Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
MASTER OF ENGINEERING – SEMESTER 1 – EXAMINATION – SUMMER 2026

Subject Code: 3710714 **Date: 16/06/2026**

Subject Name: Digital Protection

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Discuss performance and operational characteristics of digital protection.	**07**
	(b)	Discuss the block diagram of the digital relay and explain the function of (i) Surge filter, (ii) Signal conditioner unit (iii) Analog-to-digital converter and (iv) Sampling clock.	**07**
Q.2	**(a)**	Discuss anti aliasing filter and sampling to analog signal.	**07**
	(b)	Discuss full cycle window algorithm using Fourier analysis.	**07**
		OR	
Q.2	**(b)**	Discuss integral least square fit algorithm.	**07**
Q.3	**(a)**	Discuss flowchart of LINKNET structure.	**07**
	(b)	Define Walsh function and its fundamental properties (i) Index & Time scale (ii) Multiplication, and (iii) Symmetry	**07**
		OR	
Q.3	**(a)**	Discuss forward interpolation algorithm.	**07**
	(b)	Discuss the relationship between Fourier and Walsh coefficients used for protection algorithms.	**07**
Q.4	**(a)**	In case of differential protection of the power transformer, Why is it essential to differentiate inrush and internal fault currents ? Discuss least square based algorithm used for it.	**07**
	(b)	Discuss forward and backward components of travelling waves considering single phase lossless line.	**07**
		OR	
Q.4	**(a)**	Discuss Fourier based algorithm to differentiate inrush and internal fault currents for differential protection of the power transformer	**07**
	(b)	Discuss receiving end coefficient of reflection for traveling wave considering single phase lossless line.	**07**
Q.5	**(a)**	What is degree of compensation for series compensated transmission lines? Why is it difficult to implement distance protection on series compensated transmission lines?	**07**
	(b)	What is numerical relay? What are the recent advances in the digital protection of the power systems?	**07**
		OR	
Q.5	**(a)**	Discuss effect of below mentioned terms on protection of transmission lines (i) Under reach of distance relay, (ii) Over reach of distance relay, (iii) High resistance fault, and (iv) Effect of load current	**07**
	(b)	Discuss frequency modulation current based differential protection scheme for transmission lines.	**07**

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