R18 Regulation *Subject code: 2P5BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, July 2024

POWER ELECTRONICS

(EEE)

Maximum Marks: 70 Date:22.07.2024 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 which carries 10M.
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)		CO	Bloom Tx
1	Sketch static V-I characteristics of IGBT and mark the region in which the device is operated as a switch.	1	L1
2	Define holding current.	1	L1
3	What is the effect of connecting free wheeling diode across R-L load in controlled rectifiers?	2	L1
4	Write down general expression for average voltage of p- pulse fully controlled rectifier.	2	L1
5	What are applications of ac voltage controllers.	3	L1
6	What is meant PWM control in dc chopper	3	L1
7	What are the applications of inverter?	4	L1
8	What is meant by load commutation ?	4	L1
9	What are main classifications of inverter?	5	L1
10	Compare VSI & CSI	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	a) What is diode? Discuss i-v characteristics of power, signal and ideal diodes.[5M] b) Explain the operation of gate drive circuit for IGBT? [5M]	1	L2
	OR		
12	Design R and RC firing circuit for an SCR. [10M]	1	L2
13	Explain the operation of single phase half controlled bridge rectifier with R load. Derive the expression for (i) Average output voltage (ii) RMS value of output voltage. [10M]	2	L2
	OR		
14	Explain the operation of three phase half wave rectifier with R load.Derive the expression for (i) Average output voltage (ii) RMS value of output voltage. [10M]	2	L2

15	Explain in detail working principle of step up and step down chopper. [10M]	3	L2
	OR		
16	A 1 – phase a.c. regulator feed power to a resistive load of 4 Ω from 230 V, 50 Hz a.c. source. Determine i) the peak value of average and rms thyristor currents for any firing angle α. ii) the minimum circuit turn-off time for any firing angle α. [10M]	3	L2
17	A square-wave inverter has a dc source of 125 V, an output frequency of 60 Hz, and an RL series load with R = 20 Ω, and L = 25 mH. Determine (i) an expression for load current, (ii) rms load current, and (iii) average source current. [10M]	4	L2
	OR		
18	Explain the operation of single-phase bridge inverter with the help of load voltage and load current waveforms for R-L load. [10M]	4	L2
19	Describe the operation of 3-phase bridge inverter circuit diagram with resistive load in 120^0 conduction mode. [10M]	5	L2
	OR		
20	A 3-phase bridge inverter is 180^0 mode fed from a dc source of 200 V. If the load is star connected of 10 ohms / phase, determine rms value of load current and required current rating of thyristors. [10M]	5	L2