

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2022 - 23 Examination

Semester: 4**Subject Code: 203106255****Subject Name: Power Electronics - I****Date: 24/03/2023****Time: 2:00pm to 4:30pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) (15)

1. An ideal power diode must have
 - (a) low forward current carrying capacity
 - (b) large reverse breakdown voltage
 - (c) high ohmic junction resistance
 - (d) high reverse recovery time
2. Choose the correct statement
 - (a) MOSFET is a unipolar, voltage controlled, two terminal device
 - (b) MOSFET is a bipolar, current controlled, three terminal device
 - (c) MOSFET is a unipolar, voltage controlled, three terminal device
 - (d) MOSFET is a bipolar, current controlled, two terminal device
3. The static V-I curve of an IGBT is plotted with
 - (a) V_{ce} as the parameter
 - (b) I_c as the parameter
 - (c) V_{ge} as the parameter
 - (d) I_g as the parameter
4. The forward break over voltage is the
 - (a) anode-cathode voltage at which conduction starts with gate signal applied
 - (b) anode-cathode voltage at which conduction starts with no gate signal applied
 - (c) gate voltage at which conduction starts with no anode-cathode voltage
 - (d) gate voltage at which conduction starts with anode-cathode voltage applied
5. In a 3-phase full converter using six SCRs, gating circuit must provide
 - (a) one firing pulse every 30°
 - (b) one firing pulse every 60°
 - (c) one firing pulse every 90°
 - (d) three firing pulses per cycle
6. Ideally the voltage drop across a conducting diode must be _____.
7. The minimum value of anode current below which it must fall to completely turn-off the device is called as the _____ value.
8. Pulse triggering can be only used by the _____ type of triggering circuit.
9. A single phase full-converter using R load is a _____ quadrant converter and that using an RL load without FD is a _____ quadrant converter.
10. In a step down chopper, if $V_s = 100$ V and the chopper is operated at a duty cycle of 75 %, the output voltage is/are _____.
11. A single-phase full controlled converter with bridge type of connection has a continuous load current waveform. The thyristor pairs T3, T4 is triggered at $\omega t = ?$
12. In circulating current mode dual converters, the circulating current is avoided by?
13. What is the duty cycle of a chopper?
14. The chopper control strategy in which on and off time is guided by the previous set of values of a certain parameter is called?
15. Which type of commutation circuit does not work on no load?

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Explain concept of reverse recovery of power diode.
- B) Explain Static V-I Characteristics of SCR.
- C) Discuss the effect of source inductance on fully controlled converter.
- D) Describe the concept of Freewheeling diode used in phase controlled converter using necessary diagram.

Q.3 A) Explain single phase dual converter with circuit diagram and waveform. (07)

B) What is snubber circuit? Why is it needed? Draw such circuit for a SCR and give guidelines for selecting its components. (08)

OR

B) Explain three phase full controlled converter with using circuit diagram and wave form. (08)

Q.4 A) List out different control strategy used to control chopper and explain each of with the waveform diagram. (07)

OR

A) With using of circuit diagram and waveform explain voltage commutated chopper. (07)

B) Explain Type – A chopper using circuit diagram, waveform and derivation of output voltage equation. (08)