

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- V EXAMINATION-SUMMER 2023****Subject Code: 2150903****Date: 03/07/2023****Subject Name: Power Electronics – I****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) What is snubber circuit? Explain working and application for same. **03**
 (b) Differentiate Natural Commutation and Forced Commutation. **04**
 (c) Explain working of series connected SCRs. **07**
- Q.2** (a) Compare power MOSFETs with BJTs. **03**
 (b) Give at least five applications of phase controlled rectifiers. **04**
 (c) Draw and explain the working of an UJT oscillator. Discuss how the amplitude of output voltage pulse can be estimated in this oscillator. **07**
- OR**
- (c) Explain working of parallel connected SCRs. **07**
- Q.3** (a) Explain pulse transformer in detail. **03**
 (b) Explain function of freewheeling diode in mid-point full wave rectifier. **04**
 (c) Draw circuit diagram, waveform and derive expression for V_{RMS} for 3-phase full wave converter with R-L load. **07**
- OR**
- Q.3** (a) Explain the need for protection of semiconductor power devices. Explain di/dt and dv/dt protection of SCR. **03**
 (b) Explain continuous and discontinues conduction operation of choppers. **04**
 (c) Draw circuit diagram, waveform and derive expression for V_{RMS} for 3-phase half wave converter with R load. **07**
- Q.4** (a) Explain Morgan's chopper. **03**
 (b) Draw and explain RC triggering circuit for SCR. **04**
 (c) Write brief note on buck-boost converter. **07**
- OR**
- Q.4** (a) Describe Synchronized UJT Relaxation Oscillator for triggering of SCR with circuit diagram. **03**
 (b) What is chopper? Explain step-down chopper. **04**
 (c) Give block diagram for closed loop speed control of DC drive. Explain working of each block. **07**
- Q.5** (a) Explain basic concept of principle for speed control of DC motor. **03**
 (b) Explain CUK converter. **04**
 (c) Explain Principle of power control of separately excited motor with DC-DC Converter. **07**
- OR**
- Q.5** (a) Explain 1-phase dual convertor drive in short. **03**
 (b) What is regenerative braking? Explain w.r.t DC motor. **04**
 (c) Explain operation of four quadrant DC motor using chopper circuit. **07**
