

NON-DESTRUCTIVE TESTING

Course Code	20ME4702D	Year	IV	Semester	I
Course Category	Professional Elective- IV	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Pre-requisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	BTL	Units
CO1	Discuss the basics of various Non-destructive testing methods.	Understand, Communication	L2	1,2,3,4,5
CO2	Illustrate Non-destructive testing methods for identifying defects in various fields.	Apply, Communication	L3	1,2,3,4,5
CO3	Select suitable Non-Destructive testing Methods for given application.	Apply, Communication	L3	5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1	2	1			2			1	3	1
CO2	3	2		1	2	1			2			1	3	1
CO3	3	2		1	1	1			2			1	3	1

Syllabus				
UNIT	Contents			Mapped CO
I	Introduction to Non-Destructive Testing (NDT): Introduction, destructive versus non-destructive testing, Factors influencing the reliability of NDT, Materials, Manufacturing Processes and Non-Destructive Testing Materials. Visual Inspection- The eye, Optical aids used for Visual inspection, Applications Liquid Penetrant Testing – Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results.			CO1 CO2
II	Magnetic Particle Testing- Theory of magnetism, inspection materials, Magnetization methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism. Eddy Current Testing- Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.			CO1 CO2
III	Acoustic Emission Testing: Introduction, principles of acoustic emission testing, sensitivity, applications, advantages and limitations, Structural Integrity Assessment, Leak detection Ultrasonic Testing: Properties of sound beam, Ultrasonic transducers, Inspection Methods, Techniques for normal beam inspection and angle beam inspection, Flaw Characterisation Techniques, Flaw detection Equipment, Modes of Display, applications, advantages and limitations.			CO1 CO2

IV	Thermography – Basic Principles, Detectors and equipment, Techniques, applications. Radiography Testing: Basic Principle, Electromagnetic Radiation Sources, Radiation and Attenuation in the specimen, effect of Radiation on Film, Radiographic imaging, Inspection Techniques, Applications and limitations, Safety in Industrial Radiography.	CO1 CO2
V	Selection of NDT Methods: Types of defects in Materials, welding. Selection of suitable NDT method for inspecting weldments, pressure vessels and pipe lines.	CO1 CO2 CO3

Learning Resource

Text books

1. Non-Destructive Test and Evaluation of Materials, J. Prasad and C. G. K. Nair, 2/e, Tata McGraw Hill, 2011.
2. Practical Non-Destructive Testing, Baldev Raj, T. Jaya Kumar, M. Thavasimuthu, Narosa Publishing.

Reference books

1. C. Hellier, Handbook of Non-Destructive Evaluation, 1/e, McGraw Hill Professional, 2001.
2. Non-Destructive Examination and Quality Control, 9/e, ASM International, Vol.17, 1989

E- Resources & other digital material

1. <https://nptel.ac.in/courses/113/106/113106070/>
2. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm07/>