Total number of printed pages:2 **Programme(D)/Semester/DIE504**

2022

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 a power diode? Explain different types of power diodes.	10
	b)	Explain the construction and working of IGBT.	10
2.	a)	Draw the IV characteristics of an SCR and define the terms- Forward breakover voltage, Holding Current and Latching Current	8
	b)	How an SCR can be protected against high di/dt and high dv/dt? Explain with neat diagram.	5
	c)	How GTO can be turned off with negative gate pulse? Explain with two transistor model	7
3	a)	What is a phase controlled rectifier? Explain the working of a half wave phase controlled rectifier with RL-load.	2+8=10
	b)	A single phase 230V, 1KW heater is connected across 1-phase, 230V, 50Hz power supply through an SCR. For firing angle delays of 45^o and 90^o, calculate the power absorbed in the heating element.	10
4.	a)	What is a chopper? Explain the control strategies of a chopper.	2+4=6
	b)	For a type A chopper dc source voltage is 230V, load resistance is 10Ω. Voltage drop across the chopper is 2V when it is on. For a duty cycle of 0.4 calculate - (i) average and rms values of output voltage chopper efficiency	6
	c)	A step up chopper has input voltage of 220V and output voltage of 660V. If the non-conducting time of thyristor chopper is 100μS, compute the pulse	8

		width of the output voltage. In case pulse width is halved for constant frequency operation, find the new output voltage.	
5.	a)	What is an inverter? Give the steady state analysis of a voltage source single phase bridge inverter and draw its output waveforms for R, RL, RLC – over damped and RLC- Under damped load.	2+4+4 =10
	b)	Expand the inverter output in Fourier Series and define various quality factors of inverters.	10
6.	a)	Explain the working of fly back configuration of SMPS	10
	b)	What is UPS? Explain different types of UPS.	2+8=10
7.	Write short notes on		10x2=20
	a)	UJT	
	b)	Step up and Step down chopper	