

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2024

Subject Code:3152407

Date:28-11-2024

Subject Name:Power Electronics Circuits - I

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) What is the importance of isolation in power electronics circuits?	03
	(b) Explain the TRC and CLC control strategies of Chopper.	04
	(c) Discuss the effect of a freewheeling diode in detail. Justify: 'Freewheeling diode improves the power factor of the system.'	07
Q.2	(a) Consider a single-phase half-wave-controlled rectifier with R-load. Derive the expression of RMS load voltage.	03
	(b) Compare performance parameters of uncontrolled rectifier with controlled rectifier.	04
	(c) Describe single phase full wave bridge type AC to DC converter with RL load. Draw the necessary circuit diagram and waveforms. Comments on rectifying mode and inversion mode of converter.	07
	OR	
	(c) Explain the effect of source and load inductance on the performance of the converters.	07
Q.3	(a) State output voltage equations for Buck, Boost, and Buck-Boost converters.	03
	(b) Draw a circuit diagram and waveforms of a three-phase full-wave uncontrolled rectifier with resistive load.	04
	(c) Explain the class A chopper with the necessary circuit diagram and waveforms.	07
	OR	
Q.3	(a) Draw only the circuit diagram and waveforms of the Luo converter.	03
	(b) Define delay angle, conduction angle, and commutation angle (overlap angle).	04
	(c) Explain the class E chopper with the necessary circuit diagram and waveforms.	07
Q.4	(a) Mention the applications of DC-to-DC converters.	03
	(b) What is the difference between soft and hard switching?	04
	(c) Describe the UJT firing scheme with the necessary circuit diagram and waveforms.	07
	OR	
Q.4	(a) What is the principle of operation of a flyback converter?	03
	(b) What are the various types of triggering circuits and explain their role in power electronics.	04

- (c) Explain the working of a Push-Pull type isolated DC-DC converter circuit. **07**
- Q.5** (a) What is the principle of operation of a resonant converter? **03**
(b) Classify resonant converters. **04**
(c) Explain with a neat circuit diagram the principle of operation of dual converters. **07**
- OR**
- Q.5** (a) What are the advantages of resonant-switch converters? **03**
(b) Compare the performance of ZVS and ZCS. **04**
(c) Explain the ZCS resonant converter (L type or M type) in detail. **07**
