Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014

Subject code: 730701 Date: 25-11-2014

Subject Name: Power Quality Management

Time: 02:30 pm - 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)**	What do you understand about power quality issues? Discuss all the power quality issues in brief.	**07**
	(b)	(i)Discuss the voltage sag types at end use equipment that result from different types of faults in power system network. (ii) What do you mean by magnitude and phase angle jump of a voltage sag events?	**04** **03**
Q.2	**(a)**	(i)Derive the relevant formula of a voltage sag at the motor terminal due to starting of an induction motors. (ii)Suppose that a 5MVA motor is starting from 100MVA,11KV supply. The starting current is six times the nominal current. Calculate the Vsag at the motor terminalôs during motor starting.	**05** **02**
	(b)	Explain in brief the common causes of transients in power system network.	**07**
		OR	
	(b)	Explain any two scheme of stand by power supply for power quality improvement.	**07**
Q.3	**(a)**	What do you mean by ACTIVE Filter? Explain the working of an active filter with main block diagrams.	**07**
	(b)	Explain the harmonic impact on (i)Capacitor(ii)energy meter(iii)rotating motors.	**07**
		OR	
Q.3	**(a)**	(i)Determine the **K** rating of a transformer required to carry a load consisting of 300A of fundamental,100A of third harmonics,60A of fifth harmonics,30A of seventh harmonics. (ii)What is the tuning order and the quality factor for a 36 kV series-tuned filter with X_C = 544.5 Ohm, X_L = 4.5 Ohm and R=0.825 Ohm?	**04** **03**
	(b)	Define the terms ñGroundingò. If improper grounding is found in industrial building what will be the effect on sensitive equipments. Give your suggestions to solve this power quality problem.	**07**
Q.4	**(a)**	Discuss in brief various distributed generation technologies with its merits and demerits.	**07**
	(b)	Discuss following main power quality issues that affected by distributed generation technologies: 1.Sustained interruption 2.Voltage regulation 3.Harmonics 4.Voltage sags	**07**
		OR	
Q.4	**(a)**	Discuss the importance of power factor in industry as per power quality study.	**07**
Q.4	**(b)**	A 3-phase, 50 Hz, 400 V motor develops 100 H.P., the power factor being 0.75 lagging and efficiency 93%.A bank of capacitor is connected in delta across the supply terminals and power factor raised to 0.95 lagging. Each of the capacitor unit is built 4 similar 100V capacitors. Determine leading kVAR supplied by each of three sets and capacitance of each capacitor.	**07**

Q.5 **(a)** Explain the main steps to monitor the power quality problems at site. **07**

(b) Discuss the main features of a power quality analyzer meter. How is this meter connected in actual practice?

OR

Q.5 **(a)** What do you mean by electromagnetic interference? Discuss the main sources of EMI. Explain in brief EMI MITIGATION methods. **07**

(b) Discuss Harmonic Analyzer and data loggers in details. **07**

****