Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE(MINOR)- SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code:116AR02 Date:11-06-2025

Subject Name:NDT Techniques - IV (ECT, Advanced NDT)

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	With neat sketch state and explain eddy current testing principle.	**03**
	(b)	Discuss the effect of in-homogeneity and discontinuity on eddy current distribution.	**04**
	(c)	Write note on impedance diagram.	**07**
Q.2	**(a)**	Explain Faraday's law of electromagnetic induction.	**03**
	(b)	What are different characterizing quantities and impedance for eddy current test coil? Explain.	**04**
	(c)	Write detailed note on ECT coil selection criteria.	**07**
		OR	
	(c)	Discuss the effect of magnetic coupling and geometric variation on eddy current distribution.	**07**
Q.3	**(a)**	List methods of heating utilized for thermal NDT.	**03**
	(b)	Explain wax coating test.	**04**
	(c)	Write short note on Encircling and Bobbin type ECT probes.	**07**
		OR	
Q.3	**(a)**	Briefly explain ECT coil purpose and function.	**03**
	(b)	Write in brief about absolute and differential ECT probe.	**04**
	(c)	What is Frost test? Discuss in detail.	**07**
Q.4	**(a)**	Explain skin effect in ECT?	**03**
	(b)	Comment on the eddy current distribution in work-piece material due to its magnetic permeability.	**04**
	(c)	Give brief account on applications and limitations of ECT.	**07**
		OR	
Q.4	**(a)**	Enumearte different temperature distribution methods of thermal NDT.	**03**
	(b)	Explain holography briefly.	**04**
	(c)	What is MRI? Write detailed note.	**07**
Q.5	**(a)**	Explain material conductivity and its expression.	**03**
	(b)	Explain thermal method principle used in NDT.	**04**
	(c)	Give your detailed account for NDT method selection for testing.	**07**
		OR	
Q.5	**(a)**	What is meant by penetration depth in ECT? Also, state equation for it.	**03**
	(b)	Calculate frequency required to achieve penetration depth of 1.5 mm with ECT probe, magnetic permeability 1.32 x 10^{-6} H/mm and electrical conductivity of 1.45×10^{6} Siemens/m.	**04**
	(c)	Write detailed note on variation in eddy current distribution in work-piece as a result of workpiece electrical conductivity, testing coil frequency and magnitude of primary magnetic field.	**07**