

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023****Subject Code:3162413****Date:02-12-2023****Subject Name:Power Electronics Circuits - 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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Explain the principle of operation of 1- $\emptyset$  half-bridge inverter. **03**  
(b) Explain single-pulse modulation technique with necessary diagram. **04**  
(c) Write technical note on: Integral Cycle Control of ac voltage controllers. **07**
- Q.2** (a) List the advantages of multilevel inverter. **03**  
(b) Derive average and rms value for 1- $\emptyset$  square-wave inverter output. **04**  
(c) Explain 1- $\emptyset$  ac voltage controller with R-L load. Draw necessary circuit diagram and waveforms. **07**
- OR**
- (c) Explain the operation of 3- $\emptyset$  to 1- $\emptyset$  cycloconverter. Draw necessary circuit diagram and waveforms. **07**
- Q.3** (a) Explain principle of 1- $\emptyset$  to 1- $\emptyset$  step-up cycloconverter. **03**  
(b) Explain trapezoidal modulation control technique for inverter. **04**  
(c) Define THD. Determine THD of single-phase square-wave inverter output. **07**
- OR**
- Q.3** (a) Draw the waveforms of supply voltage, output voltage and gate pulses for 1- $\emptyset$  ac voltage controller with R load. Consider firing angle  $\alpha = 45^\circ$ . **03**  
(b) Explain Selective Harmonic Elimination control technique for inverter. **04**  
(c) Explain the operation of 1- $\emptyset$  parallel inverter. Draw necessary circuit diagram and waveforms. **07**
- Q.4** (a) Define Modulation Index. Explain unipolar modulation control method for inverter. **03**  
(b) Explain external control of ac output voltage in inverters. **04**  
(c) Explain the operation of 3- $\emptyset$  150° mode voltage source inverter. Draw necessary circuit diagram and waveforms. **07**
- OR**
- Q.4** (a) Explain stepped modulation technique for inverter. **03**  
(b) Explain external control of dc input voltage in inverters. **04**  
(c) Explain the operation of 3- $\emptyset$  180° mode voltage source inverter. Draw necessary circuit diagram and waveforms. **07**
- Q.5** (a) Explain the concept of space vector with reference to inverter. **03**  
(b) Explain principle of current source inverter with necessary diagrams. **04**  
(c) Explain three-level diode clamped multilevel inverter. Draw necessary circuit diagram and waveforms. **07**
- OR**
- Q.5** (a) Explain the concept of dwell time with reference to inverter. **03**  
(b) Explain principle of 1- $\emptyset$  series inverter with necessary diagrams. **04**  
(c) Explain cascaded h-bridge multilevel inverter. Draw necessary circuit diagram and waveforms. **07**

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