nd	Solving some important problems on determinants and Matrices**(Revision)**	Whiteboard
	3rd	**QUIZ & ASSIGNMENT-II**	Whiteboard
	4th	**B.TRIGONOMETRY** **2.TRIGONOMETRY:**(Trigonometric functions and their signs, domains and ranges):trigonometric ratios and common angle measures	Whiteboard
	5th	ASTC rule, domains and ranges of trigonometric functions	Whiteboard
	6th (Tutorial class)	Problem discussion on ASTC rule and trigonometric ratios	Whiteboard
5th	1st	Fundamental trigonometric identities, even and odd trigonometric functions	Whiteboard
	2nd	Compound angles: addition theorem(sin $(\alpha+\beta)$,cos $(\alpha+\beta)$,tan $(\alpha+\beta)$,tan $(\alpha+\beta+\gamma)$) and deductions	Whiteboard
	3rd	Multiple and sub multiple angles with examples	Whiteboard
	4th	Problems on Multiple and Sub -multiple angles	Whiteboard
	5th	Writing trigonometric ratios in acute angles	Whiteboard
	6th (Tutorial class)	Problem discussion on compound angles and trigonometric ratios	Whiteboard
6th	1st	Periodicity of trigonometric functions, maximum value of trigonometric expressions	Whiteboard
	2nd	**Inverse Trigonometric Functions**: definition and graphs	Whiteboard
	3rd	Useful formulae of inverse trigonometric functions	Whiteboard
	4th	Simple identities of inverse trigonometric functions	Whiteboard
	5th	**Revision** and Solving problems using inverse trigonometric identities	Whiteboard
	6th (Tutorial class)	**QUIZ & ASSIGNMENT-III**	Whiteboard
7th	1st	**C. TWO DIMENSIONAL GEOMETRY** **3.CO-ORDINATE GEOMETRY IN TWO DIMENSIONS(2D): (STRAIGHT LINE):** Geometry in two dimensions: Introduction, co-ordinate plane and axes, fundamental concepts	Whiteboard
	2nd	Distance formula with example, area of a triangle formula and problem solving	Whiteboard
	3rd	Internal division and external division of straight lines, internal division formula and external division formula and solving	Whiteboard

		related problems	
	4th	Slope: Definition , slope of a line joining two distinct points(non vertical line) properties	Whiteboard
	5th	Condition of perpendicularity and parallelism with examples	Whiteboard
	6th (Tutorial class)	Problems on distance formula, division formula and slope	Whiteboard
8th	1st	Locus and its equation: definition, equation of a straight line: slope intercept form , slope point form with examples	Whiteboard
	2nd	Equation of a straight line in: two point form, intercept form with examples	Whiteboard
	3rd	Equation of a straight line in: perpendicular form, general form of a straight line and deduction into different forms	Whiteboard
	4th	Solving problems on different forms of straight line	Whiteboard
	5th	Case of parallel lines: equation of a line passing through a point and parallel to a line with examples	Whiteboard
	6th (Tutorial class)	Problems Solving	Whiteboard
9th	1st	Case of perpendicular lines: equation of a line passing through a point and perpendicular to a line with examples	Whiteboard
	2nd	Pont of intersection of two lines, family of lines	Whiteboard
	3rd	Equation of a line passing through the intersection of two lines with examples	Whiteboard
	4th	Distance of a point from a line and related problem solving	Whiteboard
	5th	**Revision** and Problem solving of straight lines.	Whiteboard
	6th (Tutorial class)	**QUIZ & ASSIGNMENT-IV**	Whiteboard
10th	1st	**4. CIRCLE:** Definition of a circle, Equation of circle with given centre and radius with example	Whiteboard
	2nd	Problems on equation of circle in centre radius form if the circle touches X-axis, Y-axis or both the axes with examples	Whiteboard
	3rd	Equation of a circle in end point of diameter form with examples	Whiteboard
	4th	General equation of a circle. Determining centre and radius of a circle from general form	Whiteboard
	5th	**Revision** and Solving Problems on circle	Whiteboard
	6th (Tutorial class)	**QUIZ & ASSIGNMENT-V**	Whiteboard
11th	1st	**D. THREE DIMENSIONAL GEOMETRY** **5.CO-ORDINATE GEOMETRY IN THREE DIMENSIONS(3D): (PLANE):** a) Distance formulae, section formulae in 3D	Whiteboard
	2nd	Problem Solving	Whiteboard
	3rd	Direction ratio, direction cosine, angle between two lines	Whiteboard
	4th	Problem Solving	Whiteboard
	5th	Condition of parallelism and perpendicularity	Whiteboard
	6th (Tutorial class)	Problem Solving	Whiteboard
12th	1st	b) Equation of a plane i) General form	Whiteboard
	2nd	Problem Solving	Whiteboard
	3rd	Angle between two planes with examples	Whiteboard
	4th	Perpendicular distance of a point from a plane with examples	Whiteboard

	5th	Equation of a plane passing through a point and (i) parallel to a plane with examples	Whiteboard
	6th (Tutorial class)	Problem Solving	Whiteboard
13th	1st	Equation of a plane passing through a point and (ii) perpendicular to a plane with examples	Whiteboard
	2nd	Problem Solving	Whiteboard
	3rd	**Revision** and Problem Solving	Whiteboard
	4th	**QUIZ & ASSIGNMENT-VI**	Whiteboard
	5th	**6.SPHERE** Introduction to Sphere. (i) Equation of a Sphere in Center radius form	Whiteboard
	6th (Tutorial class)	Problem Solving	Whiteboard
14th	1st	ii) Equation of a Sphere in General form	Whiteboard
	2nd	Problem Solving	Whiteboard
	3rd	iii) Equation of a Sphere in two end points of a diameter form (only formulae and problems)	Whiteboard
	4th	**Revision** and Problem Solving	Whiteboard
	5th	**QUIZ & ASSIGNMENT-VII**	Whiteboard
	6th (Tutorial class)	**PREVIOUS YEAR QUESTIONS DISCUSSION**	Whiteboard

LEARNING RESOURCES:

1. Elements of Mathematics Vol-I &II (Odisha State Bureau of Text Book preparation &Production).
2. Text Book of Engineering Mathematics-I & II By C. R Mallick, Kalyani Publication.
3. Mathematics Part-I & Part-II Textbook for Class XII, NCERT Publication.

25/10/21
Signature of Concerned Faculty

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Signature of HOD

Principal
Govt. Polytechnic,Puri