

**Subject Code: 01MA2101**

**Subject Name: Differential and integral calculus**

**B. Tech. Year – I (Semester 1)**

**Rationale :** 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.

**Credits Earned : 05 Credits**

**Course Outcome :**

After completion of this course, student will be able to

1. Appreciate and apply the concepts of convergence and divergence of infinite series in problem of science, technology and engineering.
2. Evaluate Maclaurin's and Taylor's expansion for variety of functions and use them to solve further advanced problems.
3. Solve first order differential equations and will be able apply them to solve real life problems.
4. Explain the Euler's theorem and Modified Euler's theorem and will be able to verify it for given function of several variables.
5. Apply the notion of partial differentiation to evaluate equations of tangent plane and normal line for given surface.
6. Apply the method of Lagrange's multiplier to solve the problems of constrained optimization.

**Teaching and Examination Scheme :**

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

**Content :**

Sr. No.	Content	Total Hrs.
1	<b>Infinite Series</b> Concept of sequence, nature of infinite series, Properties for convergence, geometric series, Tests for convergence of positive term series.	10

2	<b>Expansion of functions</b> Concept of Expansion of functions, Taylor's series expansion, Maclaurin's series expansion	07
3	<b>Ordinary Differential Equations</b> Reorientation, order and degree, Variable separable method, Linear differential equations, Bernoulli's and Exact differential equations.	10
4	<b>Partial differentiation:</b> Partial derivatives, Euler's theorem, Modified Euler's theorem and their applications, Implicit functions, Chain rule, Total differentials.	07
5	<b>Applications of Partial differentiation:</b> Errors and approximations, Tangent plane and normal line to a surface, Constrained optimization using Lagrange's multiplier, Jacobian.	07
6	<b>Multiple Integrals:</b> Calculation of double and triple integrals, reverse the order of integration, Change into polar, spherical and cylindrical coordinates.	10

### Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level	C Level
20	30	25	15	10	--

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create**

### 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 undergraduates in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

### Reference books :

1. M. D. Weir *et al*: Thomas' Calculus, 11<sup>th</sup> Ed., Pearson Education, 2008.
2. Stewart James: Calculus Early Transcendental, 5<sup>th</sup> 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, 43<sup>rd</sup> ed., Khanna publishers
6. Erwin Kreyszig , Advanced Engineering Mathematics, 9/e, JOHN WILEY & SONS, INC

7. H. K. Dass, Advanced Engineering Mathematics, S Chand Publishing

**List of Open Base Software / learning website :**

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