

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. / Mechanical Engineering / Ist Year		
Course Title	Complex Analysis And Differential Equations		
Course Code	MAIR21	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	Jan 2021	Section	B
Name of Faculty	Dr. R.Sathya	Department	Mathematics
Official Email	sathyar@nitt.edu	Telephone No.	9944474850
Name of Course Coordinator(s)	-		
Official E-mail	-	Telephone No.	-
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	

Syllabus (approved in BoS)

Analytic functions; Cauchy-Riemann equations; Line integral, Cauchy's integral theorem and integral formula (without proof); Taylor's series and Laurent series; Residue theorem (without proof) and its applications.

Higher order linear differential equations with constant coefficients; Second order linear differential equations with variable coefficients; Method of variation of parameters; Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform- Convolution theorem – Periodic functions – Application to ordinary differential equation.

Formation of partial differential equations by eliminating arbitrary constants and functions – solution of first order partial differential equations – four standard types – Lagrange's equation. Method of separation of variables.

ESSENTIAL READINGS : Textbooks, reference books, Website addresses, journals, etc

1. James Ward Brown, Ruel Vance Churchill, *Complex Variables and Applications*, McGraw-Hill Higher Education, 2004
2. Dennis Zill, Warren S. Wright, Michael R. Cullen, *Advanced Engineering Mathematics*, Jones & Bartlett Learning, 2011
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 2019.
4. William E. Boyce, Richard C. DiPrima, Douglas B. Meade, *Elementary Differential Equations and Boundary Value Problems*, Wiley, 2017.
5. Ian N. Sneddon, *Elements of Partial Differential Equations*, Courier Corporation, 2013

COURSE OBJECTIVES

The Course presents

1. an introduction to analytic functions and power series.
2. various Cauchy's theorems and its applications in evaluation of integral.
3. various approach to find general solution of the ordinary differential equations
4. Laplace transform techniques to find solution of differential equations, partial differential equations and methods to find solution.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)

Course Outcomes (CO)

Aligned Programme Outcomes (PO)

On completion of this course students will be able to:

1. understand analytic functions discuss its properties
2. obtain series representation of analytic functions
3. evaluate various integrals by using Cauchy's residue theorem
4. classify singularities and derive Laurent series expansion
5. find the solutions of first and some higher order ordinary differential equations
6. apply properties of special functions in discussion the solution of ODE.
7. Find Laplace transform of a given function and its inverse Laplace transform.
8. Find solution of first order partial differential equations.

1 and 5

COURSE PLAN – PART II

COURSE OVERVIEW

1. This course introduces an analytic function, properties, Cauchy Residue theorem and Laurent's series expansion.
2. It plays an important role in solving higher order differential equations involving real world problems such as electric circuits.
3. To solve boundary value problems using Laplace transform techniques.
4. To find the solution of partial differential equations.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topics	Mode of Delivery
1.	1 st , 2 nd , 3 rd , 4 th week	Higher order linear differential equations with constant coefficients; Second order linear differential equations with variable coefficients; Method of variation of parameters; Cauchy- Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.	Online, Through MS Teams
2.	5 th , 6 th , 7 th week	Analytic functions; Cauchy-Riemann equations; Line integral, Cauchy's integral theorem and integral formula (without proof); Taylor's series and Laurent series; Residue theorem (without proof) and its applications.	Online, Through MS Teams
3.	6 th week	Assessment – 1	
4.	7 th , 8 th & 9 th , 10 th week	Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform- Convolution theorem – Periodic functions – Applications to ordinary differential equation.	Online, Through MS Teams

5.	11 th & 12 th 13 th week	Formation of partial differential equations by eliminating arbitrary constants and functions – solution of first order equations – four standard types – Lagrange’s equation. Method of separation of variables.	Online, Through MS Teams
6.	12 th week	Assessment – 2	
7	After 14 th week	Final Assessment	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Assessment -1	6 th Week	1 hour and 15 minutes	25
2.	Assessment – 2	12 th Week	1 hour and 15 minutes	25
3.	Assessment -3 (Assignments)		Will be announced while distributing the assignments	20
CPA	Compensation Assessment	13 th Week	1 hour and 15 minutes	(25)
4.	Final Assessment* (online written exam)	After 14 th Week	2 hours	30

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Feedback from the students during class committee meetings and in the class after the assessments 1 and 2.
2. Online feedback through questionnaire before the final assessment.
3. Student knowledge about the topics covered in this course will be judged through marks obtained in examination.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email / phone etc)

Students can ask the course faculty for clarifying doubts by fixing appointment through E-mail via Ms – teams.

COMPENSATION ASSESSMENT POLICY

- a) Students who have missed either Assessment-1 or Assessment-2 or both (only on genuine reasons) can register for Compensation Assessment which shall be conducted soon after the completion of the Assessment-2 and before the Final Assessment.
- b) The Compensation Assessment shall be conducted for the weightage of 25% comprising the syllabus of both Assessment -1 & Assessment -2.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)


- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- **Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.

- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HOD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

FOR APPROVAL


(Dr. R.Sathya)
Course Faculty

CC-Chairperson


April 23, 2021
(Dr. R.B. Anand)


HOD