Question Paper Code: R15A31EE01

R15

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech I Semester Supplementary Examinations, June/July-2024

POWER ELECTRONICS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max. Marks: 75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	Interpret the importance of line commutation?	CO1	L1	2M
2.	What is a forced commutation? What are the advantages of forced commutation.	CO1	L2	3M
3.	How power flow can be controlled in a single phase fully controlled converter between source and load for R load and RL load?	CO2	L1	2M
4.	What is reactive power input of single phase full converter at $\alpha = 30^0$?	CO2	L2	3M
5.	Demonstrate the applications of three phase-controlled converters.	CO3	L1	2M
6.	What is the conduction periods of lower group thyristors in 6 pulse converters for 60 Hz frequency with $\alpha = 60^0$.	CO3	L2	3M
7.	What are the advantages and disadvantages of cycloconverters?	CO4	L1	2M
8.	What kind of commutation is required for step-up cyclo-converter?	CO4	L2	3M
9.	Explain the time ratio control in a dc chopper.	CO5	L1	2M
10.	Compare VSI and CSI.	CO5	L2	3M

Section B (Essay Questions)

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

11. A)	i) Analyze the working of SCR. ii) Discover operation of the two-transistor analogy of SCR.	CO1	L3	5M 5M
	OR			
B)	i) simplify in detail about the series connection of SCRs. ii) List the main specifications and ratings of SCR to be considered while designing? Explain.	CO1	L3	5M 5M
12. A)	A single phase fully rectifier is used to supply power to load having impedance 200 ohms and 150 mH, from 230V, 50Hz, ac supply at a firing angle of 90 degrees. Calculate i) Average values of output voltage and current. ii) RMS values of output voltage and current.	CO2	L3	10M
	OR			
B)	Explain the effect of source inductance on the performance of a single-phase full converter with the help of voltage waveforms. Develop an expression for its output voltage in terms of supply voltage, source inductance and load current.	CO2	L3	10M
13. A)	A three phase fully controlled bridge converter is connected to three phase ac supply of 400V, 50Hz and operates with a firing angle $\alpha = \pi/4$. The load current is maintained constant at 10a and the load voltage is 360V, compute: i) Source inductance Ls ii) Load resistance R, iii) Overlap angle,μ.	CO3	L3	10M
	OR			

B)	i) Analyze the operation of three phase Bridge type Full Converter with RL – load with neat waveforms.	CO3	L3	5M
	ii) Analyze the non circulating current mode of operation of Dual converter with RL Load.			5M
14. A)	A single-phase voltage controller has input voltage of 230 V, 50 Hz and a load of R=15 Ω. For 6 cycles on and 4 cycles off, Compute i) r.m.s output voltage, ii) input pf iii) average and r.m.s thyristor currents.	CO4	L3	10M
	OR			
B)	i) Examine the various modes of operation of TRIAC with the help of equivalent circuits and relevant waveforms.	CO4	L3	5M
	ii) Examine the operation of a single phase bridge type step down cyclo converter with the help of circuit diagram and waveforms.			5M
15. A)	Analyze various voltage control techniques employed in inverter circuits.	CO5	L3	10M
	OR			
B)	i) Enumerate the merits of Morgan chopper compared to Jones chopper.	CO5	L3	4M
	ii) Simplify the following: a) Single pulse Modulation. b) SPWM Technique.			6M