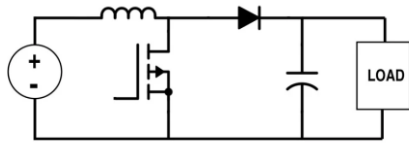


THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY
2025****Sixth Semester****Electrical and Electronics Engineering****EE3013 - SMPS and UPS****Regulations - 2021****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	Identify the type of converter and mention its advantages. 	L2	1	2
2.	Point out the impact of switching frequency on the size of inductors and capacitors in DC-DC converters.	L3	1	2
3.	Name two types of isolated DC-DC converter topologies.	L1	2	2
4.	List the advantages of using high-frequency switching in SMPS.	L2	2	2
5.	Distinguish between state-space averaging and circuit averaging.	L2	3	2
6.	How does the duty cycle affect the dynamic response of a converter?	L3	3	2
7.	Define "gain margin".	L1	4	2
8.	Point out the importance of stability analysis in controller design.	L3	4	2
9.	Identify the name of the UPS, whose back up power will come into action only when the main power supply cuts off. Also mention its advantages.	L3	5	2
10.	Identify the need of filters in power conditioning systems.	L3	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a	Explain the operating principle of a Buck converter in both CCM and DCM with the help of circuit diagrams and waveforms.	L2	1	16
	Or			
b	Explain the concept of volt-second balance and charge balance and their significance in the analysis of DC-DC converters.	L2	1	16
12. a	Analyze and explain the operation of a Flyback converter with circuit diagrams and waveforms. Derive the relationship between input and output voltage.	L3	2	16
	Or			
b i	Discuss the operation and applications of bidirectional DC-DC converters, particularly in electric vehicles.	L3	2	8

	ii	Discuss the factors to be considered in the design of magnetic components (transformer/inductor) for SMPS.	L3	2	8
13.	a	Describe the state-space averaging technique and derive the state-space model for a Boost converter.	L3	3	16
		Or			
	b	Derive the transfer function for a Buck converter and explain how it can be used to analyze the converter's stability and dynamic response.	L3	3	16
14.	a	Design a PI controller for a Buck converter to achieve a desired output voltage and improve its dynamic response.	L3	4	16
		Or			
	b i	Discuss the factors that influence the selection of controller parameters for DC-DC converters.	L3	4	8
	ii	Explain the steps involved in designing a controller for a Buck-Boost converter.	L3	4	8
15.	a	Explain the working principles and differences between offline and online UPS systems.	L2	5	16
		Or			
	b	Describe the function of a front-end battery charger in a UPS system. Explain the working principle of a boost charger and discuss its advantages in the context of UPS applications	L2	5	16