Lok Jagruti Kendra University
University with a Difference

Diploma in Electronics & Communication

LJ Polytechnic

Course Code:025030201

Engineering Mathematics-II

Programme / Branch Name			Diploma in Electronics & Communication			
Course Name	Engineering Mathematics-II				**Course Code**	025030201
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
4	2	0	6	50	50	-	100

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Basic Concept of Algebra and Trigonometry.
- ✓ Integers and Rational Arithmetic.
- ✓ Graphical Representation of Lines and Cartesian Co-ordinate Plane.
- ✓ Distance and Section Formulae.
- ✓ Quadratic Equation and its Roots.

3. Rationale

- ✓ The study of mathematics is an important requirement for the understanding and implementation of any branch of engineering. Mathematics curriculum provides students to learn the concept in-depth.
- ✓ The curriculum focuses on developing mathematical understanding, reasoning, and problem-solving skills. This will enable students for employing mathematical strategies to make precise decisions and solve familiar and unfamiliar problems efficiently.
- ✓ It helps students to become self-motivated, confident learners through active participation in challenging and engaging experiences in their day-to-day affairs.
- ✓ Develop and maintain problem solving skills.

4. Objectives

- ✓ Apply the concept of various forms of line, slope, intercepts to solve simple mathematical problems.
- ✓ Identify the different conditions for parallel and perpendicular lines to solve engineering problems.
- ✓ Compute the magnitude and the argument of a complex number.
- ✓ Recognize and plot a given complex number by its real and imaginary parts.
- ✓ Evaluate limits of rational, trigonometric, exponential, and logarithmic functions.
- ✓ Understand and work with derivatives as rates of change in mathematical models.

- ✓ Determine the nature of some stationary points using either the first or second derivative test.
- ✓ Understand the process of anti differentiation.
- ✓ Recognize the problem of calculating areas bounded by known linear functions using integration.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcome	% Weightage	Hours
1.	**Co-ordinate Geometry**	**Point:** 1.1. Distance Formula 1.2. Mid–Point **Straight Line:** 1.3. Cartesian Equation of Line and its Slope 1.4. Intercepts of a Line on the Axes 1.5. Forms of Equation of Line (Slope Point Form, Two Point Form, Intercept Form) 1.6. Parallel and Perpendicular Lines **Circle:** 1.7. Equation of Circle 1.8. Standard Equation of Circle 1.9. General Equation of Circle 1.10. Centre and Radius for General Equation of Circle 1.11. Equation of Tangent and Normal to a Circle	• Find the Distance Between Two Points • Find the Equation of a Line Using the Different Forms • Calculate the Gradients of Two Lines and Identify the Conditions for them to be Parallel or Perpendicular • Find the Equation of Circle with the help of it's Centre and Radius • Calculate Tangent and Normal to the Circle	15	10
2.	**Complex Numbers**	2.1. Concept of Complex Number 2.2. Conjugate of Complex Number and it's Properties 2.3. Modulus of a Complex Number and it's Properties 2.4. Algebraic Operrations on Complex Numbers 2.5. Polar Form of a Complex Number (Modulus Amplitude Form)	• Express Roots of Negative Numbers in Terms of i • Conver the Complex Form into a+ib Form Using Algebraic Operations of Complex Numbers • Find Cogugate, Modulus and Inverse of a Complex Number	15	10

		2.6. Square Root of a Complex Numbers 2.7. De Moivre's Theorem	• Convert the Given Complex Number into Polar Form Using Modulus and Argument • Solve Mathematical Expressions Using De Moivre's Theorem • Find Suare Roots of the Given Complex Numbers		
3.	**Function and Limit**	3.1. Definition of a Function 3.2. Concept and Rules of Limit 3.3. Standard Forms of Limit and Related Examples	• Determine the Existence of Limit, Estimate Numerically and Find Algebraically the Limits of Functions	20	12
4.	**Differentiation and its Application**	4.1. Definition and Derivative of some Standard Forms using the First Principle of Differentiation 4.2. Rules for Differentiation of Sum, Difference, Product, and Quotient of the Functions 4.3. Derivative of Composite Functions (Chain Rule) 4.4. Derivative of Implicit Functions 4.5. Derivative of Parametric Functions 4.6. Logarithmic Differentiation 4.7. Successive Differentiation up to Second Order 4.8. Application: Velocity & Acceleration, Maxima & Minima	• Able to Derive Differentiation of Function Using the First Principle of Derivative • Apply the Working Rules and Standard Forms of Differentiation to Find the Derivative of Various Functions • Find the Derivative of Simple Functions Using the Concept of Chain Rule • Solve Problems on Successive Differentiation up to Second Order • Apply the Concept and Rules of Differentiation to Solve the Problems Related to Velocity, Acceleration, and Maximum & Minimum Values of a Function	25	12

5.	**Integration and its Application**	5.1. Concept of Integration (Inverse Process of Differentiation) 5.2. Integral of Standard Functions 5.3. Working Rules of Indefinite Integration 5.4. Integration by Substitution Method 5.5. Integration by Parts 5.6. Method of Partial Function 5.7. Definite Integral and its properties 5.8. Application: Area and Volume	• Integrate the Various Function by Applying the Working Rules of Integration • Find Definite and Indefinite Integration Using Standard Forms of Integration • Find the Integral of Simple Function Using the Method of Substitution and Integration by Parts • Evaluate Area and Volume Using Integration	25	12
				Total Hours	**56**

6. List of Exercises /Tutorials

Tutorial is an important teaching-learning tool in mathematics. Small-group tutorials are an effective method to enhance student's confidence. It can help to improve their scores on tests and boost their academic performance in a class by One-on-one attention.

Sr. No.	Exercises/Tutorial	Key Competency	Hours
1	**Co-ordinate Geometry**	• Distinguish Different Forms of Equation of Line and it's Slop • Formation of Parallel and Perpendicular lines by Applying it's Condition • Evaluate Angle between Two Lines • Evaluate Equation of Circle • Calculate Centre and Radius from the Given Equation of Circle • Obtain the Equation of Tangent and Normal to the Given Circle	5
2	**Complex Numbers**	• Understand Geometrical Representation of Complex Number • Apply Properties of Complex Numbers to Solve Related Problems • Express Polar form of Complex Number. • Know Cube Root of Unity • Apply De Moivre's Theorem for Integer to Simplify Mathematical Expression	5

3	**Function and Limit**	• Understand the Concept of Function • Distinguish Different Types of Functions • Apply Rules and Standard Formulae of Limits to Related Examples	6
4	**Differentiation and its Application**	• Understands the Idea of Differentiation from First Principles • Formulate and Compute the Velocity and Acceleration of a Moving Body • Evaluate the Maximum and Minimum Values of a Function	6
5	**Integration and its Application**	• Understand Integration as an Inverse Process of Differentiation • Examine Various Techniques of Integration and Apply them to Definite and Improper Integrals • Evaluate Area and Volume Using Integration	6
		Total Hours	**28**

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	**U %**	**App %**	**C %**	**E %**	**An %**
1	Co-ordinate Geometry	20	20	30	10	10	10
2	Complex Numbers	20	20	30	10	10	10
3	Function and Limit	20	20	10	10	30	10
4	Differentiation and its Application	20	20	30	10	10	10
5	Integration and its Application	30	20	20	10	10	10

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Reference Books

1) Mathematics for Engineering Applications, Kuldip S. Rattan, Nathan W. Klingbeil, Wiley Publication
2) Elementary Engineering Mathematics, B. S. Grewal, Khanna Publishers
3) Engineering Mathematics, H. K. Das, S. Chand Publication
4) Engineering Mathematics, Croft, Anthony, Pearson Education
5) Calculus – Volume 1, Tom M Apostol, Wiley Publication
6) Advanced Engineering Mathematics, Krezig, Ervin, Wiley Publication
7) Engineering Mathematics-1, Reena Garg, Khanna Publication
8) Mathematics for Polytechnic Students, S. P. Deshpande, Pune Vidyarthi Gruh Prakashan

9. Open Sources (Website, Video, Movie)

1) https://tinyurl.com/ykddvzwu
2) https://tinyurl.com/238e2ep9
3) https://www.geogebra.org/?lang=en