Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

MATERIALS SCIENCE AND ENGINEERING
VII Semester

ML5751 – NON-DESTRUCTIVE EVALUATION OF MATERIALS

(Regulation 2019)

Time: 3hrs | Max. Marks: 100

CO1	Understanding the importance of NDT in quality assurance.
CO 2	Acquiring knowledge on the basic principles of various NDT techniques, its applications, limitations, codes and standards.
CO 3	Equipping themselves for having proper competencies to locate a flaw in various materials, products.
CO 4	Getting ready to use NDT techniques for in-situ applications too.
CO 5	Selecting the right NDT technique for a given application

PART- A(10x2=20 Marks)

(Answer all Questions)

Q.No	Questions	Marks	CO	BL
1	In what way Non-destructive testing is advantageous when compared to Destructive testing?	2	1	1
2	How does the flatness of a surface be determined by Visual inspection method?	2	1	2
3	Magnetic particle inspection cannot be used to detect internal defects. Why?	2	2	2
4	Component tested by Magnetic particle testing has to be demagnetized before putting into operation. Why?	2	2	2
5	How does the emissivity of a material influence the thermographic inspection process?	2	3	2
6	List out the parameters that are to be considered for the selection of the probe for Eddy current inspection process.	2	3	1
7	Depth of penetration of Ultrasonic waves decreases as the frequency of ultrasonic wave increases. Comment.	2	4	2
8	What is the effect of acoustic impedances of the media on the performance of Ultrasonic inspection?	2	4	2
9	Enumerate some of the machine designs used for the production of high energy X-rays	2	5	1
10	What are the various criteria used to assess the quality of a good radiograph?	2	5	1

PART- B(5x 13=65 Marks)

Q.No	Questions	Marks	CO	BL
11 (a) (i)	With the help of suitable examples, differentiate between destructive and non-destructive testing techniques.	6	1	2

(ii)	List the advantages and disadvantages of both the techniques.	7	1	2
	OR			
11 (b)(i)	Explain in detail about the different types of optical aids used in the Visual inspection process with appropriate diagrams.	13	1	2
12 (a) (i)	How does the emulsification time play a role in the Liquid inspection process?	3	2	3
(ii)	Explain the two types of emulsifiers that are used in the Liquid penetrant inspection process with neat diagrams.	10	2	3
	OR			
12 (b)(i)	In what way the wet magnetic particle inspection is advantageous over dry magnetic particle inspection process?	3	2	3
(ii)	Explain the procedures involved in the wet and dry magnetic particle inspection process.	10	2	3
13 (a)(i)	Discuss in detail with a neat sketch the following techniques. (A) Vibrothermography (6) (B) Active Thermography (7)	13	3	3
	OR			
13 (b)(i)	Compare absolute probes and differential probes used in Eddy Current Testing.	6	3	3
(ii)	Design a suitable test set up used for the evaluation of weldment in stainless steel using Eddy Current Testing.	7	3	3
14 (a)(i)	With sketches, explain the different modes of data representation in Ultrasonic Inspection process.	13	4	3
	OR			
14 (b)(i)	Explain in detail the principle involved in Acoustic emission technique and write down its applications.	5	4	3
(ii)	Explain the Pulse echo technique in Ultrasonic inspection process with a suitable diagram.	8	4	3
15 (a) (i)	Explain the principle of Radiography testing with neat diagram.	5	5	3
(ii)	Discuss in detail the films that are used for recording the intensity of the radiation transmitted through the component in radiography testing.	8	5	3
	OR			
15 (b) (i)	What are the four possible interactions between a photon (quantum) of electromagnetic radiation and material? Explain.	13	5	3

PART- C(1x 15=15 Marks)

(Q.No.16 is compulsory)

Q.No	Questions	Marks	CO	BL
16.	(i) Draw Pulse, if a normal beam probe were used to show 10 inch deep discontinuity using 10inch screen range. (3) (ii) With a case study, explain the through transmission technique of an Ultrasonic inspection process. (12)	15	2	5

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