

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023****Subject Code:3142409****Date:19-07-2023****Subject Name:Basic Power Electronics Devices, Circuits And Applications****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define Power Electronics Modulator. List the classification of PEM. **03**
- (b) List comparison between Linear Electronics System (LES) and Power Electronics System (PES). **04**
- (c) Draw the structure of Power Diode. Explain the VI characteristics and switching characteristics of Power Diode with necessary diagrams. **07**
- Q.2** (a) What is Guard Ring? Explain the use of Guard ring in power diode with necessary diagram. **03**
- (b) Define SOA. Explain the FBSOA and RBSOA with necessary diagram. **04**
- (c) What is Static Switch? Classify Static Switch. Explain in Detail working, advantages and disadvantages of static switch. **07**
- OR**
- (c) Define Cycloconverter. List the classification of Cycloconverter. Explain working 1- Ø Cycloconverter with necessary circuit diagram and waveform. **07**
- Q.3** (a) List the similarities and difference between: Ideal Switch and Practical Switch. **03**
- (b) Define Turn ON time. List the method of Triggering. Explain the Gate pulse triggering along with necessary circuit and waveforms. **04**
- (c) What do you mean by over current protection? Enlist the protective circuit that minimize the effect of over current and explain any one in detail. **07**
- OR**
- Q.3** (a) What is S Factor? Explain the abrupt and smooth recovery of Power diode with necessary diagram. **03**
- (b) Define commutation. List the method of commutation. Explain Class C commutation along with circuit diagram and necessary waveforms. **04**
- (c) Discuss causes and effect of di/dt and dv/dt problem for Thyristor and Explain its remedies. **07**
- Q.4** (a) Define Following terms: 1. Finger Voltage 2. Turn On Time 3. Peak Inverse Voltage **03**
- (b) Explain Primary and Secondary Breakdown in Transistors using diagram. **04**
- (c) Write a Technical Short note on: Power MOSFET. **07**
- OR**
- Q.4** (a) Define Following terms: 1. Reverse Recovery Time. 2. Latching Current 3. Holding current **03**
- (b) Explain the concept Soft and Hard Switching of Transistor using diagram. **04**
- (c) Write a Technical Short note on: IGBT. **07**

- Q.5** (a) Draw and explain the schematic diagram, symbol, and V-I characteristic of SITH with nomenclature. **03**
- (b) Explain two transistor analogies of SCR using necessary diagram. **04**
- (c) Define Rectification. Explain working of 1- ϕ Controlled Full Wave Rectifier along with neat circuit diagram and waveform. **07**

OR

- Q.5** (a) Draw and explain the schematic diagram, symbol, and V- I characteristic of SIT with standard notation. **03**
- (b) Define Power Electronics. Draw detailed static Anode-Cathode Characteristic of a thyristor and explain it. **04**
- (c) What is an inverter? Explain Classification of inverter in detail. Explain the working of Full Bridge inverter along with neat circuit diagram and waveform. **07**
