Total No. of Questions : 12]

SEAT No. :

P4951

[Total No. of Pages : 3

[5058]-75

T.E. (Electronics) (Semester - I)

POWER ELECTRONICS

(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers to the two Sections should be written in separate books.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables and electronic non-programmable pocket calculator is allowed.***
4) ***Assume suitable data, if necessary***
5) ***Solve Q. 1 or 2, Q. 3 or 4, Q. 5 or 6 from Section I and Q. 7 or 8, Q. 9 or 10, Q. 11 or 12 from Section II***

SECTION - I

Q1) a) Explain working of 3 phase semi controlled converter with circuit diagram and waveforms for RL load. Comment on power factor. Derive equation for DC load voltage and Load current. **[10]**

b) Explain source and load inductance effect on the operation of single phase converter. Derive the equation of average output current 'I_{dc} and load voltage V_L. **[8]**

OR

Q2) a) Single phase dual converter is operated from a 120 V, 50Hz supply and R_L =20 ohms. The circulating inductance is Lc = 60 mH. Delay angles are α_1 = 60 and α_2 =120. Calculate the peak circulating current. **[8]**

b) What is need of triggering? Explain UJT or MSI triggering for three phase controlled converter with suitable diagram. Discuss necessity of isolation in triggering and converter circuit? **[10]**

Q3) a) Explain working of Buck-Boost converter with circuit diagram. Which factors decide buck-boost action, How? **[8]**

b) DC chopper is working at 40 KHz with battery voltage of 200 V. The minimum turn-on and turn-off time of the chopper are 2μsec and 4μSec respectively. Determine the min. and max. dc voltage that the chopper can deliver. **[8]**

P.T.O.

OR

Q4) a) Explain fly-back converter topology for SMPS with circuit diagram, waveform and mathematical analysis. **[8]**

b) Explain operation of four quadrant chopper with waveforms. How this is utilized in reversible drive? **[8]**

Q5) a) Explain operation of SLR half bridge DC/DC converter in low frequency (discontinuous conduction) mode **[8]**

b) Why cycloconverters are required? Explain operation of 6 pulse cycloconverters with diagram and waveforms. **[8]**

OR

Q6) a) What are resonant converters? Why zero current switching is preferred at high voltages? **[8]**

b) Compare Linear, Switched mode and resonant converter with merits and de-merits of each. **[8]**

SECTION - II

Q7) a) Explain working of 3 phase VSI with 180° conduction mode with purely resistive load. Draw circuit diagram and waveforms for load voltage and current **[10]**

b) Explain different voltage control methods in inverters **[8]**

OR

Q8) a) Transistorised inverters are better in performance than thyristorised one. Justify. **[8]**

b) Draw circuit diagram of a Three phase CSI and explain its operation with current waveforms. **[10]**

Q9) a) Compare and contrast different types of cooling techniques **[8]**

b) Why di/dt and dv/dt protection is required? List considerations and steps in designing these protection circuits. **[8]**

OR

Q10) a) Explain Electric welding process with its block diagram and operation **[8]**

b) What is HVDC transmission? List its merits over HVAC transmission. **[8]**

Q11) a) Compare phase angle control (PAC) and symmetric angle control (SAC) methods of controlling load voltages. **[8]**

b) Why energy audit is necessary? Explain the process in steps / flowchart. **[8]**

OR

Q12) a) Compare different power factor improvement schemes **[8]**

b) What are different power line disturbances? How to minimize them? **[8]**