

<b>22MEHO304</b>	<b>NON DESTRUCTIVE TESTING AND FAILURE ANALYSIS</b>							
<b>PREREQUISITES</b>		<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>		
		<b>PE</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>		
<b>COURSE OBJECTIVES:</b>								
1.	To develop the fundamental knowledge about non-destructive and destructive analysis, in order to control the quality in manufacturing and production engineering components.							
<b>UNIT I</b>	<b>INTRODUCTION AND SURFACE NDT</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>
Non destructive testing– Comparison with destructive testing, importance, scope and difficulties. Visual Inspection: Tools, applications and limitations. Liquid penetrant Inspection - Principles, properties required for a good penetrant and developers. Magnetic particle inspection - Principles, advantage and limitations.								
<b>UNIT II</b>	<b>RADIOGRAPHY AND ACOUSTIC EMISSION</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>
Radiography- basic principle, electromagnetic radiation sources, radiographic imaging, inspection techniques, applications, limitations and safety. Acoustic emission testing- procedures and its importance.								
<b>UNIT III</b>	<b>EDDY CURRENT AND ULTRASONIC TESTING</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>
Eddy current testing – principle, application, limitation; Ultrasonic testing – basic properties of sound beam, transducers, inspection methods, flaw characterization techniques, immersion testing, advantage and limitations.								
<b>UNIT IV</b>	<b>LEAK TESTING AND THERMOGRAPHY</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>
Leak testing, Holography and Thermography – principles, procedures and applications; Comparison and selection of Non destructive testing methods; Defects in casting, forging, rolling and welding.								
<b>UNIT V</b>	<b>FAILURE ANALYSIS METHODOLOGY</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>
Failure analysis methodology, tools and techniques of failure analysis, failure data retrieval, procedural steps for investigation of a failure analysis; types of failure and techniques for failure analysis.								
<b>TOTAL (45L): 45 PERIODS</b>								
<b>TEXT BOOKS:</b>								
1.	Baldev Raj, “Practical Non-Destructive Testing”, Narosa Publishing House, 1997.							
2.	J. Prasad and C. G. K. Nair, Non-Destructive Test and Evaluation of Materials, Tata McGraw-Hill Education, 2nd edition (2011).							
3.	Peter J Shull, “Nondestructive Evaluation- Theory, Techniques and Applications” Marcel Dekker, Inc, USA 2002, ISBN: 0-8247-8872-9.							
<b>REFERENCES:</b>								
1	George E Dieter, “Mechanical Metallurgy”, McGraw Hill Book Company							
2	B.Hull and V.John. “Non-Destructive Testing”, McMillan							
3	A.K Das, “Metallurgy of failure analysis”, TMH, 1992							

<b>COURSE OUTCOMES:</b> Upon completion of this course, the students will be able to:		<b>Bloom Taxonomy Mapped</b>
<b>CO1</b>	Understand the concept of destructive and Non-destructive testing methods.	Understand
<b>CO2</b>	Explain the working principle and application of die penetrant test and magnetic particle inspection.	Remember
<b>CO3</b>	Understand the working principle of eddy current inspection, Ultrasonic testing and applications.	Understand
<b>CO4</b>	Apply radiographic techniques for testing and acoustic emission testing.	Apply
<b>CO5</b>	Define tools and techniques of failure analysis, procedural steps for investigation of failure.	Remember

### COURSE ARTICULATION MATRIX

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	1	2	1	1	0	0	0	0	0	0	0	0	2	2	0
<b>CO2</b>	2	2	1	3	0	0	0	0	0	0	0	0	2	2	0
<b>CO3</b>	2	2	1	3	1	0	0	0	0	0	0	0	2	2	0
<b>CO4</b>	2	2	1	3	1	0	0	0	0	0	0	0	2	2	0
<b>CO5</b>	2	2	1	3	3	0	0	0	0	0	0	0	2	2	0
<b>Avg</b>	<b>1.8</b>	<b>2</b>	<b>1</b>	<b>2.6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>

3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)