Total No. of Questions :8] *[Total No. of Printed Pages :2*

Roll No .....

MEPS - 203

M.E./M.Tech., II Semester

Examination, June 2014

Power Quality And Conditioning

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.
ii) Each question carry equal marks.
iii) Assume suitable data if required.

1. a) Enlist various power line disturbances and define their sources.
   b) What are power quality indices and describe its importance?

2. Three-phase uncontrolled rectifier is connected to a balanced 50 Hz, 3-phase ac, 415 *V* (rms line-line). Sinusoidal source as shown in fig. 1. All elements are ideal. The inductance *L* is large, such that the current *i(t)* is essentially constant.

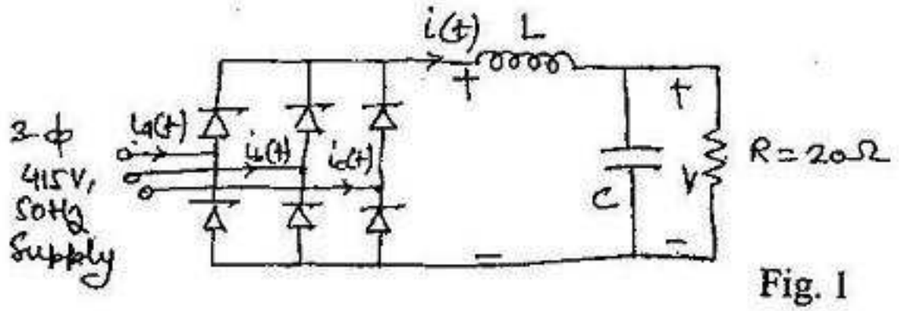

Fig. 1

i) Sketch the waveform $V_a(t)$
ii) Determine the dc output voltage V
iii) Sketch line current waveforms $i_a(t)$, $i_b(t)$ and $i_c(t)$
iv) Find Fourier series of $i_a(t)$
v) Find the distortion factor, displacement factor, power factor and line current THD.

3. a) State (i) Harmonic orders (ii) Range of harmonic magnitudes (iii) Reactive power requirements at ac mains of a single-phase voltage source type of non-linear loads.
   b) Give five examples each for a current source type and voltage source type of non-linear loads.

4. a) Draw only the circuits of (i) passive shunt tuned (ii) passive shunt damped (iii) active shunt filter for power quality improvements in single-phase AC systems.
   b) State the limitations of passive filters.

5. a) What are the problems which are resulted in the system due to the resonance caused by a tuned passive filter.
   b) A single phase load ($Z = (2+j2)\Omega$) has an input AC voltage of 220v, 50 Hz supply. It is to be realized as unity power factor load on ac supply using shunt connected lossless passive elements (L and C). Calculate the value of compensator elements.

6. a) Explain any one improved power quality converter using its system configuration and control scheme.
   b) Differentiate between constant frequency control and constant tolerance band control used in active shaping of input line current.

7. a) What are causes of electromagnetic interference and how these are eliminated.
   b) Describe using circuit diagram, the principle of operation of series active filter.

8. Write short notes (any three)
   a) IEEE 519-1992 standards
   b) Pulse width modulated AC/DC converter
   c) Series passive shunt active hybrid filter
   d) Multipulse converters.

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