

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2018

Subject Code:2160902

Date:27/11/2018

Subject Name:Power Electronics – II

Time: 02:30 PM TO 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) What is an inverter? List a few industrial applications of inverters. **03**
(b) Describe about PWM control in inverters. **04**
(c) Discuss the principle of working of a three-phase bridge inverter with an appropriate circuit diagram. Draw gate signal, phase voltage and line voltage waveforms for 180° conduction of SRCs with star connected load. **07**
- Q.2** (a) What are the control strategies for the regulation of output voltage in ac voltage controllers? **03**
(b) Explain the concept of ON-OFF or integral cycle control. **04**
(c) Discuss the principle of phase control in single-phase full-wave ac voltage controller with RL load. Illustrate your answer with relevant circuit diagram and waveforms. Derive expression for rms output voltage. **07**
- OR**
- (c) With neat circuit diagram and waveforms explain 3-Φ ac voltage controller with Y connected load. **07**
- Q.3** (a) Draw the circuit diagram and waveforms for current source inverter and give the applications of current source inverter. **03**
(b) A single phase full bridge inverter is connected to a dc source of V_s . Resolve the output voltage wave shape into Fourier series. **04**
(c) Explain the operation of a single phase parallel commutated inverter without freewheeling diode, with the help of voltage and current waveforms. **07**
- OR**
- Q.3** (a) Define: (1). Harmonic factor, (2). Total Distortion Factor and (3). Distortion Factor. **03**
(b) Compare voltage source inverter and current source inverter in brief. **04**
(c) What is space vector modulation? Explain the working principle of SVM(Space Vector Modulation). **07**
- Q.4** (a) List the speed control methods for synchronous motor. **03**
(b) Enlist advantages and disadvantages of cycloconverter. **04**
(c) Draw and explain the operation of three phase cycloconverter with relevant waveforms. **07**
- OR**
- Q.4** (a) Draw and Discuss briefly self-controlled synchronous motor drive. **03**
(b) Explain operation of single phase to three phase cycloconverter. **04**
(c) Derive an emf equation for the line-commutated phase-controlled cycloconverters. **07**
- Q.5** (a) Draw the equivalent circuit of an induction motor referred to stator side. **03**
(b) Explain the speed-torque characteristic of an induction motor. **04**
(c) Draw and explain cycloconverter based induction motor drive. **07**

OR

- | | | | |
|------------|------------|---|-----------|
| Q.5 | (a) | Discuss effect of harmonics on machine performance. | 03 |
| | (b) | Explain in brief the different speed control methods for induction motor. | 04 |
| | (c) | Discuss closed loop V/f technique used for induction motor drive. | 07 |
