

Roll No .....

**MEPS - 203**  
**M.E./M.Tech., II Semester**  
 Examination, June 2013  
**Power Quality and Conditioning**  
**Time : Three hours**

Maximum Marks : 70

**Note :** 1. Attempt any five questions.

2. Each question carry equal marks.

3. Assume suitable data if required.

1. a) Define non-linear loads. Explain its effect on normal operation of power system.
- b) Enlist various power conditioners and state their limitations.

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2. Single-phase uncontrolled full bridge rectifier is connected to a balanced 50Hz, single phase 230VAC supply. All elements are ideal and assume load inductance is large such that the load current is essentially constant (i) Sketch the supply voltage waveform (ii) Determine the dc output voltage (iii) Sketch supply current waveform (iv) Find Fourier series of supply current (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 three-phase voltage source type of non-linear loads.

- b) What are various causes of harmonics in supply system and illustrate their effects.

4. a) Draw following circuits of (i) passive series filter (ii) passive hybrid filter (iii) active series filter for power quality improvements in single phase AC systems.

- b) Discuss basic principle of operation of shunt active filter.

5. a) What is radio-interference. Define its causes.

- b) A single-phase load ( $Z = (3 + j4\Omega)$ ) has an input AC voltage of 230V, 50Hz supply. It is to be realized as unity power factor load on AC supply using shunt connected loss less passive elements (L and C). Calculate the value of compensator elements.

6. a) Draw circuit of single phase PWM rectifier and explain its working.

- b) Compare constant tolerance band and variable tolerance band control used in active shaping of input line current with improved power quality converters.

7. a) What are causes of conducted electromagnetic interference and how it can be minimized.

- b) Discuss the advantages of hybrid filters.

8. Write short notes (Any three):

- a) Boost type AC/DC Converter
- b) Twelve pulse AC/DC converter
- c) Power quality Indices
- d) IEEE S19 - 1992 standards

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