

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APR/MAY 2026

Seventh Semester

Electrical and Electronics Engineering

EE3013 - SMPS AND UPS

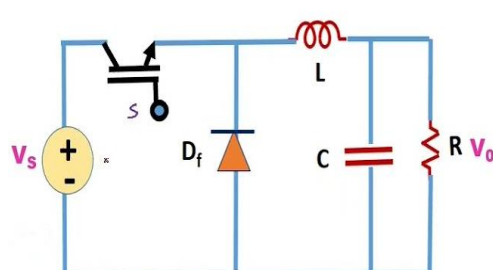
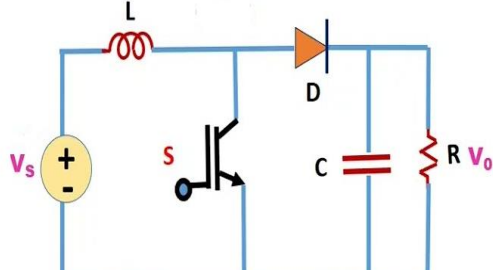
Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

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

Q.No	Questions	BLT	CO	Marks
1.	Define the term "switching frequency" in the context of DC-DC converters.	L2	1	2
2.	State the difference between the two converters.	L3	1	2

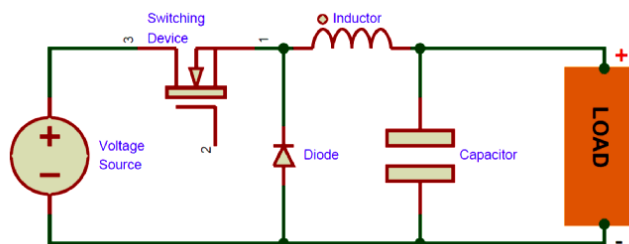



3.	Define the flyback converter and mention one application.	L1	2	2
4.	Point out the role of a transformer in an isolated SMPS.	L3	2	2
5.	Compare state space averaging and circuit averaging.	L2	3	2
6.	Write the transfer function expression for a boost converter.	L1	3	2
7.	Define gain margin in control systems.	L1	4	2
8.	How does a PID controller differ from a PI controller?	L2	4	2
9.	Point out the role of power conditioner, and why is it used?	L2	5	2
10.	Identify the need of filters in power conditioning systems	L2	5	2

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

Q.No	Questions	BLT	CO	Marks
11.	a Illustrate and explain the operation of the Buck-Boost converter. Derive its output voltage in terms of the duty cycle and input voltage. Or b Explain the concept of volt-second balance. Why is it essential in the analysis of DC-DC converters?	L3	1	16
12.	a Explain in detail the half-bridge and full-bridge topologies used in isolated DC-DC converters. Or b Explain the design process of a Switched Mode Power Supply (SMPS) in detail.	L2	2	16

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| 13. | a | Apply the concept of AC equivalent circuit analysis for DC-DC converters. | L3 | 3 | 16 |
| Or | | | | | |
| | b | Derive the transfer function model for the below converter using state space averaging. | L3 | 3 | 16 |



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| 14. | a | Explain the process of creating a Bode plot for a converter's transfer function and how it aids in stability analysis | L2 | 4 | 16 |
| Or | | | | | |
| | b | Illustrate the design and tuning of a PI controller for a Buck-Boost converter. | L2 | 4 | 16 |
| 15. | a | Explain the working principles and differences between offline and online UPS systems. | L2 | 5 | 16 |
| Or | | | | | |
| | b | Discuss the design and function of a front-end battery charger and a boost charger in a UPS system. | L2 | 5 | 16 |
