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**Question Paper Code : 70812**

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019  
Elective  
Manufacturing Engineering  
MF 5009 – NON-DESTRUCTIVE TESTING AND EVALUATION  
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What are the three different ways by which the optical connection be achieved in boroscopes ?
2. What are the factors that affect the ability of a given liquid to flow over a surface and enter surface cavities ?
3. State the uses of Eddy Current Inspection.
4. What is Acoustic Emission and what are the sources of Acoustic Emission ?
5. Name any two proprietary methods that employ ferromagnetic particles on a magnetized testpiece.
6. What is the principle of Thermography in Non-Destructive Testing ?
7. Name atleast four types of defect that can be detected by Ultrasonic Testing.
8. What are the two basic forms of Lamb Waves ?
9. What is the principle advantage of Real Time Radiography over Film Radiography ?
10. How are X-rays and  $\gamma$ -rays different from other electromagnetic radiation ?

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PART - B

(5×13=65 Marks)

11. a) Explain in detail the three typical designs of Borescopes with neat diagrams.

(OR)

b) Discuss on the following physical principles with respect to Liquid Penetrant Testing:

i) Wetting characteristics of Liquid (6)

ii) Rise or depression in small vertical capillary tubes. (7)

12. a) Discuss on the principles of Eddy Current Inspection.

(OR)

b) Illustrate the process of generation and detection of Acoustic Emission with a neat schematic representation.

13. a) Discuss in detail the advantages and limitations of magnetic particle testing.

(OR)

b) i) What are the various thermoelectric devices that are used for measuring temperature ? Discuss Briefly. (8)

ii) Discuss on the applications of Thermography in the areas of Hot and cold equipments and Process controls. (5)

14. a) Discuss on the basic equipments involved in ultrasonic inspection systems.

(OR)

b) i) How are Ultrasonic waves classified based on the mode of particle displacement ? (3)

ii) Describe in detail the two types of ultrasonic waves that are widely used in Ultrasonic inspection with neat sketches. (10)



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15. a) The most important process in radiography is the conversion of radiation into a form suitable for observation or further signal processing. Discuss in detail the different media used for image conversion.

(OR)

- b) i) How are X-ray tubes classified based on the size of the focal spot achieved? (3)  
ii) Explain with a schematic diagram, the principal components of an x-ray unit. (10)

PART – C

(1×15=15 Marks)

16. a) What are the fundamental factors that should be considered in selecting a Non-Destructive inspection method, and in selecting from among the commercially available inspection equipment? Explain them with examples.

(OR)

- b) The focus of steam generator tube inspection by eddy current has shifted from concentrating solely on the detection and characterization of tube wall denting and wastage to more complex tube wall degradation mechanisms. Discuss on the various degradation mechanisms and their inspection techniques.