

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Advance Mathematics (Group-1)
(Code: 3320002)

Diploma Programmes in which this course is offered	Semester in which offered
Biomedical Engineering, Chemical Engineering, Electrical Engineering, Computer Engineering, Electronics & Communication Engineering, Information Technology, Power Electronics	Second Semester

1. RATIONALE

The course is classified under Advance Mathematics and students are intended to understand the advance concepts and principles of Mathematics such as calculus, complex numbers and differential equations. This knowledge is required to understand and solve engineering problems.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of mathematical skills so that students are able to acquire following competencies:

- Use proper Mathematical tool to understand engineering principles and concepts.
- Apply concepts of calculus or suitable mathematical tool to solve given engineering problems.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	100
2	2	0	4	70	30	0	0	

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

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Complex Number	1a. Simplify Complex expressions 1b. Find Modulus and Amplitude of given expressions 1c. Use De Moivre's Theorem to simplify mathematical expressions and to find roots	Concept, Modules and Amplitude form, Root of Complex Number, De Moivre's Theorem. Apply concept of complex numbers in simple engineering problems.
Unit– II Function & Limit	2a .Solve the problems using functions 2b .Solve the problem of function using the concept of Limit	2.1 Function Concept and Examples 2.2 Limit Concept of Limit, Standard Formulae and related Examples.
Unit– III Differentiation & it's Applications	3a. Differentiate the various function 3b. Apply the differentiation to Velocity, Acceleration and Maxima & Minima	3.1 Differentiation: Definition, Rules of, Sum, Product, Quotient of Functions, Chain Rule, Derivative of Implicit functions and Parametric functions, Logarithmic Differentiation. Successive Differentiation up to second order 3.2 Application: Velocity, Acceleration, Maxima & Minima.(simple problems)
Unit– IV Integration & its application	4a .Integrate the various function 4b .Apply the Integration for finding Area and Volume	4.1 Integration: Concept, Integral of Standard Functions, Working Rules of Integration, Integration by Parts, Integration by Substitution Method, Definite Integral and its properties. 4.2 Application: Area and Volume.(simple problems)
Unit-V Differential Equations(First Order First Degree)	1a. Find the Order and Degree of a Differential Equation. 1b. Form a Differential Equation for simple Engineering problems 1c. Solve Differential Equations using Variable Separable, Homogeneous and Integrating Factor methods.	5.1 Definition, Order and Degree of Differential Equation 5.2 Formation of DE 5.3 Solution of DE of First Degree and First Order by Variable Separable, Homogeneous and Integrating Factor methods.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Complex Number	3	2	5	3	10
II	Function & Limit	4	3	5	4	12
III	Differentiation & its Application	8	4	8	6	18
IV	Integration & its Application	8	4	8	4	16
V	Differential Equations	5	2	8	4	14
Total		28	15	34	21	70

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The exercises should be properly designed and implemented with an attempt to develop different types of mathematical skills so that students are able to acquire above mentioned competencies.

S. No.	Unit No.	Practical Exercises
1	I	Complex Number, Practice Examples
2		Use software for further understanding of applications
3	II	Practice Examples of Function & Limit
4		Use of Various Method/Techniques
5	III	Differentiation and Related Examples
6		Solve problems related to various methods/techniques of differentiations
7		Identify the Engineering Applications from respective branches and solve the problems
8	IV	Integration & Related Examples.
9		Solve problems Related to Various Methods/Techniques of integration
10		Identify the Engineering Applications from respective branches and solve the problems
11	V	Identify the corresponding Engineering Applications for differential equations from respective branches and solve the problems.

Note: The above Tutor sessions are for guideline only. The remaining Tutorial hours are may be used by teachers appropriately for revision and practice.

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like: course/topic based seminars, internet based assignments, teacher guided self learning activities, course/library/internet/lab based Mini-Projects etc. These could be individual or group-based. Some of these activities may be as below:

1. Applications to solve identified Engineering problems and use of Internet.
2. Learn graphical softwares: EXCEL, D PLOT, GRAPH etc.
3. Learn MathCAD to use Mathematical Tools and solve the problems of Calculus.
4. Learn MATLAB and use it to solve the identified problems.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Anthony croft and others	Engineering Mathematics (third edition)	Pearson Education, 2012
2	Pandya N R	Advanced Mathematics for Polytechnic	Macmillan Publishers India Ltd., 2012
3	Deshpande S P	Polytechnic Mathematics	Pune Vidyarthi Gruh Prakashan, 1984
4	Prakash D S	Polytechnic Mathematics	S Chand, 1985

B. List of Major Equipment/ Instrument

1. Simple Calculator
2. Computer System with Printer, Internet
3. LCD Projector

C. List of Software/Learning Websites

1. Excel
2. D Plot
3. Graph
4. MathCAD
5. MATLAB

You may use other Software like Mathematical and other Graph

Plotting software. Use websites such as wikipedia.org, mathworld.wolfram.com Etc...

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE:**Faculty Members from Polytechnics**

- **Dr. N. R. Pandya**, HOD-General Dept., Govt. Polytechnic, Ahmedabad
- **Dr N A Dani**, Lecturer, Govt. Polytechnic, Junagadh.
- **Prof. (Smt) R L Wadhwa**, Lect Govt Polytechnic, Ahmedabad
- **Prof. H C Suthar**, BPTI, Bhavnagar
- **Prof. P N Joshi**, Govt Polytechnic, Rajkot

Coordinator and Faculty Member From NITTTR Bhopal

- **Dr. P. K. Purohit**, Associate Professor, Dept. of Science.
- **Dr. Deepak Singh**, Associate Professor, Dept. of Science.