Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–IV • EXAMINATION – SUMMER 2015

Subject Code: 740701 **Date: 01/05/2015**

Subject Name: Harmonic Measurements & Filtration Techniques

Time: 2:30 pm to 5:00 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)**	Giving examples, distinguish linear and non-linear load.	**07**
	(b)	Define following terms: (a) Total Harmonic Distortion (THD) (b) Total Demand Distortion (TDD) (c) Instantaneous real and reactive average power.	**07**
Q.2	**(a)**	Discuss general description of shunt active filter with shunt current compensation principle.	**07**
	(b)	Why harmonic measurement is required? In brief mention steps required in harmonic measurement procedure.	**07**
		OR	
	(b)	Discuss harmonic sources and their effect on power quality.	**07**
Q.3	**(a)**	Discuss design of single tuned filter with necessary equations. Also explain of parallel resonance on the design.	**07**
	(b)	Giving schematic diagram, explain the working of positive sequence voltage detector circuit. Also explain functional block diagram of PLL circuit. Why positive sequence voltage detector circuit is so important in shunt active filter design?	**07**
		OR	
Q.3	**(a)**	Discuss all possible condition, in which Harmonic are generated in Variable frequency drives and Electric furnace type loads. Also, discuss the types of harmonics generated.	**07**
	(b)	Explain effect of Harmonics on the performance of rotating machines. How pulsating torque is produced by harmonic in rotating machine?	**07**
Q.4	**(a)**	Compare Hybrid filters with Active filters.	**07**
	(b)	Giving circuit diagram, explain the working of series active filters. Also discuss the algorithm used to generate compensated voltage signals.	**07**
		OR	
Q.4	**(a)**	Discuss aim of harmonic flow studies. Draw Z-f plot for series and parallel resonance.	**07**
	(b)	Discuss basic concept of UPQC. What is difference between UPFC and UPQC?	**07**
Q.5	**(a)**	Discuss harmonic cancellation using multi pulse converters.	**07**
	(b)	Discuss effect of harmonics on lighting devices and relays.	**07**
		OR	
Q.5	**(a)**	Discuss harmonic distortion limits for voltage and current in conformance with IEEE 519:1992.	**07**
	(b)	Explain use of Fourier series for harmonic analysis. What is odd and even function.	**07**

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