Seat No.: _____ Enrolment No._____

# 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.**

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|---|---|---|---|
| **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:<br>R = 1 Ý, L = 0.1 mH, C = 10 µF, $t_q$ = 12 µSec.<br>Find the maximum switching frequency for non overlap operation of inverter. | **07** |
| **Q.4** | **(a)** | A series resonant inverter with bidirectional switches in half bridge topology has following circuit parameters:<br>(1) $C_1 = C_2$ = 4 µF, (2) $L_r$ = 40 µH, (3) R = 2 Ý,<br>(4) $E_{dc}$ = 120 Volt and (5) $t_q$ = 20 µSec.<br>Assume output frequency to be 40% of resonant frequency.<br>Determine: (a) Resonant frequency,<br>(b) Max. operating frequency,<br>(c) Time required by current to reach at peak value,<br>(d) Peak device current. | **07** |
| | **(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)** | Discus the steps to design inductor for boost dc-dc converter. | **07** |
| | **(b)** | Discuss the steps to design high frequency transformer. | **07** |

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