Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1724502 **Date: 18-06-2014**

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 concept and importance of High Frequency Transformer. Also write steps for the designing of the same. **07**

(b) For the Basic Series Resonant Inverter having $L_1 = L_2 = L = 50\ \mu H$, $C = 6\ \mu F$, $R = 2\Omega$, the DC input voltage is 220 V and frequency of output voltage is 7 KHz. The turn off time of the switch is 10 μS. Determine: **07**

(i) The available turn off time

(ii) The maximum permissible frequency

(iii) The peak-to-peak capacitor voltage

Support answer with necessary circuit and waveforms.

Q.2 **(a)** List disadvantages of Single-Phase Line-Commutated Rectifiers. Suggest necessary circuit, waveforms and control system diagram of Single Phase Boost Rectifier. **07**

(b) Explain the working of the PFC circuit shown in fig.1. Also draw the waveforms for switch 'S, Input Current $i_1(t)$ and Input V-I Characteristics. **07**

OR

(b) Explain the working of the PFC circuit shown in fig.2. Also draw the waveforms for switch 'S, Input Current $i_1(t)$ and Input V-I Characteristics. **07**

Q.3 **(a)** With necessary circuit and waveforms explain operation of High Frequency Link Integral Half Cycle Converter. **07**

(b) Explain Two Quadrant ZVS Resonant Converter. Support the answer with necessary circuits and waveforms. **07**

OR

Q.3 **(a)** Explain 3-Ø Resonant DC link Inverter. Also explain Active Clamp Circuit for the same. **07**

(b) Explain L-type ZCS Resonant Converter. Support the answer with necessary circuits and waveforms. **07**

Q.4 **(a)** Compare various Multilevel carrier-based PWM techniques for Multilevel inverter. Draw necessary diagram to support the answer. **07**

(b) Explain Single Phase structure of a Multilevel Cascaded H-Bridge Inverter with five separate DC sources. Support the answer with necessary circuit and waveforms. **07**

OR

Q.4 **(a)** Explain concept of Multilevel Converter. Compare the same with respect to Conventional Converter. **07**

(b) Compare Five Level Diode Clamped and Capacitor Clamped Inverter in all respect. Draw necessary circuits in support. **07**

Q.5 **(a)** Explain significance of Multi-Pulse Converters. Also explain Twelve Pulse Converter with Application. **07**

(b) Explain Power Factor in Electrical Power Systems with Linear and Non-Linear Loads. Derive necessary equations to support the answer. **07**

OR

Q.5 **(a)** Explain working Principle of Matrix Converter. Also discuss Practical issues related to same. **07**

(b) Explain importance of EMI filters. Also write steps involves in designing of the same. **07**

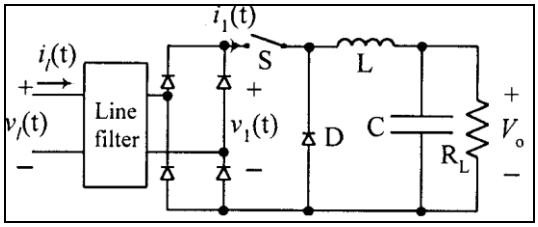

Fig.1 Q.2 (b)

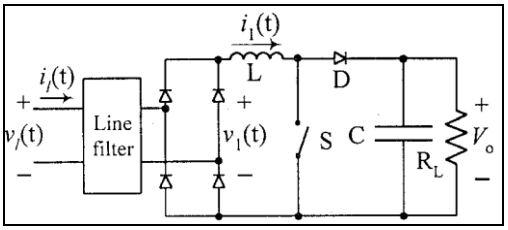

Fig.2 Q.2 (b) (OR)

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