

**NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI- 620 015**

**DEPARTMENT OF MATHEMATICS**

<b>COURSE OUTLINE TEMPLATE</b>		
Course Title	<b>Mathematics – II</b>	
Course Code	<b>MAIR 21</b>	No. of Credits : 4
Department	<b>Mathematics</b>	Section: <b>MME</b>
Pre-requisites Course Code	<b>MAIR 11 - Mathematics-I</b>	
Course Teacher(s)/Tutor(s)	Email Id	Telephone No.
<b>Dr. R.Pandiya Raj</b>	<b>panrajmaths@gmail.com</b>	<b>9344764070</b> <b>8870782541</b>
	<b>rpraj@nitt.edu</b>	
Course Type	<b>Core course</b>	
<b>COURSE OVERVIEW</b>		
To understand the fundamental concepts and solve problems on Vector spaces, inner product spaces, Linear differential Equations, Line, Surface, and volume integrals, Analytic functions, conformal mapping, and complex integrations.		
<b>COURSE OBJECTIVES</b>		
<ol style="list-style-type: none"> <li>1. Introduce the structure vector space and various operations on it.</li> <li>2. Introduce different method to solve the 2<sup>nd</sup> order differential equations and its applications in electric circuit problems.</li> <li>3. familiarize concepts like differentiations and integration for function of complex variable.</li> <li>4. Introduce vector differential operator for vector function and important theorems on vector functions to solve engineering problems</li> </ol>		

<b>COURSE OUTCOMES (CO)</b>			
Course Outcomes			Aligned Programme Outcomes(PO)
<p>After the completion of the course, students are able to</p> <ul style="list-style-type: none"> <li>• Perform standard operation in finite dimensional vector spaces</li> <li>• Compute the dot product of vectors, lengths of vectors, and angles between vectors.</li> <li>• Perform gradient, div, curl operator on vector functions and give physical interpretations.</li> <li>• Use Green's , Gauss divergence and Stoke's theorems to solve engineering problems.</li> <li>• solve higher order ODEs and interpret it geometrically.</li> <li>• Compute differentiation of functions of complex variable.</li> <li>• Construct analytic function for given real or imaginary part of it.</li> <li>• find images of the given region by standard functions of complex variable.</li> <li>• compute bilinear map by knowing the images of three points.</li> </ul>			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
S.No.	Week	Topic	Mode of Delivery
1	Week 1	1. Vector spaces and examples of VS. 2. Subspaces and examples 3. Linear independence, linear dependence. 4. More Problems +Tutorial	Chalk and Talk
2	Week 2	5. Span, Basis, Dimension. 6. More Examples 7. Inner Product spaces & Orthogonality 8. Ortho normal basis + Tutorial.	
3	Week 3	9. Gram Schmidt orthogonalization process 10. First order differential equation and its soln 11. Higher order homogeneous Linear differential Equations and its soln. 12. Particular integrals for Type-I, II, III	

4	Week 4	13. Particular Integrals for Type IV, V 14. Particular Integrals for Type VI 15. Equation reducible to linear equations with constant coefficients. 16. More Problems + Tutorial.	Chalk and Talk
5	Week 5	17. Simultaneous Differential Equations 18. Method of Variation of Parameters 19. Applications – Electric Circuit Problems 20. Tutorial	
6	Week 6	21. Analytic function, C-R equation. 22. Cartesian and polar form of CR –Eqn 23. Properties and Construction of analytic function. 24. Problems +tutorials.	
	Week 7	25. Conformal mapping <b>First Assessment</b>	
7	Week 8	26. Conformal mapping 27. Problems 28. Bilinear Transformations 29. Problems+Tutorials.	
8	Week 9	30. Cauchy's integral Theorem 31. Cauchy's integral formula 32. Taylor's and Laurent's series 33. Problems+ Tutorials	
9	Week 10	34. Singularities, Residues. 35. Cauchy's residue Theorem. 36. Problems 37. Problems+tutorials	
10	Week 11	38. Contour Integration. 39. Problems. 40. Grad, Div, Curl, Directional Derivative 41. Tangent plane, normal to surfaces.	
11	Week 12	42. Angle between surfaces, Solenoidal, irrotational fields. 43. Problems +Tutorials. <b>Second Assessment</b>	
12	Week 13	44. Line, Surface, volume integrals. 45. Green's Theorem, Stokes' Theorem 46. Gauss Divergence Theorem 47. Problems+Tutorials.	

<b>COURSE ASSESSMENT METHODS</b>				
<b>S.No.</b>		<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
1.	<b>First Assessment (Descriptive-from first two units)</b>	7 <sup>th</sup> week	1 Hour	20%
2.	<b>Second Assessment (Descriptive- from third and fourth units)</b>	12 <sup>th</sup> week	1 Hour	20%
3.	<b>Reassessment for the absentist. (Descriptive- from first four units)</b>	13 <sup>th</sup> week	1 Hour	20%
4.	<b>Third assessment (objective type questions)</b>	13 <sup>th</sup> week	1 Hour	10%
5.	<b>Final Assessment (Descriptive-from all the units)</b>		3 Hours	50%
<b>Total : 100 Marks</b>				

**ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc**

**Reference Books:**

1. Kreyszig, E., Advanced Engineering Mathematics, 10<sup>th</sup> edn, John Wiley Sons, 2010.
2. Grewal, B.S., Higher Engineering Mathematics, 43<sup>rd</sup> edition, Khanna Publications, Delhi.
3. Gilbert Strang, Linear Algebra and its applications, 4<sup>th</sup> edn, Cengage Learning, 2006
4. James Ward Brown and Ruel V. Churchill, Complex variables and Applications, 9<sup>th</sup> edn, McGraw-Hill, 2013

**COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)**

1. Feedback from students during class committee meeting.
2. Anonymous feedback through questionnaire (as followed previously).


**COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)**

1. Absentees of the first assessment or the second assessment can only write the reassessment test.
2. To appear the final assessment exam, students should have at least 75% of class attendance.
3. In case, the students who have 60% to 74% attendance, with the genuine reasons can be allowed to appear the final assessment exam prior to providing the proof within the stipulated time.
4. Those students who have less than 60% of class attendance are not allowed to appear the final assessment examination, also they have to redo the course again.
5. Failure students with more than 59% class attendance(excluding OD, medical leave) can
  - i) write a reassessment exam for 50 marks in the third week of July and can get either F or E grade or
  - ii) choose a Formative Assessment or
  - iii) choose to REDO the course to get any of the grades S, A, B, C,D, E, F.
6. In case, the failure Student fails again in the reassessment, then he will be given the option to choose FA or REDO.
7. Final Assessment Absentees with **genuine reasons** will have to write the Reassessment exam for 50 marks in the third week of July and can get any of the grades S, A, B, C,D, E, F.
8. **The Passing minimum is  $=\min \left\{ \frac{\text{class average}}{2}, \frac{\text{Class maximum}}{3} \right\}$ .**


**ADDITIONAL COURSE INFORMATION**

Faculty is available for discussion after the class hours at the Department on the first floor of Lyceum. Room No. 218. Faculty can also be contacted over phone: 88707 82541.

**FOR SENATE'S CONSIDERATION**

Course Faculty   
11/01/17

CC-Chairperson  18/1/17

HOD  11/01/2017

**Dr. K. MURUGESAN**  
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