Question Paper Code: R22A31EE01

R22

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech I Semester Regular Examinations, December – 2024

POWER ELECTRONICS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max. Marks: 60**

Section – A (Short Answer type questions) (10 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	Define power electronics?	CO1	L1	1M
2.	What are the static characteristics of thyristor?	CO1	L1	1M
3.	What is firing angle?	CO2	L1	1M
4.	Draw the three-phase input waveform and mention the all input parameters?	CO2	L1	1M
5.	What is chopper?	CO3	L1	1M
6.	What are the classification in chopper?	CO3	L1	1M
7.	What is inverter?	CO4	L1	1M
8.	What are the application of inverter?	CO4	L1	1M
9.	What is TRAIC?	CO5	L1	1M
10.	Compare phase control and on/off control techniques?	CO5	L1	1M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	What is two transistor model of thyristor? Prove that anode current of thyristor is given by $I_A = \frac{\alpha I_G + I_{CB01} + I_{CB02}}{1-(\alpha_1+\alpha_2)}$	CO1	L3	10M
	OR			
B)	Explain in details about static characteristics of SCR	CO1	L2	10M
12. A)	A three-phase dual converter operates in the circulating current mode when per phase rms voltage is 220 V, 50 Hz and L = 20 mH with firing angle a1 = 45°. i) Find the expression of circulating current. ii) Determine the peak value of circulating current	CO2	L3	10M
	OR			
B)	Draw the circuit diagram of three-phase half-wave-controlled rectifier with RL load and explain its operating principle with voltage and current waveforms.	CO2	L3	10M
13. A)	A step-down chopper with RLE load has input voltage of 200 V, R = 2 ohms, L = 10 mH, E = 50 V, TON = 500 ms, T = 1000 ms. i) Determine whether load current is continuous or discontinuous, ii) Find the value of average load current,	CO3	L3	10M
	OR			
B)	Explain in detail about four quadrant choppers with neat circuit diagrams?	CO3	L3	10M

14. A)	A three-phase bridge inverter is fed from 400 V dc supply. If the semiconductor switches (transistors) which are used in inverter conducts for 180° duration and the inverter is supplying a star connected resistive load of 10 W, determine i) rms value of per phase voltage and line voltage ii) rms value of load current iii) rms value of current flows through transistors iv) Power delivered to load v) Average source current.	CO4	L3	10M
	OR			
B)	Compare the voltage source and current source inverter?	CO4	L2	10M
15. A)	A single-phase half wave ac voltage controller is connected with a load of R = 15 W with an input voltage of 230 V, 50 Hz. When the firing angle of thyristor is 30°, find the RMS output voltage, power output at load, input power factor and average value of output voltage.	CO5	L3	10M
	OR			
B)	A single-phase unidirectional ac voltage controller is connected with a load of R = 20 W with an input voltage of 230 V, 50 Hz. If the firing angle of thyristor is 90°, determine i) the RMS value of output voltage, ii) power delivered to load, iii) input power factor and average, iv) average value of thyristor current and v) average value of diode current.	CO5	L3	10M