CLASS: M.TECH   SEMESTER : I
BRANCH: EEE   SESSION : MO/19

SUBJECT: EE507 ADVANCED POWER ELECTRONICS

TIME: 3 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Draw vertical cross sectional diagram of POWER MOSFET. Label its different layers. Explain and Draw   [5]
         switching characteristics of Power MOSFET.
Q.1(b)   In the diode and LC network, the capacitor is charged to voltage Vo with upper plate positive. Switch S   [5]
         is closed at t=0. Derive expressions for current through and voltage across C.
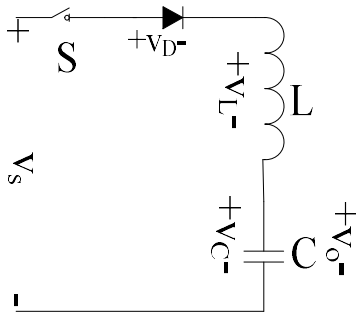
Q.2(a)   With the help of equivalent circuit diagram explain operating principle of Fly Back converter along with   [5]
         the theoretical waveforms under discontinuous mode of operation.
Q.2(b)   Design a forward converter of 100W. Assume other specifications.   [5]

Q.3(a)   Explain Space vector PWM switching scheme. Obtain and draw the instantaneous phase voltages (time   [5]
         averaging) during one switching cycle period for sector 1.
Q.3(b)   Explain the operating principle of cascaded multilevel converter with a neat circuit diagram.   [5]

Q.4(a)   Explain and Draw operational modes of L-type ZCS Resonant Converter indicating the current path and   [5]
         voltage across resonant capacitance.
Q.4(b)   A basic series resonant inverter has both inductors ($L_1=L_2=L$) of 50µH. It has a capacitor of 6µF.   [5]
         Connected resistive load is of 2Ω. The DC supply voltage is 220V and the frequency of output voltage
         is 7kHz. Determine (a) the maximum possible turn OFF time for the Thyristor (b) maximum permissible
         frequency (c) peak to peak capacitor voltage (d) Peak load current (e) Output power P_0.

Q.5(a)   Write short notes on IGBT Gate Drive circuit.   [5]
Q.5(b)   Explain the PIN configuration of UC3843 chip. Draw the functional block diagram of UC3843 chip.   [5]

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