

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: Diploma in Electrical Engineering

Programme Specific Outcome (PSO)

PSO1 : Use principles of basic sciences, engineering laboratory skills, tools and methodologies for building, testing, operating and maintaining Electrical engineering systems.

PSO2 : Analyze and design Electrical engineering systems which are cost effective, safe and sustainable.



The Maharaja Sayajirao University of Baroda
 Polytechnic
 Department of Electrical Engineering
 Polytechnic, Near Shastri Bridge, Fatehgunj, Vadodara-2
 www.msubaroda.ac.in

**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Electrical Engineering : Full Time (Regular)

Year	I	AMT 3104 & AMT3104L: Applied Mathematics-I & Applied Mathematics-I(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	I	Core / Elective / Foundation	Hours per week(Theory lecture)	4	
			Hours per week (Tutorial)	1	
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics

Course Outcome (CO): AMT 3104

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

CO1 Recall, extend and perceive the important elements of Algebra viz., Logarithms, Partial Fractions, Quadratic equations, progressions, binomial theorem and complex numbers.

CO2 Evaluate the limits, examine the continuity at a point for functions of one variable and Find their derivatives using appropriate methods.

CO3 Interpret the geometrical meaning of derivative and apply the knowledge of derivatives in different engineering/physical problems. and also determine partial derivatives of functions and make their use in finding approximate values and maxima-minima of function of two variables.

CO4 Demonstrate and explain the basic concepts of two dimensional co-ordinate geometry viz., straight line and circle.

CO5 Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1.	Algebra Logarithm-Introduction, Rules of logarithm and Examples. Partial fractions: Introduction, Proper and Improper fractions Quadratic Equations: Nature of roots of quadratic equations Geometric Progressions: Definition, general term and sum of first n terms of geometric progressions, geometric mean	07	14	1, 2,5	CO1	PSO1	SD	G	
2.	<u>Functions, Limits, Continuity and Differentiation</u> Concept of Limit, Standard Limit, different methods to evaluate limits and continuity of function of one variable, Definition of derivative, differentiation of standard functions by first principle, Rules of differentiation, Differentiation of algebraic, trigonometric, exponential, logarithmic, implicit functions and composite functions, Higher order derivatives, Leibnitz's Theorem	14	33	1,2,4,5	CO2	PSO1	SD	G	

<p>3.</p>	<p><u>Applications of differentiation</u></p> <p>Geometrical interpretation of derivative, Tangent and Normals, Maxima and Minima, Approximate value, Radius of curvature</p> <p><u>Partial Differentiation and its applications</u></p> <p>Functions of two variables , Definition of partial derivatives, Chain Rule, Euler’s Theorem, Implicit functions and Differentials, Applications (Approximations, Maxima And Minima).</p>	20	15	1,2,3,5	CO3	PSO1	SD	G	
<p>4.</p>	<p><u>Co-ordinate Geometry</u></p> <p>Reorientation, Point, Collinearity, Line, Inclination and slope of a line, different forms of equations to a straight line (i) Slope-intercept form (ii) Point-slope form (iii) Two-point form (iv) Intercept-form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines.</p> <p>Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle.</p>	06	12	1, 2, 5	CO4	PSO1	SD	G	

5.	<u>Trigonometry</u> (Trigonometric functions as circular functions), Addition and Factor formula, Trigonometric functions of multiple and submultiples angles. Introduction of inverse trigonometric functions. <u>Properties of Triangle:</u> Sine formula, Cosine formula, Projection formula, Napier's analogy, Half-Angle formulae.	07	20	1, 5	CO5	PSO1	SD	G	
6.	<u>Complex Numbers and Binomial Theorem</u> Definition, operation, properties, cartesian and polar forms, De'Moivre's theorem and its application Binomial Theorem: Introduction, Development of Binomial expansion	06	05	1, 2.5	CO1	PSO1	SD	G	

REFERENCE BOOKS

SR. NO	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
3	Calculus and Analytic Geometry by G. B. Thomas, R. L. Finney	Narosa Publishing House, Delhi (Sixth Edition, 1998)
4.	A textbook of Engineering Mathematics by N .P. Bali	Laxmi Publications(2016)



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Electrical Engineering: Full Time (Regular)

Year	I	Applied Mathematics-I (Term-work including Viva)	Hours per week	1
			Credits	
Semester	I	Core / Elective / Foundation	Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1.	Solve examples of Logarithms, Binomial Theorem, Partial Fractions.	1,2,5	1	1
2.	Solve examples of evaluating limits of functions of one variable using various appropriate methods	1,2,5	1	1
3.	Solve examples based on Allied and Compound angles in Trigonometry	1,2,5	2	1
4.	Solve examples of Addition and Factor formula, T-ratios of multiple and sub-multiple angles	1,2,5	5	1
5.	Solve examples related to fundamental laws of differentiation, chain rule, implicit differentiation and parametric functions of one variable.	1,2,5	5	1
6.	Solve examples of logarithmic differentiation and higher order derivatives	1,2,5	3	1
7.	Solve examples on finding first order, second order partial derivatives of functions of more than one independent variables	1,2,5	3	1

8.	Solve examples based on Euler's theorem and its corollaries	1,2,5	3	1
9.	Solve examples related to different forms of straight line including the concept of parallel and perpendicular lines, distance between parallel lines, concurrent lines.	1,2,5	3	1
10.	Solve examples on circle through three points including those based on particular cases of general equation of circle	1,2,5	4	1
11.	Solve examples based on complex numbers and quadratic equations.	1,2,5	4	1
12.	Solve examples based on applications of derivatives	1,2,3,5	3	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

First Semester of First Year

Subject: Applied Mathematics -I

Code: AMT 3104

<u>AMT3104</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	1	-
CO2	3	1	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	2	-
CO4	3	2	-	-	-	-	2	2	-
CO5	3	2	-	-	-	-	1	2	-
Average	3	1.4	-	-	-	-	0.8	1.8	-



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 YEAR
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Diploma in Electrical Engineering: Full Time (Regular)

Year	I	AMT 3217 & AMT3217L: Applied Mathematics-II & Applied Mathematics-II(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	II	Core / Elective / Foundation	Hours per week(Theory lecture)		4
			Hours per week (Tutorial)		1
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics & Applied Mathematics-I

Course Outcome (CO): AMT 3206

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

- CO1 Evaluate determinants and solve system of linear equations using determinants and matrices ,determine the eigen values of matrices and apply Cayley Hamilton theorem; outline the concept of Vector Algebra.
- CO2 Find the indefinite integrals of algebraic, exponential, logarithmic, trigonometric functions using the methods of substitution, trigonometric substitution , integration by parts and integration by partial fractions.
- CO3 List and prove the properties of definite integrals and utilize them to evaluate the definite integrals
- CO4 Categorize and solve first order, first degree ordinary differential equations and solve higher order linear ordinary differential equations with constant coefficients
- CO5 Evaluate the Laplace transform and Inverse Laplace transform of various functions including properties.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1	<u>Determinants</u> Equation of second and third order determinants, Minors and cofactors, Properties, solution of simultaneous linear equations in two and three unknowns, Consistency condition <u>Matrices</u> Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two and three unknowns, Eigen values, eigen vectors and Cayley Hamilton Theorem.	12	20	1,2,3,5	CO1	PSO1	SD	G	
2	<u>Indefinite Integration</u> Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions	12	20	1,2,5	CO2	PSO1	SD	G	

3	<u>Definite Integration</u> Definite Integrals : Definition, Definite Integrals as the limit of a sum, properties of definite integrals	08	15	1,2,5	CO3	PSO1	SD	G	
4	Differential Equations Formation of differential equations, Separation of variables, Equations reducible to separation of variables, Linear Differential Equation, Equation Reducible to Linear form, Exact Differential Equation. Higher Order Linear Differential Equations with constant co-efficients (right hand side is equal to zero, e^{ax} , $\sin ax$, $\cos ax$, x^m).	16	25	1, 2, 5	CO4	PSO1	SD	G	
5	Laplace transform Definition of Laplace Transform and Inverse Laplace transform, Laplace Transform of k , $\sin kt$, $\cos kt$, e^{at} , t^n , Linearity property.	06	15	1, 2,5	CO5	PSO1	SD	G	
6	<u>Vector Algebra</u> Introduction, Addition of Vectors, Properties of Addition of Vectors, Subtraction of a vector, Multiplication of a Vector by scalar, Position Vector, Product of two Vectors, Scalar or dot Product.	06	05	1,2,5	CO1	PSO1	SD	G	

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1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
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4.	A textbook of Engineering Mathematics by N .P. Bali	Laxmi Publications(2016)
5.	Integral Calculus by Shanti Narayan, Dr. P.K.Mittal	S.Chand Publications (35 th Edition,2005)



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 (2023-2024)**

Diploma in Electrical Engineering :Full Time (Regular)

Year	I	Applied Mathematics-II (Term-work including Viva)AMT 3217L	Hours per week	1	
Semester	II		Credits		
		Core / Elective / Foundation	Maximum Marks	25	
No.	Tutorial		BT Level	CO	PSO
1	Solve examples on properties of determinants and matrix operations and solution of system of linear equations using determinants and matrices		1,2,3,5	CO1	1
2	Solve examples of Vector Algebra		1,2,5	CO1	1
3	Solve examples based on finding indefinite integrals of functions using simple substitutions.		1,2,5	CO2	1
4	Solve examples based on finding indefinite integrals of functions using trigonometric substitutions		1,2,5	CO2	1
5	Solve examples based on finding indefinite integrals of functions using the method of integration by parts and substitution		1,2,5	CO2	1
6	Solve examples based on finding indefinite integrals of functions using the method of partial fractions and substitution		1,2,5	CO2	1
7	Practice examples of properties of definite integrals		1,2,5	CO3	1
8	Solve examples of first order ODE		1,2,5	CO4	1

9	Solve problems related to solution of first order ODE	1,2,5	CO4	1
10	Practice examples of finding solution of higher order linear ODE with constant coefficients	1,2,5	CO5	1
11	Practice examples of Laplace transform	1,2,5	CO5	1
12	Practice examples of inverse Laplace transform	1,2,5	CO5	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

Second Semester of First Year

Subject: Applied Mathematics -II

Code: AMT 3217L

<u><i>AMT3206</i></u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	-	-	-	-	3	-
CO2	3	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	2	-
CO4	3	2	2	-	-	-	-	3	-
CO5	3	2	2	-	-	-	-	3	-
Average	3	1	1	-	-	-	-	2.6	-

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: Diploma in Information Technology

Programme Specific Outcome (PSO)

PSO1 : Use principles of basic sciences, engineering laboratory skills, tools and methodologies for building, testing, operating and maintaining Information Technology systems.

PSO2 : Analyze and design Information Technology systems which are cost effective, safe and sustainable.



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**ACADEMIC
YEAR
(2023-2024)**

Diploma in Information Technology: Full Time (Regular)

Year	I	AMT 3104 & AMT3104L: Applied Mathematics-I & Applied Mathematics-I(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	I	Core / Elective / Foundation	Hours per week(Theory lecture)	4	
			Hours per week (Tutorial)	1	
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics

Course Outcome (CO): AMT 3104

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

CO1 Recall, extend and perceive the important elements of Algebra viz., Logarithms, Partial Fractions, Quadratic equations, progressions, binomial theorem and complex numbers.

CO2 Evaluate the limits, examine the continuity at a point for functions of one variable and Find their derivatives using appropriate methods.

CO3 Interpret the geometrical meaning of derivative and apply the knowledge of derivatives in different engineering/physical problems. and also determine partial derivatives of functions and make their use in finding approximate values and maxima-minima of function of two variables.

CO4 Demonstrate and explain the basic concepts of two dimensional co-ordinate geometry viz., straight line and circle.

CO5 Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1.	Algebra Logarithm-Introduction, Rules of logarithm and Examples. Partial fractions: Introduction, Proper and Improper fractions Quadratic Equations: Nature of roots of quadratic equations Geometric Progressions: Definition, general term and sum of first n terms of geometric progressions, geometric mean	07	14	1, 2,5	CO1	PSO1	SD	G	

<p>2.</p>	<p><u>Functions, Limits, Continuity and Differentiation</u></p> <p>Concept of Limit, Standard Limit, different methods to evaluate limits and continuity of function of one variable, Definition of derivative, differentiation of standard functions by first principle, Rules of differentiation, Differentiation of algebraic, trigonometric, exponential, logarithmic, implicit functions and composite functions, Higher order derivatives, Leibnitz's Theorem</p>	<p>14</p>	<p>33</p>	<p>1,2,4,5</p>	<p>CO2</p>	<p>PSO1</p>	<p>SD</p>	<p>G</p>	
<p>3.</p>	<p><u>Applications of differentiation</u></p> <p>Geometrical interpretation of derivative, Tangent and Normals, Maxima and Minima, Approximate value, Radius of curvature</p> <p><u>Partial Differentiation and its applications</u></p> <p>Functions of two variables , Definition of partial derivatives, Chain Rule, Euler's Theorem, Implicit functions and Differentials, Applications (Approximations, Maxima And Minima).</p>	<p>20</p>	<p>15</p>	<p>1,2,3,5</p>	<p>CO3</p>	<p>PSO1</p>	<p>SD</p>	<p>G</p>	

<p>4.</p>	<p><u>Co-ordinate Geometry</u></p> <p>Reorientation, Point, Collinearity, Line, Inclination and slope of a line, different forms of equations to a straight line (i) Slope-intercept form (ii) Point-slope form (iii) Two-point form (iv) Intercept-form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines.</p> <p>Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle.</p>	06	12	1, 2, 5	CO4	PSO1	SD	G	
<p>5.</p>	<p><u>Trigonometry</u></p> <p>(Trigonometric functions as circular functions),</p> <p>Addition and Factor formula, Trigonometric functions of multiple and submultiples angles. Introduction of inverse trigonometric functions.</p> <p><u>Properties of Triangle:</u></p> <p>Sine formula, Cosine formula, Projection formula, Napier's analogy, Half-Angle formulae.</p>	07	20	1, 5	CO5	PSO1	SD	G	
<p>6.</p>	<p><u>Complex Numbers and Binomial Theorem</u></p> <p>Definition, operation, properties, cartesian and polar forms, De'Moivre's theorem and its application</p> <p>Binomial Theorem: Introduction, Development of Binomial expansion</p>	06	05	1, 2.5	CO1	PSO1	SD	G	

REFERENCE BOOKS

SR. NO	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Information Technology: Full Time (Regular)

Year	I	Applied Mathematics-I (Term-work including Viva)	Hours per week	1
			Credits	
Semester	I	Core / Elective / Foundation	Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1.	Solve examples of Logarithms, Binomial Theorem, Partial Fractions.	1,2,5	1	1
2.	Solve examples of evaluating limits of functions of one variable using various appropriate methods	1,2,5	1	1
3.	Solve examples based on Allied and Compound angles in Trigonometry	1,2,5	2	1
4.	Solve examples of Addition and Factor formula, T-ratios of multiple and sub-multiple angles	1,2,5	5	1
5.	Solve examples related to fundamental laws of differentiation, chain rule, implicit differentiation and parametric functions of one variable.	1,2,5	5	1
6.	Solve examples of logarithmic differentiation and higher order derivatives	1,2,5	3	1
7.	Solve examples on finding first order, second order partial derivatives of functions of more than one independent variables	1,2,5	3	1

8.	Solve examples based on Euler's theorem and its corollaries	1,2,5	3	1
9.	Solve examples related to different forms of straight line including the concept of parallel and perpendicular lines, distance between parallel lines, concurrent lines.	1,2,5	3	1
10.	Solve examples on circle through three points including those based on particular cases of general equation of circle	1,2,5	4	1
11.	Solve examples based on complex numbers and quadratic equations.	1,2,5	4	1
12.	Solve examples based on applications of derivatives	1,2,3,5	3	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

First Semester of First Year

Subject: Applied Mathematics -I

Code: AMT 3104

<u>AMT3104</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	1	-
CO2	3	1	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	2	-
CO4	3	2	-	-	-	-	2	2	-
CO5	3	2	-	-	-	-	1	2	-
Average	3	1.4	-	-	-	-	0.8	1.8	-



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Information Technology: Full Time (Regular)

Year	I	AMT 3218 & AMT3218L: Applied Mathematics-II & Applied Mathematics-II(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	II	Core / Elective / Foundation	Hours per week(Theory lecture)		4
			Hours per week (Tutorial)		1
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics & Applied Mathematics-I

Course Outcome (CO): AMT 3206

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

- CO1 Evaluate determinants and solve system of linear equations using determinants and matrices ,determine the eigen values of matrices and apply Cayley Hamilton theorem; outline the concept of Vector Algebra.
- CO2 Find the indefinite integrals of algebraic, exponential, logarithmic, trigonometric functions using the methods of substitution, trigonometric substitution , integration by parts and integration by partial fractions.
- CO3 List and prove the properties of definite integrals and utilize them to evaluate the definite integrals
- CO4 Categorize and solve first order, first degree ordinary differential equations and solve higher order linear ordinary differential equations with constant coefficients
- CO5 Solve the examples based on finding approximate roots of algebraic and transcendental functions and also finding approximate area using numerical integration.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1	<u>Determinants</u> Equation of second and third order determinants, Minors and cofactors, Properties, solution of simultaneous linear equations in two and three unknowns, Consistency condition <u>Matrices</u> Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two and three unknowns, Eigen values, eigen vectors and Cayley Hamilton Theorem.	12	20	1,2,3,5	CO1	PSO1	SD	G	
2	<u>Indefinite Integration</u> Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions	12	20	1,2,5	CO2	PSO1	SD	G	

3	<u>Definite Integration</u> Definite Integrals : Definition, Fundamental Theorem of Integral Calculus, Definite Integrals as the limit of a sum, properties of definite integrals	08	15	1,2,5	CO3	PSO1	SD	G	
4	<u>Differential Equations</u> Formation of differential equations, Separation of variables, Equations reducible to separation of variables, Homogenous differential equations, Equations reducible to Homogenous, Linear Differential Equation, Equation Reducible to Linear form, Exact Differential Equation.	16	24	1, 2, 5	CO4	PSO1	SD	G	
5	<u>Vector Algebra:</u> Introduction, Addition of Vectors, Properties of Addition of Vectors, Subtraction of a vector, Multiplication of a Vector by scalar, Position Vector, Product of two Vectors- Scalar or dot Product, Vector or cross product	06	06	1, 2,5	CO1	PSO1	SD	G	
6	<u>Numerical Methods</u> Solution of algebraic and transcendental equations of one variable: Bisection Method, Method of false position, Newton Raphson's Method. Finite differences, Newton's interpolation, Lagrange's formula. Numerical integration: Trapezoidal Rule, Simpson's 1/3 & 3/8 rules	06	15	1,2,3,5	CO5	PSO1	SD	G	

REFERENCE BOOKS

SR. NO	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
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 (2023-2024)**

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Year	I	Applied Mathematics-II (Term-work including Viva)AMT 3218L	Hours per week	1
			Credits	
Semester	II	Core / Elective / Foundation	Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1	Solve examples on properties of determinants and matrix operations and solution of system of linear equations using determinants and matrices	1,2,3,5	CO1	1
2	Solve examples of Vector Algebra	1,2,5	CO1	1
3	Solve examples based on finding indefinite integrals of functions using simple substitutions.	1,2,5	CO2	1
4	Solve examples based on finding indefinite integrals of functions using trigonometric substitutions	1,2,5	CO2	1
5	Solve examples based on finding indefinite integrals of functions using the method of integration by parts and substitution	1,2,5	CO2	1
6	Solve examples based on finding indefinite integrals of functions using the method of partial fractions and substitution	1,2,5	CO2	1
7	Practice examples of properties of definite integrals	1,2,5	CO3	1

8	Solve examples of first order ODE	1,2,5	CO4	1
9	Solve problems related to solution of first order ODE	1,2,5	CO4	1
10	Practice examples of finding solution of algebraic and transcendental equations	1,2,5	CO5	1
11	Practice examples of finding eigen values and Cayley Hamilton theorem	1,2,5	CO1	1
12	Practice examples of Numerical Integration	1,2,5	CO5	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

Second Semester of First Year

Subject: Applied Mathematics -II

Code: AMT 3218L

<u>AMT3206</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	-	-	-	-	3	-
CO2	3	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	2	-
CO4	3	2	2	-	-	-	-	3	-
CO5	3	2	2	-	-	-	-	3	-
Average	3	1	1	-	-	-	-	2.6	-

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: Diploma in Petrochemical Technology

Programme Specific Outcome (PSO)

- PSO1** : To apply the understanding and knowledge of basic sciences, engineering, laboratory skills, tools, and methodologies to provide appropriate solutions in the field of chemical and process industries.
- PSO2** : To develop professional approach in managing production, operations, maintenance, and design of safe and sustainable chemical processes.



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Petrochemical Technology: Full Time (Regular)

Year	I	AMT 3109 & AMT3109L: Applied Mathematics-I & Applied Mathematics-I(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	I	Core / Elective / Foundation	Hours per week(Theory lecture)		4
			Hours per week (Tutorial)		1
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics

Course Outcome (CO): AMT 3109

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

- CO1** Recall, extend and perceive the important elements of Algebra viz., Logarithms, Partial Fractions, Quadratic equations, progressions, binomial theorem, determinants, matrices and complex numbers.
- CO2** Evaluate the limits and examine the continuity at a point of functions of one variable.
- CO3** Find derivatives of functions of one variable using appropriate methods and also determine partial derivatives of functions and make their use in approximation and maxima-minima.
- CO4** Demonstrate and explain the basic concepts of two dimensional co-ordinate geometry viz., straight line and circle.
- CO5** Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1.	<u>Reorientation</u> <u>Surds</u> -Definition, Operation and rationalization. (Revision) <u>Logarithm</u> -Change of Base Rule and Examples. <u>Binomial Theorem</u> – (for integral power) <u>Partial fractions</u> <u>Quadratic Equations</u> : Nature of roots of quadratic equations <u>Progressions</u> : Arithmetic (Revision) and Geometric progressions <u>Determinants</u> Equation of second and third order determinants, Properties, solution of simultaneous linear equations in two and three unknowns, Consistency condition <u>Matrices</u> Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two and three unknowns. <u>Complex Numbers</u> Definition, operation, properties, Cartesian and polar forms, De’moivre’s theorem and its application.	16	25	1, 2,5	CO1	PSO1	SD	G	
2.	Limits, Continuity (functions of one variable)	5	15	1,2,4,5	CO2	PSO1	SD	G	

3.	<p><u>Differentiation:</u></p> <p>Definition of derivative, differentiation of standard functions by first principle, Rules of Differentiation, Differentiation of algebraic, trigonometric, Exponential, Logarithmic, Implicit functions and Composite functions, Higher order derivatives, Leibnitz's Theorem</p> <p><u>Partial Differentiation</u></p> <p>Functions of two variables, Definition of partial derivatives, Euler's Theorem, Implicit functions and Differentials, Applications (Approximations, Maxima and Minima).</p>	18	30	1,2,3,5	CO3	PSO1	SD	G	
4.	<p><u>Straight line</u></p> <p>Inclination and slope of a line, different forms of equations to a straight line (i) Slope-intercept form (ii) Point-slope form (iii) Two-point form (iv) Intercept-form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines.</p> <p><u>Circle</u></p> <p>Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle.</p>	10	15	1, 2, 5	CO4	PSO1	SD	G	
5.	<p><u>Reorientation</u></p> <p>(Trigonometric functions as circular functions),</p> <p>Addition and Factor formula, Trigonometric functions of multiple and submultiples angles.</p>	08	10	1, 2, 5	CO5	PSO1	SD	G	
6.	<p><u>Properties of Triangle:</u></p> <p>Sine formula, Cosine formula, Projection formula, Napier's analogy, Half-Angle formulae</p>	03	05	1, 5	CO5	PSO1	SD	G	

REFERENCE BOOKS

SR. NO	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
3	Calculus and Analytic Geometry by G. B. Thomas, R. L. Finney	Narosa Publishing House, Delhi (Sixth Edition,1998)
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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Petrochemical Technology: Full Time (Regular)

Year	I	Applied Mathematics-I (Term-work including Viva)	Hours per week	1
Semester	I		Core / Elective / Foundation	Credits
			Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1.	Solve examples of Logarithms, Binomial Theorem, Partial Fractions.	1,2,5	1	1
2.	Solve examples on properties of determinants and matrix operations and solution of system of linear equations using determinants and matrices	1,2,5	1	1
3.	Solve examples of evaluating limits of functions of one variable using various appropriate methods	1,2,4,5	2	1
4.	Solve examples based on Allied and Compound angles in Trigonometry	1,2,5	5	1
5.	Solve examples of Addition and Factor formula, T-ratios of multiple and sub-multiple angles	1,2,5	5	1
6.	Solve examples related to fundamental laws of differentiation, chain rule, implicit differentiation and parametric functions of one variable.	1,2,5	3	1
7.	Solve examples of logarithmic differentiation and higher order derivatives and also continuity at a point.	1,2,5	3	1

8.	Solve examples on finding first order, second order partial derivatives of functions of more than one independent variables	1,2,5	3	1
9.	Solve examples based on Euler's theorem and its corollaries	1,2,5	3	1
10.	Solve examples related to different forms of straight line including the concept of parallel and perpendicular lines, distance between parallel lines, concurrent lines.	1,2,5	4	1
11.	Solve examples on circle through three points including those based on particular cases of general equation of circle	1,2,5	4	1
12.	Solve examples based on polar form of complex numbers and also on quadratic equations.	1,2,5	1	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

First Semester of First Year

Subject: Applied Mathematics -I

Code: AMT 3109

<u>AMT3109</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	3	-
CO2	3	1	-	-	-	-	-	3	-
CO3	3	2	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	2	3	-
CO5	3	2	-	-	-	-	1	3	-
Average	3	1	-	-	-	-	0.8	2.8	-



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Petrochemical Technology: Full Time (Regular)

Year	I	AMT 3211 & AMT3211L: Applied Mathematics-II & Applied Mathematics-II(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	II	Core / Elective / Foundation	Hours per week(Theory lecture)		4
			Hours per week (Tutorial)		1
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics & Applied Mathematics-I

Course Outcome (CO): AMT 3211

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

- CO1 Interpret the geometrical meaning of derivative and apply the knowledge of derivatives in different engineering/physical problems.
- CO2 Find the indefinite integrals of algebraic, exponential, logarithmic, trigonometric functions using the methods of substitution, trigonometric substitution, integration by parts and integration by partial fractions.
- CO3 List and prove the properties of definite integrals and utilize them to evaluate the definite integrals
- CO4 Apply the knowledge of integration in solving various physical problems.
- CO5 Categorize and solve first order, first degree ordinary differential equations ;Outline the topics of Vector algebra and solve examples.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1	<u>Application of derivatives</u> Geometrical interpretation of the derivative, Tangent and Normals, Angle between two curves, Sub-tangent and sub-normal, Maxima and Minima, Rectilinear Motion, Approximate value, Radius of Curvature	10	20	1,2,3,5	CO1	PSO1	SD	G	
2	<u>Indefinite Integration</u> Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions	12	20	1,2,5	CO2	PSO1	SD	G	
3	<u>Definite Integration</u> Definite Integrals : Definition, Definite Integrals as the limit of a sum, properties of definite integrals	08	15	1,2,5	CO3	PSO1	SD	G	
4	<u>Application of Integration:</u> Area, Volume, Approximate integrations- Simpson's rule ,Trapezoidal rule, Moment of Inertia, Center of gravity, Pappus Theorem, Length of Arc, Surface areas.	12	15	1, 2,3, 5	CO4	PSO1	SD	G	

5	<u>Differential Equations:</u> Formation of differential equations, Separation of variables, Equations reducible to separation of variables, Homogeneous differential equations, Equation reducible to homogeneous, Linear Differential Equation, Equation Reducible to Linear form, Exact Differential Equation	12	25	1, 2, 5	CO5	PSO1	SD	G
6	<u>Vector Algebra</u> Introduction, Addition of Vectors, Properties of Addition of Vectors, Subtraction of a vector, Multiplication of a Vector by scalar, Position Vector, Product of two Vectors, Scalar or dot Product. Work done as a scalar product, vector product of cross product, scalar triple product	06	05	1,2, 5	CO5	PSO1	SD	G

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SR. NO	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
3	Calculus and Analytic Geometry by G. B. Thomas, R. L. Finney	Narosa Publishing House, Delhi (Sixth Edition, 1998)
4.	A textbook of Engineering Mathematics by N .P. Bali	Laxmi Publications(2016)
5.	Integral Calculus by Shanti Narayan, Dr. P.K.Mittal	S.Chand Publications (35 th Edition, 2005)



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Petrochemical Technology: Full Time (Regular)

Year	I	Applied Mathematics-II (Term-work including Viva)AMT 3211L	Hours per week	1
				Credits
Semester	II	Core / Elective / Foundation	Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1	Solve examples related to Equations of Tangent and Normal, Lengths of Sub-tangent and Sub-normal and Angle between two curves	1,2,3,5	CO1	1
2	Solve examples based on Radius of Curvature, Rectilinear motion and Approximate value	1,2,3,5	CO1	1
3	Solve examples based on finding extreme values of a function and also finding indefinite integrals of functions	1,2,3,5	CO1	1
4	Solve examples based on finding indefinite integrals of functions using simple substitutions.	1,2,5	CO2	1
5	Solve examples based on finding indefinite integrals of functions using trigonometric substitutions	1,2,5	CO2	1
6	Solve examples based on finding indefinite integrals of functions using the method of integration by parts and substitution	1,2,5	CO2	1
7	Solve examples based on finding indefinite integrals of functions using the method of partial fractions and substitution	1,2,5	CO2	1

8	Practice examples of properties of definite integrals	1,2,5	CO3	1
9	Solve examples of Area under the curve and Volume of solid of revolution	1,2,3,5	CO4	1
10	Solve problems related to finding length of arc of plane curves and surface areas of solids of revolution	1,2,3,5	CO4	1
11	Solve examples of centre of gravity of plane regions	1,2,3,5	CO4	1
12	Forming differential equations and solving first order ordinary differential equations by various methods	1,2,3,5	CO5	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

Second Semester of First Year

Subject: Applied Mathematics -II

Code: AMT 3211L

<u>AMT3211</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	-	-	-	-	3	-
CO2	3	-	-	-	-	-	-	3	-
CO3	3	-	-	-	-	-	-	2	-
CO4	3	2	2	-	-	-	-	3	-
CO5	3	2	2	-	-	-	-	3	-
Average	3	1.2	1.2	-	-	-	-	2.8	-

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: Diploma in Civil Engineering

Programme Specific Outcome (PSO)

PSO1 : Use principles of basic sciences, engineering laboratory skills, tools and methodologies for building, testing, operating and maintaining civil engineering structures.

PSO2 : Analyze and design civil engineering structure which are cost effective, safe and sustainable.



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Civil Engineering : Full Time (Regular)

Year	I	AMT 3104 & AMT3104L: Applied Mathematics-I & Applied Mathematics-I(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	I	Core / Elective / Foundation	Hours per week(Theory lecture)	4	
			Hours per week (Tutorial)	1	
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics

Course Outcome (CO): AMT 3104

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

- CO1** Recall, extend and perceive the important elements of Algebra viz., Logarithms, Partial Fractions, Quadratic equations, progressions, binomial theorem and complex numbers.
- CO2** Evaluate the limits, examine the continuity at a point for functions of one variable and Find their derivatives using appropriate methods.
- CO3** Interpret the geometrical meaning of derivative and apply the knowledge of derivatives in different engineering/physical problems. and also determine partial derivatives of functions and make their use in finding approximate values and maxima-minima of function of two variables.
- CO4** Demonstrate and explain the basic concepts of two dimensional co-ordinate geometry viz., straight line and circle.
- CO5** Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) /
1.	Algebra Logarithm-Introduction, Rules of logarithm and Examples. Partial fractions: Introduction, Proper and Improper fractions Quadratic Equations: Nature of roots of quadratic equations Geometric Progressions: Definition, general term and sum of first n terms of geometric progressions, geometric mean	07	14	1, 2,5	CO1	PSO1	SD	G	
2.	Functions, Limits, Continuity and Differentiation Concept of Limit, Standard Limit, different methods to evaluate limits and continuity of function of one variable, Definition of derivative, differentiation of standard functions by first principle, Rules of differentiation, Differentiation of algebraic, trigonometric, exponential, logarithmic, implicit functions and composite functions, Higher order derivatives, Leibnitz's Theorem	14	33	1,2,4,5	CO2	PSO1	SD	G	

3.	<p>Applications of differentiation</p> <p>Geometrical interpretation of derivative, Tangent and Normals, Maxima and Minima, Approximate value, Radius of curvature</p> <p>Partial Differentiation and its applications</p> <p>Functions of two variables , Definition of partial derivatives, Chain Rule, Euler's Theorem, Implicit functions and Differentials, Applications (Approximations, Maxima And Minima).</p>	20	15	1,2,3,5	CO3	PSO1	SD	G	
4.	<p>Co-ordinate Geometry</p> <p>Reorientation, Point, Collinearity, Line, Inclination and slope of a line, different forms of equations to a straight line (i) Slope-intercept form (ii) Point-slope form (iii) Two-point form (iv) Intercept-form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines.</p> <p>Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle.</p>	06	12	1, 2, 5	CO4	PSO1	SD	G	

5.	<p>Trigonometry (Trigonometric functions as circular functions), Addition and Factor formula, Trigonometric functions of multiple and submultiples angles. Introduction of inverse trigonometric functions. Properties of Triangle: Sine formula, Cosine formula, Projection formula, Napier's analogy, Half-Angle formulae.</p>	07	20	1, 5	CO5	PSO1	SD	G	
6.	<p>Complex Numbers and Binomial Theorem Definition, operation, properties, cartesian and polar forms, De'Moivre's theorem and its application Binomial Theorem: Introduction, Development of Binomial expansion</p>	06	05	1, 2.5	CO1	PSO1	SD	G	

REFERENCE BOOKS

SR. NO.	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
3	Calculus and Analytic Geometry by G. B. Thomas, R. L. Finney	Narosa Publishing House, Delhi (Sixth Edition, 1998)
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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Civil Engineering: Full Time (Regular)

Year	I	Applied Mathematics-I (Term-work including Viva)	Hours per week	1
			Credits	
Semester	I	Core / Elective / Foundation	Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1.	Solve examples of Logarithms, Binomial Theorem, Partial Fractions.	1,2,5	1	1
2.	Solve examples of evaluating limits of functions of one variable using various appropriate methods	1,2,5	1	1
3.	Solve examples based on Allied and Compound angles in Trigonometry	1,2,5	2	1
4.	Solve examples of Addition and Factor formula, T-ratios of multiple and sub-multiple angles	1,2,5	5	1
5.	Solve examples related to fundamental laws of differentiation, chain rule, implicit differentiation and parametric functions of one variable.	1,2,5	5	1
6.	Solve examples of logarithmic differentiation and higher order derivatives	1,2,5	3	1

7.	Solve examples on finding first order, second order partial derivatives of functions of more than one independent variables	1,2,5	3	1
8.	Solve examples based on Euler's theorem and its corollaries	1,2,5	3	1
9.	Solve examples related to different forms of straight line including the concept of parallel and perpendicular lines, distance between parallel lines, concurrent lines.	1,2,5	3	1
10.	Solve examples on circle through three points including those based on particular cases of general equation of circle	1,2,5	4	1
11.	Solve examples based on complex numbers and quadratic equations.	1,2,5	4	1
12.	Solve examples based on applications of derivatives	1,2,3,5	3	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

First Semester of First Year

Subject: Applied Mathematics -I

Code: AMT 3104

<u>AMT3104</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	-	-	-	-	-	1	1	-
CO2	3	1	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	2	-
CO4	3	2	-	-	-	-	2	2	-
CO5	3	2	-	-	-	-	1	2	-
Average	3	1.4	-	-	-	-	0.8	1.8	-



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Civil Engineering: Full Time (Regular)

Year	I	AMT 3206 & AMT3206L: Applied Mathematics-II & Applied Mathematics-II(Term-work including Viva)	Max. Marks	UA(Theory)	100
				UA(Termwork including Viva)	25
Semester	II	Core / Elective / Foundation	Hours per week(Theory lecture)		4
			Hours per week (Tutorial)		1
			Credits		

Mode of Transaction : Lectures and Tutorial (4L+1T)

Prerequisite : 10th Standard Mathematics & Applied Mathematics-I

Course Outcome (CO): AMT 3206

Upon successful learning in the course of Applied Mathematics – I, the students will be able to;

- CO1 Evaluate determinants and solve system of linear equations using determinants and matrices too; outline concept of Vector Algebra.
- CO2 Find the indefinite integrals of algebraic, exponential, logarithmic, trigonometric functions using the methods of substitution, trigonometric substitution, integration by parts and integration by partial fractions.
- CO3 List and prove the properties of definite integrals and utilize them to evaluate the definite integrals
- CO4 Apply the knowledge of integration in solving various physical problems.
- CO5 Analyze the sample data using measures of central tendency and measures of dispersion; study correlation and linear regression; Explain the elementary theory of probability and outline the distributions viz., Binomial, Normal and Poisson Distribution.

Unit No.	Topic	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp.) / Entrepreneurship (Ent.) / Skill Development (SD)	Relevance to Local (L) / National (N) / Regional (R) / Global (G)	Relation to Gender (G) / Environment and Sustainability (ES) / Human Values (HV) / Professional Ethics (PE)
1	<p><u>Determinants</u> Equation of second and third order determinants, Properties, Minors and cofactors, solution of simultaneous linear equations in two and three unknowns, Consistency condition</p> <p><u>Matrices</u> Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two and three unknowns.</p> <p><u>Vector Algebra</u> Introduction, Addition of Vectors, Properties of Addition of Vectors, Subtraction of a vector, Multiplication of a Vector by scalar, Position Vector, Product of two Vectors, Scalar or dot Product. Work done as a scalar product, vector product or cross product, scalar triple product</p>	14	20	1,2,3,5	CO1	PSO1	SD	G	

2	<u>Indefinite Integration</u> Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions	10	20	1,2,5	CO2	PSO1	SD	G	
3	<u>Definite Integration</u> Definite Integrals : Definition, Fundamental theorem of Integral Calculus, Definite Integrals as the limit of a sum, properties of definite integrals	08	15	1,2,5	CO3	PSO1	SD	G	
4	<u>Application of Integration:</u> Area under the curve, Volume of solid of revolution, Approximate integration- Simpson's rule Trapezoidal rule, Center of gravity of plane regions, Length of Arc (of a plane curve), Area of surface of revolution	12	20	1, 2,3, 5	CO4	PSO1	SD	G	
5	<u>Statistics:</u> Grouped and Ungrouped Data, Frequency Distribution table, Measure of Central tendency: Mean, Median and Mode Measure of Dispersion : Mean deviation, standard deviation and variance, Correlation, Linear Regression	10	15	1, 2,3, 5	CO5	PSO1	SD	G	
6	<u>Probability:</u> Permutation and combination, Elementary Theory of Probability, Binomial Distribution, Normal Distribution, Poisson Distribution.	06	10	1,2, 3,5	CO5	PSO1	SD	G	

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SR. NO	BOOK TITLE AND AUTHOR	PUBLICATION DETAILS
1	Elementary Engineering Mathematics For I & II Semesters of B. Tech. and Diploma Courses by B. S. Grewal	Khanna Publishers, Delhi (2015)
2	Mathematics for Polytechnic students By S. P. Deshpande (For Diploma Students).	Pune Vidyarthi Gruha Prakashan
3	Calculus and Analytic Geometry by G. B. Thomas, R. L. Finney	Narosa Publishing House, Delhi (Sixth Edition,1998)
4.	A textbook of Engineering Mathematics by N .P. Bali	Laxmi Publications(2016)
5.	Integral Calculus by Shanti Narayan, Dr. P.K.Mittal	S.Chand Publications (35 th Edition,2005)



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**ACADEMIC
 YEAR
 (2023-2024)**

Diploma in Petrochemical Technology: Full Time (Regular)

Year	I	Applied Mathematics-II (Term-work including Viva)AMT 3211L	Hours per week	1
			Credits	
Semester	II	Core / Elective / Foundation	Maximum Marks	25

No.	Tutorial	BT Level	CO	PSO
1	Solve examples on properties of determinants and matrix operations and solution of system of linear equations using determinants and matrices	1,2,3,5	CO1	1
2	Solve examples of Vector Algebra	1,2,3,5	CO1	1
3	Solve examples based on finding indefinite integrals of functions using simple substitutions.	1,2,5	CO2	1
4	Solve examples based on finding indefinite integrals of functions using trigonometric substitutions	1,2,5	CO2	1
5	Solve examples based on finding indefinite integrals of functions using the method of integration by parts and substitution	1,2,5	CO2	1
6	Solve examples based on finding indefinite integrals of functions using the method of partial fractions and substitution	1,2,5	CO2	1
7	Practice examples of properties of definite integrals	1,2,5	CO3	1

8	Solve examples of Area under the curve and Volume of solid of revolution	1,2,5	CO4	1
9	Solve problems related to finding length of arc of plane curves and surface areas of solids of revolution	1,2,3,5	CO4	1
10	Practice examples of Measures of central tendency	1,2,3,5	CO5	1
11	Practice examples of Measures of dispersion, correlation and regression	1,2,3,5	CO5	1
12	Practice examples of Probability and various distributions	1,2,3,5	CO5	1

MAPPING OF COURSE OUTCOME WITH PROGRAM OUTCOMES

Second Semester of First Year

Subject: Applied Mathematics -II

Code: AMT 3206L

<u>AMT3206</u>	PROGRAM OUTCOMES							PROGRAM SPECIFIC OUTCOMES	
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	-	-	-	-	3	-
CO2	3	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	2	-
CO4	3	2	2	-	-	-	-	3	-
CO5	3	2	2	-	-	-	-	3	-
Average	3	1	1	-	-	-	-	2.6	-

Programme Name: Diploma in Mechanical Engineering

After completion of course “APPLIED MATHEMATICS-I” ,The students will able to,

CO1	Recall, extend and perceive the important elements of Algebra viz., Logarithms, Partial Fractions, Quadratic equations, progressions, binomial theorem and complex numbers.
CO2	Evaluate the limits, examine the continuity at a point for functions of one variable and Find their derivatives using appropriate methods
CO3	Interpret the geometrical meaning of derivative and apply the knowledge of derivatives in different engineering/physical problems. and also determine partial derivatives of functions and make their use in finding approximate values and maxima-minima of function of two variables.
CO4	Demonstrate and explain the basic concepts of two dimensional co-ordinate geometry viz., straight line and circle
CO5	Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles

COURSE CONTENTS:

Unit No.	Content	Contact hours	Theory Marks
UNIT-I	Algebra	07	14
	Logarithm-Introduction, Rules of logarithm and Examples. Partial fractions: Introduction, Proper and Improper fractions Quadratic Equations: Nature of roots of quadratic equations Geometric Progressions: Definition, general term and sum of first n terms of geometric progressions, geometric mean		
UNIT-II	Functions, Limits, Continuity and Differentiation	14	33
	Concept of Limit, Standard Limit, different methods to evaluate limits and continuity of function of one variable, Definition of derivative, differentiation of standard functions by first principle, Rules of differentiation, Differentiation of algebraic, trigonometric, exponential, logarithmic, implicit functions and composite functions, Higher order derivatives, Leibnitz's Theorem		
UNIT-III	Applications of differentiation	20	

	Geometrical interpretation of derivative, Tangent and Normals, Maxima and Minima, Approximate value, Radius of curvature		
	Partial Differentiation and its applications		15
	Functions of two variables , Definition of partial derivatives, Chain Rule, Euler's Theorem, Implicit functions and Differentials, Applications (Approximations, Maxima And Minima).		
UNIT-IV	Co-ordinate Geometry		
	Reorientation, Point,Collinearity, Line, Inclination and slope of a line, different forms of equations to a straight line (i) Slope-intercept form (ii) Point-slope form (iii) Two-point form (iv) Intercept-form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines. Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle.	06	12
UNIT-V	Trigonometry		
	(Trigonometric functions as circular functions), Addition and Factor formula, Trigonometric functions of multiple and submultiples angles. Introduction of inverse trigonometric functions.	07	20
	Properties of Triangle		
	Sine formula, Cosine formula, Projection formula, Napier's analogy, Half-Angle formulae.		
UNIT-VI	Complex Numbers and Binomial Theorem		
	Definition, operation, properties, cartesian and polar forms, De'Moivre's theorem and its application Binomial Theorem: Introduction, Development of Binomial expansion	06	06

11 SPECIFICATION TABLE:

Unit No.	Unit Title	Level of Learning					COs	Total
		Remember	Understand	Apply	Analyze	Evaluate		
1	Algebra	02	02			12	1	14
2	Functions, Limits, Continuity and Differentiation	05	02		03	23	2	33
3	Applications of differentiation, Partial Differentiation and its applications	03	02	03		07	3	15
4	Co-ordinate Geometry	03	03			06	4	12
5	Trigonometry, Properties of Triangle	05				15	5	20
6	Complex Numbers and Binomial Theorem	02	01			02	1	05
Total								100

After completion of course “**APPLIED MATHEMATICS-II**” ,the students will able to,

CO1	Evaluate determinants and solve system of linear equations using determinants and matrices too; outline concept of Vector Algebra
CO2	Find the indefinite integrals of algebraic, exponential, logarithmic, trigonometric functions using the methods of substitution, trigonometric substitution , integration by parts and integration by partial fractions.
CO3	List and prove the properties of definite integrals and and utilize them to evaluate the definite integrals
CO4	Apply the knowledge of integration in solving various physical problems.
CO5	Categorize and solve first order, first degree ordinary differential equations and solve higher order linear ordinary differential equations with constant coefficients

COURSE CONTENTS:

Unit No.	Content	CONTACT HOURS	Theory Marks
1	<u>Determinants</u> Equation of second and third order determinants, Properties, Minors and Cofactors, solution of simultaneous linear equations in two and three unknowns, Consistency condition <u>Matrices</u> Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two and three unknowns. <u>Vector Algebra</u> Introduction, Addition of Vectors, Properties of Addition of Vectors, Subtraction of a vector, Multiplication of a Vector by scalar, Position Vector, Product of two Vectors, Scalar or dot Product. Work done as a scalar product, vector product or cross product, scalar triple product	14	15
2	<u>Indefinite Integration</u> Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions	10	20
3	<u>Definite Integration</u> Definite Integrals : Definition, Definite Integrals as the limit of a sum, properties of definite integrals	08	15
4	<u>Application of Integration:</u> Area under the curve, Volume of solid of revolution, Approximate integration- (Simpson's rule Trapezoidal rule), Center of gravity of plane regions, Length of Arc (of a plane curve), Area of surface of revolution	12	20
5	<u>Differential Equations:</u> Formation of differential equations, Separation of variables, Equations reducible to separation of variables, Homogeneous differential equations, Equation reducible to homogeneous, Linear Differential Equation, Equation Reducible to Linear form, Exact Differential Equations	10	15
6	<u>Higher order linear differential equations</u> Linear differential equations of higher order with constant coefficients and Engineering applications	06	15

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11 SPECIFICATION TABLE:

Unit No.	Unit Title	Level of Learning					COs	Total
		Remember	Understand	Apply	Analyze	Evaluate		
1	Determinants, Matrices, Vector Algebra	02	03			10	1	15
2	Indefinite integration	03	02			15	2	20
3	Definite Integration	03	02			10	3	15
4	Applications of Integration	03	02	05		10	4	20
5	Differential Equations	03	02			10	5	15
6	Higher order Linear Differential Equations with Constant coefficients	03	02			10	5	15