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.

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 staement 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 characterisitcs 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**