

COURSE CODE	NON-DESTRUCTIVE TESTING	L	T	P	C
1152ME115		3	0	0	3

1. Preamble

To study and understand the various non-destructive evaluation and testing methods, theory and their industrial applications.

2. Prerequisite

Engineering Materials and Metallurgy

1151ME117

3. Links to other courses

Project Work

4. Course Educational Objectives

Students undergoing this course are expected to:

- Explain the importance and different methods of NDT.
- Explain procedural steps involved in Liquid Penetrate and Eddy Current Testing.
- Describe the fundamental principle and testing procedures of Magnetic Particle Inspection and Thermography.
- Explain the principles and different testing methods of Ultrasonic and Radiography Testing methods.
- Explain the principles and different testing methods of radiography

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Obtain the fundamental knowledge about different NDT methods.	K2
CO2	Explain the principles and testing knowledge of LPT, ECT & ACT methods for product testing.	K2
CO3	Understand the materials and testing procedure for Magnetic Particle Testing & Thermography Testing.	K2
CO4	Describe the knowledge about Ultrasonic Testing for products.	K2
CO5	Explain the principles and techniques in Radiography Testing.	K2

6. Correlation of CO's with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H		L			L						L	M	
CO2	H		L			L						L	M	
CO3	H		L			L						L	M	
CO4	H		L			L	L					L	M	
CO5	H		L			L	L					L	M	

H- High; M-Medium; L-Low

7. Course Content

UNIT I: BASICS OF NDT

L-9

Introduction to various non-destructive methods, Comparison of Destructive and Non-destructive Tests, Codes, standards, specification and procedures. Visual Inspection, Optical aids used for visual inspection, Applications. Physical principles & procedure for penetrant testing, Penetrant testing materials, Penetrant testing methods-water washable, Post – Emulsification methods, Advantages and Limitations, Applications. Case studies by taking various manufacturing defects.

UNIT II: EDDY CURRENT TESTING & ACOUSTIC EMISSION

L-9

Principles, Instrumentation for ECT, Absolute, differential probes, Techniques – High sensitivity techniques, Phased array ECT, Advantages and Limitations, Applications. Principle of AET, Procedure, Instrumentation, Advantages and Limitations, Applications. Case studies on both ECT and AE.

UNIT III: MAGNETIC PARTICLE TESTING & THERMOGRAPHY

L-9

Principle of MPT, procedure used for testing a component, Equipment used for MPT, Magnetizing techniques, Advantages and Limitations, Applications. Principle of Thermography, Infrared Radiometry, Active thermography measurements, Advantages and Limitations, Applications, Case studies based on MPT and Thermography.

UNIT IV: ULTRASONIC TESTING

L-9

Principle, Ultrasonic transducers, Ultrasonic Flaw detection Equipment, Modes of display A- scan, B- Scan, C- Scan, Applications, Inspection Methods - Normal Incident Pulse-Echo Inspection, Normal Incident Through-transmission Testing, Angle Beam Pulse-Echo testing, Advantages and Limitations, Applications, Case studies.

UNIT V: RADIOGRAPHY

L-9

Principle of Radiography, Types, Effect of radiation on Film, Radiographic imaging, Inspection Techniques – Single wall single image, Double wall Penetration, Multiwall Penetration technique, Real Time Radiography, Advantages and Limitations, Applications. Case studies.

Total: 45 Periods

8. Text Books

1. Baldev Raj, Jeyakumar, T., Thavasimuthu, M., “Practical Non Destructive Testing” Narosa publishing house, New Delhi, 2006.

9. References

1. Krautkramer. J., “Ultra Sonic Testing of Materials”, 1st Edition, Springer – Verlag Publication, New York, 1996.
2. Peter J. Shull “Non Destructive Evaluation: Theory, Techniques and Application” Marcel Dekker, Inc., New York, 2002.