



Regulation R18

Subject code: 2P5BB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, February 2024
POWER ELECTRONICS

(EEE)

Maximum Marks: 70

Date: 17.02.2024 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.
 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	Blooms Tx
1	List out at least two merits of IGBT over MOSFET.	2	CO1	L2
2	Power MOSFET is a voltage controlled device. why?	2	CO1	L2
3	Mention some applications of controlled rectifier	2	CO2	L2
4	What are the advantages of freewheeling diodes in a controlled rectifier?	2	CO2	L2
5	Write down the expression for average output voltage for step down converter?	2	CO3	L2
6	What are the types of TRC?	2	CO3	L2
7	What is meant by load commutation	2	CO4	L1
8	What do you mean by PWM control	2	CO4	L1
9	What are the applications of CSI?	2	CO5	L2
10	Compare CSI and VSI.	2	CO5	L2

Part-B

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

11	a) What is diode? Discuss i-v characteristics of power, signal and ideal diodes.	5	CO1	L2
	b) For a power diode, the reverse recovery time is 3.9 μs and rate of diode current decay is 50 A/μs. For a softness factor of 0.3, calculate the peak inverse current and the storage charge.	5		L2
OR				
12	With neat circuit diagram explain how UJT firing circuit will generate pulse for an SCR.	10	CO1	L3
13	Describe with neat circuit diagram and associated waveforms, operation of a 1-Φ half wave-controlled converter with Inductive load.	10	CO2	L3
OR				

14	a) Explain the operation of 3- phase half-wave converter for resistive load with necessary waveform and circuit diagram.	5	CO2	L2
	b) A 1- phase semi-converter delivers power to RL load with $R= 5 \Omega$, $L = 10 \text{ mH}$. The a.c. supply voltage is 230 V, 50 Hz. For the continuous conduction, find the average value of output voltage and current for the firing angle of 45° .	5		L2
15	Draw the circuit of single-phase voltage controller with anti-parallel connection of two thyristors and an R-L load. Explain its working. Sketch load voltage and load current waveforms. Derive an expression for output voltage.	10	CO3	L3
	OR			
16	a) Explain in detail working principle of buck -boost chopper	6	CO3	L2
	b) A step-down chopper is fed from 200V DC and its duty cycle is 0.6. Calculate the average and RMS value of output voltages.	4		L2
17	Explain the operation of single phase bridge inverter with the help of load voltage and load current waveforms for R-L load.	10	CO4	L3
	OR			
18	a) Draw the circuit diagram of a single-phase half bridge inverter and explain its operation.	5	CO4	L2
	b) A single phase full bridge inverter has a resistance of load of $R=3 \text{ ohms}$ and DC input voltage $E_{dc}=100 \text{ V}$ calculate a) rms output voltage at fundamental frequency b) output power.	5		L3
19	Describe the operation of 3-phase bridge inverter circuit diagram with resistive load in 180° conduction mode.	10	CO5	L3
	OR			
20	A 3-phase bridge inverter is 120° 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.	10	CO5	L3