APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : PE0819222-I **(Pages: 2)** **Name:** .....

Reg. No:.....

SECOND SEMESTER M.TECH. DEGREE EXAMINATION JUNE 2019

Branch: Electrical Engineering **Specialization: Power Electronics**

08EE6222 SWITCHED MODE POWER CONVERTERS

(Common to PE)

Time:3 hours **Max. marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	Obtain the relation for average output current for a dc-dc **boost** converter at the boundary between continuous and discontinuous mode of operation	3
	Answer b or c	
b	With the help of relevant waveforms, derive the following for a dc-dc **buck** converter (i) input-output voltage relation in terms of duty ratio for continuous conduction mode (ii) output voltage ripple	6
c	Explain the working of a basic forward converter. Explain the role of demagnetizing winding in tackling the issue of stored energy due to transformer magnetizing current and avoiding the chances of converter failure.	6

Q.no.	Module 2	Marks
2.a	With the help of circuit diagram and relevant waveforms, discuss the working principle of half bridge converter	3
	Answer b or c	
b	With the help of circuit diagram and relevant waveforms, discuss the working principle of Full bridge converter	6
c	Explain the voltage mode control principle of a Flyback converter	6

Q.no.	Module 3	Marks
3.a	What are the various criteria for the stable loop operation for a typical converter with feedback	3
	Answer b or c	

b	Explain the shaping of gain versus frequency characteristic of converter for stable operation	6
c	Explain the technical reasons for the advantages of current mode control of converter over voltage mode control. Also, List the disadvantages of it.	6

Q.no.	Module 4	Marks
4.a	What is meant by state space averaging? What are the basic steps in obtaining it for a converter?	3
	Answer b or c	
b	Discuss and derive the small signal model for any one basic switched mode dc-dc converter	6
c	Obtain the small signal ac equivalent circuit model for a non-ideal flyback converter with help of relevant equations and sketches. Take the main switch internal resistance as Ron.	6

Q.no.	Module 5	Marks
5.a	Explain the purpose and concept of average switch modelling?	4
	Answer b or c	
b	Derive the state space averaging model of non-ideal buck boost converter	8
c	Explain in detail modelling of pulse width modulator.	8

Q.no.	Module 6	Marks
6.a	What is meant by resonant converters? How are they useful in smpc applications?	4
	Answer b or c	
b	With the help of neat circuit diagram and relevant waveforms, discuss the operation of series loaded resonant dc-dc converter in discontinuous current conduction mode.	8
c	Explain the working of ZVS resonant switch converter with neat sketches.	8