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MEPS–203

M. E./M. Tech. (Second Semester) EXAMINATION, June, 2012

(Grading/Non-Grading)

(Power System)

POWER QUALITY AND CONDITIONING

(MEPS – 203)

Time : Three Hours

Maximum Marks : {*GS : 70* / *NGS : 100*}

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Specify various categories of power quality problems along with their distinctive characteristics.

   (b) Giving a case study explain how performance of an electrical equipment gets affected due to power quality problem.

2. (a) Explain power quality monitoring system for distribution network.

   (b) Explain the following terms pertaining to power quality :
   (i) Long duration voltage variation
   (ii) Swell
   (iii) Notching

3. (a) Explain the type of sources and effects of harmonics on power quality. How can this problem be minimized ?

   (b) Consider an inductive load having resistance 4 ohm and reactance 10 ohm at fundamental frequency is driven by a periodic sinusoidal voltage source :

$$v = \sqrt{2}\,[200 \sin \omega t + 200 \sin (5\,\omega t + 30°)]$$

   Calculate the degree of power factor improvement that can be obtained by capacitance compensation at $f_1 = 50$ Hz.

4. (a) Explain multipulse converter in the following terms of power quality :
   (i) Total harmonic distortion
   (ii) Power factor
   (iii) Ripples
   (iv) Efficiency

   (b) Describe the configuration of VSI based shunt APF and CSI based shunt APF.

5. (a) Describe a control algorithm for hybrid active power filter for customer side solution.

   (b) Suggest the procedure adopted for harmonics evaluation at :
   (i) Utility system
   (ii) End-user level

6. (a) What is the purpose of standardisation of power quality ? What are the standards for EMC ?

   (b) Distinguish between variable and constant tolerance band control.

7. (a) Explain the adjustable speed drive in CSI fed operation. What is the application and protection equipment of ASD ?

   (b) Draw the block diagram of constant frequency control. How is it implemented ?