Code No: **R194203H** **R19** **Set No. 1**

**IV B.Tech II Semester Regular Examinations, April– 2023**

**NON DESTRUCTIVE EVALUATION**

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

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**UNIT I**

| | | | |
|---|---|---|---|
| 1 | a) | Discuss the operational characteristics of X-ray equipment. | [7] |
| | b) | Give the names of a few visual aids and their uses in NDT. | [8] |
| | | **(OR)** | |
| 2 | a) | What are the types of radioactive materials to be used for the production of X-rays and Gamma rays? | [7] |
| | b) | Discuss the factors influencing the reliability of NDE. | [8] |

**UNIT II**

| | | | |
|---|---|---|---|
| 3 | a) | Write the applications and limitations of ultrasonic testing. | [7] |
| | b) | Explain the following in ultrasonic testing: i) Mode conversion ii) Diffraction and Attenuation | [8] |
| | | **(OR)** | |
| 4 | a) | Explain about the guidelines for Acceptance and Rejection of Ultrasonic Testing? | [7] |
| | b) | Write short notes on the characteristics of ultrasonic transducers. | [8] |

**UNIT III**

| | | | |
|---|---|---|---|
| 5 | a) | What are the requirements of dye penetrant testing materials? | [7] |
| | b) | Describe about eddy current test system in detail? | [8] |
| | | **(OR)** | |
| 6 | a) | What is the principle of eddy current testing? | [7] |
| | b) | Explain the method of liquid penetrant testing. Which type of jobs are suitable? | [8] |

**UNIT IV**

| | | | |
|---|---|---|---|
| 7 | a) | Which materials are subjected to magnetic particle testing? Discuss them briefly. | [7] |
| | b) | Which technique is most sensitive in magnetic particle testing? Why? | [8] |
| | | **(OR)** | |
| 8 | a) | Explain the magnetic particle test principle with a neat sketch and flow chart. | [7] |
| | b) | Explain how various defects can be analysed based on the indications in MPT. | [8] |

**UNIT V**

| | | | |
|---|---|---|---|
| 9 | a) | Explain how liquid penetrant test applicable for automotive industries. | [7] |
| | b) | With a neat diagram, discuss the Nonlinear Harmonic technique in detail. | [8] |
| | | **(OR)** | |
| 10 | a) | How NDE is involved in nuclear and non-nuclear applications. | [7] |
| | b) | Explain about IR imaging in aerospace applications. | [8] |

Code No: **R194203H** **R19** **Set No. 2**

**IV B.Tech II Semester Regular Examinations, April– 2023**

**NON DESTRUCTIVE EVALUATION**

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

*****

**UNIT I**

| | | | |
|---|---|---|---|
| 1 | a) | Discussthe working procedure of X-ray image intensifier with neat sketch. | [7] |
| | b) | Discuss the manufacturing process and defects in metals and composites. | [8] |

**(OR)**

| | | | |
|---|---|---|---|
| 2 | a) | Explain how NDE technology will support at design, manufacturing and life cycle management stages. | [7] |
| | b) | What is Radiography? Illustrate about safety aspects of industrial radiography? | [8] |

**UNIT II**

| | | | |
|---|---|---|---|
| 3 | a) | Write short notes on piezoelectric effect. | [7] |
| | b) | Explain the principle of wave propagation in ultrasonic testing. | [8] |

**(OR)**

| | | | |
|---|---|---|---|
| 4 | a) | What is an immersion testing technique in ultrasonic testing? List the advantages and disadvantages. | [7] |
| | b) | Write a short note on the effectiveness and limitations of ultrasonic testing. | [8] |

**UNIT III**

| | | | |
|---|---|---|---|
| 5 | a) | Explain in detail about the applications of Eddy Current Testing. | [7] |
| | b) | A crude oil pipe line is to be tested for leakage. What NDT techniqueis to be used and why? Explain the principle of the technique and the procedure. | [8] |

**(OR)**

| | | | |
|---|---|---|---|
| 6 | a) | How do you measure the effectiveness of eddy current testing? | [7] |
| | b) | Discuss the different field of application of liquid penetrant test. What are itslimitations? | [8] |

**UNIT IV**

| | | | |
|---|---|---|---|
| 7 | a) | Name different methods of magnetization. Discuss briefly anyone. | [7] |
| | b) | Discuss MPT with reference to steps of operation and principle. | [8] |

**(OR)**

| | | | |
|---|---|---|---|
| 8 | a) | Discuss the guidelines for current selection for prod magnetization. | [7] |
| | b) | Explain the classification of magnetic particle test methods. | [8] |

**UNIT V**

| | | | |
|---|---|---|---|
| 9 | a) | Explain the magnetic particles inspection method to detect any defects in casting operation. | [7] |
| | b) | Explain the mechanism of image formation in Holography. | [8] |

**(OR)**

| | | | |
|---|---|---|---|
| 10 | a) | What is the importance of NDE in off shore gas and petroleum projects? | [7] |
| | b) | Describe about non-contact thermal inspection methods? | [8] |

Code No: **R194203H** **R19** **Set No. 3**

**IV B.Tech II Semester Regular Examinations, April– 2023**

# NON DESTRUCTIVE EVALUATION

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

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## UNIT I

1 a) Explain construction and structure of Industrial X –Ray Film with neat sketches? [8]
b) What factors to be consider when we apply NDE techniques? [7]

**(OR)**

2 a) Explain importance of NDT over Destructive Testing methods. [7]
b) What are filters and scenes used in X-ray radiography? Why are they used? [8]

## UNIT II

3 a) Explain near zone, far zone and transition zone in Ultrasonic Testing. [7]
b) Draw the neat sketch of Ultrasonic test setup? Explain how the through transmission technique implemented in the U.T? [8]

**(OR)**

4 a) Draw the Ultrasonic testing flaw detector architecture? Explain [7]
b) Write about applications and limitations of ultrasonic testing? [8]

## UNIT III

5 a) Explain about effectiveness and limitations of Liquid Penetrant Testing? [7]
b) Illustrate about theoretical analysis of eddy-current circuit and effectiveness of Eddy Current Testing? [8]

**(OR)**

6 a) Explain the effectiveness and limitations of liquid penetrant testing. [7]
b) Explain Eddy current Testing method. What is sensitivity in ECT? [8]

## UNIT IV

7 a) What are the pre-requisites for a material to be tested through magnetic particle NDT? [7]
b) Explain about Standardization and Calibration of Magnetic Particle Test? [8]

**(OR)**

8 a) Discuss briefly about the reasons for demagnetization. [7]
b) Explain the characteristics of magnetic materials used in MPT. [8]

## UNIT V

9 a) Explain the magnetic particles inspection method to detect any defects in welding operation. [7]
b) Discuss the fundamental points to be made for Optical Holography. [8]

**(OR)**

10 a) Discuss how NDT is used in aerospace industries. [7]
b) Explain the various steps in the holography method. [8]

Code No: **R194203H** **R19** **Set No. 4**

**IV B.Tech II Semester Regular Examinations, April– 2023**

**NON DESTRUCTIVE EVALUATION**

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

*****

**UNIT I**

| | | | |
|---|---|---|---|
| 1 | a) | Write the properties of X – rays and Gamma rays. | [7] |
| | b) | List out the differences between destructive and non-destructive testing. | [8] |
| | | **(OR)** | |
| 2 | a) | Discuss the effectiveness and limitations of radiography. | [7] |
| | b) | Discuss various steps involved in radiography. | [8] |

**UNIT II**

| | | | |
|---|---|---|---|
| 3 | a) | Discuss the advantages of using ultrasonic inspection as compared to the X- ray radiography? | [7] |
| | b) | Explain different transducers in ultrasonic testing with neat sketch. | [8] |
| | | **(OR)** | |
| 4 | a) | Discuss various factors affecting ultrasonic testing. | [7] |
| | b) | Explain about principle of wave propagation with neat sketches. | [8] |

**UNIT III**

| | | | |
|---|---|---|---|
| 5 | a) | Discuss the factors affecting eddy currents. | [7] |
| | b) | Describe about liquid penetrant system with neat diagram? | [8] |
| | | **(OR)** | |
| 6 | a) | Explain the single frequency and multi frequency eddy current testing. | [7] |
| | b) | Explain capillary action, contact angle, adhesive force and cohesive force. Mention limitations of dye penetranttest. | [8] |

**UNIT IV**

| | | | |
|---|---|---|---|
| 7 | a) | Explain various methods of demagnetization commonly practiced in Non-destructive testing procedure. | [7] |
| | b) | Explain about effective Applications and Limitations of the Magnetic Particle Test? | [8] |
| | | **(OR)** | |
| 8 | a) | What is impedance diagram? How coupling, crack and magnetic permeability effects the impedance diagram? | [7] |
| | b) | How the magnetic particle test procedure is calibrated? What are the basic properties specimen to qualify for magnetic particle test? | [8] |

**UNIT V**

| | | | |
|---|---|---|---|
| 9 | a) | Write about the importance of NDE in Coal Mining Industry? | [7] |
| | b) | Explain the significance thermographic testing method? | [8] |
| | | **(OR)** | |
| 10 | a) | State the applications of NDE. | [7] |
| | b) | Explain the principle of Acoustic emission testing with line diagram. | [8] |