

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)
SEMESTER	1
COURSE TITLE	DIFFERENTIAL AND INTEGRAL CALCULUS
COURSE CODE	01MA2101
COURSE CREDITS	5

Objective:

- 1 This subject aims to provide an essential background of differential and integral calculus to students of science and engineering courses at graduate level. A good science or engineering graduate is expected to have a sound knowledge of these two areas of mathematics as Differential and integral calculus are essential tools for learning Technology, Engineering and Sciences.
- 2 To make the students learn to deal with traffic issues including traffic safety, operation and control.
- 3 A good science or engineering graduate is expected to have a sound knowledge of these two areas of mathematics as Differential and integral calculus are essential tools for learning Technology, Engineering and Sciences.

Course Outcomes: After completion of this course, student will be able to:

- 1 Apply the concept of derivatives in Taylor and Maclaurin's series.
- 2 Employ first-order ordinary differential equations using variable separable, linear, Bernoulli's, and exact methods.
- 3 Compute partial derivatives and apply Euler's theorem and chain rules to functions of several variables.
- 4 Evaluate double and triple integrals in Cartesian and transformed coordinate systems and change the order of integration to simplify problems.
- 5 Analyze the nature and convergence of infinite series using standard tests, including geometric series and positive term series.
- 6 Employ the method of Lagrange's multiplier to solve the problems of constrained optimization.

Pre-requisite of course:Differentiation, Integration

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	2	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Infinite Series Concept of sequence, nature of infinite series, Properties for convergence, geometric series, Tests for convergence of positive term series	10
2	Expansion of functions Concept of Expansion of functions, Taylor's series expansion, Maclaurin's series expansion	7
3	Ordinary Differential Equations Reorientation, order and degree, Variable separable method, Linear differential equations, Bernoulli's and Exact differential equations	6
4	Partial differentiation Partial derivatives, Euler's theorem, Modified Euler's theorem and their applications, Implicit functions, Chain rule, Total differentials	7
5	Applications of Partial differentiation Errors and approximations, Tangent plane and normal line to a surface, Constrained optimization using Lagrange's multiplier, Jacobian	7
6	Multiple Integrals Calculation of double and triple integrals, reverse the order of integration, Change into polar, spherical and cylindrical coordinates	5
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Infinite Series Tutorial 1, Tutorial 2, Tutorial 3	2
2	Expansion of functions Tutorial	2
3	Ordinary Differential Equations Tutorial	2
4	Partial differentiation Tutorial	2
5	Applications of Partial differentiation Tutorial	2
6	Multiple Integrals Tutorial	2
7	Infinite Series Tutorial 1, Tutorial 2, Tutorial 3	2
8	Expansion of functions Tutorial 1, Tutorial 2	2
9	Ordinary Differential Equations Tutorial 1, Tutorial 2	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
10	Partial differentiation Tutorial 1, Tutorial 2	2
11	Application Partial differentiation Tutorial 1, Tutorial 2	2
12	Multiple Integrals Tutorial 1, Tutorial 2	6
Total Hours		28

Textbook :

- 1 Thomas' Calculus, Maurice D. Weir, Pearson Education, 2008
- 2 Calculus Early Transcendental, Stewart James, Thomson India, 2007

References:

- 1 Advanced Engineering Mathematics, Advanced Engineering Mathematics, Wylie & Barrett, Mc Graw Hill, 1962
- 2 Advanced Engineering Mathematics, Advanced Engineering Mathematics, Erwin Kreyszig, JOHN WILEY & SONS, INC, 2001
- 3 Higher Engineering Mathematics, Higher Engineering Mathematics, B.S.Grewal, Khanna publishers, 2019
- 4 Advanced Engineering Mathematics, Advanced Engineering Mathematics, H. K. Dass, S Chand Publishing, 2008
- 5 Advanced Engineering Mathematics, Advanced Engineering Mathematics, Greenberg M D., Pearson., 2002

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	20.00	30.00	15.00	10.00	5.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be directed toward the completion of semester for assessment of performance of understudies in laboratory.

Instructional Method:

- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <http://mathworld.wolfram.com/>
- 2 <http://en.wikipedia.org/wiki/Math>