

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (OLD) EXAMINATION – SUMMER 2019****Subject Code: 171002****Date: 14/05/2019****Subject Name: Power Electronics****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.

- Q.1** (a) Define the following:- **08**
(1) Reverse recovery Charge (2) Latching Current (3) Holding Current (4) Softness Factor
- (b) Draw the symbols, V-I characteristics and give one application of following devices: **06**
(1) IGBT (2) GTO (3) TRIAC
- Q.2** (a) Explain operation of series connected thyristors in detail. **07**
- (b) Explain parallel operation of thyristor in detail. **07**
- OR**
- (b) Explain the operation of DC Chopper's principal of operation **07**
- Q.3** (a) Briefly discuss switching behavior of a GTO **07**
- (b) Discuss Pulse Width Modulated Inverter **07**
- OR**
- Q.3** (a) Compare single phase half wave controlled bridge rectifier with Resistive load (symmetrical configuration) from single phase half controlled bridge rectifier with Resistive Inductive load (symmetrical configuration) using the following asked performance parameter:- [Sketch must be neatly drawn]. **07**
1) Average load voltage along with waveform
2) Average load current along with waveform
- (b) A highly inductive d.c. load requires 12A at 150V from 230V single phase a.c. supply. Give the design details for this requirement using B-2 connection for $\alpha=30^\circ$. Assume each SCR to have a voltage drop of 1.5 V. Draw the respective waveforms of load voltage and load current. **07**
- OR**
- Q.4** (a) Derive an expression for :- **07**
a) Average load voltage
b) Average load current
c) RMS load voltage
- For bi-phase half wave circuit with resistive load. Compare the waveforms of the same circuit with resistive and inductive load for the given firing angles of 60° , 90° , 150° .
- (b) Compare dielectric heating and induction heating **07**

OR

- Q.4** (a) With an appropriate power diagram, discuss the principle of working of three phase bridge inverter. Draw phase and line voltage waveforms on the assumption that each thyristor conducts for 180° and resistive load is star connected. **07**
- (b) With the help of a neat circuit diagram and associated waveforms, discuss the operation of Buck-Boost converter. List the advantages and disadvantages of this type of converter. **07**
- Q.5** (a) With the help of basic structural diagram explain the operation of DIAC and TRIAC **07**
- (b) Enlist and explain the performance parameters of Inverters **07**

OR

- Q.5** (a) Describe switched mode power supply with necessary details using diagram **07**
- (b) Explain battery charger with necessary diagrams **07**

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