Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70889

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Seventh/Eighth Semester

Mechanical Engineering

ME 8097 — NON DESTRUCTIVE TESTING AND EVALUATION

(Common to Aeronautical Engineering/Manufacturing Engineering/Mechanical Engineering (Sandwich)/Production Engineering)

(Regulations 2017)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the significance of NDT in engineering applications?

2. List the optical aids that are used for visual inspection process.

3. A 6 mm cast iron plate is to be tested for defects by magnetic particle inspection process. A magnetic yoke with AC and DC mode is available. What mode is preferred for detecting the defects that are present below the surface of the plate? Give justification for your answer.

4. Is it essential to demagnetise the specimen before and after the magnetic particle testing? Substantiate your answer.

5. Write down the differences between differential probe and reflection probe.

6. How does the frequency affect the depth of penetration in eddy current inspection process?

7. Is calibration of ultrasonic testing instrument mandatory? Justify your answer.

8. What is Kaiser effect and what is its significance in Acoustic emission testing?

9. What are the safety measures that are to be followed in the radiography testing?

10. What is high energy x-rays and write down its significance.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the working of computer enhanced visual inspection system with a neat diagram.

Or

(b) What are the different visual aids used in visual inspection? Explain the working of fibroscopes and boroscopes in detail.

12. (a) An 8mm thick MS plate of size 300 mm × 250 mm has to be tested for detecting defects that are present below the surface. Explain the inspection procedure using magnetic prod with neat sketches.

Or

(b) Explain the following magnetization techniques used in Magnetic Particle Inspection with neat sketches:

(i) Head shot technique (4)

(ii) Magnetization using prods (3)

(iii) Coil shot technique (3)

(iv) Central conductor technique. (3)

13. (a) Explain the following terms in Eddy current inspection process.

(i) Inductive reactance (4)

(ii) Impedance (3)

(iii) Lift off (3)

(iv) Edge effect. (3)

Or

(b) With examples, explain the impedance plane obtained for the following by eddy current inspection process. (7+6)

(i) Copper plate with and without defects

(ii) Steel tubes with defects in the inner side.

14. (a) (i) With a neat sketch, explain how Time of Flight Diffraction (TOFD) can be used to detect cracks in a weldment. (6)

(ii) Explain the working of piezoelectric transducer with a neat sketch. (7)

Or

(b) Discuss in detail the various AE parameters and their significance in Acoustic inspection process.

15. (a) (i) Explain the various criteria used to assess the quality of a radiograph. (5)

(ii) Differentiate between high speed film and low speed film used in Radiography Testing and explain the techniques. (8)

Or

(b) Explain the Single wall single image and Double wall single image inspection techniques in Radiography Testing (RT) of pipes with neat sketches.

PART C — (1 × 15 = 15 marks)

16. (a) A heat exchanger tube has to be inspected for internal corrosion. Suggest the most suitable NDT technique for detecting the internally corroded portion and explain the technique in detail with a schematic diagram.

Or

(b) Design a suitable test set up used for the evaluation of weldments in stainless steel using Eddy Current Testing and explain the testing procedure in detail.

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