MT

DEPARTMENT OF MATHEMATICS

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech. Welding Engineering		
Course Title	Engineering Mathematics		
Course Code	MA613	**No. of Credits**	3
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2018	**Section (if, applicable)**	Nil
Name of Faculty	Mr. V.Tamilselvan	**Department**	Mathematics
Email	vtsmaths@yahoo.in	**Telephone No.**	
Name of Course Coordinator(s) (if, applicable)	Dr. R.Ponalagusamy		
E-mail	rpalagu@nitt.edu	**Telephone No.**	
Course Type	☑ **Core course**	☐ **Elective course**	

Syllabus (approved in BoS)

MA 613 Engineering Mathematics

Partial Differential equations – basic concepts – One dimensional heat flow equation - Two dimensional heat flow equation in steady flow in Cartesian and Polar coordinates.

Calculus of variations - Euler's equation - Variational problems in parametric form - Natural boundary condition – Conditional Extremum - Isoperimetric problems.

Numerical Solution of ODE's – Euler's, Taylor's and Runge Kutta methods – Milne's and Adams' predictor-corrector methods.

Finite difference scheme for elliptic, parabolic, and hyperbolic partial differential equations.

Introduction to Finite Element Method - Rules for forming interpolation functions - Shape functions - Application to fluid flow and heat transfer problems.

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

Reference Books:

1. Desai, C.S. and Abel, J. P., Introduction to Finite Element Method, Van Nostrand Reinhold.
2. Elsegolts, L., Differential Equations and the Calculus of Variations, Mir Publishers.
3. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers.
4. Reddy, J.N., Introduction to Finite Element Method, Mcgraw Hill.
5. Jain, M.K., Iyengar, S.R. and Jain, R.K., Numerical Methods for Scientific and Engineering Computation, Wiley Eastern, 2010.

COURSE OBJECTIVES
✓ To make the students mathematically strong for solving engineering and scientific problems. ✓ To train students with Mathematical aspects so as to comprehend, analyse, design and create novel products and solution for the real life problems.

COURSE OUTCOMES (CO)	
Course Outcomes	**Aligned Programme Outcomes (PO)**
✓ To identify, formulate and solve metallurgical engineering problems in terms of Mathematical concepts. ✓ To be knowledgeable about partial differential equations (PDEs) and how they serve as mathematical models for physical processes such as vibrations and heat transfer problems. ✓ To be familiar with the mathematical ability to design and conduct experiments, interpret and analyse data, and generating correlation of obtained results.	The Engineering Post-graduates will apply their knowledge of Mathematical and Numerical techniques to solve industrially applicable problems.

COURSE PLAN – PART II

COURSE OVERVIEW

1. To understand the Mathematical applications to engineering problems using PDE, Calculus of Variations, Numerical methods and Finite element methods.
2. To understand the rules for forming interpolation functions and shape function.
3. To understand the application of fluid flow and heat transfer problems.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week Hours	Topic	Mode of Delivery
1	Week - 1	Basic concepts of PDE, One-dimensional heat flow equations.	Chalk and Talk
	Week - 2	Two-dimensional heat flow equation in Cartesian and Polar form.	
2	Week - 3	Introduction to Calculus of Variations, Euler's equation, Variational Problems in Parametric form.	
	Week – 4	Natural Boundary conditions, Conditional Extremum, Isoperimetric Problems.	
3	Week - 5	Numerical Solution of Ordinary Differential Equations by Euler's, Taylor's and Runge Kutta methods.	

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week Hours	Topic	Mode of Delivery
4	Week - 6	Numerical Solution of Ordinary Differential Equations by Milne's and Adam's Predictor – Corrector methods.	Chalk and Talk
	Week - 7	Finite difference scheme for Elliptic type of Partial Differential Equations.	
	Week - 8	Finite difference scheme for Parabolic and Hyperbolic Partial Differential Equations.	
5	Week - 9	Introduction to Finite element method, Rules for forming interpolation functions.	
	Week - 10	Introduction to Shape functions and Problems.	
	Week - 11	Applications to fluid flow.	
	Week - 12	Applications to heat transfer problems.	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment -1	4th week	1 Hour	20
2	Assessment - 2	8th week	1 Hour	20
3	Assessment - 3	Seminar		10
4	Assessment – 4 (End Semester)		3 Hour	50
CPA	Compensation Assessment*	10th week	1 Hour	

***mandatory; refer to guidelines on page 5**

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. Exit survey from the students at the end of the session through questionnaire

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc.)

1. All the correspondence regarding the course will be communicated through webmail or intimated during class hours.
2. Queries/ Clarifications (if necessary) may be e-mailed to kani@nitt.edu or can be communicated directly during Institute working hours.

COMPENSATION ASSESSMENT POLICY

The students who are absent for assessment Tests will be allowed for compensation Assessment. Also compensation Assessment is not permitted for improvement.

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.

ADDITIONAL INFORMATION

Faculty is available for discussion after the class hours at the Department on the first floor of Lyceum Room No. 222.

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____

(Dr. R. PONACHAMY) (Dr. S. MUTHUKUMARAN) T/C

Guidelines:

a) The number of assessments for a course shall range from 4 to 6.

b) **Every course shall have a final assessment on the entire syllabus with at least 30% weightage.**

c) **One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.**

d) **The passing minimum shall be as per the regulations.**

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or class average/2 whichever is greater.		Peak/3 or class average/2 whichever is lower		40%

e) **Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.**

f) **Absolute grading policy shall be incorporated if the number of students per course is less than 10.**

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.