

NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech, ICE Sec A&B, I Year		
Course Title	Complex Analysis and Differential Equations		
Course Code	MAIR 22	No. of Credits	03
Course Code of Pre-requisite subject(s)	NIL		
Session	Jan, 2022	Section (if, applicable)	(A&B)
Name of Faculty	Dr. N. Shivaranjani Dr.Kamalika Roy	Department	Mathematics
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Name of Course Coordinator(s) (if, applicable)	--		
E-mail		Telephone No.	
Course Type	General Institute Requirements (GIR)		
Syllabus (approved in BoS)			
<p>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.</p> <p>Higher order linear differential equations with constant coefficients; Second order linear differential equations with variable coefficients; Method of variation of parameters; Cauchy Euler equation.</p> <p>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.</p> <p>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.</p>			
ESSENTIAL READINGS : (Textbooks, reference books etc.)			
<ul style="list-style-type: none"> • Dennis Zill, Warren S. Wright, Michael R. Cullen, Advanced Engineering Mathematics, Jones & Bartlett Learning, 2011. • Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2019 • James Ward Brown, Ruel Vance Churchill, Complex Variables and Applications, McGraw-Hill Higher Education, 2004 			



NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

- Ian N. Sneddon, *Elements of Partial Differential Equations*, Courier Corporation, 2013.
- William E. Boyce, Richard C. DiPrima, Douglas B. Meade, *Elementary Differential Equations and Boundary Value Problems*, Wiley, 2017.

COURSE OBJECTIVE

The course presents

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

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
<p>On completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Understand analytic functions and discuss its properties. • Obtain series representation of analytic functions. • Evaluate various integrals by using Cauchy's residue theorem. • Classify singularities and derive Laurent series expansion. • Find the solutions of first and some higher order ordinary differential equations. • Apply properties of special functions in evaluating the solution of ODE. • Find Laplace transform of a given function and its inverse Laplace transform. • Find solution of first order partial differential equations. 	<p>(i) Identify, formulate and analyze engineering problems through technical literature, and (ii) apply knowledge of mathematics to arrive at solutions.</p>

COURSE PLAN – PART II

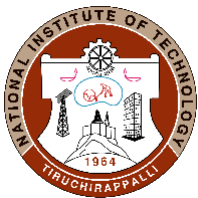
COURSE OVERVIEW

This course will introduce;

1. Importance of analytic functions and complex integration.
2. The techniques of obtaining solutions of ODEs.
3. Laplace transforms.
4. The formation of PDE and method of separation of variables to deal with PDEs.

COURSE TEACHING AND LEARNING ACTIVITIES

Sr.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	1 st , 2 nd & 3 rd week	Analytic functions; Cauchy-Riemann equations; Line integral, Cauchy's integral theorem and integral formula (without proof); Taylor's series and	Online / Video Lecture / PPT



NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

		Laurent series; Residue theorem (without proof) and its applications.		
2.	4 th & 5 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	Online / Video Lecture / PPT	
3.	6 th Week	Assignment -1	Written/Viva	
4.	6 th Week	Assessment -1	Written Test	
5.	7 th ,8 th & 9 th week	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.	Online / Video Lecture / PPT	
6.	10 th , 11 th 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.	Online / Video Lecture / PPT	
7.	11 th Week	Assignment -2	Written/Viva	
8.	11 th Week	Assessment - 2	Written Test	
10.	12 th Week	Compensation Assessment	Written Test	
11.	After 12 th Week	Final Assessment (Assessment -3)	Written Test	
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Assessment 1 (Written Test)	6 th Week	1.5 hour	25%
2.	Assessment 2 (Written Test)	11 th Week	1.5 hour	25%



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3.	Assignments			20%
CPA	Compensation Assessment * (Written Test)	12 th Week		
4.	Final Assessment# (Assessment -3, Written Test)	After 12 th Week	2 hours	30%

* One compensation assessment for absentees in the assessments (other than the final assessment) will be conducted for 25 marks comprising the syllabus of both Assessment-1 and Assessment-2. Only genuine cases of absence shall be considered.

Minimum 20% must be secured in the Final Assessment for passing the course.

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

1. Students can meet the faculty (with prior appointment) 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)

The institute follows relative grading with flexibility given to teachers to decide the marks range for grades. All assessments of a course will be done on the basis of marks.

MODE OF CORRESPONDENCE (email / phone etc)

Students can meet the course faculty by fixing appointment through E-mail or phone call between 9:30 am to 5:30 pm in the working days.

COMPENSATION ASSESSMENT POLICY

Only the students who are absent in any of the Assessment Tests (or both) **with genuine reasons (medical emergencies /On Duty)** will be allowed to write the compensation test. Students are strictly not allowed to enroll for compensation assessment to improve their marks.

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.



NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

- 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

FOR APPROVAL

Dr.N.Shivaranjani

Dr. Kamalika Roy

(Course Faculty)

CC-Chairperson

HOD

Guidelines:

- a) **The number of assessments for a course shall range from 4 to 6.**
- b) **Every 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. Details of compensation assessment to be specified by faculty.**
- 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.**