

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2017****Subject Code: 2161708****Date: 01/05/2017****Subject Name: Power Electronics****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.

		MARKS
Q.1	Short Questions	14
	1 What is meant by reverse recovery time for a diode?	
	2 Define SCR or Thyristor and draw its symbol.	
	3 Define holding current.	
	4 What is Triac?	
	5 How the inversion layer is formed in IGBT?	
	6 What are requirements of good base drive?	
	7 Draw anti-saturation (Baker's Clamp) circuit used in base drive circuit.	
	8 What are controlled rectifier?	
	9 What is the function of freewheeling diode?	
	10 What is hold time of filter-rectifier?	
	11 Define Duty Cycle.	
	12 Define chopper.	
	13 Give difference between driven and self-driven inverter.	
	14 How many SPDT switches are needed for a two and four-level	
Q.2	(a) Classify the diodes based on the turn-off times. Write the important parameters of diode.	03
	(b) Draw and explain switching characteristics of transistor.	04
	(c) Discuss the functional structure and static characteristics of MOSFETs.	07
	OR	
	(c) Draw symbols and static characteristics of SCR, DIAC and TRIAC. In which ways it can be fired?	07
Q.3	(a) Draw and discuss the turn-on waveform of transistor with expanded timescale for various base-current.	03
	(b) Explain operation of any one non-isolated base drive circuit.	04
	(c) Explain turn-Off snubber circuit.	07
	OR	
Q.3	(a) What are the gate drive requirements for a MOSFET?	03
	(b) Explain operation of opto-isolated MOSFET drive circuit.	04
	(c) Draw and explain operation of any two base drive circuits with transformer isolation.	07
Q.4	(a) Calculate average DC output voltage for a half-wave rectifier that has an input voltage is 230 V rms ac. Transformer turn ratio is 1.	03
	(b) Draw circuit and waveforms of single phase half-wave rectifier with RL-load.	04
	(c) Explain 1-Ø full-wave bridge uncontrolled rectifier with relevant waveforms.	07

OR

- Q.4** (a) What are the advantages of three-phase over single-phase rectifier? What is the ripple voltage? **03**
- (b) What are the advantages and disadvantages of LC-rectifier filter? **04**
- (c) Explain 1- ϕ half-wave controlled rectifier (RL-load) with relevant waveforms. **07**
- Q.5** (a) Implement STTP three-level arm by two SPDT switches and write output voltage levels in relation to the switching pattern. **03**
- (b) What is inverter? What is the distinction between choppers, oscillators and inverters? **04**
- (c) Explain circuit operation of push-pull configuration for driven inverter. **07**
- OR**
- Q.5** (a) What is the isolated converter? What are the benefits of isolation in isolated converters? **03**
- (b) Draw chopper output waveform and schematic using SPDT and semiconductor switches. **04**
- (c) With circuit diagram and relevant waveforms, explain the working of step-down chopper. **07**
