

**IV B.TECH - II Semester**  
**NON DESTRUCTIVE EVALUATION**

**Course Code: ME8T2A**

**Lecture: 3 periods/week**

**Tutorial: 1 period/week**

**Credits: 3**

**Internal assessment: 30 marks**

**Semester end examination: 70 marks**

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**COURSE OBJECTIVES:**

- Familiarize with various ultrasonic hardness tests.
- Gain knowledge about X-ray radiography.
- Acquire knowledge on different types of radiographic tests.
- Get educated on Holography and applications of NDT.

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to:

1. Demonstrate the knowledge about different acoustic flaw detection techniques.
2. Familiarize with basic principles of electromagnetic NDT methods.
3. Explain X-ray and gamma ray radiography inspection process.
4. Apply different holography techniques and know about real time applications of NDT.

**Pre-Requisites:** Production Technology

**UNIT I**

**ACOUSTICAL METHODS: Ultrasonic testing-** Generation of ultrasonic waves, Horizontal and shear waves, Near field and far field acoustic wave description, Ultrasonic probes- Straight beam, direct contact type, Angle beam, Transmission/reflection type, and delay line transducers, acoustic coupling and media.

**ULTRASONIC TESTS:** Transmission and pulse echo methods, A-scan, B-scan, C-scan, F-scan and P-scan modes, Flaw sizing in ultrasonic inspection: AVG, Amplitude, Transmission, TOFD, Satellite pulse, Multi-modal transducer, zonal method using focused beam. Flaw location methods, Signal processing in Ultrasonic NDT; Mimics, spurious echo's and noise. Ultrasonic flaw evaluation.

**UNIT II**

**ELECTRO-MAGNETIC METHODS-** magnetic particle inspection-introduction to electrical impedance, principles of eddy current testing, flaw detection using eddy currents.

**UNIT III**

**RADIOGRAPHIC METHODS:** Introduction to x-ray radiography, the radiographic process, X-ray and Gamma ray sources, Geometric principles, Factors governing exposure, radiographic screens, scattered radiation, arithmetic of exposure, radiographic image quality and detail visibility, industrial X-ray films.

**X-RAY RADIOGRAPHY PROCESSES:** Fundamentals of processing techniques, process control, the processing room, special processing techniques, paper radiography, sensitometric characteristics of X-ray films, film graininess signal to noise ratio in radiographs. The photographic latent image, radiation protection.

**UNIT IV**

**OPTICAL METHODS:** holography- Principles and practices of Optical holography, acoustical, microwave, x-ray and electron beam holography techniques.

**UNIT V**

**APPLICATIONS:** NDT in flaw analysis of Pressure vessels, piping  
NDT in Castings, Welded constructions, etc., Case studies.

**Learning Resources****Text Books:**

1. Ultrasonic testing, (3rd edition), by Krautkramer and Krautkramer, Springer-Verlag; .1983.
2. Ultrasonic inspection to Training for NDT, by E.A. Gingel, Prometheus Press,2006.
3. Metals and alloys, by ASTM Standards, Vol 3.01.