Seat No.:

Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subj	ect co	ode: 714501N Date: 13-06-2014	
Subj Time	ibject Name: Power Electronics - I me: 02:30 pm - 05:00 pm Total Marks: 70		
Insti	ucti 1. 4 2. 1 3. 1	ONS: Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	
Q.1	(a)	In context with Design of Magnetic Components explain various types of losses to be considered.	07
	(b)	Explain significance of the effect of the heat transfer by radiation and convection on the power semiconductor switches.	04
	(c)	 Justify the following: (i) The conductors winding in an inductor and transformer are made from copper. (ii) During the designing of magnetic component total copper area will be less than winding window area. 	03
Q.2	(a)	Explain the working principle of 1- Ø Line Commutated Converter. Also list limitations of the same. Draw necessary circuit and waveforms.	07
	(b)	Explain operation of 3-Ø Full Converter with highly Inductive load. Support the answer with necessary equations, circuit and waveforms.	07
	(b)	Explain operation of 3-Ø Semi-converter with highly Inductive load. Support the answer with necessary equations, circuit and waveforms.	07
Q.3	(a)	Explain operation of Full bridge DC-DC Converter. Also explain various Pulse Width Modulation strategies with respect to same.	07
	(b)	Explain the working/ operation of the circuit shown in fig. 1. $ \begin{array}{c c} S & i_{L} & L & I_{O} \\ \hline i_{s} & \downarrow & \downarrow & \downarrow & \downarrow \\ v_{s} & \downarrow & D & C & \downarrow & \downarrow & \downarrow \\ v_{s} & \downarrow & D & C & \downarrow & \downarrow & \downarrow \\ & & & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ & & & & \downarrow & \downarrow & \downarrow & \downarrow \\ & & & & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ & & & & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ & & & & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow &$	07

Also draw necessary waveforms considering continuous mode of operation.

OR

Q.3(a) Explain Fly-back Converter derived from Buck-Boost Converters.07Support the answer with necessary circuits and waveforms.

(b) Explain the working/ operation of the circuit shown in fig. 2.



Also draw necessary waveforms considering continuous mode of operation.

- Q.4 (a) Explain operation of 1-Ø Half Bridge Inverter considering (i) R load and (ii) R-L 07 load. Also draw the necessary circuits and waveforms to support the answer.
 (b) Explain importance of Voltage Control for Single Phase Inverters. 07
 - (b) Explain importance of Voltage Control for Single Phase Inverters. List commonly used techniques for the same and explains any one in detail.

OR

- Q.4 (a)Explain operation of 1-Ø Full Bridge Inverter considering
(i) R load and (ii) R-L load.07Also draw the necessary circuits and waveforms to support the answer.
 - (b) Explain concept of Harmonic Reduction. Draw only circuit and waveforms for Harmonic Elimination by Transformer connection.
- Q.5 (a) Derive expression for RMS Output phase voltage of 3-Ø Unidirectional Controller 07 considering Star connected Resistive load.

Also draw necessary waveforms of line and phase quantities. **b**) Explain the working of the circuit shown in fig. 2

(b) Explain the working of the circuit shown in fig. 3.



Also draw waveforms with respect to all the components shown in the circuit.

OR

Q.5 (a) Derive the expression for RMS Output phase voltage of 3-Ø Bidirectional 07 Controller considering Delta connected Resistive load.

Also draw necessary waveforms of line and phase quantities.

(b)

07

07

07

07



Also draw waveforms with respect to all the components shown in the circuit.
