Course Type	Course Code	Name of Course	L	T	P	Credit
DC	AMR13101	Methods of Applied Mathematics-I	3	1	0	7

Course Objective

The objective of the course is to well acquaint the students with some strong mathematical methods for solving engineering problems in their domain.

Learning Outcomes

Upon successful completion of this course, students will:

- extend their knowledge from real calculus to complex calculus.
- be able to compute some complicated integrals using complex contour integration.
- learn about the special functions (with their properties) which are solutions of a certain ODE with variable coefficients using power series and more generalized Frobenius method.
- be well acquainted with the Laplace Transform which is recognized as an engineers' mathematical toolbox for solving linear ODE and related initial value problems.
- Be enabled to model the physical problem such as vibrating string problem, heat conduction problem, etc using PDE.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Limit, Continuity and Differentiability of function of complex variables, Analytic Functions, Cauchy – Riemann's equations	03	Understanding the concept of the limit, continuity, differentiability and analyticity of complex functions
2	Cauchy's Integral Theorem, Morera's Theorem, Cauchy Integral Formula	03	Developing the fundamental concept of complex integration theory
3	Taylor and Laurent Series, Singularities	03	This will help to expand complex functions in an infinite series form
4	Residues theorem, Computing Contour Integrals	03	This topic will help to compute certain complicated integrals using residue calculus
5	Solution of Legendre's equation, Orthogonal Property, recurrence relations, Generating function and Rodrigue's Formula for $P_n(x)$.	04	Student will learn about the solution of Legendre's equation and its properties
6	Solution of Bessel's equation, generating function for $J_n(x)$, orthogonal property, recurrence relations and integral representation of $J_n(x)$.	03	Student will learn about the solution of Bessel's equation and its properties
7	Laplace Transform of simple functions, some important properties of Laplace transform: Linearity property, First and second shifting properties, Change of scale property	03	Developing the concept of Laplace transform and its properties
8	Laplace transform of derivatives, integral and periodic functions, t^n-multiplication and t-division theorems, methods of finding Laplace transform	03	Understanding the methods of finding Laplace transform of functions
9	Inverse Laplace transform and its properties, inverse Laplace transform of derivatives and integrals, s-multiplication and s-division theorems, Convolution theorem, methods of finding inverse Laplace transform	03	Developing the concept of inverse Laplace transform and its properties
10	Use of Laplace transform in evaluating complicated and improper integrals and solution of ordinary differential equations related to engineering problems	03	This topic will help to apply Laplace transform in solving some engineering problems
11	Classifications of partial differential equations, solutions of one dimensional wave equations, one dimensional unsteady heat flow equation and two dimensional heat flow equation in Cartesian and polar coordinates by variable separable method with reference to Fourier trigonometric series.	08	This topic will enable to model the physical problem such as vibrating string problem, heat conduction problem,etc using PDE and solve those using variable separable method with reference to Fourier trigonometric series

		Total 39	

Text Books:

1. R K Jain and S R K Iyenger "Advanced Engineering Mathematics", 4th Edition. Alpha Science, 2014
2. E Kreyszig "Advanced Engineering Mathematics, 10th Edition, 2011

Reference Books:

1. **Murray Spiegel, Schaum's outline of Laplace Transforms, McGraw Hill.**
2. **B V Ramana, Higher Engineering Mathematics, McGraw Hill, 2007.**
3. **B. S. Grewal, Higher Engineering Mathematics**

We propose marks division among the following evaluation events as follows:

Quiz 1: 10 marks (Preferably in the last week of August, 2019)

Mid Sem: 30 marks (As per Schedule in the Academic Calender)

Quiz 2: 10 marks (Preferably in the last week of October 2019)

End Sem: 50 marks (As per schedule in the Aacademic Calaender)