

Reg.No.:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8015

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024

Fifth Semester

Electrical and Electronics Engineering

U19EE519 – POWER ELECTRONICS

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define latching and holding current.	2	K1	CO1
2.	What are the losses occur in a thyristor during working conditions?	2	K1	CO1
3.	Illustrate the waveform of three phase half wave converter with R load.	2	K2	CO2
4.	Write the applications of the phase controlled rectifier.	2	K1	CO2
5.	Illustrate the circuit diagram of step up chopper.	2	K2	CO3
6.	What is time ratio control in chopper?	2	K1	CO3
7.	Why thyristor is not preferred for inverters?	2	K2	CO4
8.	Compare current source and voltage source inverter.	2	K4	CO4
9.	List the applications of AC voltage controller.	2	K1	CO5
10.	What is meant by sequence control of AC voltage regulators?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Illustrate the basic structure of MOSFET and explain its working, with its equivalent circuit, turn ON and turn OFF processes.	13	K2	CO1

(OR)

- | | | | | |
|--------|--|----|----|-----|
| b) | Infer the various modes of working of TRIAC, with necessary diagrams. | 13 | K1 | CO1 |
| 12. a) | A single phase full converter is supplied from 230 V 50 Hz source. The load consists of $R=10\ \Omega$ and a large inductance so as to render the load current constant. For a firing angle delay of 30° Determine, the following:
i. Average output voltage
ii. Average output current
iii. Average and RMS value of thyristors current
iv. Power factor | 13 | K3 | CO2 |

(OR)

- | | | | | |
|--------|---|----|----|-----|
| b) | Explain the operation of single phase full wave converter with relevant waveforms and obtain the suitable expressions. | 13 | K2 | CO2 |
| 13. a) | i. A DC chopper has resistive load of $20\ \Omega$ and input voltage of $V_s=220\text{ V}$. When the chopper is ON, its voltage drop is 1.5 V and chopping frequency is 10 kHz . If duty cycle is 80%
Calculate
a. Average output voltage
b. RMS values of output voltage
ii. Interpret the working of SEPIC converter. | 7 | K2 | CO3 |
| | | 6 | K2 | |

(OR)

- | | | | | |
|--------|--|----|----|-----|
| b) | Explain the principle of operation of buck boost converter with a neat circuit diagram and wave forms. | 13 | K2 | CO3 |
| 14. a) | Infer the operation of 3 phase bridge inverter for 180° mode of operation with the relevant phase and line voltage waveforms. | 13 | K2 | CO4 |

(OR)

- | | | | | |
|--------|--|----|----|-----|
| b) | i. Identify any two types of harmonic control of inverters and explain the operation of any one.
ii. With necessary diagrams and wave forms interpret the operation of current source inverter. | 7 | K3 | CO4 |
| | | 6 | K1 | |
| 15. a) | Explain the operation of single phase to single phase cyclo converter with neat circuit diagram and relevant waveforms. | 13 | K2 | CO5 |

(OR)

- | | | | | |
|----|---|----|----|-----|
| b) | With neat circuit diagram, explain the operation of three phase to three phase cyclo converter employing three phase half wave circuits and list few of its applications. | 13 | K2 | CO5 |
|----|---|----|----|-----|

PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	A DC chopper has an input voltage of 400V and a load of 20 Ω resistance. When the chopper is ON, its voltage drop is 1.5V and the chopping frequency is 15 KHz. If the duty cycle is 85%. Determine the following parameters and model the circuit also i. average and rms output voltage ii. chopper on time. iii. prove the output voltage of step down chopper is $V_o = D V_s$.	15	K3	CO3

(OR)

b)	A single phase half wave AC voltage controller has a resistive load of 4 Ω and an input source of 230 V, 50Hz. The firing angles of thyristors T1 and T2 also 60°. Evaluate i. the rms value of load voltage ii. input power factor iii. average value of current of thyristor iv. rms current of thyristor v. load power develop the circuit and explain the operation of the thyristors.		K3	CO5
		3		
		3		
		4		
		3		
		2		

