

Code: 19EE3603

III B.Tech - II Semester – Regular Examinations – JUNE 2022**POWER ELECTRONICS
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

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- Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place.
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PART – A

1. a) Draw the block diagram of a typical power electronic system.
- b) What is the purpose of a freewheeling diode?
- c) Define modulation index.
- d) Define Chopper along with classification.
- e) Enumerate the differences between inverter and converter.

PART – B**UNIT – I**

2. a) Explain the V-I characteristics of a power diode with a neat sketch. 6 M
- b) Explain the two transistor analogy of SCR. 6 M

OR

3. a) Draw the symbol of IGBT and explain its characteristics. 6 M
- b) List and explain the various turn on methods of SCR. 6 M

UNIT – II

4. a) Explain the operation of single phase half controlled rectifier with RL load with a neat circuit diagram and waveforms. 6 M
- b) A single phase 230 V, 1 kW heater is connected across single phase 230 V, 50 Hz supply through a diode. Calculate the power delivered to the heater element. Find also the peak diode current and input power factor. 6 M

OR

5. Explain the operation of three phase fully controlled rectifier with RL load and derive the expression of output voltage and load currents with necessary illustrations. 12 M

UNIT-III

6. a) Enumerate the difference between Voltage and Current source inverters. 6 M
- b) Explain the construction and operation of single phase bridge inverter with necessary waveforms. 6 M

OR

7. a) List and explain various inverter voltage control techniques with suitable illustrations. 6 M
- b) Explain the construction and operation of 180 degree mode three phase voltage source inverter. 6 M

UNIT – IV

8. a) List and explain various control strategies of chopper. 6 M
- b) State the principle and operation of buck-boost chopper with necessary waveforms. 6 M

OR

9. a) Derive the average load voltage and current expressions for boost chopper. 6 M
- b) With a neat sketch, explain the principle of operation of a four quadrant chopper. 6 M

UNIT – V

10. Construct the AC to AC converter with two SCRs in anti-parallel with R load and derive the RMS load voltage, current and power factor. 12 M

OR

11. Explain the operating principle single phase midpoint cycloconverter with resistive load with necessary illustrations. 12 M