

GOVERNMENT POLYTECHNIC, NAYAGARH

LESSON PLAN

SUBJECT-MATHEMATICS

ACADEMIC SESSION-2026-27

Discipline: Mathematics & Science	1ST YEAR DIPLOMA ENGG.	NAME OF THE TEACHING FACULTY: Debi Prasad Tripathy, Lecturer(STAGE-II) in Mathematics		
COURSE- MATHEMATICS	No of Period per weeks-04	SEMESTER FROM DATE-17-08-2026 to 17-04-2027		
COURSE CODE-TH-4	Total Class allotted-128			
MONTH	WEEK	DAY	UNIT	TOPICS
Aug-26	3RD	1ST	UNIT-I (Trigonometry) (16 Hours)	Explain the concept of angles and express them in different units.
		2ND		Convert angles from one unit to another accurately.
		3RD		Evaluate trigonometric ratios of allied angles using standard identities.
		4TH		Apply trigonometric sum and difference formulae to simplify expressions and solve problems.
	4TH	1ST		Apply product formulae to solve trigonometric problems.
		2ND		Transform trigonometric expressions using standard transformation formulae.
		3RD		Solve examination-oriented numerical problems involving trigonometric identities.
		4TH		Evaluate trigonometric ratios of double-angle and triple-angle expressions.
	1ST	1ST		Apply half-angle formulae in solving trigonometric problems.
		2ND		Solve comprehensive problems involving multiple-angle identities.
		3RD		Define inverse trigonometric functions and identify their principal values.
		4TH		Apply the standard properties of inverse trigonometric functions in problem-solving.
		1ST		Solve examination-oriented problems involving inverse trigonometric functions.
		2ND		Integrate all trigonometric concepts to solve comprehensive numerical problems.

Sep-26

2ND	3RD		Review important concepts, identities and formulae through discussion and previous examination questions.
	4TH		Assess students' understanding of the complete unit through a written test.
3RD	1ST	UNIT-II (Co-Ordinate Geometry) (14 Hours)	Explain the Cartesian coordinate system and calculate the distance between two points.
	2ND		Apply the section formula to determine the coordinates of a point dividing a line segment.
	3RD		Determine the slope of a line using coordinates of two points.
4TH	1ST		Identify whether two lines are parallel or perpendicular using their slopes.
	2ND		Write and convert equations of straight lines in different standard forms.
	3RD		Solve numerical problems involving equations of straight lines.
	4TH		Determine the point of intersection and calculate the angle between two straight lines.
5TH	1ST		Calculate the shortest distance between a point and a straight line.
	2ND		Identify the centre and radius from the general equation of a circle and write the equation when centre and radius are given.
	3RD		Solve examination-oriented problems on centre and radius of circles.
1ST	1ST		Determine the equation of a circle passing through three non-collinear points.
	2ND		Derive and solve problems involving the equation of a circle using the endpoints of its diameter.
2ND	1ST		Solve comprehensive problems covering straight lines and circles.
	2ND		Review all concepts and assess students through a written test.
	3RD		Define a complex number and identify its real and imaginary parts.
	4TH		Represent complex numbers in Cartesian and Polar forms.

Oct-26

	3RD	1ST	UNIT-III (Complex Number) (12 Hours)	Convert complex numbers from Cartesian to Polar form and vice versa.
		2ND		Determine the conjugate, modulus and amplitude of a complex number.
	3RD	3RD		Perform addition and subtraction of complex numbers in Cartesian form.
		4TH		Perform multiplication and division of complex numbers using algebraic methods.
	4TH	1ST		Solve examination-oriented problems involving basic operations on complex numbers.
		2ND		Determine the square root of a given complex number using standard methods.
		3RD		Explain the concept of cube roots of unity and determine their values and properties.
	5TH	1ST		State De Moivre's Theorem and apply it to solve simple problems involving powers of complex numbers.
		2ND		Solve comprehensive problems covering complex numbers, operations, square roots, cube roots of unity and De Moivre's Theorem.
		3RD		Review all concepts and assess students' understanding through a written test.
		4TH	UNIT-III (Partial Fraction) (04 Hours)	Define polynomial, proper and improper fractions, and explain the concept of partial fractions. Distinguish between proper and improper rational functions.
	1ST	1ST		Resolve proper fractions having distinct linear factors in the denominator into partial fractions and solve numerical problems.
		2ND		Resolve proper fractions with repeated linear factors into partial fractions using appropriate methods.
		3RD		Resolve proper fractions involving irreducible quadratic factors into partial fractions and solve mixed examination-oriented problems. Review the complete unit.
		4TH	UNIT-III (Permutation)	Define factorial notation and evaluate factorials using their properties.

Nov-26

2ND	1ST	UNIT-II (Permutation, Combination & Binomial Theorem) (06 Hours)	Differentiate between permutations and combinations and compute $P(n,r)$ and $C(n,r)$ for given values.
	2ND		Solve examination-oriented problems involving arrangements and selections.
2ND	3RD	UNIT-III (Permutation, Combination & Binomial Theorem) (06 Hours)	State and apply the Binomial Theorem to expand expressions of the form $(a+b)^n$.
	4TH		Determine the general term and identify the middle term(s) in a binomial expansion.
3RD	1ST	UNIT-III (Permutation, Combination & Binomial Theorem) (06 Hours)	Review factorials, permutations, combinations and binomial expansion through mixed problems and assess learning.
	2ND		Define a matrix, determine its order and classify different types of matrices.
	3RD		Identify the order and type of given matrices accurately.
	4TH		Perform addition, subtraction and scalar multiplication of matrices.
4TH	1ST	UNIT-III (Permutation, Combination & Binomial Theorem) (06 Hours)	Multiply matrices and verify the properties of matrix multiplication.
	2ND		Define determinants and evaluate determinants of order 2.
	3RD		Evaluate determinants of order 3 using expansion methods.
	4TH		Apply determinant properties to simplify calculations.
5TH	1ST	UNIT-III (Determinant & Matrices) (16 Hours)	Solve examination-oriented determinant problems efficiently.
1ST	1ST		Compute minors and cofactors of matrix elements.
	2ND		Determine the inverse of a non-singular matrix.
	3RD		Solve problems involving matrix inverses.
	4TH		Solve systems of linear equations using Cramer's Rule.
2ND	1ST		Solve engineering-oriented problems involving three variables.
	2ND		Solve systems of linear equations using the inverse matrix method.
	3RD		Solve comprehensive problems covering the complete unit.
	4TH		Review all concepts and assess students through a written test.

Dec-26

Dec-26	3RD	1ST	UNIT-IV (Vector Algebra) (12 Hours)	Distinguish between scalar and vector quantities with suitable engineering examples.
		2ND		Represent vectors using standard notation and resolve vectors into rectangular components.
		3RD		Identify and classify different types of vectors.
		4TH		Perform vector addition, subtraction and scalar multiplication using analytical methods.
	4TH	1ST		Solve examination-oriented numerical problems on vector operations.
		2ND		Compute dot and cross products and interpret their physical significance.
		3RD		Determine the angle between two vectors using the scalar product.
		4TH		Calculate scalar and vector projections of one vector onto another and interpret the results.
	5TH	1ST		Determine the area of a triangle and parallelogram using vector algebra.
		2ND		Apply scalar product to calculate work done and vector product to determine the moment of a force.
		3RD		Solve comprehensive problems covering all vector operations and applications.
		4TH		Review all concepts and assess student understanding through written evaluation.
	1ST	1ST	UNIT-V (Limit & Continuity) (08 Hours)	Define a function and identify different types of functions with suitable examples.
		2ND		Classify functions and solve simple problems based on different function types.
	2ND	1ST		Explain the concept of the limit of a function and determine whether a limit exists.
		2ND		Apply the laws of limits to simplify and evaluate limit expressions.
		3RD		Recall standard limit formulae and evaluate limits involving absolute value and greatest integer functions.
		4TH		Solve examination-oriented problems using algebraic manipulation and standard limits.

Jan-27

Jan-27	3RD	1ST	UNIT-V (Differentiation) (10 Hours)	Verify the continuity of functions at a given point using the definition of continuity.
		2ND		Review all concepts of functions, limits, and continuity and assess student learning.
		3RD		Recall standard differentiation formulae and differentiate elementary functions.
		4TH		Apply derivative formulae to solve numerical problems accurately.
	4TH	1ST		Apply sum, product, and quotient rules to differentiate composite algebraic expressions.
		2ND		Solve examination-oriented problems involving multiple differentiation rules.
		3RD		Apply the chain rule to differentiate composite functions.
		4TH		Solve problems involving nested algebraic, exponential, logarithmic and trigonometric functions.
	5TH	1ST		Apply logarithmic differentiation to functions involving products, quotients and powers.
		2ND		Differentiate one function with respect to another using parametric relationships.
		3RD		Integrate all differentiation methods to solve comprehensive problems.
		4TH		Review all differentiation concepts and assess students' understanding.
	6TH	1ST		Explain integration as the inverse of differentiation and evaluate simple indefinite integrals.
	1ST	1ST		Apply standard integration formulae to solve simple problems.
		2ND		Practice on Basic Integration.
		3RD		Identify suitable substitutions and solve simple integrals.
		4TH		Solve a variety of substitution-based integrals.
	2ND	1ST		Apply integration by parts to solve integrals involving products of functions.
		2ND		Solve examination-oriented problems using integration by parts.
		3RD		Decompose rational functions into partial fractions and integrate them.

Feb-27

3RD

4TH

1ST

2ND

3RD

4TH

4TH

1ST

2ND

3RD

4TH

5TH

1ST

UNIT-VI
(Integral Calculus)
(18 Hours)

Solve integrals involving linear partial fractions accurately.

Evaluate definite integrals using fundamental integration techniques.

Solve problems involving definite integrals.

Apply properties of definite integrals to simplify calculations.

Use integral properties for efficient evaluation.

Explain the geometrical meaning of definite integrals in area calculation.

Solve simple area problems using definite integration.

Solve problems involving substitution, parts, partial fractions, and definite integrals.

Consolidate concepts through discussion and previous examination questions.

Assess understanding of all topics in the unit.

Define a differential equation and identify its components.

Determine the order and degree of various differential equations. solved examples.

Solve problems involving determination of order and degree.

Elimination of arbitrary constants. Form differential equations from given relations.

Solve numerical problems independently.

Recognize separable differential equations and apply the solution method.

Solve engineering-oriented examples using variable separation.

solving first-order, first-degree differential equations.

Convert equations into standard linear form and determine integrating factor.

Solution of Linear Differential Equations
Solve linear differential equations using integrating factor method.

Solve a variety of examination-oriented problems.

Mar-27

1ST

1ST

2ND

3RD

4TH

2ND

1ST

2ND

3RD

4TH

3RD

1ST

2ND

3RD

UNIT-VII
(Differential Equation)
(12 Hours)

Apr-27	1ST	4TH	Review all concepts and solve previous examination questions.
		1ST	QUESTION BANK 1ST UNITDISCUSSION
		2ND	QUESTION BANK 1ST UNITDISCUSSION
		3RD	QUESTION BANK 2ND UNITDISCUSSION
	2ND	4TH	QUESTION BANK 3RDUNITDISCUSSION
		1ST	QUESTION BANK 4TH UNIT DISCUSSION
		2ND	QUESTION BANK 5TH UNITDISCUSSION
		3RD	QUESTION BANK 6TH UNITDISCUSSION
	3RD	4TH	QUESTION BANK 7THUNITDISCUSSION
		1ST	VERY SIMILAR TEST DISCUSSION
		2ND	VERY SIMILAR TEST DISCUSSION
		3RD	VERY SIMILAR TEST DISCUSSION
		4TH	VERY SIMILAR TEST DISCUSSION

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31/7/26