NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I

Name of the programme and specialization	B.Tech (EEE), 1st Year
Course Title	Complex Analysis and Differential Equations

Course Code	MAIR22	**No. of Credits**	3
Course Code of Pre-requisite subject(s)	Nil		
Session	January 2020	**Section (if, applicable)**	A & B
Name of Faculty	Dr. V.Shanthi	**Department**	Mathematics
Official Email	vshanthi@nitt.edu	**Telephone No.**	9487440341
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		**Telephone No.**	
Course Type (please tick appropriately)	√ Core course	☐ 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;

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.

Reference books:

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' 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
5. Partial differential equations and methods to find solution of it.

MAPPING OF COs with POs

Course Outcomes: Completion of the course, student will be able to	Programme Outcomes (PO) (Enter Numbers only)
1. understand analytic functions discuss its properties 2. obtain series representation of analytic functions 3. classify singularities and derive Laurent series expansion 4. evaluate various integrals by using Cauchy's residue theorem	1
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.	1, 7
7. Find Laplace transform of a given function and its inverse Laplace transform.	1, 2, 7
8. Find solution of first order partial differential equations.	1

COURSE PLAN – PART II

COURSE OVERVIEW

This course will introduce
- function of complex variable and its properties.
- ordinary/partial differential equations and various approach to find its solution.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1st, 2nd, 3rd Weeks /10 hours	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	Chalk & Talk
2	3rd, 4th, 5th weeks 10 hours	Higher order linear differential equations with constant coefficients; Second order linear differential equations with variable coefficients; Method of variation of parameters; Cauchy-Euler equation	Chalk & Talk

3	6th	Assessment-1	*one hour exam*
4	6th ,7th ,8th , 9th weeks 10 hours	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.	Chalk & Talk
5	9th week	Assessment - 2	*one hour exam*
6	9th , 10th 11th weeks 10 hours	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	Chalk & Talk
7	12th week	Compensation Assessment	*one hour exam*
8	13th week	Final assessment (Assessment -4)	*Three hours exam*

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment 1 (written test)	6th week	1 hour	20
2	Assessment 2 (written test)	9th week	1 hour	20
3	Assessment 3 (Assignments)			10
CPA	Compensation Assessment (written test)	12th week	*1 hour*	*20*
4	Final Assessment (Assessment 4, written test)	13th week	3 hours	50

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 concept.
2. Feedback form issued to students to express their comments about the course before assessment - 1 & 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 (including compensation assessment to be specified)

1. Examination:
   a) Students who have missed the assessment – 1 or assessment - 2 or both can register the **Compensation Assessment** which shall be conducted soon after the completion of the assessment – 2 and before the regular semester examination (assessment – 4).
   b) The **Compensation Assessment** shall be conducted for 20 marks comprising the syllabus of both assessment – 1 and assessment - 2.
   c) Students were strictly not allowed to enroll for **Compensation Assessment** to improve their marks.
   d) Students should submit assignments before last date of submission. In case students fails to submit their assignments, he/she will get zero mark for that particular assignment.
   e) A student must score a minimum of 20% in the final assessment to complete the course

2. The Institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades. All assessment of a course will be done on the basis of marks.

3. Supplementary Examination
   a) Students who get "F" or "X" grade and satisfactory attendance in the courses are eligible for Supplementary Examination.

   b) The Supplementary Examination will normally be held during a specific week of the subsequent semesters. The supplementary examination shall be scheduled by the Office of the Dean Academic

   c) The Supplementary Examination will be conducted by the course teacher who offered the course or a faculty member nominated by the HoD/Mathematics.

   d) The weightage for the supplementary examination shall be 100%. Absolute grading system with a passing minimum of 35% shall be followed.

   e) In case a student fails in the Supplementary Examination he/she has to reappear till the student passes the course.

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, IF ANY

Students can reach course faculty by fixing appointment through E-mail (vshanthi@nitt.edu or phone (948744034 or intercom: 3673).
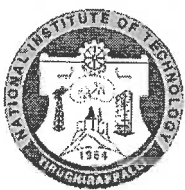
FOR APPROVAL

Dr. V.Shanthi
Course Faculty

CC- Chairperson

HOD Head of The Department
विभाग प्रमुख / Head of The Department
विद्युत् व ड्वान्थ अभियांत्रिकी / Department of Electrical And Electronics
राष्ट्रीय प्रौद्योगिकी संस्थान / National Institute of Tech
तिरुचिरापल्ली - 620 015 / Tiruchirapalli - 620 0
तमिलनाडु, भारत / TamilNadu, INDIA

Guidelines

a) The number of assessments for any theory course shall range from 4 to 6.

b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.

c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.