

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E -IVth SEMESTER-EXAMINATION – MAY- 2012****Subject code: 740701****Date: 12/05/2012****Subject Name: Harmonic Measurement & Filtration Techniques****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) Discuss all possible conditions, in which Harmonics are generated in Transformer and Variable drives. **07**
- (b) Describe non-linear loads giving suitable examples. Also give its comparison with linear load. **07**

- Q.2** (a) Define following terms: **07**
1. Total Harmonic Distortion (THD)
 2. Total Demand Distortion (TDD)
 3. Telephone influence factor (TIF)
 4. K factor
- (b) Discuss harmonic distortion limits for voltage and current in conformance with IEEE 519:1992. **07**

OR

- (b) Discuss harmonic distortion limits for voltage and current in conformance with IEC limits. **07**
- Q.3** (a) Explain working and design aspects of Band pass passive filters. Also discuss its quality factor. **07**
- (b) In which conditions, harmonics are responsible for neutral current over loading? Justify your answer. **07**

OR

- Q.3** (a) Explain methodology to be adopted to design tuned power filter for harmonics. How filter capacitors are useful for reactive power compensation? **07**
- (b) Explain how following methods helps to reduce harmonics in power systems : **07**
1. Multiphase Power Converters
 2. Series Reactors
 3. Load Grouping.

- Q.4** (a) How harmonics are responsible to create Thermal Effects on transformer & Abnormal operation of Electronic relays? **07**
- (b) Discuss various aspects to be considered in the design of passive filters. **07**

OR

- Q.4** (a) Why it is necessary to measure waveform distortions and also state how to carry out its measurements. **07**
- (b) Compare Active filter with Passive filters. **07**

- Q.5** (a) Giving schematic diagram, explain the working of positive sequence voltage detector circuit. Also explain functional block diagram of PLL circuit. Why positive sequence voltage detector circuit is so important in shunt active filter design? **07**
- (b) Giving block diagram and control algorithm, explain how shunt active filters are used for sinusoidal current control. **07**

OR

- Q.5** (a) Giving circuit diagram, explain the working of series active filters. Also discuss the algorithm used to generate compensated voltage signals. **07**
- (b) Write short note on Second-generation control circuit for series active filter. **07**
