M.E. First Semester (Electrical (Electronics & Power) Engineering) (New-CGS)

13314 : Power Electronic Converters : 1 EEPME 2

P. Pages : 2

Time : Three Hours

AW - 3578

Max. Marks : 80

Notes :
1. Answer **three** question from Section A and **three** question from Section B.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Explain voltage current characteristics of IGBT and describe the symmetric and asymmetric IGBTs. **7**

b) What do you mean by MOSFET? State and explain the different types of MOSFET. **6**

OR

2. a) Describe the basic structure of MOS controlled thyristor (MCT). Draw its equivalent circuit and explain its turn on and turn off process. **8**

b) Explain the on state losses in power BJT with suitable response characteristics. **5**

3. a) The buck regulator has an input voltage of $V_s = 12V$. The required average output voltage is $V_o = 5V$ and the peak to peak output ripple voltage is 20mV. The switching frequency is 25kHz. If the peak-to-peak ripple current of inductor is limited to 0.8A. Determine. **8**

a) Duty cycle. b) Filter inductance L.

c) Filter capacitor C.

b) Give the design of DC to DC converter based on SEPIC topology. **6**

OR

4. a) Explain the basic principle of operation of SMPS. Discuss the selection criterion for various components of SMPS. **7**

b) Explain the operation of full bridge converters with different operating modes. State its advantages and disadvantages. **7**

5. a) Explain the different types of core materials used in constructing power electronic converters. **6**

b) Explain the design process of high frequency inductors for various converters. **7**

OR

6. a) Draw neat circuit diagram and relevant waveforms of continuous mode fly back converters. Derive the expression for voltage and transfer ratio. 7

b) Explain the design of DC inductor. How it is different from that of an AC induction. 6

SECTION – B

7. a) Explain the operation of bridge inverter with 180° modes of operation. Draw circuit diagram and related waveforms. 8

b) Explain the effect of harmonics present in inverter system. Enlist various methods in inverter for reduction of Harmonics. 6

OR

8. a) Explain the space vector transformation and space vector switching with the help of diagram. What are the advantages of SVM? 7

b) Describe the circuit analysis of current source Inverter with resistive load. 7

9. a) Explain any one thyristor drive circuits with neat diagram. 6

b) Describe the significance of blanking circuit in inverters. Hence give details on blanking times for bridge circuits. 7

OR

10. a) Explain electrically isolated drive circuit using some commonly available driver chips. 7

b) Describe cascade connected drive circuits in detail. 6

11. Explain the working principle of three phase cycloconverter with circuit diagram and waveforms. 13

OR

12. a) Why is the power factor of semi converter better than that of full converter.

b) What are the advantages and disadvantages of on off control and phase angle control.

****