Total number of printed pages: 2 **UG/6th Semester/UECE616 (B)**

2025

POWER ELECTRONICS

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What is the function of the gate terminal in an SCR? Explain the working and application of PIN diode in power electronics.	2+8=10
	b)	What are the conditions under which a transistor operates as a switch? Explain the switching performance of power BJT with relevant waveforms.	3+7=10
2.	a)	Explain the term dv/dt protection in thyristors. Explain the need for protecting power semiconductor devices in power electronic circuits.	4+8=12
	b)	Describe the working of a RC snubber circuit. Where is it commonly used? Explain the basic working principle of a controlled rectifier.	3+1+4=8
3.	a)	A single phase fully rectifier is used to supply power to load having impedance 200 ohms and 150 mH, from 230V, 50Hz, ac supply at a firing angle of 90 degrees. Calculate i) Average values of output voltage and current ii) RMS values of output voltage and current.	6
	b)	What is meant by inverter? What are the main classification of inverter? Describe the principle of operation of 3 phase voltage source inverter with 180˚conduction mode with necessary waveforms and circuits. Also obtain the expression for line to line voltage.	2+2+10=14
4.	a)	Describe the working principle of a series linear regulator using a transistor. In a shunt regulator circuit using a Zener diode, the input voltage is 18V, the Zener diode has a breakdown voltage of 12V, and the load resistance is 240Ω. Calculate the output voltage and the current through the Zener diode.	6+4=10
	b)	With a neat power circuit diagram, explain the operation of boost converter. Draw the load voltage and load current waveforms and derive the expression for the output voltage.	10

5.	a)	Explain the basic working principle of an SMPS. How does it differ from a linear power supply?	6+4=10
	b)	List the main components of a UPS and their functions. Compare and contrast Offline UPS and Online UPS systems.	5+5=10
6.	a)	What is the function of drive circuit in stepping motor? Explain the construction and operation of variable reluctance type stepper motor.	2+10=12
	b)	Write a short notes (any two) on the following: (i) Freewheeling diode (ii) TRIAC (iii) Characteristics of stepping motor.	4+4=8