

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-I • EXAMINATION – WINTER 2014

Subject Code: 2710702

Date: 09/01/ 2015

Subject Name: Power Electronics

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) Discuss static and dynamic characteristics of power MOSFET and IGBT. **07**
(b) Discuss importance of isolation in driver circuit. Discuss various electrically isolated driver circuits. **07**

- Q.2** (a) Explain working of boost regulator with necessary circuit and waveforms And obtain necessary derivations for continuous mode of conduction. **07**
(b) Explain working of Buck-boost regulator with necessary circuit and waveforms and also obtain necessary derivations for continuous mode of conduction. **07**

OR

- (b) Draw the circuit of a forward converter and explain its operation with relevant waveforms and analysis. **07**
- Q.3** (a) In relation to inverter operation, what does one mean by unipolar modulation? How is it different from bi-polar modulation? What is the effect of these two schemes on the output voltage's harmonic spectrum? **07**
(b) Compare voltage source inverter and current source inverter. **07**

OR

- Q.3** (a) State the need for reduction of harmonics in inverters. Discuss the various methods for reduction of harmonics in inverter output. **07**
(b) Compare sine PWM technique with SVPWM technique. Prove that output voltage amplitude obtained in SVPWM technique is 15.5% higher than that of obtained in sine SCPWM technique. **07**

- Q.4** (a) Compare cyclo-converter and dc link converter. **07**
(b) Describe 3-phase to 3-phase cyclo-converter with relevant circuit using 18 thyristors. **07**

OR

- Q.4** (a) Draw the neat circuit diagram of three phase full wave bidirectional AC voltage controller and explain its working with waveforms for different firing angles. **07**
(b) Discuss in brief the on-off control and phase control techniques for AC voltage controller. **07**

- Q.5** (a) Discuss in brief the design of inductors used in DC to DC converters. **07**
(b) What is the difference in design of power transformer and high frequency transformer? **07**

OR

- Q.5** (a) Describe the transformer design for fly back converter with its topology and waveforms. **07**
(b) Discuss cascade connected drive circuits. Explain driver circuit protection in brief. **07**
