



R20 Regulation

Subject code:3P5BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

B.Tech V Semester Supplementary Examinations, December 2024

POWER ELECTRONICS

(EEE)

Maximum Marks: 70

Date:23.12.2024

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	What are the different methods to turn on the thyristor?	1	L1
2	IGBT is a voltage controlled device. why?	1	L1
3	Mention some applications of controlled rectifier.	2	L1
4	What is meant by natural commutation ?	2	L1
5	What is meant by duty -cycle?	3	L1
6	What is meant by FM control in dc chopper?	3	L1
7	What is meant by load commutation?	4	L1
8	What do you meant by PWM control?	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)		CO	Bloom Tx
11	A) Discuss the basic structure and operation of power IGBT. [5M] B) Explain the static characteristics and modes of operation of SCR. [5M]	1	L2
OR			
12	A) Explain the resistance firing circuit with the help of circuit diagram and waveforms. [5M] B) Explain the turn on and turn off characteristics of the SCR. [5M]	1	L2
13	A) Thyristor the input and output load voltage waveform of 1- Phase half controlled bridge converter having highly inductive load with firing delay angle of 60° . Justify your comments about the power flow. [5M] B) Derive an expression for i) average load voltage ii) average load current iii) RMS load voltage of 1-phase half-controlled converter with inductive load. [5M]	2	L2
OR			
14	A) Explain the operation of 3-phase fully controlled Converter with R load operation. [5M]	2	L2

	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. [5M] resistance, $R = 0.5 \Omega$, and load inductance, L is large enough to cause the load current to be essentially constant. Determine the delay angle α ii) Estimate the power delivered to the load.		
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. [10M]	3	L2
	OR		
16	A)Explain in detail working principle of buck -boost chopper. [5M] 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. [5M]	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 $R = 20 \Omega$, and $L = 25 \text{ mH}$. 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° conduction mode. [10M]	5	L2
	OR		
20	Explain briefly Bi-polar sinusoidal pulse width modulation with neat waveforms? [10M]	5	L2