

B.Sc. Semester-V Examination, 2022-23**ELECTRONICS [Honours]****Course ID : 51716 Course Code : SH/ELC/503/DSE-1(T)****Course Title : Power Electronics**

Time : 1 Hour 15 Minutes

Full Marks : 25

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer any **three** of the following questions:

1×3=3

- What is power electronics?
- Classify power semiconductor devices with examples.
- How can a thyristor be turned off?
- What is the use of snubber circuit?
- What is meant by phase controlled rectifier?
- Define Total Harmonics distortion.

2. Answer any **three** of the following questions:

2×3=6

- What is the turn-off time for converter grade SCRs and inverter grade SCRs?

- Define holding current and latching current of a SCR.
- What are the advantages of GTO over SCR?
- What is the function of freewheeling diodes in controlled rectifier?
- What is meant by input power factor in controlled rectifier?
- What are the two configuration of single phase 2 pulse controlled rectifier? Name them.

3. Answer any **two** of the following questions:

5×2=10

- With neat sketch explain the turn on and turn off characteristic of SCR. 5
- Draw the basic structure of an IGBT and explain its operation. 5
- Explain in brief single-phase half wave controlled rectifier for RL load with suitable voltage and current waveform. Hence derive expression for rms load voltage. 3+2=5
- Describe, with the help of a circuit diagram, the function of various components used for the protection of gate circuit of a thyristor. 5

4. Answer any **one** of the following questions:

$$6 \times 1 = 6$$

- a) Explain the principle of operation of DC-DC step up chopper with suitable waveform. Derive an expression for its average DC output voltage.

$$4 + 2 = 6$$

- b) Mention the difference between power diode and signal diode. Show that reverse recovery time and peak inverse current of power diode are dependent upon storage charge and rate of change of current.

$$2 + 4 = 6$$

- c) A dc battery is charged through a resistor R as shown in figure below. Derive an expression for the average value of charging current in terms of V_m , E and R etc. on the assumption that SCR is fired continuously.

$$6$$

