Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 41038

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Fifth/Sixth Semester

Electrical and Electronics Engineering

EE 3591 – POWER ELECTRONICS

(Common to: Mechanical and Automation Engineering/ Mechatronics Engineering/Robotics and Automation)

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the advantage of MOSFET.
2. Mention the application of buck converter.
3. Draw the transfer characteristics of IGBT.
4. List the disadvantages of single-phase half bridge inverter.
5. List out the types of power diodes.
6. Define distortion factor.
7. Mention the thermal protection methods of SCR.
8. What are the features of three phase-controlled rectifier?
9. How TRIAC is different from other silicon-controlled rectifiers?
10. Mention the application of SCR based soft starters.

PART B — (5 × 13 = 65 marks)

11. (a) Describe how boost converter is used to step up the supply voltage with necessary diagram.

Or

(b) Discuss the operation of flyback transformer and discuss its applications.

12. (a) Analyze how pulse width modulation is used to control the output power of an inverter.

Or

(b) How the harmonics can be reduced in inverter output voltage? Explain in detail.

13. (a) Discuss the various characteristics of uncontrolled full wave rectifier.

Or

(b) Obtain the performance parameters of diode bridge full wave voltage rectifier.

14. (a) Explain in detail about two transistor analogy of an SCR.

Or

(b) Analyse the 3-phase half wave SCR converter connected with resistive load.

15. (a) Elaborate the various operating modes of a TRIAC and discuss its advantages and disadvantages.

Or

(b) Discuss about various configurations of SCR based three phase controllers.

PART C — (1 × 15 = 15 marks)

16. (a) Design a suitable driver circuit for MOSFET which is used as switching device in DC to DC conversion circuit.

Or

(b) For Type A step down chopper with dc source voltage of 230V, load resistance of 10 ohm. Consider a voltage drop of 2 V across chopper when it is ON. For a duty cycle of 0.4, calculate

(i) average and rms values of output voltage and (10)

(ii) chopper efficiency. (5)