2012-13

PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY

(COURSE STRUCUTRE FOR AUTONOMOUS SCHEME)

I Year M. Tech. (Machine Design) M.E.	**T**	**P**	**C**
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MEMD2T6A - NON-DESTRUCTIVE TESTING

(Elective-IV)

Unit – I

Introduction: Various methods, advantages, disadvantages and applications.

Visual Examination: Basic principle, the eye- defects which can be detected by unaided visual inspection, optical aids used for visual inspection- microscope, bore scope, endoscope, telescope, holography; applications.

Unit – II

Liquid Penetrant Testing: Physical principles, Procedure for penetrant testing- cleaning, penetrant application, removal of excess penetrant, application of developer, inspection and evaluation; Penetrant testing materials: penetrants, cleaners and emulsifiers, developers, special requirements, test blocks; penetrant testing methods: water washable method, post-emulsifiable method, solvent removal method; sensitivity, applications & limitations.

Unit – III

Magnetic Particle Testing: Principle of MPT, Magnetizing techniques- magnetization using a magnet, magnetization using an electro magnet, constant current flow method. Procedure used for testing a component: Equipment used for MPT-simple equipment, large portable equipment, stationary magnetizing equipment; sensitivity, limitations.

Unit – IV

Ultrasonic Testing: Basic properties of sound beam- sound waves, velocity of ultrasonic waves, acoustic impedance, behavior of ultrasonic waves. Inspection methods: Normal incident pulse-echo inspection, normal incident through-transmission testing, angle beam pulse-echo testing, criteria for probe selection, flaw sensitivity, beam divergence, penetration and resolution.

Unit – V

Acoustic Emission Testing: Principle of AET, technique, instrumentation, sensitivity, applications.

Thermography: Basic principles, detectors and equipment, techniques, applications.

Unit – VI

Codes, standards, specification and procedures: Code, standards- international and national standards, industry standards, government and military standards, industry practices, company standards; specification, procedures, Indian National standards for NDT, International standards for NDT- ISO standards for quality systems.

Unit – VII

Liquid Crystals for Flaw Detection in Composites: Equipment, specimen preparation procedure, results, passive tests, discussion and conclusions.

Detection of damage in composite materials by Vibrothermography: Experimental technique, results and discussion.

Unit – VIII

Application of X-ray Tomography to the Non-Destructive Testing of High Performance

Polymer Composites: Introduction, presentation of basic method on the medical scanner, absorption of x-rays, x-ray tomography, terminology, results achieved with the CGR – ND 8000 Scanner, conclusions.

References:

1. Practical Non-Destructive Testing, 2nd Edition: Baldev Raj, T. Jayakumar, M. Thavasimuthu, Woodhead Publishing Limited.
2. Non-Destructive Testing of Fibre-Reinforced Plastics Composites: J. Summerscales, Springer
3. Damage Detection in Composite Materials: Masters JE, ASTM STP 1128.