CALCULUS AND LAPLACE TRANSFORMS
(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code : 19MA21	**CIE Marks : 50**
Contact Hours/Week : 04(3L+1T)	**SEE Marks: 50**
Total Hours:42	**Exam Hours : 03**
Semester : II	**Credits: 04**

Course Learning Objectives: The purpose of the course **19MA21** is to facilitate the students with concrete foundation of Partial derivatives, vector calculus, partial differential equations and infinite series enabling them to acquire the knowledge of these mathematical tools.

MODULE-I **08 Hours**

Partial differentiation; Definition and simple problems, Eulers theorem (without proof) and examples, Total derivatives, differentiation of composite functions. Jacobians-Simple problems. Taylor's theorem for function of two variables (statement only) and simple examples. Maxima and minima for a function of two variables with illustrative examples. (**RBT Levels: L1 & L2)**

MODULE-II 08 Hours

Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals by change of order of integration and changing into polar co-ordinates. Applications to find area by double integration and volume by double and triple integration

(**RBT Levels: L1 & L2)**

MODULE-III

Vector Calculus:- 08 Hours

Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- Illustrative problems.
Vector Integration: Line integrals, Theorems of Green, Gauss and Stokes (without proof).Applications to work done by a force and flux. (**RBT Levels: L1 & L2)**

MODULE-IV

Laplace Transformations: 09 Hours

Defination, Transforms of elementary functions. Laplace transform of Derivatives and integrals and problems, periodic function Unit step function. Inverse Laplace transform, properties, convolution theorem, solution of linear differential equations.

(**RBT Levels: L1 & L2)**

MODULE V

Infinite Series: Convergence and divergence of infinite series- Cauchy's root test and D'Alembert'sratio test(without proof)- Illustrative examples. 09 Hours

Partial Differential Equations(PDE's):-

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration method and variable separable method. Homogeneous PDEs involving derivative with respect to one independent variable only.

(**RBT Levels: L1 & L2)**

Course Outcomes: On completion of this course, students are able to:

CO1: Learn the partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO2: Apply the concept of multiple integrals and their usage in computing the area and volumes.

CO3: Illustrate the applications vector calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surface and volume integrals.

CO4: Apply the knowledge of Laplace transform and inverse laplace transform to solve the differential equations.

CO5: Understand a variety of partial differential equations and solution by exact methods/method of separation of variables and test the convergence of series.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be finally reduced to 50.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Early Transcendentals Calculus- James Stewart, Thomson Books, 5e 2007
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010. 4. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.

5. Thomas G.B. and Finney R.L."Calculus and Analytical Geometry"9th Edition, Pearson, 2012.