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**BTECH-HONOURS
(SEM V) THEORY EXAMINATION 2024-25
SMPS AND UPS**

TIME: 3 HRS**M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A**1. Attempt all questions in brief.****2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Write the difference between SMPS and UPS.	02	1
b.	What is Non-isolated DC-DC converters?	02	1
c.	Write some advantage of EV.	02	2
d.	Write the parts of SMPS.	02	2
e.	What are the challenges in designing high-efficiency isolated DC-DC converters?	02	3
f.	Discuss the role of magnetic components in SMPS design.	02	3
g.	What is PD controller?	02	4
h.	Define gain margin.	02	4
i.	Define filter.	02	5
j.	What is modulation?	02	5

SECTION B**2. Attempt any three of the following:****3 x 10 = 30**

Q no.	Question	Marks	CO
a.	Describe the working principle of a Buck-Boost converter in CCM.	10	1
b.	Explain the push-pull converter topology with its circuit configuration. Discuss its advantages and limitations in isolated DC-DC conversion application	10	2
c.	Simulate the operation of a buck converter using the state-space model derived from state space averaging.	10	3
d.	Describe the process of using gain and phase margins to refine a PID controller for a buck converter.	10	4
e.	Discuss the concept of power conditioners, their working principle, and their role in mitigating power line disturbances. Include different types of power conditioners in your answer	10	5

SECTION C**3. Attempt any one part of the following:****1 x 10 = 10**

Q no.	Question	Marks	CO
a.	Discuss the concept of charge balance in the analysis of DC-DC converters.	10	1
b.	Discuss the factors affecting the efficiency of a Buck converter. How can switching losses and conduction losses be minimized in practical implementations?	10	1



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SMPS AND UPS**

TIME: 3 HRS**M.MARKS: 100****4. Attempt any one part of the following: 1 x 10 = 10**

Q no.	Question	Marks	CO
a.	What is the C'uk converter? Explain how the isolated version of the C'uk converter is derived and discuss its operation	10	2
b.	Derive the equations governing the operation of a half-bridge converter. Discuss its application in low-to-medium power isolated DC-DC conversion.	10	2

5. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Describe the circuit averaging method in the context of converter dynamics. Derive the averaged model for a buck converter.	10	3
b.	For a buck-boost converter, develop the AC equivalent circuit and discuss its performance under varying load conditions.	10	3

6. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Explain the dynamic behavior of a buck converter with a PI controller in terms of its gain and phase characteristics	10	4
b.	Discuss the challenges in designing controllers for power electronic converters operating under varying load conditions.	10	4

7. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Describe the working principle and design considerations of filters for Pulse Width Modulated Voltage Source Inverters (PWM VSI)	10	5
b.	What is a front-end battery charger in a UPS system? Explain its operation, design, and importance in maintaining system reliability	10	5