COURSE TITLE	**ADVANCE CALCULUS**
COURSE CODE	**01CT0111**
COURSE CREDITS	**4**

Objective:

1. 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. 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.

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

1. Expand functions using Maclaurin's and Taylor's series.
2. Explain and use the Mean value theorems and Improper Integrals.
3. Apply various techniques to solve first order differential equations to real life problems.
4. Understand and evaluate the functions using the concepts of partial derivatives
5. Apply Multiple Integrals to evaluate the Surface Area and Volume of any three dimensional objects.

Pre-requisite of course: Basic Maths

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Improper Integrals** Improper integral of the first kind, second kind and third kind, convergence - divergence of the improper integral	4
2	**Partial differentiation** Partial derivatives, Euler's theorem, Modified Euler's theorem and their applications, Implicit functions, Chain rule, Total differentials	10
3	**Expansion of functions and Mean Value theorems** Expansion of functions by Maclaurin's series and Taylor's series, Limit, continuity and differentiability of functions , Mean value Theorems.	6

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Contents : Unit	Topics	Contact Hours
4	**Ordinary Differential Equations** Reorientation, order and degree, Variable separable method, Linear differential equations, Bernoulli's equation, Exact differential equations.	6
5	**Applications of Partial differentiation** Errors and approximations, Tangent plane and normal line to a surf, Constrained optimization using Lagrange's multiplier, Jacobian	6
6	**Multiple Integrals** Calculation of double and triple integrals, reverse the order of integration, Change into polar, spherical and cylindrical coordinates	10
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorial** Improper Integrals, Expansion of functions and Mean Value theorems, Ordinary Differential Equations, Partial differentiation, Applications of Partial differentiation, Multiple Integrals	14
Total Hours		**14**

Textbook :

1 Thomas' Calculus, M. D. Weir , Pearson Eduaction,, 2008

References:

1 Calculus Early Transcendental, Calculus Early Transcendental, Stewart James:, Thomson India, 2017

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

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.

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Instructional Method:

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.

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

Supplementary Resources:

1 http://mathworld.wolfram.com

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