DEPARTMENT OF MATHEMATICS
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech. / Electrical and Electronics Engineering		
Course Title	Complex Analysis and Differential Equations		
Course Code	MAIR22	No. of Credits	3 (L) + 0 (T) = 3
Course Code of Pre-requisite subject(s)	NIL		
Session	January 2023	Sections (if, applicable)	A and B
Name of Faculty	Dr. Vamsinadh Thota	Department	Mathematics
Email	vamsinadh@nitt.edu	Telephone No.	+91- 8173980996
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	✓ Core course	☐ Elective course	

Syllabus (approved in BoS-2019)

MAIR22 – Complex Analysis and Differential Equations

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.

Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform – Convolution theorem – Periodic functions – solution of ordinary differential equation and simultaneous equations with constant coefficients and integral equations by Laplace Transform.

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.

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 main objective of this course is to
1. Introduce analytic functions, Taylor's series and Laurent's series
2. Evaluate integrals using various Cauchy's theorems
3. Introduce various methods to solve higher order linear ODEqs
4. Introduce Laplace transforms and their applications in solving ODEqs and Integral equations
5. Formulate partial differential equations and finding solutions to standard PDEqs

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
After completion of this course, students will be able to 1. Identify analytic functions and their properties, classify the singularities 2. Evaluate various integrals using Cauchy's theorems and obtain the series representation 3. Find the solutions of higher order linear ODEqs using various methods. 4. Find the Laplace transforms and inverse Laplace transforms of given functions, and solving ODEqs and Integral equations using Laplace transform. 5. Find the solution of first order PDEqs using various methods.	PO1, PO7

COURSE PLAN – PART II

COURSE OVERVIEW

This course will introduce;
1. Basic calculus of complex valued functions and solving the complex integral
2. Various methods and techniques to solve higher order differential equations
3. Finding solutions to standard partial differential equations.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week/ Contact Hours	Topic	Mode of Delivery
1.	1st, 2nd & 3rd 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.	
2.	4th & 5th week	Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform – Convolution theorem – Periodic functions	
	6th week	Assessment – 1	Chalk and Talk
3.	6th & 7th week	Solution of ordinary differential equation and simultaneous equations with constant coefficients and integral equations by Laplace Transform.	
4.	8th, 9th & 10th 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.	
	10th week	Assessment – 2	

| 5. | 11th, 12th & 13th week | 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. | |
| | 14th week | End-Semester Examination | |

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Assessment 1	6th week	2 hours	20%
2.	Assessment 2	10th week	2 hours	20%
CPA	Compensation Assessment	13th week	2 hours	20%
3.	Assessment 3 (Written Assignments/Quizs)	Will be announced in due course of time		20%
4.	Assessment - 4 (End Sem)	14th week	3 hours	40%

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

1. Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the topic.
2. Feedback form issued to students to express their comments about the course before Assessment -1, and after completing the syllabus. Students are requested to give genuine feedback about the course.
3. Student knowledge about the topic 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)

a) Students who have missed either assessment – 1 or assessment – 2 or both can register for compensation assessment, which shall be conducted soon after the completion of the assessment – 2 and before the regular semester examination. Other students are strictly NOT allowed to register for the compensation assessment.

b) The compensation assessment shall be conducted for 20% marks comprising the syllabus of both assessment – 1 & assessment – 2.

c) Students should submit assignments before last date of submission. In case students fails to submit their assignments within last date of submission, he/she will get zero mark for that particular assignment.

d) If the students fail to appear semester examination due to genuine/medical reason, can register for special end semester examination after approval from course teacher & Head of Department of Mathematics. The special end semester examination will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for special end semester examination within three days from reopening of institute for next semester. Grade issued as per the guidelines followed for his/her batch students.

e) There will be one reassessment for the students who have secured "F" in this course and will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for reassessment within three days from reopening of institute for next semester. If the students satisfy the criteria fixed by the faculty to promote E grade will be given E grade and others given 'F' grade.

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.

  The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION
MODE OF CORRESPONDENCE (email / phone etc)
Students can meet the course faculty by fixing appointment through E-mail (vamsinadh@nitt.edu) or mobile (+91 – 8173980996), during office hours (8:30 am to 5:30 pm).

FOR APPROVAL

20|03|23	Skaya 28|3|23	30|03|23
Dr. Vamsinadh Thota	Dr. S Kamalvizhi	Dr. M P Selvan
Course Faculty	CC-Chairperson	HOD/EEE