



DEPARTMENT OF MATHEMATICS

| COURSE PLAN – PART I | | | |
|--|---|--|-------------|
| Name of the programme and specialization | B. Tech. (CIVIL), I Year | | |
| Course Title | Complex Analysis and Differential Equations | | |
| Course Code | MAIR21 | No. of Credits | 3 |
| Course Code of Pre-requisite subject(s) | Nil | | |
| Session | January 2020 | Section (if, applicable) | A & B |
| Name of Faculty | Dr. R. Tamil Selvi | Department | Mathematics |
| Official Email | tamil@nitt.edu | Telephone No. | 7598176202 |
| Name of Course Coordinator(s) (if, applicable) | | | |
| Official E-mail | | Telephone No. | |
| Course Type (please tick appropriately) | <input checked="" type="checkbox"/> Core course | <input type="checkbox"/> Elective course | |
| 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; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.</p> <p>Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform – Convolution theorem – Periodic functions – Application to ordinary differential equation.</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> | | | |
| Reference books: | | | |
| <ol style="list-style-type: none">1. James Ward Brown, Ruel Vance Churchill, Complex Variables and Applications , McGraw-Hill Higher Education, 20042. Dennis Zill, Warren S. Wright, Michael R. Cullen, Advanced Engineering Mathematics, Jones & Bartlett Learning, 20113. 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 | | | |



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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 | |
| 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. | |

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 | 1 st , 2 nd , 3 rd Weeks | 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 | 4 th , 5 th , 6 th weeks | 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 |



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| | | | |
|---|--|---|--------------|
| 3 | 7 th | Assessment I | |
| 4 | 8 th , 9 th , 10 th weeks | Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties. | Chalk & Talk |
| 5 | 11 th , 12 th , 13 th weeks | Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform – Convolution theorem – Periodic functions – Application to ordinary differential equation. | |
| 6 | 14 th week | Assessment II | Chalk & Talk |
| 7 | 15 th and 16 th weeks | 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. Compensation Assessment | |
| 8 | After 16 th week | Final Assessment (Assessment III) | |

COURSE ASSESSMENT METHODS

| S.No. | Mode of Assessment | Week/Date | Duration | % Weightage |
|-------|--|-----------------------------|----------|-------------|
| 1 | Assessment I (written test) | 7 th week | 1 hour | 20 |
| 2 | Assessment II (written test) | 14 th week | 1 hour | 20 |
| 3 | Assignments | | | 10 |
| CPA | Compensation Assessment (written test) | 16 th week | | |
| 4 | Final Assessment (Assessment III, written test) | After 16 th week | 3 hours | 50 |

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



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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 I & 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 I or Assessment II or both can register the Compensation Assessment which shall be conducted soon after the completion of the Assessment II and before the regular semester examination (Assessment III).
 - b) The Compensation Assessment shall be conducted for 20 marks comprising the syllabus of both Assessment I and Assessment II.
 - c) Students are 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 fail 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 assessments 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.



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- 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.

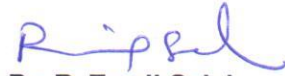
ACADEMIC DISHONESTY & PLAGIARISM

- 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 (tamil@nitt.edu) or phone (7598176202).

FOR APPROVAL



Dr. R. Tamil Selvi
Course Faculty



CC- Chairperson



HOD