

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VI EXAMINATION – SUMMER 2025**

**Subject Code:3162413**

**Date:20-05-2025**

**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.

|     |                                                                                                                        | MARKS |
|-----|------------------------------------------------------------------------------------------------------------------------|-------|
| Q.1 | (a) State the importance of Fourier analysis in inverters.                                                             | 03    |
|     | (b) Discuss dead band in an inverter along with its importance.                                                        | 04    |
|     | (c) Classify inverters. State and explain performance parameters of inverter.                                          | 07    |
| Q.2 | (a) State the performance parameters of AC-AC voltage controller.                                                      | 03    |
|     | (b) Describe single phase static switch with diagram.                                                                  | 04    |
|     | (c) Draw and explain the working of 1-ph AC-AC controller with R and RL Load                                           | 07    |
|     | <b>OR</b>                                                                                                              |       |
|     | (c) Discuss three phase AC-AC voltage controllers with different configurations.                                       | 07    |
| Q.3 | (a) Explain the working principle of a single-phase inverter.                                                          | 03    |
|     | (b) Compare VSI and CSI in a tabular form.                                                                             | 04    |
|     | (c) Describe the working of single-phase full bridge inverter with RL load along with necessary waveforms and circuit. | 07    |
|     | <b>OR</b>                                                                                                              |       |
| Q.3 | (a) State the full form of SHE. State its advantages.                                                                  | 03    |
|     | (b) Describe Third Harmonics Injection technique with waveforms.                                                       | 05    |
|     | (c) Draw and compare Unipolar and Bipolar PWM along with neat waveforms.                                               | 06    |
| Q.4 | (a) State the use of overmodulation and its effect on inverter output.                                                 | 03    |
|     | (b) Discuss various switching states in SVPWM.                                                                         | 04    |
|     | (c) Describe the 120° mode of conduction of 3-ph inverter with neat waveforms.                                         | 07    |
|     | <b>OR</b>                                                                                                              |       |
| Q.4 | (a) Define Dwell Time in SVPWM. State its importance.                                                                  | 03    |
|     | (b) Discuss modulation index and its influence on output voltage.                                                      | 04    |
|     | (c) Describe the 180° mode of conduction of 3-ph inverter with neat waveforms.                                         | 07    |
| Q.5 | (a) Classify Multi Level Inverters (MLI).                                                                              | 03    |
|     | (b) Differentiate high and low side switch. State the importance of floating ground.                                   | 04    |
|     | (c) Discuss various control techniques of an inverter.                                                                 | 07    |
|     | <b>OR</b>                                                                                                              |       |
| Q.5 | (a) State full form and define THD.                                                                                    | 03    |
|     | (b) State the advantages of PWM control of inverter.                                                                   | 04    |

- (c) Describe the working principle of Multi Level Inverter. State its 2 advantages and 2 disadvantages. Discuss how THD is reduced using MLI.

07

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