

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Summer Examination-2019

**Subject Name: Power Electronics**

**Subject Code: 4TE06PEL1**

**Branch: B.Tech (IC)**

**Semester: 6**

**Date: 29/04/2019**

**Time: 10:30 To 01:30**

**Marks: 70**

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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**Q-1**

**Attempt the following questions:**

**(14)**

- 1) Draw the symbol of MOSFET and GTO.
- 2) How many junction exists in an SCR?
- 3) Define: Latching Current.
- 4) Reverse voltage blocking capability of power diode is more compare to the signal diode. Determine whether the given statement is True or False.
- 5) Which one of the power electronics converter is used to convert fixed frequency into variable frequency?
- 6) How many power switches are used in single phase half bridge inverter?
- 7) In a full wave bridge rectifier with inductive load, if a freewheeling diode is connected across the load, the power factor gets improved. Determine whether the given statement is True or False.
- 8) Which one of the power electronics converter is used to convert fixed DC voltage into variable DC voltage?
- 9) If the firing angle of the SCR increases, the output voltage of the rectifier decreases. Determine whether the given statement is true or false.
- 10) Which one of the power semiconductor switch from a thyristor family is a bidirectional switch?
- 11) Give the types of thyristor commutation techniques.
- 12) If the gate current through the gate terminal of SCR increases, forward break voltage of SCR decreases. Determine whether the given statement is True or False.



- 13) List the turn on methods of SCR.
- 14) Give any four industrial applications of power electronics.

**Attempt any four questions from Q-2 to Q-8**

- Q-2 Attempt all questions (14)**
- a) Draw the basic structure of power diode and explain its operation with the help of its V-I characteristics. **07**
  - b) Draw the structure and V-I characteristics of IGBT and explain its operation. **07**
- Q-3 Attempt all questions (14)**
- a) Explain the following modes of operation for SCR with help of its V-I characteristics. **07**
    - i) Forward blocking mode
    - ii) Forward conduction mode
  - b) Draw the circuit diagram and waveforms of single phase half wave controlled rectifier with resistive load and explain its operation. **07**
- Q-4 Attempt all questions (14)**
- a) Draw the circuit diagram and waveforms of single phase full wave diode rectifier with resistive load and explain its operation. **07**
  - b) A step down dc chopper has a resistive load of  $R = 15 \Omega$  and input voltage  $E_{dc} = 200 V$ . When the chopper switch remains ON its voltage drop is  $0 V$ . The chopper frequency is  $1 kHz$ . If the duty cycle is  $50 \%$ , Determine, **07**
    - i) Average output voltage
    - ii) RMS output voltage
    - iii) DC output power
- Q-5 Attempt all questions (14)**
- a) Draw the circuit diagram and waveforms of single phase to single phase cyclo-converter for resistive load and explain its operation. **07**
  - b) Draw the block diagram of off-line UPS and explain its operation. **07**
- Q-6 Attempt all questions (14)**
- a) Draw the circuit diagram of a step down chopper and explain its operation. **07**
  - b) Draw the circuit diagram and waveforms of single phase half bridge inverter with resistive load and explain its operation. **07**
- Q-7 Attempt all questions (14)**
- a) Draw the circuit diagram of class B chopper and explain its operation. **07**



b) Explain how snubber circuit is useful in over voltage protection for thyristor. **07**

**Q-8** **Attempt all questions** **(14)**

a) Draw the circuit diagram and waveforms of three phase to single phase cyclo-converter for resistive load and explain its operation. **07**

b) Draw the circuit diagram and waveforms of single phase full bridge inverter with *R-L* load and explain its operation. **07**

