Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER IV (NEW) – • EXAMINATION – WINTER 2016

Subject Code: 740701 Date: 26/10/2016

Subject Name: Harmonic Measurements & Filtration Techniques

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)**	Enlist the difference between linear and non-linear load. Support your answer with examples.	**07**
	(b)	Discuss harmonic sources and their effect on power quality.	**07**
Q.2	**(a)**	Discuss in brief the effects of Harmonics on Transformer.	**07**
	(b)	Discuss harmonic cancellation using multi pulse converters.	**07**
		OR	
	(b)	How the harmonics effects on lighting devices and relays.	**07**
Q.3	**(a)**	Explain the procedure to be carried out to perform harmonic measurement of voltage and current.	**07**
	(b)	Explain how increase of short circuit ratio helps to reduce harmonics in power systems.	**07**
		OR	
Q.3	**(a)**	Why harmonic measurement is required? In brief mention steps required in harmonic measurement procedure.	**07**
	(b)	Explain use of Fourier series for harmonic analysis. What is odd and even function.	**07**
Q.4	**(a)**	Compare Hybrid filter with pure Active Filter.	**07**
	(b)	What is UPFC? Explain voltage regulation principle realized by shunt converter of the UPFC with phasor diagrams.	**07**
		OR	
Q.4	**(a)**	Giving circuit diagram, explain the working of series active filters. Also Discuss the algorithm used to generate compensated voltage signals.	**07**
	(b)	Discuss basic concept of UPQC. What is difference between UPFC and UPQC?	**07**
Q.5	**(a)**	Explain how following methods helps to reduce harmonics in power systems: (1) Network reconfigurations. (2) Increase of short circuit ratio and (3) Series reactors	**07**
	(b)	Draw block diagram of shunt active filter for current minimization. Also explain, how generalized Fryze current compensation algorithm is implemented in the filter.	**07**
		OR	
Q.5	**(a)**	Discuss aim of harmonic flow studies. Draw Z-f plot for series and parallel resonance.	**07**
	(b)	Explain following terms: a. Instantaneous real and reactive average power b. Instantaneous real and reactive oscillating power	**07**

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