Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170921 Date:01-12-2023

Subject Name: Power Quality and FACTS

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)**	Discuss long duration transients, Impulse transients, and Oscillatory transients.	**03**
	(b)	Discuss the first summation law for combining harmonics.	**04**
	(c)	Discuss CBEMA and ITI curves	**07**
Q.2	**(a)**	What is load compensation	**03**
	(b)	How Static Var Compensators (SVCs) are used to improve transient stability of the power system	**04**
	(c)	Discuss FC-TCR	**07**
		OR	
	(c)	Discuss STATCOM	**07**
Q.3	**(a)**	List out applications of SVCs for traction systems.	**03**
	(b)	List out different categories of load supplied by utilities which are responsible for harmonics generation	**04**
	(c)	Discuss the control systems of SVC for traction applications.	**07**
		OR	
Q.3	**(a)**	Enumerate the applications of SVCs for transmission lines of the power system.	**03**
	(b)	What is inter-harmonics and sub-harmonics?	**04**
	(c)	Discuss the control systems of SVC for reactive power control.	**07**
Q.4	**(a)**	Compare harmonics in rotating machine with arc furnace loads	**03**
	(b)	Discuss harmonics limits	**04**
	(c)	Discuss switched mode power supply and pulse width modulated adjustable speed drives as a source of harmonics.	**07**
		OR	
Q.4	**(a)**	Compare the harmonics due to DC drives and AC drives.	**03**
	(b)	Discuss the application of harmonics standards for utility systems.	**04**
	(c)	Discuss k-factor rating of the transformer	**07**
Q.5	**(a)**	List out undesirable effects of harmonics.	**03**
	(b)	Discuss designing of single tuned filter.	**04**
	(c)	Discuss harmonic analyzer.	**07**
		OR	
Q.5	**(a)**	Classification of filter circuit.	**03**
	(b)	Discuss multi-winding transformer model used for harmonic analysis.	**04**
	(c)	Discuss the measurement of frequency response of instrument transformer.	**07**

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