Code No: **RT42034A** **R13** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

NON DESTRUCTIVE EVALUATION

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) State the law of radioactivity transformation. [4]
   b) Explain the Ultrasonic test calibration steps on V_1 or V_2 block with suitable example. [4]
   c) Write short notes on cohesion and adhesion. [4]
   d) What are the various components of magnetic non destructive test? [4]
   e) What is fill factor? [3]
   f) Give the applications of Non destructive evaluation (NDE). [3]

PART–B *(3x16 = 48 Marks)*

2. a) Write a brief note on radiographic film and its processing. [8]
   b) What are the sources for X and Gamma rays? Explain its interacting with matter and interpret the results. [8]

3. a) Classify ultrasonic inspection methods. Explain through transmission technique with advantages and disadvantages. [8]
   b) List applications, advantages and limitations of ultrasonic testing. [8]

4. a) Explain the method of Die Penetrant Testing (DPT) with diagram. Can it be used for subsurface defects? Yes / No – Justify. [8]
   b) Discuss the method of examination, interpretation and evaluation of liquid penetrant test. [8]

5. a) What are the pre-requisites for a material to be tested through magnetic particle NDT? [8]
   b) Explain various methods of magnetization and demagnetization commonly practiced in Non destructive testing procedure. [8]

6. a) What is impedance diagram? How coupling, crack and magnetic permeability effects the impedance diagram? [8]
   b) Enumerate the applications of NDE in offshore gas and petroleum projects. [8]

7. a) List the defects in parts manufactured by various processes. [8]
   b) What is the importance of NDE in nuclear and non nuclear applications? [8]

Code No: **RT42034A** **R13** **Set No. 2**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

NON DESTRUCTIVE EVALUATION

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) What is Radioactivity and explain how Radioactive elements are divided? [4]
   b) Write short notes on Piezo-electric effect and list various piezo-electric materials. [4]
   c) Give essential safety precautions while performing liquid penetrant test. [4]
   d) Define magnetic flux and draw diagram of different types of magnetic fields used in magnetic particle test. [4]
   e) How can you relate depth of penetration and frequency for various materials? [3]
   f) Write the span of NDE activities in automotive industries. [3]

PART–B *(3x16 = 48 Marks)*

2. a) Discuss the radiography in welding briefly. [8]
   b) What are filters and scenes used in X-ray radiography? Why are they used? [8]

3. a) What is an immersion testing technique in ultrasonic testing? Explain with advantages and disadvantages. [8]
   b) Explain different types of sound waves and conversion. [8]

4. a) State the principle of dye penetrant test and explain capillary action, contact angle, adhesive force and cohesive force. Mention limitations of dye penetrant test. [8]
   b) Explain the methods of removing excess penetrant from the surface of the component. [8]

5. a) Explain the procedure of magnetic particle testing and state its limitations. [8]
   b) What is the purpose of standardization of magnetic particle test system and explain how it is calibrated? [8]

6. a) What is the principle of Eddy current testing? What are its applications? Explain its merits and demerits. [8]
   b) Write about various test coils use in Eddy current testing. [8]

7. a) Differentiate between destructive and non destructive testing. List commonly used NDT methods. [8]
   b) Discuss briefly about selection of different NDT techniques for detection of defects. [8]

Code No: **RT42034A** **R13** **Set No. 3**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

NON DESTRUCTIVE EVALUATION

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Explain basic principle of radiographic examination. [4]
   b) What are different types of ultrasonic waves? Explain. [4]
   c) In what way the capillary rise is related to penetrant test? [4]
   d) State the reasons for demagnetization of the materials after completion of magnetic particle test. [4]
   e) What is Magnetic coupling? [3]
   f) What NDE methods are used for inspecting flexible pipes in petroleum projects? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Explain the principle, application and disadvantages of Radiographic Testing. [8]
   b) Differentiate between X-ray radiography and Gamma Radiography Testing. [8]

3. a) Explain the terms attenuation, beam spread and acoustic impedance and their importance in ultrasonic testing. [8]
   b) Compare and contrast ultrasonic testing with radiographic testing. [8]

4. a) Discuss briefly about ‘Penetrants’, ‘Cleaners and Emulsifiers’ and ‘developers’. [8]
   b) Briefly explain the sequence of operations in Die Penetrant Test (DPT). [8]

5. a) Explain magnetic particle testing principle and give applications and limitations. [8]
   b) How can you interpret and evaluate the defects in Magnetic particle testing? [8]

6. a) Explain the principles of Eddy Current Testing (ECT). What do you understand by sensitivity in ECT? Narrate one application on ECT. [8]
   b) What are different types of defects identified using eddy current testing method? [8]

7. a) List most commonly used NDT methods. State advantages and limitations of NDT. [8]
   b) What is the role of NDE in Aircraft and Aerospace Industries? [8]

Code No: **RT42034A** **R13** **Set No. 4**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

NON DESTRUCTIVE EVALUATION

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) List the properties of X-rays and gamma rays. [4]
   b) With neat sketch explain cylindrical and spherical focus transducers. [4]
   c) What is the procedure involved in liquid penetrant test? [4]
   d) Give the limitations of Magnetic particle test. [4]
   e) Write short notes on effectiveness of eddy current testing. [3]
   f) How ultrasonic test applicable for Offshore gas and petroleum projects? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Explain the term 'Film contrast', 'subject contrast', 'penetrameters' and discuss their importance in radiographic testing? [8]
   b) Describe the arrangement of real time radiographic system with neat sketch. [8]

3. a) What is the principle of ultrasonic testing? Discuss different methods of ultrasonic testing. [8]
   b) Discuss the elements in pulse echo flaw detector system. [8]

4. a) Explain various methods of surface preparation in liquid penetrant test. [8]
   b) Discuss on fluorescent liquid penetrant testing method and its sensitivity. [8]

5. a) Briefly explain the principle and flow chart of Magnetic particle test. [8]
   b) Name different methods of magnetization. Why and how demagnetization is carried out? [8]

6. a) State the principle of eddy currents and explain the factors affecting eddy currents? [8]
   b) Explain with neat sketch the different types sensing elements in eddy current test. [8]

7. a) What are the scope and limitations of Non destructive evaluation methods? Justify its advantages over Destructive testing. [8]
   b) What is the importance of NDE in Coal mining industry? [8]