# NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI- 620 015 DEPARTMENT OF MATHEMATICS

	TLI	NE TEMPLATE				
Course Title	8.0	AID 44 - Mathamatica I				
Course	MAIR 11 : Mathematics – I					
Code	M	MAIR 11			4	
Department	Mathematics		Faculty		EEE	
					A SECTION	
Pre-requisites		.O MATHEMATICS				
Course Code		+2, MATHEMATICS				
Coordinator	Dr. T.N.janakiraman, janaki@nitt.edu, 9894794198,9489066245					
Other Course	Te	eacher(s)/Tutor(s)	Email Id		Telepho	one No.
					1	
1	D	r. T. N. Janakiraman	janaki@nitt.edu		9894794198(Personal)	
					3669(Intercom)	
Course	9489066245(official)				6245(OTTICIAI)	
Type	L	Core course	Liective	ourse		
COURSE OVE	ER۱	/IEW				
To understan	d 1	the mathematical applicat	ions to eng	jineering	problen	ns using matrix
theory, conve	erg	ence of series, calculus w	ith function	ns sever	al variab	les.
COURSE OB	JEC	CTIVES				
To acquire be disciplines.	asi	c knowledge in matheama	itics and to	o apply	in engine	eering
COURSE OUT	тс	OMES (CO)				
				Aligne	d Progra	mme Outcomes
Course Outcomes					(F	20)
1. To apply m	atr	ix analysis for Engineerin	g			
2. To formula		real problems with multi				
dimensions u	ısir	ng algebra & calculus.				
To understand the convergence and divergence in practical problems.						

## COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
	Week-1	1. Introduction to Characteristic equation of a matrix — Eigen values and Eigen vectors.(Theory and Applications) 2. Problems related to Eigen values p and Eigen vectors. (Symmetric and Nonsymmetric matrices with distinct and repeated Eigen values) 3. Properties of eigen values. 4. Properties continued and introduction to similarity and orthogonal Transformation.	Chalk and Talk
	Week – 2	<ul> <li>5. Diagonalization of matrix( Using both similarity and orthogonal transformations).</li> <li>6. Cayley-Hamilton(C-H) Theorem (without proof) verification</li> <li>7. Finding Inverse and Power of a matrix using C-H Theorem.</li> <li>8. Quadratic form +Tutorial</li> </ul>	
	Week -3	9. Definite and indefinite forms 10. Orthogonal reduction of quadratic form to canonical form + Theory and problems and Tutorial	
	Week -4	<ul> <li>11. Introduction to Sequences of real numbers - Limit of sequence, Convergent and divergent sequences + Tutorial</li> <li>12. Introduction series. Series as limit of sequences, convergence and divergence of series and overview of proposed tests of convergence.</li> <li>13. Standard series and their properties.</li> <li>14. Comparison test and Problems to use this test.</li> </ul>	

Week-5		Chalk and
Week- 6	<ul> <li>15. Ratio test -Some basic theory and problems to use this test.</li> <li>16. Problems continued. Introduction to Raabe's test. (Theory in back ground)</li> <li>17. Problems using Raabe's test.</li> <li>18. Logarithmic Test(Some theory in back ground) and problems.</li> <li>19. Integral Test(explanation of little theory) and problems.</li> <li>20. Root test and problems.</li> <li>21. Leibnitz's test in the alternating series.</li> <li>22. Absolute and Conditional Convergence</li> </ul>	Talk
Week -7	23. Riemann rearrangement theorem(without proof + Tutorial 24. Functions of several variables- partial derivatives – 25. Transformation of variables + Tutorial 26. Some problems on transformations.	Chalk and Talk
Week – 8	26. Some more problems on transformations.  27. Jacobian and its Properties.  28. Problems on Jacobian transformation.  29. Some more Problems. Taylor's series in Two variables. Expansion of two variable function about a point. Maxima and Minima of function of two variables (Introduction).	
Week – 9	30. Derivation of scheme for Maxima and Minima in two variable functions and problems. 31. Some more problems. 32. Some more problems. 33. Double integral –meaning-evaluation.	Chalk and Talk
Week - 10	<ul> <li>34. Changing the order of Integration-</li> <li>35. Change of variables from Cartesian to Polar Co-ordinates-+ Problems</li> <li>36. Some more problems.</li> <li>37. Triple integrals in Cartesian &amp; Polar systems</li> </ul>	

Week - 11	38. Change of Variables from Cartesian to Spherical and Cylindrical polar system +Some problems. 39. Some more problems. 38. Volume using double and triple integrals. (Two sessions)	Chalk and Talk

## COURSE ASSESSMENT METHODS

S.No.		Week/Date	Duration	% Weightage
1.	Cycle Test –I	6 <sup>th</sup> week	1 Hour fifteen minutes	20%
2.	Cycle Test-II	10 <sup>th</sup> week	1 Hour fifteen minutes	20%
3.	Retest	11 <sup>th</sup> week	1 Hour fifteen minutes	20%(Only for the students who didn't appear for at least one of the Cycle tests- Test portion for the retest is the portions covered for both cycle tests I and II)
4.	Assignments (Two)			10%
5.	End Semester Exam	December Second week	3 Hours	50% Total : 100 Marks

 ${\tt ESSENTIAL\ READINGS: Textbooks, reference\ books\ Website\ addresses,\ journals,\ etc}$ 

#### **Text Books**

- 1. Krevszig, E., Advanced Engineering Mathematics, 9thedition, John Wiley Sons, 2006.
- 2. Grewal, B.S., Higher Engineering Mathematics, 42ndedition, Khanna Publications, Delhi,
- 3. M K Venkataraman, Engineering mathematics, Volume I, 2nd ed., National Publishing Co. 2003

#### Reference Books

- 1. Apostol, T.M. Calculus Volume I & II Second Edition, John Wiley & Sons (Asia)
- 2. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002
- 3. Strauss. M.J, Bradley, G.L. and Smith, K.J. Calculus, 3rd Edition, Prentice Hall, 2002.
- 4. T Veerarajan, Engg Mathematics McGraw-Hill Education (India) Pvt Limited, 2007

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

Feed back at the end of the course may be given with their rating

- To the expected use of this course for their higher studies;
- (ii) To teacher's involvement, capacity, authority and approach to introduce this course in UG level; and
- To improve understanding and further applications need for addition of (iii) some new contents and also removal of unrelated topics need to be obtained.

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

- 1. Minimum 75% attendance in general.
- 2. In genuine case, with medical certificate minimum 65% attendance.
- 3. Cycle test I and II -20 marks each.
- 4. Duration cycle each of the cycle tests 1(1/4) hours.
- 5. Assignments have to be submitted before the respective cycle tests.

### ADDITIONAL COURSE INFORMATION

The Course Coordinator can be contacted through the contact numbers given or mail address for the availability time for discussion.

FOR SENATE'S CONSIDERATION

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Course Faculty

**CC-Chairperson**