

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E -IVth SEMESTER-EXAMINATION – MAY- 2012****Subject code: 742901****Date: 12/05/2012****Subject Name: Harmonics and Filtration methods****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) Define and explain following terms. **07**
1. Total Harmonics distortion. 2. Total demand Distortion
3. Telephone Influence Factor 4. K factor 5. Power Quality Factor
6. Displacement 7. Harmonic Distortion Limit
(b) Describe general configuration of Shunt active filters with necessary block diagram stating the functions of each block involved. **07**
- Q.2** (a) Explain working of shunt active filter for constant power compensation. Draw the block diagram for constant instantaneous power control strategy and explain its working. **07**
(b) Describe in brief effects of Harmonics on Rotating machines. **07**
- OR**
- (b) Give a comparison of 1st and 2nd generation control circuit for combined series active and shunt passive filters in terms of stability and filtering characteristics. **07**
- Q.3** (a) Describe in Brief about Power quality standards. **07**
(b) Explain the sinusoidal current control strategy for three phase Three Wire Shunt Active Filter with necessary Block Diagram. **07**
- OR**
- Q.3** (a) Explain How harmonics cancellation is obtained through the use of Multi pulse converter with necessary sketches and waveforms. **07**
(b) Describe the procedure for the design and validation of single tuned Passive Harmonic filters. Also discuss its quality factor. **07**
- Q.4** (a) Discuss harmonic distortion limits for voltage and currents in conformance with IEC limits. **07**
(b) Describe PWM converter Topologies for Three Phase four Wire Shunt Active Filter with necessary block diagrams. **07**
- OR**
- Q.4** (a) List various power quality measuring devices. Discuss harmonic Analyzer in brief. **07**
(b) Relevant to the Harmonic measurement explain following: **07**
(a). Need to measure waveform distortion.
(b). How to carry out harmonic measurement
- Q.5** (a) Distinguish between linear and non-linear load. Give their examples. **07**
(b) Giving circuit diagram, explain the working of series active filters. Also discuss the algorithm used to generate compensated voltage signals. **07**
- OR**
- Q.5** (a) Compare Hybrid filter with pure Active Filter. **07**
(b) With functional block diagram describe 3- phase 4 wire Unified Power quality Controller (UPQC controller - the combined series and shunt active harmonic Filter) giving a general overview of each functional blocks involved. **07**
