Regulation R18 *Subject code: 2P5BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech V Semester Supplementary Examinations, June/July 2023

POWER ELECTRONICS

(EEE)

Maximum Marks: 70 Date:26.06.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Define latching current.
2 Define different components of turn on time and turn off times of a thyristor.
3 What is the function of freewheeling diodes in controlled rectifier ?
4 What is meant by natural commutation?
5 What is meant by duty -cycle?
6 What is snubber circuit?
7 Define the step up and step-down chopper.
8 Define the load commutation.
9 Define the term PWM control.
10 Define Displacement Factor.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Analyze the constructional details of an SCR. Sketch its schematic diagram and explain its operation? 10

OR

12 a) Draw and explain the transfer and output characteristics of *n*-channel enhancement type MOSFET's. 5

b) Explain the RC firing circuit with the help of circuit diagram and waveforms 5

13 Analyze the effect of source inductance in the operation of single phase fully controlled converter with relevant diagram and analysis? 10

OR

14 a) Explain the operation of 3-phase fully controlled Converter with R load operation 5

b) The dc voltage from a 1- phase fully controlled bridge converter with RL load is 110 V. The ac source voltage is 220 V rms. The load resistance, $R = 0.5\ \Omega$, and load inductance, L is large enough to cause the load current to be essentially constant. Determine the i) delay angle α ii) Estimate the power delivered to the load. 5

15 a) Explain in detail about the time ratio control. 5

b) A step down chopper is fed from 200V DC and its duty cycle is 0.6. Calculate the RMS value of output voltages for fundamental and third harmonic components. 5

OR

16	a) Explain the operation of a single phase AC voltage controller with the help of circuit diagram and waveforms	5
	b) A single phase voltage controller with resistive load has the following data: supply mains: 230V, 50 Hz, R = 5Ω. Calculate the firing angle at which the greatest forward or reverse voltage is applied to either of the thyristors and the magnitude of these voltages	5
17	How do you use PWM to inverters? Explain operation of single full bridge inverter with quasi-square wave pulse width modulation	10
	OR	
18	Explain working principle of single phase voltage sourse inverter with necessary diagrams?	10
19	Explain the 3-phase bridge inverter is operated in 180^0 conduction mode. Derive output line voltage?	10
	OR	
20	Describe the operation of 3-phase bridge inverter circuit diagram with resistive load in 120^0 conduction mode	10