

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023

Subject Code: 3152407

Date: 07-12-2023

Subject Name: Power Electronics Circuits - 1

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) Give the Classification of Uncontrolled rectifier. Also state its applications. **03**
 - (b) Discuss the effect of source inductance on rectifier operation. **04**
 - (c) Explain the working of single phase half wave uncontrolled rectifier with Resistive type load. Draw necessary diagram. **07**
- Q.2**
- (a) What is difference between controlled rectifier and un-controlled rectifier? **03**
 - (b) Discuss the significance of freewheeling diode in controlled converter operation. **04**
 - (c) Explain working of single phase semi-converter with necessary wave form for resistive type load. **07**
- OR**
- (c) Explain working of three phase half wave controlled rectifier with resistive type load. Draw necessary waveforms. **07**
- Q.3**
- (a) What is importance of isolation in Power Electronics circuit? Explain. **03**
 - (b) Explain meaning of Discontinuous Conduction Mode (DCM) with reference to DC-DC converter. **04**
 - (c) Explain working principle of Boost converter circuit with appropriate waveform. **07**
- OR**
- Q.3**
- (a) What is function of chopper circuit? Explain. **03**
 - (b) Explain Time ratio control used in chopper circuit. **04**
 - (c) Explain working principle of Type-B Chopper (second quadrant chopper) circuit. **07**
- Q.4**
- (a) State the function of Buck-Boost DC-DC converter circuit. **03**
 - (b) Discuss the first quadrant operation of Chopper circuit in brief **04**
 - (c) Explain working of Push-Pull type isolated DC-DC converter circuit. **07**
- OR**
- Q.4**
- (a) What is function of triggering circuit in AC-DC converter? Explain. **03**
 - (b) Compare single phase half wave rectifier and single phase full wave rectifier in all respect. **04**
 - (c) Explain working of Multi-phase chopper circuit with necessary waveforms. **07**
- Q.5**
- (a) What is inversion mode operation in single phase full bridge AC-DC controlled converter? Explain. **03**
 - (b) Explain necessity of AC-DC type Dual converter. **04**
 - (c) Explain working of Morgan Copper circuit with neat diagram. **07**
- OR**
- Q.5**
- (a) What is basic principle of Zero current switch (ZCS)? **03**
 - (b) State the advantages of Resonant type DC-DC converter. **04**
 - (c) Explain working of ZVS (Zero voltage switch) resonant converter with neat circuit diagram and waveforms. **07**
