

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fifth Semester

Electrical and Electronics Engineering

EE3591 –Power Electronics

Regulations - 2021

Duration : 3 Hrs

*Maximum : 100
Marks*

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	What is the use of driver circuits?	RE	1	2
2.	Compare resonant converters with hard switching converters.	UN	1	2
3.	Draw the equivalent circuit of IGBT.	RE	2	2
4.	Compare VSI and CSI.	UN	2	2
5.	What is bridge rectifier?	RE	3	2
6.	Define distortion factor.	RE	3	2
7.	What is the necessity of thermal protection in converters?	RE	4	2
8.	Define harmonic factor.	RE	4	2
9.	Compare SCR and TRIAC.	RE	5	2
10.	Mention the demerits of AC voltage controllers.	RE	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a Explain the steady state and switching characteristics of MOSFET. Or	UN	1	13
	b Illustrate the step down (buck) converter with necessary waveforms.	UN	1	13
12.	a Analyze the operation of single phase full bridge inverter with necessary waveforms and also describe the sinusoidal pulse with modulation. Or	UN	2	13
	b Summarize the programmed harmonics elimination switching techniques.	UN	2	13
13.	a With neat diagram and derivation, compare the output performance of the single phase half wave and full wave rectifiers. Or	UN	3	13
	b i Draw and explain the working principle of voltage doubler circuit.	UN	3	8
	ii Draw the waveforms and explain the use of LC filter in diode rectifier.	UN	3	5

14.	a i	Explain the operation of two transistor analogy based turn ON of SCR.	UN	4	7
	ii	Describe the turn ON losses and thermal protection.	UN	4	6
Or					
	b i	Illustrate the 2-pulse converter with waveforms.	UN	4	7
	ii	Describe the effect of source inductance in three phase converter.	UN	4	6
15.	a	With a neat sketch explain the operation of TRIAC. Also discuss the VI characteristics of TRIAC.	UN	5	13
	Or				
	b	Explain about the pulse and high frequency carrier gating of single phase AC controller with RL load.	UN	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>	<i>Questions</i>		<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a i	A 230 V, 50 Hz, one pulse SCR controlled converter is triggered at a firing angle of 40° and the load current extinguishes at an angle of 120° . Find the circuit turn off time, average output voltage and the average load current for a) $R = 5\Omega$ and $L = 2\text{ mH}$ b) $R = 5\Omega$, $L = 2\text{ mH}$ and $E = 110\text{ V}$	AP	4	8
	ii	A single phase full converter feeds power to RLE load with $R = 6\Omega$, $L = 6\text{mH}$ and $E = 60\text{ V}$. The AC source voltage is 230 V, 50Hz. For continuous conduction, find the average value of load current for a firing angle of 50° .	AP	4	7
Or					
	b i	A single phase full converter bridge is connected to RLE load. The source voltage is 230 V, 50 Hz. The average load current of 10 A is continuous over the working range. For $R = 0.4\Omega$ and $L = 2\text{mH}$. Find a) Firing angle delay for $E = 120\text{ V}$ b) Firing angle delay for $E = -120\text{ V}$	AP	4	8
	ii	A three phase full converter charges a battery from a three phase supply of a 230 V, 50 Hz. The battery emf is 200 V and its internal resistance is 0.5Ω on account of inductance connected in series with battery, charging current is constant at 20 A. compute the firing angle delay and the supply power factor.	AP	4	7