APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

6222_May17_1 **(Pages: 2)** **Name: .....**

Reg. No:.....

SECOND SEMESTER M.TECH. DEGREE EXAMINATION MAY 2017

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

08EE6222 SWITCHED MODE POWER CONVERTERS

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	What is the principle of voltage control in the basic DC-DC switching converters?	3
b	In a step down power supply, the output is to be maintained constant at 5 V. Calculate the minimum inductance required to keep the conduction mode continuous, if the input is varying between 10 - 40 V. The output P_0 >= 5 W, and switching frequency is 50 kHz. Derive any formula you may use.	6
c	Explain the principle of operation of a push pull converter with relevant waveforms. Derive an expression for the duty ratio. What are the merits and demerits of a push pull configuration?	6

Q.no.	Module 2	Marks
2.a	Compare isolated and non isolated dc-dc converters	3
b	With circuit diagram and waveforms, explain the principle of operation of a full bridge converter. Derive the expression for duty ratio.	6
c	With circuit diagram and waveforms, explain the principle of operation of a flyback converter. Derive expressions for duty ratio, peak current through the switch and peak voltage across the switch	6

Q.no.	Module 3	Marks
3.a	What are the conditions for stability of a feedback loop? What is K factor?	3
b	How will you shape the error amplifier gain versus frequency characteristics?	6
c	What are the advantages of current mode control? Why slope compensation is required in the current mode control of converters?	6

Q.no.	Module 4	Marks
4.a	Obtain the DC model of a boost converter operating inn continuous conduction mode.	3
b	Obtain the transfer function $\frac{\widehat{v0}}{\hat{d}}(s)$ of a forward converter operating in continuous conduction mode using state space averaging . Assume the turns ratio as 1:1.	6
c	Obtain the basic Ac model of a flyback converter. Assume the turns ratio as 1 : n and on state resistance as R_{on}.	6

Q.no.	Module 5	Marks
5.a	Compare state space averaging and circuit averaging methods of modelling of dc-dc converters.	4
b	Obtain the state space averaged model of a non ideal fly back converter.	8
c	Obtain the circuit averaged model of a boost converter.	8

Q.no.	Module 6	Marks
6.a	What are resonant converters? How they are classified?	4
b	Explain the operation of a series loaded half bridge resonant converter operating in discontinuous conduction mode with relevant circuits, expressions and waveforms.	8
c	Explain the operation of a zcs resonant buck converter with relevant circuits, expressions and waveforms.	8