

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

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

Seventh Semester

Electrical and Electronics Engineering

EE3013 - SMPS and UPS

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

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

Q.No	Questions	BLT	CO	Marks
1.	Mention the major application of buck converter.	RE	1	2
2.	Compare continuous and discontinuous conduction mode in converters.	UN	1	2
3.	What is the use of diode in forward converter?	RE	2	2
4.	Recall the applications of half-bridge converters.	RE	2	2
5.	What is circuit averaging in converter analysis?	RE	3	2
6.	Why is it important to simulate power converters using state space models?	UN	3	2
7.	Define gain margin.	RE	4	2
8.	Why is it important to maintain sufficient phase margin in a power converter design?	UN	4	2
9.	List the common types of power line disturbances.	RE	5	2
10.	Why are filters needed in power electronic systems?	UN	5	2

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

Q.No	Questions	BLT	CO	Marks
11.	a Explain the construction and working principle of buck converter with necessary circuit diagram and waveforms. Analyze the converter circuit to obtain the expression of output voltage and current. Or b Explain the construction and working principle of buck-boost converter with necessary circuit diagram and waveforms. Analyze the converter circuit to obtain the expression of output voltage and current.	UN	1	13
12.	a Exemplify the construction and working principle of forward converter with necessary circuit diagram and waveforms. Analyze the converter circuit to obtain the expression of output voltage and current. Or b Illustrate the construction and working principle of half-bridge converter with necessary circuit diagram and waveforms. Analyze the converter circuit to obtain the expression of output voltage and current.	UN	2	13
13.	a Derive the state-space model for a buck converter operating in continuous conduction mode. Explain the significance of state-space averaging in the analysis of switched-mode power supplies. How does state-space averaging simplify the modeling of power converters for control design? Or	AP	3	13

	b	Develop the transfer function model for buck-boost converter. Discuss how these models are used to analyze converter performance in terms of input-output voltage relations, and dynamic response. Why is the transfer function model important in the control design of SMPS systems?	AP	3	13
14.	a	Explain P, PI, PID Control concepts with clear diagram. Or	RE	2	13
	b	Explain in detail about the design of controller for Buck and Boost converters.	UN	2	13
15.	a i	Discuss the effects of power line disturbances on sensitive electrical equipment.	UN	5	8
	ii	Explain the importance of filters in power electronics and UPS systems.	UN	5	5
		Or			
	b i	Explain how power conditioners are integrated into UPS systems.	UN	5	8
	ii	Explain the function of front-end battery chargers in UPS systems.	UN	5	5

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	Explain how gain margin and phase margin are used to assess the stability of power converters. Or	UN	2	15
	b	Explain the procedure for designing PI controller for a boost converter using Bode plot analysis.	UN	2	15