Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

First Semester

Power System Engineering

PPST2414 / PX4151- Analysis of Power Converters

Regulations – 2021 & 2024

Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Define the static characteristics of a power diode.	UN	1	2
2.	How does an RL load influence the converter operation?	RE	1	2
3.	Mention the significance of using an R-L load in converter applications.	RE	2	2
4.	Define performance parameters in converters.	UN	2	2
5.	Differentiate between a MOSFET and an IGBT.	UN	3	2
6.	Name two common PWM techniques used in inverters.	RE	3	2
7.	Infer the role of single-pulse modulation in inverter voltage control.	UN	4	2
8.	Define induction heating and its main application.	RE	4	2
9.	Name two advantages of using multilevel inverters.	RE	5	2
10.	Define a high-pass filter and its role in inverter applications.	UN	5	2

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

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Explain the operation of a half-controlled converter with an RL load, detailing the impact of load changes on the converter output.	UN	1	9
		ii	Compare continuous and discontinuous conduction modes in power converters.	UN	1	4
			Or			
	b	i	Analyze the effect of source impedance on the performance of a converter and discuss how it influences the system stability.	UN	1	9
		ii	Compare the performance of a half-controlled converter and a fully-controlled converter	UN	1	4
12.	a		Describe the function of freewheeling diode in R-L load circuits. Discuss their role in improving converter performance.	UN	2	13
			Or			
	b		Elucidate the design and working of a 12-pulse converter with detailed circuit diagrams.	UN	2	13
13.	a		Apply the working principle of a full-bridge inverter, illustrating with relevant diagrams and waveforms.	AP	3	13
			Or			
	b		Apply the key design considerations for UPS systems, explaining the role of the inverter, battery management, and the various topologies used in UPS configurations.	AP	3	13

14.	a	Apply the principles of a three-phase inverter operating in 180° conduction mode with a star-connected load. Include relevant waveforms and perform voltage calculations to support your explanation.	AP	4	13
		Or			
	b	Demonstrate the operation of a Voltage Source Rectifier (VSR) and explore its applications. Apply the advantages of VSRs compared to traditional rectifiers in power system.	AP	4	13
15.	a	Discuss the working principle of a flying capacitor multilevel inverter. Discuss its circuit configuration, operation, and advantages over diode-clamped inverters.	UN	5	13
		Or			
	b	Explain the working principle, applications of a single-phase impedance source inverter.	UN	5	13

*PART – C (Marks 1*15 = 15)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
16.	a	Analyze how excitation systems benefit from the use of fully controlled converters. Discuss how these converters provide stability and response.	AN	2	15
		Or			
	b	Analyze the differences between various PWM techniques and discuss the advantages and limitations of each technique in controlling inverter output.	AN	3	15