

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS / B.TECH(EIE) / SEM-8 / EI-801B / 2012**

**2012**

**NON-DESTRUCTIVE TESTING METHODS**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

$$10 \times 1 = 10$$

- i) The principles of operation of the most commonly used eddy current instruments are based on
  - a) Roentgen's formulae
  - b) Maxwell's inductance bridge
  - c) Reciprocity
  - d) The Inverse Square Law.
- ii) Which of the following is a disadvantage of LPI ?
  - a) Only surface breaking flaws can be detected
  - b) Surface finish and roughness can affect inspection sensitivity
  - c) Post cleaning is required
  - d) All of these.



- iii) Which type of screen presentation displays a plan-type view of the location and size of the test specimen features ?
  - a) A-scan
  - b) B-scan
  - c) C-scan
  - d) All of these.
- iv) The force required to remove the residual magnetism from the material is called the
  - a) Inverse force
  - b) Reciprocal force
  - c) Coercive force
  - d) Residual force.
- v) Which type of developer is considered the most sensitive ?
  - a) Water suspendable
  - b) Water soluble
  - c) Dry powder
  - d) Nonaqueous wet.
- vi) X-rays and Gamma rays
  - a) Are both affected by radioactive decay
  - b) Are both produced by a radioactive atom
  - c) Have completely different properties
  - d) Differ only in their source.
- vii) When a magnetic field cuts across a crack
  - a) Electrons begin jumping back and forth across the crack
  - b) The crack begins to heat up
  - c) Magnetic poles form at the edges of the crack
  - d) All of these.
- viii) Sound can propagate as
  - a) Longitudinal waves
  - b) Shear waves
  - c) Surface waves
  - d) All of these.
- ix) X-ray generators produce radiation through
  - a) Bremsstrahlung process
  - b) K-shell emission process
  - c) Radioactive decay
  - d) Both (a) and (b).



- x) Beam spread is greater when using
  - a) High frequency transducers
  - b) Low frequency transducers
  - c) Angle beam transducers
  - d) Larger diameter transducers.
- xi) Developer times are usually in the range of
  - a) 10 minutes
  - b) 10 seconds
  - c) 20-30 minutes
  - d) 5-60 minutes.
- xii) An eddy current test circuit will have
  - a) resistance
  - b) inductive reactance
  - c) a small amount of capacitance
  - d) all of these.

#### GROUP – B

##### ( Short Answer Type Questions )

Answer any *three* of the following.  $3 \times 5 = 15$

2. What are the basic properties of sound beam ?
3. What do you mean by sensitivity of MPT ?
4. What are the advantages and limitations of Non-destructive test ?
5. Which defects can be detected by unaided Visual Inspection ?
6. What is the function of a Developer in LPT method ?

#### GROUP – C

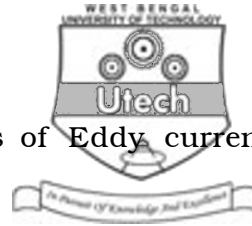
##### ( Long Answer Type Questions )

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Make a comparison between destructive and non-destructive tests.
- b) What are the safety precautions essential to perform a liquid penetrant test.
- c) Which procedure is used for testing component using MPT method ?

$5 + 5 + 5$

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8. a) List the applications and limitations of Eddy current testing method.
- b) What is the basic principle of Radiography process ? What are properties of X-ray and Gamma ray ?
- c) Briefly describe the Latent technique of inspection.

$$5 + ( 2 + 3 ) + 5$$

9. a) Classify the Ultrasonic waves on the basis of the modes of vibrating particles with respect to the direction of propagation waves.
- b) What is the inspection methods used in Ultrasonic testing ?
- c) Briefly describe the modes of display for ultrasonic flaw detection.

$$4 + 6 + 5$$

10. a) Draw the block diagram of a typical AET system and explain its ( AET ) basic principle.
- b) What is the basic principle used in Thermography system ?
- c) Explain helium leak detector with a neat sketch.

$$( 2 + 3 ) + 5 + 5$$

11. Write short notes on any *three* of the following :  $3 \times 5$

- a) Magnetizing techniques
- b) Thermography
- c) Image quality indicator
- d) Visual Inspection Techniques
- e) ISO standard for NDT
- f) Application of NDT in Railways.

