

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

OR

(b) Draw the circuit of a forward converter and explain its operation with relevant **07**
) waveforms and analysis.

Q.3 (a) In relation to inverter operation, what does one mean by unipolar modulation? **07**
How is it different from bi-polar modulation? What is the effect of these two
schemes on the output voltage's harmonic spectrum?
(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 **07**
methods for reduction of harmonics in inverter output.
(b) Compare sine PWM technique with SVPWM technique. Prove that output **07**
) voltage amplitude obtained in SVPWM technique is 15.5% higher than that of
obtained in sine SCPWM technique.

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 **07**
) thyristors.

OR

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

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 **07**
) transformer?

OR

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