LESSON PLAN

MATHEMATICS-II

PREPARED BY

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(LECTURER (STAGE-II) IN MATHEMATICS)

GOVERNMENT POLYTECHNIC BARGARH

DEPARTMENT OF MATHEMATICS & SCIENCE

GOVERNMENT POLYTECHNIC BARGARH

VISION

To be a reputed polytechnic institute imparting quality technical education to produce diploma engineers with dynamic personalities and innovative competencies in the state of Odisha.

MISSION

- To offer the best and advanced lab facilities adhering to the curriculum to make future engineers.
- To engage highly qualified and competent faculties to make the student acquire the skillful knowledge required.
- To develop an excellent teaching learning environment leading to create the best institute.

SYLLABUS

NAME OF THE C0URSE: MATHEMATICS-II			
COURSE CODE	TH-3	SEMESTER	2ND
TOTAL PERIOD	60	TIMING OF END EXAMINATION	3 Hours
THEORY PERIOD	4P/Week	CLASS TEST (IA)	30
MAXIMUM MARKS	100	END SEMESTER EXAMINATION	70

COURSE CONTENTS:

UNIT - I: Determinants and Matrices

Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT - II: Integral Calculus

Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formulas $\int_0^{\frac{\pi}{2}} \sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x\, dx$ and $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x\, dx$ for solving problems Where m and n are positive integers.

Applications of integration for

(i) . Simple problem on evaluation of area bounded by a curve and axes.

(ii) . Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT - III: Co-Ordinate Geometry

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

General equation of a circle and its characteristics. To find the equation of a circle, given:

(a) Centre and radius,

(b) Three points lying on it and

(c) Coordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems
on conics when their foci, directories or vertices are given.

UNIT - IV: Vector Algebra

Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar
and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT-V: Differential Equations

Solution of first order and first degree differential equation by variable separation method (simple
problems). MATLAB – Simple Introduction.

References:

- ✓ Mathematics-II by Dr. Garima Singh (Download from https://ekumbh.aicte- india.org/dbook.php)
- ✓ B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
- ✓ G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
- ✓ S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
- ✓ Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
- ✓ Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi
- ✓ Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna PublishingHouse, New Delhi
- ✓ Elements of Mathematics Vol. –I and Voil.-II by Odisha Text Book Bureau.

COURSE OUTCOME: -

At the end of the course, the students will be able to:

(i) Apply the concept of Determinants and Matrices on 3rd order system of equations to find the unknown parameters and simple programming using MATLAB.

(ii) Apply Integral calculus to obtain area and volume of solid.

(iii) Connect algebra and geometry through graphs of lines and curves.

(iv) Differentiate between a resultant and a concurrent force through vector algebra.

(v) To model simple physical problems in the form of a differential equation, analyze and interpret its solutions.

Discipline: Basic Sc. & Humanities	SEMESTER: 2ND SESSION-SUMMER	Name of the Teaching faculty: Jitendra Kumar Malik, Lecturer(STAGE-II) in Mathematics
Subject: Mathematics-II(TH3)	No of Days/weeks-04 Total Class allotted-60	
Week	**Class Day**	**Theory Topics.**
1ST	1ST	Definition of matrix, type of matrix, Examples of different types of matrix. order a matrix.
	2ND	Algebra of matrices(matrix addition , subtraction and multiplication)
	3RD	Inverse of a matrix. Examples to find out the inverse of a matrix
	4TH	Matrix inverse method to solve a system of linear equations in 3 variables.
2 ND	1ST	Solving of problems related to inverse method.
	2ND	Elementary properties of determinants up to 3rd order.
	3RD	Crammer's rule.
	4TH	Solving of problems related to Crammer's rule.
3 RD	1ST	Solving of problems related to Crammer's rule.
	2ND	Solving of problems related to Elementary properties of determinants .
	3RD	Solving of problems related to Elementary properties of determinants .
	4TH	Solving of miscellaneous Problems of Unit-I
4TH	1ST	Integration as inverse operation of differentiation.
	2ND	Simple integration by substitution method.
	3RD	Solving of problems .
	4TH	Solving of problems .
5TH	1ST	By parts method.
	2ND	Solving of problems related to by parts method.
	3RD	Solving of integration by using partial fraction.
	4TH	Solving of problems .
6 TH	1ST	Proper integration and their properties.
	2ND	Solving of problems related to proper integration.
	3RD	Use of formulas $\int_0^{\frac{\pi}{2}} \sin^n x\,dx$, $\int_0^{\frac{\pi}{2}} \cos^n x\,dx$ and $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x\,dx$ for solving problems Where m and n are positive integers.
	4TH	Solving of problems .
7 TH	1ST	Applications of integration. Solving Simple problem on evaluation of area bounded by a curve and axes.
	2ND	Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).
	3RD	Solving of problems .
	4TH	Solving of miscellaneous Problems of Unit-II.
8 TH	1ST	Distance formula in 2D, ratio, midpoint, Slope of a line.
	2ND	Equation of straight line in various standard forms.

	3RD	Intersection of two straight lines, angle between two lines.
	4TH	Parallel and perpendicular lines, perpendicular distance formula.
9 TH	1ST	Solving of problems .
	2ND	Solving of problems .
	3RD	General equation of a circle and its characteristics. To find the equation of a circle, given: Centre and radius, Three points lying on it and Coordinates of end points of a diameter.
	4TH	Find out the center and radius of a circle.
10TH	1ST	Solving of problems .
	2ND	Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof.
	3RD	Problems on conics when their foci, directories or vertices are given.
	4TH	Solving of miscellaneous Problems of Unit-III.
11TH	1ST	Definition, notation and rectangular resolution of a vector.
	2ND	Addition and subtraction of vectors. Scalar and vector products of 2 vectors.
	3RD	Solving of problems .
	4TH	Simple problems related to work, moment and angular velocity.
12TH	1ST	Solving of miscellaneous Problems of Unit-IV.
	2ND	Definition of Differential equation. Order and degree of a differential equation.
	3RD	Solution of first order and first degree differential equation by variable separation method
	4TH	Solving of problems .
13 TH	1ST	Solving of problems .
	2ND	MATLAB – Simple Introduction.
	3RD	MATLAB – Simple Introduction.
	4TH	Solving of miscellaneous Problems of Unit-V.
14 TH	1ST	Solving of Problems from question bank.
	2ND	Solving of Problems from question bank.
	3RD	Solving of Problems from question bank.
	4TH	Solving of Problems from question bank.
15TH	1ST	Solving of Problems from question bank.
	2ND	Solving of Problems from question bank.
	3RD	Solving of Problems from question bank.
	4TH	Solving of Problems from question bank.

Jeetendra 31/01/2025
Signature of the faculty

31-01-25
Signature of the HOD