Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. – SEMESTER – IV EXAMINATION – OCTOBER 2012

Subject code: 740701 **Date: 25-10-2012**

Subject Name: Harmonics Measurements & Filtration Techniques

Time: 2:30 pm – 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)**	Describe in brief effects of Harmonics on Transformer.	**07**
	(b)	Define and explain following terms. 1. Total Harmonics distortion. 2. Total demand Distortion 3. Telephone Influence Factor 4. K factor 5.Total Power Factor 6. Displacement 7.Harmonic Distortion Limit	**07**
Q.2	**(a)**	Explain How harmonics cancellation is obtained through the use of Multi pulse converter with necessary sketches and waveforms.	**07**
	(b)	Explain how increase of short circuit ratio helps to reduce harmonics in power systems.	**07**
		OR	
	(b)	Explain working of shunt active filter for constant power compensation. Draw the block diagram for constant instantaneous power control strategy and explain its working.	**07**
Q.3	**(a)**	Explain functional block diagram of PLL circuit. Why positive sequence voltage Detector circuit is so important in shunt active filter design?	**07**
	(b)	Describe the procedure for the design and validation of single tuned Passive Harmonic filters. Also discuss its quality factor.	**07**
		OR	
Q.3	**(a)**	Explain the sinusoidal current control strategy for three phase Three Wire Shunt Active Filter with necessary Block Diagram.	**07**
	(b)	Describe PWM converter Topologies for Three Phase four Wire Shunt Active Filter with necessary block diagrams.	**07**
Q.4	**(a)**	Give a comparison of 1st and 2nd generation control circuit for combined series. Active and shunt passive filters in terms of stability and filtering characteristics.	**07**
	(b)	Describe in Brief about UPFC.	**07**
		OR	
Q.4	**(a)**	Discuss different facts related to harmonic propagation for harmonic analysis.	**07**
	(b)	Relevant to the Harmonic measurement explain following: (a). Need to measure waveform distortion. (b). How to carry out harmonic measurement	**07**
Q.5	**(a)**	In which conditions, harmonics are responsible for neutral conductor over loading? Justify your answer by giving example.	**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.5	**(a)**	With functional block diagram describe 3- phase 4 wire Unified Power quality Controller (UPQC controller - the combined series and shunt active harmonic Filter) giving a general overview of each functional blocks involved.	**07**
	(b)	Compare Hybrid filter with pure Active Filter.	**07**

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