

B.E DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Seventh Semester

AERONAUTICAL ENGINEERING

U18AEE0012: Non Destructive Testing

COURSE OUTCOMES

CO1: Identify various methods of Non-destructive testing (NDT) to test the material integrity used in engineering application.

CO2: Apply different NDT processes in aerospace industry.

CO3: Utilize Thermal inspection, Optical holography NDT methods for aerospace applications.

CO4: Distinguish various defect types and select the appropriate NDT methods for better evaluation.

Time: Three Hours**Maximum Marks: 100****Answer all the Questions:-****PART A (10 x 2 = 20 Marks)****(Answer not more than 40 words)**

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|---|-----|-------------------|
| 1. What is the significance of NDT in quality assurance for aerospace applications? | CO1 | [K ₂] |
| 2. What information can be obtained from NDT regarding the size, location, and orientation of cracks? | CO1 | [K ₁] |
| 3. How is gamma ray radiography used in industrial applications? | CO2 | [K ₂] |
| 4. Explain the difference between X-ray and gamma ray radiography. | CO4 | [K ₂] |
| 5. How do variables such as frequency and material properties affect ultrasonic wave propagation? | CO4 | [K ₂] |
| 6. Describe the pulse-echo technique used in ultrasonic testing. | CO2 | [K ₁] |
| 7. What safety precautions are necessary when performing liquid penetrant testing? | CO2 | [K ₁] |
| 8. What are the common defects that can be identified using magnetic particle testing? | CO4 | [K ₁] |
| 9. What factors influence the effectiveness of eddy current testing? | CO3 | [K ₂] |
| 10. What is the principle of optical holography in non-destructive testing? | CO3 | [K ₁] |

Answer any FIVE Questions:-**PART B (5 x 16 = 80 Marks)****(Answer not more than 400 words)**

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| 11. An aerospace component is made of a material that is prone to fatigue cracks. Which NDT method would you recommend to detect the cracks, and how would | 16 | CO1 | [K ₄] |
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you interpret the results?

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| 12. | Apply the principles of gamma ray radiography to inspect welds in critical aerospace components. How does this method compare to X-ray radiography in terms of effectiveness and safety? | 16 | CO2 | [K ₃] |
| 13. | A weld joint is suspected to have a defect. Describe the ultrasonic testing procedure you would follow to detect the defect, and explain the advantages and limitations of this method. | 16 | CO2 | [K ₃] |
| 14. | a) Perform a step-by-step analysis of liquid penetrant testing for detecting surface cracks. What factors must be considered for effective testing? | 8 | CO4 | [K ₂] |
| | b) Analyze the use of eddy current testing to detect fatigue cracks in an aircraft's aluminum skin. What factors influence the accuracy and effectiveness of this method? | 8 | CO4 | [K ₄] |
| 15. | a) A thermal inspection is to be performed on a component to detect defects. Describe the inspection procedure, and explain how you would interpret the results to detect defects. | 6 | CO3 | [K ₃] |
| | b) An acoustic emission inspection is to be performed on a component to detect defects. Describe the inspection procedure, and explain how you would interpret the results to detect defects. | 10 | CO3 | [K ₃] |
| 16. | With neat sketch explain the types of image presentations available in Ultrasonic Testing. | 16 | CO4 | [K ₂] |
