



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Architecture**

**Level: Diploma**

**Branch: Architecture**

**Course / Subject Code : DA02063041**

**Course / Subject Name : Mathematics**

w. e. f. Academic Year:	2025-26
Semester:	Second
Category of the Course:	Building Sciences and Applied Engineering (BS&AE)

<b>Prerequisite:</b>	Linear equation in two variables, Factorization, Polynomial, Quadratic Equation, Coordinate Geometry, Trigonometry, LCM, GCD, Concept of Set
<b>Rationale:</b>	This course aims to build essential mathematical competencies tailored to the field of architecture, with a focus on the practical applications of determinants and vectors, functions and limits, differentiation, integration, and differential equations. By integrating mathematical concepts with architectural contexts, the course supports the development of analytical thinking, spatial reasoning, and problem-solving skills, which are crucial for effective planning, design, and structural analysis. Structured to promote multidisciplinary learning and technical proficiency, the course content is both comprehensive and application-oriented. It aligns with academic standards while addressing the practical demands of architectural education and professional practice.

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

No	Course Outcomes	RBT Level
1	Demonstrate the ability to solve architectural problems based on concepts of Vectors.	R, U, A
2	Demonstrate the ability to analyse and illustrate the functions using the concept of limits.	R, U, A
3	Apply differentiation techniques to analyze and solve quantitative problems in architectural design, structural behavior and environmental performance	R, U, A
4	Demonstrate proficiency in applying integration methods to analyze and solve problems in architectural design and structural analysis.	R, U, A
5	Develop the ability to apply differential equations to significant applied problems.	R, U, A

**Teaching and Examination Scheme:**

Teaching Scheme (in Hours)			Total Credits L+T+P	Assessment Pattern and Marks				Total Marks
L	T	P		C	Theory		Tutorial / Practical	
			ESE (E)		PA/CA (M)	PA/CA (I)	ESE (V)	
3	1	0	4	70	30	20	00	120

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, CA - Continuous Assessment; ESE -End Semester Examination.



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Unit No.	Content	No. of Hours	% of Weightage
1.	<b>Determinants and Vectors</b> 1.1 Determinant and its value up to 3rd order (without properties) 1.2 Vector, addition, subtraction, magnitude and direction. 1.3 Direction cosines of a vector 1.4 Scalar and vector products and their properties 1.5 Angle between two vectors 1.6 Position vector of a point dividing a line segment in a given ratio 1.7 Calculation of work done by using scalar product of vectors	10	22
2.	<b>Functions and Limits</b> 2.1 Functions with simple examples. 2.2 Logarithms as functions 2.3 Laws of logarithms and related simple examples 2.4 Trigonometric function 2.5 Special angles (allied, compound, multiple), sum and factor formulas, inverse trigonometric function (without proof) (Simple Examples) 2.6 Limit of a function. 2.7 Standard formulae of limits and related simple examples.	12	26
3.	<b>Differentiation and its Applications</b> 3.1 Concept and definition of differentiation 3.2 Working rules: sum, product and quotient rules 3.3 Chain rule 3.4 Derivatives of implicit functions 3.5 Derivatives of parametric functions 3.6 Logarithmic differentiation 3.7 Successive differentiation up to second order 3.8 Applications: velocity, acceleration, maxima and minima of simple functions	10	22
4.	<b>Integration and its Applications</b> 4.1 Concept and definition of integration 4.2 Working rules and integrals of standard functions 4.3 Method of substitution 4.4 Integration by parts 4.5 Definite integral and its properties 4.6 Applications: area and volume (Simple Problems)	8	18
5.	<b>Differential Equations</b> 5.1 Concept and definition; order and degree of differential equations 5.2 Solution of first-order, first-degree differential equations by variable separable method 5.3 Solution of linear differential equation	5	12
	<b>Total</b>	<b>45</b>	<b>100</b>



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## Suggested Specification Table with Marks (Theory):

Unit No.	Unit Title	Distribution of Theory Marks						Total
		R Level	U Level	A Level	N Level	E Level	C Level	
I	Determinants and Vectors	04	06	06	0	0	0	16
II	Functions and Limits	04	06	08	0	0	0	18
III	Differentiation and its Applications	04	06	06	0	0	0	16
IV	Integration and its Applications	02	04	06	0	0	0	12
V	Differential Equations	02	02	04	0	0	0	08
<b>Total</b>		<b>16</b>	<b>24</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>70</b>
<b>%</b>		<b>23</b>	<b>34</b>	<b>43</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>100</b>

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:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Elementary Engineering Mathematics	B. S. Grewal	Khanna Publishers, 15 <sup>th</sup> 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
3	Calculus and Its Applications	Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent	Addison-Wesley 10 <sup>th</sup> Edition ISBN-13:978-0-321-69433-1
4	Calculus and Analytic Geometry	G. B. Thomas, R. L. Finney	Addison Wesley, 9 <sup>th</sup> Edition, 1995 ISBN: 978-8174906168
5	Understanding Engineering Mathematics	John Bird	Routledge; 1 <sup>st</sup> Edition ISBN: 978-0415662840
6	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley Publ., New Delhi, 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
9	Elementary Mathematical Statistics	S. C. Gupta and V. K. Gupta	Sultan Chand and Sons, Educational Publisher, New Delhi ISBN: 978-8180547003
10	A Text Book of Vector Analysis	Narayan Shanti and Mittal P. K.	S. Chand Publication, ISBN: 978-8121922432



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## (b) Open source software and websites:

<https://www.youtube.com/@GujaratTechnologicalUniversity>

[https://youtube.com/playlist?list=PLLfoR5ZJ0A\\_4ushGMb\\_\\_Kvsk3ffqlrIr3&si=PsGV4GDzUliiByEB](https://youtube.com/playlist?list=PLLfoR5ZJ0A_4ushGMb__Kvsk3ffqlrIr3&si=PsGV4GDzUliiByEB)  
(GTU official YouTube Channel)

<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](http://www.dplot.com/-DPlot)

[www.wolfram.com/mathematica/](http://www.wolfram.com/mathematica/)

<https://www.khanacademy.org/>

[www.easycalculation.com](http://www.easycalculation.com)

[www.scilab.org/-SCILab](http://www.scilab.org/-SCILab)

<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: Kaushale Pustakalaya ePathshala IGNOU e-content
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## List of Laboratory/Learning Resources Required:

Computer system, smartphone and LCD Projector

Scientific Calculator (Display type: Natural Display, Algebraic input logic: Natural V.P.A.M. Significant function: 10+2.)

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