Register No : ________________

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

EE3015 - Control of Power Electronics Circuits

Regulations - 2021

Duration : 3 Hrs — *Maximum : 100 Marks*

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

Q.No	Questions	BLT	CO	Marks
1.	Define the term transfer function and its importance in control systems.	RE	1	2
2.	Indicate the function of Bode plots in frequency analysis for control applications.	UN	1	2
3.	Define symbolic variables and explain their use in simplifying equations.	RE	2	2
4.	List commands used in handling polynomial expressions symbolically.	RE	2	2
5.	Identify the key benefits of applying sliding-mode control to DC-DC converters.	UN	3	2
6.	State the function of switching in sliding-mode control.	RE	3	2
7.	Recall the advantages of using boost converters for PFC.	RE	4	2
8.	List the components involved in a boost converter-based PFC system.	RE	4	2
9.	List the key components in a Ćuk converter-based PFC circuit.	RE	5	2
10.	Identify the role of SEPIC converters in PFC circuit design.	UN	5	2

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

Q.No		Questions	BLT	CO	Marks
11.	a	Explain the relationship between transfer functions and time-response plots in detail. Indicate the reason, Why this connection is critical in control systems?	UN	1	13
		Or			
	b	Summarize the function of single and double integration in control system behavior analysis. How do they relate to real-world applications?	UN	1	13
12.	a	Describe how vector symbolic variables assist in solving control system equations. Also mention their primary advantages.	UN	2	13
		Or			
	b	Explain how matrix operations in symbolic algebra contribute to simplifying control analysis and which aspects of control systems are most enhanced by these operations.	UN	2	13

13.	a	Apply sliding-mode control to a DC-DC converter and outline how it improves system response. Describe the steps involved in implementing this control strategy for an effective outcome.	AP	3	13
		Or			
	b	Apply the principles of sliding-mode control to identify stability parameters in a buck converter. Describe adjustments to optimize control.	AP	3	13
14.	a	Analyze the role of inner and outer control loops in a PFC circuit in detail. How do they contribute to power factor stability?	AN	4	13
		Or			
	b	Analyze the performance of a boost converter-based PFC circuit under variable load conditions. How does load affect power factor correction?	AN	4	13
15.	a	Implement a bridgeless topology in a PFC circuit and discuss its effect on overall energy efficiency.	AP	5	13
		Or			
	b	Apply control strategies to optimize PFC in SEPIC converters. Explain the key changes in voltage stability.	AP	5	13

*PART – C (Marks 1*15 = 15)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
16.	a	Develop a comparative study on the performance of a converter with sliding-mode control versus one with PID control in varied load scenarios.	CR	2	15
		Or			
	b	Design a boost converter with PFC for high-power applications. Detail the specifications and expected outcomes.	CR	3	15