

NON DESTRUCTIVE TESTING

VI Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME526	Professional Elective	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
<p>OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> I. Apply the techniques of surface non destructive techniques testing methods II. Apply of ultrasonic, radiographic techniques. III. Understand advanced NDT technique. IV. Understand the relevant non-destructive testing methods for various engineering practice. <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> 1. Understand the visual examination techniques in direct and indirect methods for NDT. 2. Remember the various equipment available for the visual inspection and the codes and standards for non-destructive testing. 3. Apply the liquid penetrant test that can be used for effective identification of surface cracks in metals. 4. Apply the codes and standards applicable for the liquid penetrant testing in the classification of NDT. 5. Understand the principle of magnetic particle testing and the advantages and limitations of the magnetic particle testing equipment and process. 6. Understand the principle of ultrasonic testing and identify the suitable methods for conducting nondestructive testing using the ultrasonic testing equipment. 7. Evaluate the interpretation procedures for NDT by ultrasonic testing along with its applications 8. Understand transmission and pulse-echo methods of ultrasonic testing. 9. Evaluate and apply ultrasonic testing and acoustic emission testing and for various particle applications. 10. Understand the working principle, advantages, limitations and applications of X-ray film in radiography testing. 11. Remember X-ray films used in industrial radiography and describe the stage of development of X-ray films in radiography testing. 12. Apply the knowledge of radiographic testing method for the NDT of metals for knowing the defects internally present in the metals. 13. Remember the variables and the radiographic image quality improving techniques along with the safety norms to be considered for radiation effects. 14. Understand various process during interaction of X-ray with matter. 15. Understand the working principle, advantages, limitations and applications of various advanced radiography techniques viz fluoroscopy testing, xerography, computed tomography 16. Understand the principle of phase array and its technique utilized for the NDT of materials along with the equipment for phase array. 17. Remember the verification for flow existence and position for reporting and applications of the phase array. 18. Understand the techniques and interpretation of radiography in the field of phase array techniques and various applications of the process. 19. Remember the special radiographic techniques and the various advantages and limitations of the processes 								

20. Understand the acoustic emission inspection method principle and understand its various applications.		
UNIT-I	SURFACE NDE METHODS	Classes: 12
Visual examination, direct and indirect methods, equipment, codes and standards, liquid penetrant testing, variables, interpretation and evaluation of test results, applicable codes and standards, magnetic particle testing, principle, equipment, advantages and limitations.		
UNIT -II	ULTRASONIC TESTING	Classes: 12
Principle of ultrasonic testing, methods, equipment, evaluation, interpretation, applications.		
UNIT -III	RADIOGRAPHIC TESTING	Classes: 12
Principles, films, radiography equipment, variables, radiographic image quality, techniques, safety.		
UNIT -IV	ADVANCED NDE TECHNIQUES-I	Classes: 12
Principle of phase array, technique, equipment, verification of flow existence and position, reporting, application, special radiographic techniques and interpretation of radiography, advantages and limitations.		
UNIT -V	ADVANCED NDE TECHNIQUES-II	Classes: 12
Acoustic, emission inspection, principles and applications, leak testing, principles and applications, industrial computed tomography principles and applications.		
Text Books:		
<ol style="list-style-type: none"> 1. J. Prasad, C.G.K Nair, —Non-destructive Test and Evaluation of materials, Tata McGraw-Hill, 2nd Edition, 2011. 2. J. Krautkramer, H. Krautkramer, —Ultrasonic Testing of material, Springer, 4th Edition, 1990 		
Reference Books:		
<ol style="list-style-type: none"> 1. B. Raj, T. Jayakumar, M. Thavasinumuthu, —Practical Non-destructive Testing, Alpha science International Limited, 3rd Edition, 2002. 2. R. Halshaw, —Industrial Radiography: Theory and Practice, Springer, 2nd Edition, 1995. 3. ASM, —Non-destructive examination and quality control, ASM International, volume 17, 9th Edition, 1989. 		
Web References:		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/112104117/ 2. https://easyengineering.net/a-textbook-of-fluid-mechanics-and-and-hydraulic-machines-bansal/ 3. https://lecturenotes.in/subject/95/fluid-mechanics-and-hydraulic-machines-fmhm 4. https://nptel.ac.in/downloads/112106200/ 		
E-Text Books:		
<ol style="list-style-type: none"> 1. https://www.pdfdrive.com/fluid-mechanics-and-hydraulic-machines-e18705469.html 2. https://insightgovtexam.com/basic-fluid-mechanics-and-hydraulic-machines-pdf-free-download/ 3. http://www.faadooengineers.com/threads/44517-Fluid-Mechanics-and-Hydraulic-Machines-by-Rajput-Free-Download 		

