GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Engineering
Level: Diploma
Branch: Electrical Engineering, Renewable Energy, Automation and Robotics Instrumentation & Control Engineering, Power Electronics Engineering
Course / Subject Code: DI02C00021(Only for C to D Students)
Course / Subject Name: Engineering Mathematics

w. e. f. Academic Year:	2024
Semester:	2nd
Category of the Course:	BSC

Prerequisite:	Function, Logarithm, Determinant, Trigonometry, Limit, Factorization, Polynomial, Quadratic Equation, Coordinate Geometry, LCM, GCD, Concept of Set.
Rationale:	This course is an extension of the course Mathematics-I of first semester namely Engineering Mathematics. The course is designed to inculcate its applications in relevant branch of engineering and technology using the techniques of Differentiation, Integration, Differential equations, Matrix theory and Complex numbers. The course is structured with an emphasis on multidisciplinary learning and skill development, ensuring that students can apply mathematical techniques and concepts effectively in their vocational and technical areas. Its elements are designed to be thorough, hands-on, and aligned with both academic standards and professional expectations.

Course Outcome:
After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Demonstrate the ability to Crack engineering related problems based on Matrices.	A(Application)
02	Demonstrate the ability to solve engineering related problems based on applications of differentiation.	A(Application)
03	Demonstrate the ability to solve engineering related problems based on applications of integration.	A(Application)
04	Develop the ability to apply differential equations to significant applied problems.	A(Application)
05	Represent complex numbers algebraically and geometrically for solving engineering related problems.	A(Application)

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	1	0	4	70	30	00	00	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1. Matrices	1.1 Concept of Matrix 1.2 Types of Matrices 1.3 Addition, Subtraction and multiplication by scalar of matrices 1.4 Product of two matrices 1.5 Adjoint and Inverse of a matrix of order 2X2 and 3X3. 1.6 Solution of Simultaneous linear equations of two variables.	**10**	**23**
2. Differentiation and its Applications	2.1. Concept and Definition of Differentiation 2.2. Working rules : Sum, Product, Division 2.3. Chain Rule 2.4. Derivative of Implicit functions 2.5. Derivative of Parametric functions 2.6. Logarithmic Differentiation 2.7. Successive Differentiation up to second order 2.8. Applications: Velocity, Acceleration, Maxima & Minima of given simple functions.	**11**	**23**
3. Integration and its Applications	3.1 Concept and Definition of Integration. 3.2 Working rules and Integral of standard functions. 3.3 Method of substitution. 3.4 Integration by parts. 3.5 Definite Integral and its properties. 3.6 Applications: Area and volume. (Simple problems)	**10**	**20**

4. Differential Equations	4.1 Concept and Definition, Order and Degree of differential equation. 4.2 Solution of DE of first degree and first order by Variable Separable method. 4.3 Solution of linear Differential equation.	**7**	**17**
5. Complex Numbers	5.1 Concept of Complex number. 5.2 Algebra of Complex numbers. 5.3 Conjugate, Modulus and inverse of Complex numbers. 5.4 Argument and Polar form of a Complex number. 5.5 De Moivre's Theorem and related simple examples. 5.6 Square root of a Complex number and cube root of unity.	**7**	**17**
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Unit No.	Unit Title	Distribution of Theory Marks						
		R Level	U Level	A Level	N Level	E Level	C Level	Total
1	Matrices	4	6	6	0	0	0	16
2	Differentiation and its Applications	4	6	6	0	0	0	16
3	Integration and its Applications	4	4	6	0	0	0	14
4	Differential Equations	2	4	6	0	0	0	12
5	Complex Numbers	2	4	6	0	0	0	12
Total		16	24	30	0	0	0	70
%		23	34	43	0	0	0	100

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy

References/Suggested Learning Resources:

(a) Books:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Elementary Engineering Mathematics	B. S. Grewal	Khanna Publishers,15th Edition. ISBN: 978-81-7409-257-1
2	Engineering Mathematics (Third edition).	Croft, Anthony	Pearson Education, New Delhi, 2014.ISBN 978-81-317-2605-1

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1	Elementary Engineering Mathematics	B. S. Grewal	Khanna Publishers,15th Edition. ISBN: 978-81-7409-257-1
3	Calculus and Its Applications	Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent	Addison-Wesley 10th Edition ISBN-13: 978-0-321-69433-1
4	Calculus and Analytic Geometry	G. B. Thomas, R. L. Finney	Addison Wesley, 9th Edition, 1995.ISBN 978-8174906168
5	Understanding Engineering Mathematics	John Bird	Routledge; 1st edition ISBN 978-0415662840
6	Advanced Engineering Mathematics	Krezig, Ervin	Wiley Publ., NewDelhi,2014, ISBN: 978-0-470-45836-5
7	Mathematics-I	Deepak Singh	Khanna Book Publishing Co ISBN: 978-93-91505-42-4
8	Mathematics-II	Garima Singh	Khanna Book Publishing Co ISBN: 978-93-91505-52-3

(b) Open-source software and website:

	● https://www.youtube.com/channel/UCLJVrQyPYsseCf78QWCDsvA/featured (YouTube Channel of DTEGUJ) ● https://www.geogebra.org/?lang=en ● https://phet.colorado.edu/ ● www.dplot.com/ - DPlot ● www.wolfram.com/mathematica/ ● https://www.khanacademy.org/ ● www.easycalculation.com ● www.scilab.org/ - SCI Lab ● https://ncert.nic.in/textbook/pdf/lemh102.pdf ● https://www.geeksforgeeks.org
Apps in Google Play Store	National Digital Library e-Granthalaya NSDC eBook Reader: KaushalePustakalaya ePathshala IGNOU e-content

List of Laboratory/Learning Resources Required:

1. Computer System, smart phone & LCD Projector
2. Scientific Calculator (Display type: Natural Display Algebraic input logic: Natural V.P.A.M. Significant function: 10+2.)

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