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Total Number of Pages: 02

M.TECH
PEPC201

2nd Sem Back Examination – 2015-16

POWER CONVERTER-II

Q.CODE:W759x

Time: 3 Hours

Max marks: 70

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)
- a) What is the difference between linear power supplies and switching power supplies?
 - b) What is bidirectional core excitation in DC-DC converter?
 - c) How the current and source inverters are different?
 - d) In SVM why two consecutive voltage vectors are selected for synthesizing the reference voltage vectors?
 - e) What are possible application of multilevel inverters?
 - f) What will happen in forward converter if we select tertiary turns equal to primary turns and duty ratio greater than 0.5?
 - g) What is the difference between SVPWM and PWM technique?
 - h) Draw the circuit diagram of a push-pull converter.
 - i) What are the methods for voltage control in series resonant inverter?
 - j) What is the dead zone of a resonant inverter?
- Q2 a) What is switch mode rectifier? Describe the operation of a single phase switch mode rectifier. What will happen if the inductor is moved from load side to source side? (5)
- b) Explain the operation of 3-phase series inverter with diagram and waveforms. What are disadvantages and how they are overcome? (5)
- Q3 a) Describe the operation of 5-level diode clamped multilevel inverter with diagrams and the switching states in a table. (6)
- b) Compare the number of diodes and capacitors for diode clamp, flying capacitor and cascaded inverters if $m=5$ (4)
- Q4 For three phase SVM Based inverter, derive the expressions of durations for which the consecutive voltage vectors are to be applied in order to synthesize V_{ref} , in case the reference vector is lying in sector one. What do you mean by pulse of opposite polarity? (7+3)
- Q5 a) Derive the expression for output voltage of sepic converter by considering a non-ideal inductor that is the inductor has a finite resistance 'r'. (5)
- b) In a buck-boost converter, consider all components to be ideal. Let V_d be 8-40V, $V_0=15V$, $f_s=20kHz$, and $C=470\mu F$. calculate L_{min} that will keep the converter operating in a continuous conduction mode if $P_0 \geq 2W$ (5)

- Q6 a) Explain the working of two quadrant zvs resonant converter with circuits and waveforms. (5)
b) What are the advantages of and limitations of ZCS and ZVS converters? (5)
- Q7 a) A flyback converter is operating in complete demagnetization mode. Derive the voltage transfer ratio in terms of load resistance R , switching frequency f_s , transformer inductance L_m and duty ratio D . (5)
b) In a CUK converter, operating at 50kHz, $L_1=L_2=1\text{mH}$ and $C=5\mu\text{F}$. the output capacitor is sufficiently large to yield an constant output voltage. Here $V_d=10\text{V}$ and output voltage is regulated be constant at 5V. It is supplying 5W to a load. Assume ideal components. Calculate percentage error in i_{L1} , i_{L2} and V_{C1} , if all these are assumed to be constant. (5)
- Q8 Answer any two (5 x 2)
a) Push-pull converter
b) Current regulated PWM voltage source inverter
c) Buck converter
d) Three Phase Series Inverter.