

Enrollment No./ Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

MASTER OF ENGINEERING - SEMESTER - 1 EXAMINATION – SUMMER 2026

Subject Code: 3710713

Date: 10-06-2026

Subject Name: Power Electronics Converters and Applications

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)** Draw and explain the construction and V-I characteristics of IGBT. **07**
(b) Explain space vector pulse width modulation (SVPWM) technique in brief. **07**
- Q.2 (a)** Draw the circuit diagram of buck converter and explain the discontinuous conduction mode of operation with necessary waveform and equations. **07**
(b) Explain the working of SCR using two transistor analogy in detail. **07**
- OR**
- (b)** Explain the dual converter with circulating current control mode. **07**
- Q.3 (a)** Explain the techniques to improve the power factor of AC – DC converters in brief. **07**
(b) Draw circuit diagram of sepic converter and explain its working with relevant waveforms and derive the equation of output voltage in terms of duty ratio. **07**
- OR**
- Q.3 (a)** Explain the effect of source impedance using single phase full bridge converter with circuit diagram and waveforms. **07**
(b) Draw circuit diagram of C'uk converter and explain its working with relevant waveforms and equations. **07**
- Q.4 (a)** A 3 phase bridge inverter with Y – connected balanced resistive load is operated under 120° conduction mode. Draw the circuit diagram and waveforms of gate pulses, pole voltages, common mode voltage, phase voltages and line voltages. **07**
(b) Explain the concept of integral cycle control strategy for regulating power flow in AC voltage controller. **07**
- OR**
- Q.4 (a)** Explain the working of Single phase AC voltage controller using R load with the needed waveform and derive its equation for RMS and Average output voltage. **07**
(b) Explain with neat circuit and waveform how single phase low frequency output voltage is fabricated from the segment of three phase to single phase cycloconverter. **07**
- Q.5 (a)** What is the need of isolation in driver circuit? Discuss the basic ways of isolating gate signal. **07**
(b) Explain the 3 phase fully controlled AC – DC converter with RL load using circuit diagram and waveforms. **07**
- OR**
- Q.5 (a)** Explain the method of providing electrical isolation between control circuit and driver circuit using transformer when the switching frequency is very less. Draw relevant waveforms and circuit diagram. **07**
(b) Explain the Buck – Boost converter using circuit diagram and waveform also derive the equation of output voltage in terms of duty cycle. **07**
