

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:3162413****Date:04-07-2023****Subject Name:Power Electronics Circuits - II****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define: 1. Total harmonic distortion 2. Distortion factor 3. Lowest order harmonic. **03**
(b) Explain sinusoidal pulse width modulation technique with necessary diagram. **04**
(c) Explain the working of single-phase ac voltage controller with RL load. Draw necessary circuit diagram and waveforms. **07**
- Q.2** (a) List the features of multilevel inverter. **03**
(b) Determine the value of THD for single-phase square-wave inverter output. **04**
(c) Explain two-stage sequence control of ac voltage controller with R load. Draw necessary circuit diagram and waveforms. **07**
- OR**
- (c) Explain single-phase to single-phase mid-point cycloconverter with RL load for continuous load current operation. Draw necessary circuit diagram and waveforms. **07**
- Q.3** (a) Explain principle of phase control in ac voltage controllers. **03**
(b) Explain third harmonic injection control technique for inverter. **04**
(c) Analyze δ modulated quasi-square wave output of single-phase inverter using Fourier analysis. **07**
- OR**
- Q.3** (a) Draw the waveforms of supply voltage, output voltage and gate pulses for three-phase ac voltage controller. Consider firing angle $\alpha = 60^\circ$. **03**
(b) Explain trapezoidal modulation control technique for inverter. **04**
(c) Explain single-phase capacitor commutated current source inverter with R load. Draw necessary circuit diagram and waveforms. **07**
- Q.4** (a) Explain unipolar modulation control method for inverters. **03**
(b) Explain external control of ac output voltage in inverters. **04**
(c) Explain the operation of a three-phase 180° mode voltage source inverter with star connected resistive load. Draw necessary circuit diagram and waveforms. **07**
- OR**
- Q.4** (a) Explain bipolar modulation control method for inverter. **03**
(b) Explain external control of dc input voltage in inverters. **04**
(c) Explain the operation of a three-phase 120° mode voltage source inverter with star connected resistive load. Draw necessary circuit diagram and waveforms. **07**
- Q.5** (a) Draw the output voltage and current waveforms for single-phase inverter with RL and RLC underdamped load. **03**
(b) Explain the concept of space vector with reference to inverter. **04**
(c) Explain five-level diode clamped multilevel inverter. Draw necessary circuit diagram and waveforms. **07**

OR

- Q.5** (a) Draw the output voltage and current waveforms for single-phase inverter with R and RLC overdamped load. **03**
- (b) Explain the concept of dwell time with reference to inverter. **04**
- (c) Explain five-level flying capacitor multilevel inverter. Draw necessary circuit diagram and waveforms. **07**
