NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI- 620 015

DEPARTMENT OF MATHEMATICS

COURSE OUTLINE TEMPLATE			
Course Title	**Mathematics – II**		
Course Code	**MAIR 21**	No. of Credits : **4**	
Department	**Mathematics**	Section: **ECE- A & ECE- B**	
Pre-requisites Course Code		**+2 Mathematics, MAIR11-Mathematics-I**	
Course Teacher(s)/Tutor(s)		Email Id	Telephone No.
Dr. V. Lakshmana Gomathi Nayagam		**velulakshmanan@nitt.edu**	**9486001191**
Course Type		**Core course**	

COURSE OVERVIEW

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.

COURSE OBJECTIVES

To acquire basic knowledge in Linear Algebra, Differential Equation, Line, Surface, Volume integration,analytic functions, conformal mappings, bi-linear transformation, and Complex Integration.

Enhance his/her knowledge in Matrix theory through Linear Algebra to have a wider applications in Analysis and Differential Equations and solving linear differential Equations and etc.

Understanding the concepts of Line, Surface, Volume integrals as an extension of Multiple integrals and studying some important theorems and solving problems.

Studying complex valued functions and its necessary conditions for analyticity, Conformal mapping, bi-linear transformation and Complex Integration, Taylor's series, Laurent's series, Residues, Contour Integration.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes(PO)
Applying all those above concepts in Engineering. Particularly, • Use the Gram Schmidt process to produce an orthogonal basis. • To solve initial value problems for constant coefficient linear ODEs. • To solve differential equations with variable coefficients using the method like variation of parameters. • To calculate the gradients and directional derivatives of functions of several variables. • To find the velocity and acceleration of a particle moving along a space curve. • To use Green's theorem to evaluate line integrals along simple closed contours on the plane • To use Stokes' theorem to give a physical interpretation of the curl of a vector field • To use the divergence theorem to give a physical interpretation of the divergence of a vector field. • To know the properties of analytic and harmonic functions. • To evaluate complicated real integrals using complex integration.	

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
	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
	Week 2	5. Span, Basis, Dimension. 6. More Examples 7. Inner Product spaces & Orthogonality 8. Ortho normal basis + Tutorial.	
	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 + Tutorial	

	Week4 **Week 5** **Week 6**	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. 17. Simultaneous Differential Equations 18. Method of Variation of Parameters 19. Applications – Electric Circuit Problems 20. Tutorial **Assessment-I** 21. Problems on Grad, Div, Curl, 22. Directional Derivative	Chalk and Talk
	Week 7 **Week 8** **Week 9** **Week 10** **Week 11**	23. Tangent plane, normal to surfaces. 24. Angle between surfaces, Solenoidal, irrotational fields. 25. Line Integral & Problems 26. Green's Theorem+Tutorial 27. Surface &Volume Integral, Stokes' Theorem 28. Stokes' Theorem 29. Gauss Divergence Theorem 30. Problems+ Tutorial 31. Analytic function, C-R equation. 32. Problems on C-R equation 33. Cartesian and polar form of CR –Eqn 34. Properties and Construction of analytic function (RP given)+ Tutorial 35. Construction of analytic function (IP Given) 36. Conformal mapping 37. Conformal mapping of standard elementary mappings 38. Bilinear Transformations 39. Problems+Tutorial	Chalk and Talk
	Week 12 **Week 13**	**Assessment-II** 40. Cauchy's integral Theorem 41. Cauchy's integral formula +Tutorial 42. Taylor's Series **Reassessment** 43. Laurent's series 44. Singularities, Residues. 45. Cauchy's residue Theorem+Tutorial	

	Week 14	**Assessment-III** 46. Contour Integration. 47. Integration involving unit circle + Tutorial	Chalk and Talk

COURSE ASSESSMENT METHODS

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

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

Text Books

1. *Kreyszig, E., Advanced Engineering Mathematics, 9thedition, John Wiley Sons, 2006.*

2. Grewal, B.S., Higher Engineering Mathematics, 42ndedition, Khanna Publications, Delhi, 2012.

3. Gilbert Strang, Linear algebra and its applications, 4th edn. Cengage Learning, 2006.

4. James Ward Brown and Ruel V. Churchill, Complex Variable and Applications, 9th 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.
5. Students awarded F grade may REDO the course or opt for formative assessment.
6. Students with less than 60% class attendance (excluding OD, medical leave) have to redo the course.
7. If the students fails to appear semester examination due to genuine/medical reason, can register for special end semester examination after approval from course teacher & Head of department of Mathematics/Dean (academic). The special end semester examination will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for special end semester examination within three days from reopening of institute for next semester. Grade issued as per the guidelines followed for his/her batch students.
8. There will be one reassessment (for 90 marks) for the students who have secured "F" in this course and will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for reassessment within three days from reopening of institute for next semester. If the students satisfy the criteria fixed by the faculty to promote E grade will be given E grade and others given 'F' grade.
9. The passing minimum should be $\frac{\bar{X}}{2}$ or $X_{max}/3$, whichever is less Where $\bar{X}$ is the mean of the class and X_{max} is the maximum mark in the class.

ADDITIONAL COURSE INFORMATION

Faculty is available for discussion after the class hours at the Department on the first floor of Lyceum. Room No. 221. Faculty can also be contacted over phone: 9486001191.

FOR SENATE'S CONSIDERATION

Course Faculty V. Lak **CC-Chairperson** 18/1/17 **HOD** 12/1/17

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