

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER- IV EXAMINATION – SUMMER 2013**

**Subject Code: 744501****Date: 14/05/2013****Subject Name: Harmonic Elimination technique****Time:****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) Describe in brief effects of harmonics on transmission system? **07**  
 (b) Discuss briefly power quality indices under non-sinusoidal conditions? **07**
- Q.2** (a) Distinguish between linear and non linear loads. Give their examples. **07**  
 (b) Write down the design parameters for the single tuned filter and explain the quality factor? **07**
- OR**
- (b) Define harmonics and discuss voltage versus current distortion? **07**
- Q.3** (a) Describe briefly the controlling of 3 -  $\phi$ , three wire shunt active filter with d ñ q modeling? **07**  
 (b) Discuss harmonic distortion limits for voltage and current in conformance with IEC limits. **07**
- OR**
- Q.3** (a) How harmonics affects the performance of transformer? **07**  
 (b) Draw and explain the harmonic sources generated in AC Drives and also discuss impact of operating condition? **07**
- Q.4** (a) List out the type of hybrid filters? Explain the operation of the hybrid passive series with shunt active filter? **07**  
 (b) Explain the operation of the unified power quality conditioner with current control? **07**
- OR**
- Q.4** (a) Explain the operation of the series active filter with appropriate diagrams and equations? **07**  
 (b) What are all the modifications to be done to obtain harmonic cancellation mode? **07**
- Q.5** (a) Relevant to the harmonic measurement explain following: **07**  
     a. Need to measure wave form distortion  
     b. How to carry out harmonic measurement  
 (b) Discuss different facts related to harmonic propagation for harmonic analysis? **07**
- OR**
- Q.5** (a) Derive the expression to find the switching angle for 9 ñ level cascaded MLI to eliminate 5<sup>th</sup>, 7<sup>th</sup> and 11<sup>th</sup> order harmonics from the line voltage? **07**  
 (b) Explain sinusoidal (carrier based) PWM, which are all parameters to be consider for a selecting the switching frequency? **07**

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