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

2023

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 power electronics? Give some applications of power electronics.	2+3=6
	b)	Compare turn off mechanism of TRIAC and Thyristor.	4
	c)	What are the different TURN ON methods of SCR?	3
	d)	Explain the constructional details and working of power MOSFET	7
2.	a)	Define the term holding current and latching current. What is the function of freewheeling diodes in controlled rectifier? Define the delay angle of phase controlled rectifier.	4+3+3=10
	b)	Analyze the constructional details of an SCR. Sketch its schematic diagram and explain its operation.	10
3.	a)	What is Firing Angle? A single phase fully controlled bridge converter with RL load is supplied from 220 V, 50 Hz ac supply. If the firing angle is 45o, determine i) average output voltage, ii) output current iii) input power factor.	3+7=10
	b)	Explain briefly about the different protection required to ensure the reliable operation of power semiconductor device.	10
4.	a)	List a few industrial applications of inverters.	2
	b)	The single phase half bridge inverter has resistive load of R=10 ohm and dc input voltage is 220v. Determine rms output voltage, average value, rms current and output power.	8
	c)	Describe the working of three phase inverter with suitable waveform.	10
5.	a)	What are the advantages and disadvantages of buck/boost regulator?	6
	b)	Draw the schematic diagram of boost converter for the ON and OFF time of switching modes. Discuss in brief why a large capacitor is used in the output of boost converters. Deduce an expression to represent the output	2+2+4=8

		voltage as a function of V_{in} and D.	
	c)	A series voltage regulator is required to supply a current of 1A at a constant voltage of 6V. If the supply voltage is 10 V and the Zener operates in the breakdown region, design the circuit. Assume β = 50, V_{BE}=0.5V and minimum Zener current = 10mA.	6
6.		Write a short notes (*any four*) on the following: (i) UPS (ii) SMPS (iii) IC voltage regulator (iv) Buck converter (v) Transistor shunt regulator	4×5=20