

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023****Subject Code:2150903****Date:18-12-2023****Subject Name:Power Electronics – 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) Define and explain latching and holding current.	03
(b) Explain difference between half controlled and full controlled Bridge rectifier.	04
(c) What is chopper? Explain step-up chopper.	07
Q.2 (a) What are the essential requirements of a gate triggering pulse?	03
(b) With the help of a neat circuit diagram, explain static V-I characteristic of an SCR.	04
(c) Draw necessary waveforms and explain working of 1- ϕ full controlled rectifier circuit with R-L load.	07
OR	
(c) Explain UJT relaxation oscillator.	07
Q.3 (a) Explain why the IGBT is called voltage controlled device?	03
(b) Explain pulse transformer and opto-coupler.	04
(c) Explain the principle of operation of power MOSFET.	07
OR	
Q.3 (a) Describe the uses of freewheeling diode in converters circuit.	03
(b) What is Commutation? List various conditions necessary for the commutation of SCR.	04
(c) What is necessity of connecting SCRs in parallel? Indicate problems associated with it and discuss the common methods of current sharing of parallel connected SCRs.	07
Q.4 (a) Explain DIAC with its construction and V-I characteristic.	03
(b) Compare TRIAC and SCR.	04
(c) Explain working of single phase half converter with R load.	07
OR	
Q.4 (a) Give basic topologies of switch mode regulators.	03
(b) What is chopper? List the methods of load voltage control.	04
(c) With a neat circuit diagram and wave forms describe the Morgan's Chopper circuit states its applications & limitations.	07
Q.5 (a) Explain working of SCR using two transistor analogy.	03
(b) Explain four quadrant operation of DC Drive with Phase controlled converters.	04
(c) Explain phase locked loop (PLL) control of dc motor.	07
OR	
Q.5 (a) List the advantages and disadvantages of boost regulator.	03
(b) Give a comparison between Regenerative and Rheostatic braking?	04
(c) Give block diagram for closed loop speed control of DC drive. Explain working of each block.	07
