Subject Code:01MA2101

Subject Name: DIFFERENTIAL AND INTEGRALCALCULUS

B.Tech. (Sem I)

Objective of the Course:

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.

Credit Earned: 4

Course outcomes:

After successful completion of the course, it is expected that student will be able to

- Appreciate and apply the concepts of convergence and divergence of infinite series in problem of science, technology and engineering.
- Solve first order differential equations and will be able apply them to solve real life problems.
- Explain the Euler's theorem and Modified Euler's theorem and will be able to verify it for given function of several variables.
- Understand the role of multiple integral in finding volume of three dimensional objects, finding area between to two curves, finding moment of inertia etc.
- Understand the key role of vector integral calculus in finding flux in vector field, finding potential function, etc.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	IA (M)	Viva (V)	Term Work (TW)	
3	2	0	5	50	20	30	25	25	150

Contents:

Sr. No.	Title of the unit - topics	Number of hours
1	**Infinite Series and Expansion of functions:** Concept of sequence, nature of infinite series, Properties for convergence, geometric series, Tests for convergence of positive term series, Concept of Expansion of functions, Taylor's series expansion, Maclaurin's series expansion.	12
2	**Ordinary Differential Equations:** Reorientation, order and degree, Variable separable method, Linear differential equations, Bernoulli's and Exact differential equations.	08
3	**Partial differentiation and Applications of Partial differentiation:** Partial derivatives, Euler's theorem, Modified Euler's theorem and their applications, Implicit functions, Chain rule, Total differentials, Tangent plane and normal line to a surface, Constrained optimization using Lagrange's multiplier.	12
4	**Multiple Integrals:** Calculation of double and triple integrals, reverse the order of integration, Jacobian, change into polar.	10
5	**Vector differential calculus and Vector Integral calculus:** Recall the concept of vector algebra, Scalar and vector functions, gradient of a scalar point functions, Divergence and Curl of a vector point function, Physical meaning of gradient, divergence and curl, directional derivatives, Conservative vector fields, Irrotational and Solenoidal function., Line integrals, Path Independence of Line Integrals, Green's theorem	10
	Total Hours	52

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as per 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	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	05%

Instructional Method:

a. 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.
b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Reference Book:

1. M. D. Weir *et al*: Thomas' Calculus, 11th Ed., Pearson Education, 2008.
2. Stewart James: Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett: Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson
5.B.S.Grewal: Higher Engineering Mathematics, 43rd ed., Khanna publishers
6. Erwin Kreyszig , Advanced Engineering Mathematics, 9/e, JOHN WILEY & SONS,
7. H. K. Dass, Advanced Engineering Mathematics, S Chand Publishing..

Web Resources
1. www.scilab.org/
2. http://nptel.ac.in/
3. http://ocw.mit.edu/
4.http://mathworld.wolfram.com/
5.http://en.wikipedia.org/wiki/Math