R20 Regulation *Subject code: 3P5BA*

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:19.07.2024 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.**
4. **Each question carries 10 marks and may have a, b, c, d as sub questions.**

	Part-A	CO	Bloom Tx
All the following questions carry equal marks (10X2M=20 Marks)			
1	Compare turn off mechanism of TRIAC and Thyristor	CO1	BL1
2	Discuss is the effect of connecting freewheeling diode across R-L load in controlled rectifiers?	CO1	BL5
3	Draw the circuit diagram of a 3-phase full wave uncontrolled rectifier	CO2	BL3
4	What is an AC chopper?	CO2	BL1
5	Explain duty cycle in step up chopper operation	CO3	BL2
6	A 1-phase voltage controller has input voltage of 230 V, 50 Hz for 6 cycles on and 4 cycles off. Determine RMS output voltage.	CO3	BL4
7	What is the principle of operation of Inverter?	CO4	BL2
8	Brief about PWM control and its advantages?	CO4	BL5
9	Differentiate between VSI and CSI?	CO5	BL6
10	Distinguish between On-Off control and phase control?	CO5	BL2
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	a) Explain the operation of snubber circuit and also design the parameters of snubber circuit. [5] b) Draw the two-transistor analogy of a SCR? Explain SCR operation with this analogy. [5]	CO1	BL1 BL2
	OR		
12	a) What is IGBT? What are the advantages of IGBT over power BJT and power MOSFET? [5] b) Draw the V-I characteristics of a thyristor and explain different operating regions. What is the effect of Gate current on the V-I characteristics of a thyristor? [5]	CO1	BL2 BL2
13	Explain the single –phase full – wave-controlled bridge rectifier with RL load? Draw the voltage and current waveforms. [10]	CO2	BL2
	OR		

14	a) Describe the working of single-phase fully controlled bridge converter in the Rectifying mode. [5] b) A single phase half wave rectifier is used to supply power to a load of impedance 10 Ω from 230 V, 50 Hz a.c. supply at the firing angle of 300 . Calculate: i) Average load voltage, ii) Load current, iii) Effective value. [5]	CO2	BL3 BL4
15	a) Explain the operation of a single-phase AC voltage controller with a neat circuit diagram and output wave forms with respect to source voltage waveforms at $\alpha = 60$ degrees for R-load. [5] b) Explain the principle of integral cycle control with relevant waveforms and also derive the expression for rms value of output voltage, power delivered to load and input power factor. [5]	CO3	BL6 BL1
	OR		
16	With help of neat circuit diagram and associated waveforms discuss the operation of a Buck converter in continuous conduction mode and discontinuous conduction mode. [10]	CO3	BL2
17	a) With necessary waveforms explain the working of single-phase half bridge inverter with RL load and also derive the expression for RMS value of output voltage. [5] b) Single phase full bridge inverter has a resistive load of R= 2.4 ohms and DC input voltage of 48 volts. Calculate: i) RMS output voltage at fundamental frequency, ii) output power, iii) Average and peak current of each thyristor. [5]	CO4	BL1 BL3
	OR		
18	a) How do you use PWM to inverters? Explain operation of single full bridge inverter with quasi-square wave pulse width modulation. [5] b) Explain the working of auto sequential commutated current source inverter? [5]	CO4	BL5
19	a) Compare between CSI & VSI. [5] b) Compute the output frequency of a series inverter with the following specifications: L=10 mH; C=0.1μF; R= 150Ω; Toff = 0.2 ms. Also, find the attenuation factor. [5]	CO5	BL4
	OR		
20	Explain the working of a 1-phase full bridge Inverter with RL load. Draw the relevant output waveforms. [10]	CO5	BL3