

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT  
COURSE CURRICULUM**

Course Title: Advance Mathematics (Group-2)  
(Code: 3320003)

| Diploma Programmes in which this course is offered   | Semester in which offered |
|--|---------------------------|
| Civil Engineering, Ceramic Engineering, Environment Engineering, Mechanical Engineering, Mining Engineering, | 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, coordinate geometry and Statics. 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<br>(In Hours) |   |   | Total Credits<br>(L+T+P) | Examination Scheme |    |                 |    | Total Marks |
|-------------------------------|---|---|--------------------------|--------------------|----|-----------------|----|-------------|
|                               |   |   |                          | Theory Marks       |    | Practical Marks |    |             |
| L                             | T | P | C                        | ESE                | PA | ESE             | PA |             |
| 2                             | 2 | 0 | 4                        | 70                 | 30 | 0               | 0  | 100         |

**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  |
|--|---|--|
| <b>Unit – I<br/>Co-ordinate<br/>Geometry</b>                         | <p><b>1a.</b> Find the distance between two points, use Mid-Point formula for quadrilateral</p> <p><b>1b.</b> Find the equation of locus using Distance Formula</p> <p><b>1c.</b> Find the equation of line using the different forms</p> <p><b>1d.</b> Find the equation of circle</p> <p><b>1e.</b> Find Tangent and Normal to the circle</p> | <p><b>1.1 Point :</b> Distance Formula, Mid-point, Locus of a point</p> <p><b>1.2 Straight Line :</b> Forms of Equation of St Lines : Slope Point Form, Two Point Form, Intercept Form, Parallel and Perpendicular lines</p> <p><b>1.3 Circle :</b> Equation of Circle, Centre and radius form, Tangent and Normal and related problems.</p> |
| <b>Unit- II<br/>Function &amp;<br/>Limit</b>                         | <p><b>2a</b> . Solve the problem using functions</p> <p><b>2b</b> . Solve the problem of function using the concept of Limit</p>  | <p><b>2.1 Function</b> Concept and Examples</p> <p><b>2.2 Limit</b> Concept of Limit, Standard Formulae and related Examples.</p>  |
| <b>Unit- III<br/>Differentiation<br/>&amp; it's<br/>Applications</b> | <p><b>3a.</b>Differentiate the various function</p> <p><b>3b.</b>Apply the differentiation to Velocity, Acceleration and Maxima &amp; Minima</p>  | <p><b>3.1 Differentiation:</b> 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</p> <p><b>3.2 Application:</b> Velocity, Acceleration, Maxima &amp; Minima.</p>                  |
| <b>Unit- IV<br/>Integration &amp;<br/>its application</b>            | <p><b>4a</b> .Integrate the various function</p> <p><b>4b</b> .Apply the Integration for finding Area and Volume</p>  | <p><b>4.1 Integration:</b> Concept, Integral of Standard Functions, Working Rules of Integration, Integration by Parts, Integration by Substitution Method, Definite Integral and its properties.</p> <p><b>4.2 Application:</b> Area and Volume.</p>  |
| <b>Unit-V<br/>Statistics</b>   | <p><b>5a</b> .Measure Central Tendency in given data</p> <p><b>5b.</b> Measure Dispersion in given data</p>   | <p><b>5.1 Measures of Central Tendency</b> for Ungrouped and Grouped Data : Mean, Median and Mode</p> <p><b>5.2 Measure of Dispersion</b> for Grouped and Ungrouped data : Standard deviation</p>  |

## 5. SUGGESTED SPRCIFICATION TABLE WITH HOURS AND MARKS (THEORY)

| Unit No.     | Unit Title                        | Teaching Hours | Distribution of Theory Marks |           |           |           |
|--------------|-----------------------------------|----------------|------------------------------|-----------|-----------|-----------|
|              |                                   |                | R Level                      | U Level   | A Level   | Total     |
| I            | Co-ordinate Geometry              | 5              | 2                            | 8         | 4         | 14        |
| 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            | Statistics                        | 3              | 2                            | 5         | 3         | 10        |
| <b>Total</b> |                                   | <b>28</b>      | <b>15</b>                    | <b>34</b> | <b>21</b> | <b>70</b> |

**Legends:** R = Remember; U= Understand; A= Application 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 (During tutorial hours)

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. | Exercises/Tutorial  |
|--------|----------|---|
| 1      | I        | Co-ordinate Geometry, Practice Examples   |
| 2      | I        | Solve engineering problems using coordinate geometry                                  |
| 3      | II       | Practice Examples of Function & Limit   |
| 4      | II       | Use of Various Method/Techniques.   |
| 5      | III      | Differentiation and Related Examples  |
| 6      | III      | Solve problems related to various methods/techniques of differentiations              |
| 7      | III      | Identify the Engineering Applications from respective branches and solve the problems |
| 8      | IV       | Integration & Related Examples.   |
| 9      | IV       | Solve problems Related to Various Methods/Techniques of integration                   |
| 10     | IV       | Identify the Engineering Applications from respective branches and solve the problems |
| 11     | V        | Statistics, Practice Examples   |
| 12     | V        | Use Excel 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 may be as below:

1. Applications to solve identified Engineering problems and use of Internet.
2. Learn graphical softwares:EXCEL,DPLT,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. DPlot
3. Graph
4. Math CAD
5. MATLAB

You may use other Software like Mathematica and other Graph

Plotting software. Use 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 Applied Science
- **Dr. Deepak Singh**, Associate Professor, Dept. of Applied Science