Pandit Deendayal Petroleum University **School of Technology**

19MA 103T MATHEMATICS-II										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	**1**	**--**	**4**	**4**	**25**	**50**	**25**	**--**	**--**	**100**

COURSE OBJECTIVES:

To be able to apply the calculus of complex functions to evaluate contour integrals.
To formulate and solve various engineering problems using the methods of solving ODEs.
To understand basic concepts of Fourier series and Special Functions.
To study the properties of Laplace transforms and apply them to solve ODEs and PDEs.

UNIT –I **[10]**

Complex Analysis: Complex numbers, Function of a Complex variable, Analytic function, Cauchy-Riemann equations, Conformal mapping and its types, Some standard & special conformal mappings, Definition of a Complex line integral, Cauchy's integral theorem, Cauchy's Integral formula, Residue theorem, Calculation of residues, Evaluation of real definite integrals.

UNIT- II **[10]**

Ordinary differential equations: Differential equations of first order and higher degree, Linear independence and dependence of functions. Higher order differential equations with constant coefficient, Rules for finding C.F. and P.I., Method of variation of parameters, and method of undermined coefficients, Cauchy and Legendre's linear equations, Linear differential equations of second order with variable coefficients; Simultaneous linear equations with constant coefficients. Various applications of higher order differential equations in solution of engineering problems, Orthogonal trajectories.

UNIT- III **[10]**

Fourier Series: Periodic functions, Euler's Formulae, Dirichlet's conditions, expansion of even and odd functions, half range, Fourier series, Fourier transform, Fast Fourier transform, Z - transform.

Special Functions: Power series method to solve the differential equation, Frobenius method for solution near regular singular points, Legendre Polynomials and Bessel's function.

UNIT -IV **[9]**

Laplace transforms: Piecewise continuous functions and exponential functions, Definition, Existence and Properties of Laplace transforms, unit step function and Heavyside function, Inverse Laplace transforms, Laplace transform of derivative, Convolution theorem, Applications in solving differential equations.

TUTORIAL **[13]**
TOTAL **[52]**

Text books and References:

R.V. Churchill and J. W. Brown, Complex variables and applications, McGraw-Hill, 7th Ed., 2003.
J. M. Howie, Complex analysis, Springer-Verlag, 1st Ed., 2003.
R. K. Jain and S. R. K. Iyernagar, Advanced Engineering Mathematics, Alpha Science, 3rd Ed., 2007.
Erwin Kreyszig, Advanced Engineering mathematics, John Wiley, 10th Ed., 2015.

COURSE OUTCOMES:

Apply the calculus of complex functions to evaluate contour integrals.
Formulate and solve various engineering problems using the knowledge of ODEs.
Apply the knowledge of Fourier series and special functions to real world problems.
Study the properties of Laplace transforms and apply them to solve ODEs and PDEs.