

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1724502****Date: 03-12-2014****Subject Name: Power Electronics-II****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) Explain the basic concepts of series resonance circuit. **07**
(b) What is power factor? Derive its formula for Linear load. **07**

- Q.2** (a) List the application of multilevel inverter and explain one in detail. **07**
(b) Explain the Frequency response of series resonant inverter. **07**

OR

- (b) What are the modifications required in basic series resonant inverter? Explain any one. **07**

- Q.3** (a) What is the main function of resonant switch converter? Explain ZCS resonant converter. **07**
(b) Explain switching state in 7-level H-bridge inverter. **07**

OR

- Q.3** (a) Explain the diode clamped 5-level inverter **07**
(b) A Thyristor based series resonant inverter has following parameters: **07**
 $R = 1 \Omega$, $L = 0.1 \text{ mH}$, $C = 10 \mu\text{F}$, $t_q = 12 \mu\text{Sec}$.
Find the maximum switching frequency for non overlap operation of inverter.

- Q.4** (a) A series resonant inverter with bidirectional switches in half bridge topology has following circuit parameters: **07**
(1) $C_1 = C_2 = 4 \mu\text{F}$, (2) $L_r = 40 \mu\text{H}$, (3) $R = 2 \Omega$,
(4) $E_{dc} = 120 \text{ Volt}$ and (5) $t_q = 20 \mu\text{Sec}$.
Assume output frequency to be 40% of resonant frequency.
Determine: (a) Resonant frequency,
(b) Max. operating frequency,
(c) Time required by current to reach at peak value,
(d) Peak device current.

- (b) Define: (1) Voltage distortion factor, (2) Current distortion factor and (3) Displacement factor. Give relation between these three factors and power factor for non linear load. **07**

OR

- Q.4** (a) Explain boost converter based power factor control topology. **07**
(b) With the help of block diagram explain the principle of active power filter. **07**

- Q.5** (a) What is the meaning of multipulse converter? Give its advantages and explain working of six pulse converter. **07**
(b) Explain AC voltage PWM controller with waveforms. **07**

OR

- Q.5** (a) Discuss the steps to design inductor for boost dc-dc converter. **07**
(b) Discuss the steps to design high frequency transformer. **07**
