



DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. in Electrical and Electronics Engineering		
Course Title	Complex Analysis and Differential Equations		
Course Code	MAIR22	No. of Credits	03
Course Code of Pre-requisite subject(s)	MAIR12		
Session	January 2022	Section (if, applicable)	B
Name of Faculty	Dr. N. Prakash	Department	Mathematics
Email	<a href="mailto:prakashn@nitt.edu">prakashn@nitt.edu</a>	Mobile No.	(+91) 7845688072
Name of Course Coordinator(s) (if, applicable)	NIL		
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
<b>Syllabus (approved in BoS)</b>			
<ul style="list-style-type: none"> <li>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.</li> <li>Higher order linear differential equations with constant coefficients; Second order linear differential equations with variable coefficients; Method of variation of parameters; Cauchy-Euler equation.</li> <li>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.</li> <li>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.</li> </ul>			
<b>ESSENTIAL READINGS : (Textbooks, reference books etc.)</b>			
<ol style="list-style-type: none"> <li>James Ward Brown, Ruel Vance Churchill, <i>Complex Variables and Applications</i>, McGraw-Hill Higher Education, 2004.</li> <li>Dennis Zill, Warren S. Wright, Michael R. Cullen, <i>Advanced Engineering Mathematics</i>, Jones &amp; Bartlett Learning, 2011.</li> <li>Erwin Kreyszig, <i>Advanced Engineering Mathematics</i>, John Wiley &amp; Sons, 2019.</li> <li>William E. Boyace, Richard C. DiPrima, Douglas B. Meade, <i>Elementary Differential Equations and Boundary Value Problems</i>, Wiley, 2017.</li> <li>Ian N. Sneddon, <i>Elements of Partial Differential Equations</i>, Courier Corporation, 2013.</li> </ol>			
<b>COURSE OBJECTIVES</b>			





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The course objective is to

1. Learn the concept of analytic function and its series representation and to study complex integration.
2. Solve higher order ODEs with constant and variable coefficients.
3. Introduce Laplace and inverse Laplace transforms and apply them to solve ordinary differential equations, simultaneous equations, and integral equations.
4. Discuss the formation of partial differential equations and solutions of first order PDEs by the method of separation of variables and other methods.

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

Course Outcomes	Aligned Programme Outcomes (PO)
On completion of this course students will be able to	
1. Construct analytic functions using Cauchy-Riemann equations and evaluate complex integrals using Cauchy's integral theorem, integral formula, and residue theorem.	1,2
2. Find solutions of higher order ordinary differential equations with constant and variable coefficients.	
3. Find Laplace and inverse Laplace transform of standard functions and apply Laplace transform technique to find solutions of ordinary differential equations, simultaneous equations, and integral equations.	
4. Formulate, categorize, and solve partial differential equations.	

### COURSE PLAN – PART II

#### COURSE OVERVIEW

This course will introduce

1. Analytic functions, Cauchy-Riemann equations, line integrals and residue theorem.
2. Higher order ODEs with constant & variable coefficients.
3. Laplace transform and its inverse to solve various equations.
4. PDEs and solutions of first order PDEs by the method of separation of variables and other methods.

#### COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	1 <sup>st</sup> , 2 <sup>nd</sup> & 3 <sup>rd</sup> week	Higher order linear differential equations with constant coefficients; Second order linear differential equations with variable coefficients; Method of variation of parameters; Cauchy-Euler equations;	Online- Through MS teams
2.	4 <sup>th</sup> , 5 <sup>th</sup> & 6 <sup>th</sup> 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- Through MS teams
3.	6 <sup>th</sup> Week	Assessment - 1	Quiz/Written Test





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4.	7 <sup>th</sup> & 8 <sup>th</sup> week	Formation of partial differential equations by eliminating arbitrary constants and functions; Solution of first order PDEs; Four standard types;	<b>Online- Through MS teams</b>
5.	9 <sup>th</sup> & 10 <sup>th</sup> week	Lagrange's equation; Method of separation of variables. Analytic functions; Cauchy-Riemann equations; Line integral;	<b>Online- Through MS teams</b>
6.	11 <sup>th</sup> & 12 <sup>th</sup> week	Cauchy's integral theorem and integral formula (without proof); Taylor's series and Laurent series;	<b>Online- Through MS teams</b>
7.	12 <sup>th</sup> Week	<b>Assessment - 2</b>	<b>Quiz/Written Test</b>
8.	13 <sup>th</sup> Week	Residue theorem (without proof) and its applications.	<b>Online- Through MS teams</b>
9.	After 13 <sup>th</sup> Week	<b>Final Assessment</b>	

### COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	<b>Assessment – 1 (Quiz/Written test)</b>	6 <sup>th</sup> Week	90 minutes	25%
2.	<b>Assessment - 2 (Quiz/Written test)</b>	12 <sup>th</sup> Week	90 minutes	25%
3.	<b>Assessment - 3 (Assignments)</b>			20%
4.	<b>Final Assessment (Written Exam)</b>	After 13 <sup>th</sup> Week	2 hours	30%
CPA	<b>Compensation Assessment (Written Test)</b>	13 <sup>th</sup> Week	90 minutes	25%

### 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.
2. Feedback form will be 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)

1. Students can contact the faculty over phone: **+91-7845688072** or E-mail: [prakashn@nitt.edu](mailto:prakashn@nitt.edu).





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2. 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 Final Assessment.
3. The Compensation Assessment shall be conducted for the weightage of 25% comprising the syllabus of both Assessment-1 and Assessment-2.
4. Students who get "F" grade or "X" grade due to genuine reason and satisfactory attendance in the course will be allowed for Reassessment (Supplementary Examination).
5. Students who get "V" grade must compulsorily Redo 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.

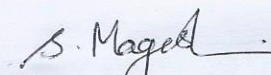
### ACADEMIC DISHONESTY & PLAGIARISM

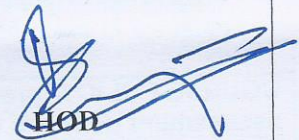
- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental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

### FOR APPROVAL

  
14/04/2022  
Dr. N. Prakash  
(Course Faculty)

  
CC-Chairperson  
(Dr. S. MARESHWARI)  
Dr. S. Mareshwari

  
HOD