CBCS SCHEME

15MT63

Sixth Semester B.E. Degree Examination, June/July 2019
Power Electronics

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a. What are the different types of power electronic converters?   (08 Marks)
    b. Compare MOSFET and IGBT.   (08 Marks)

OR

2   a. Define power electronics. List the applications of power electronics.   (08 Marks)
    b. Draw the symbol and control characteristics of i) SCR   ii) IGBT   iii) GTO.   (08 Marks)

Module-2

3   a. Draw the circuit diagram of a complimentary commutation, and explain the principle of complimentary commutation.   (08 Marks)
    b. Explain the V-I characteristics of SCR with different operating modes.   (08 Marks)

OR

4   a. Derive an expression for anode current in terms of the common base current gain of the transistor (two transistor analogy).   (08 Marks)
    b. Distinguish natural and forced commutation.   (08 Marks)

Module-3

5   a. Explain the operation of a bidirectional A.C. voltage controller for an resistive load.
                                                                                       (08 Marks)
    b. With the help of waveforms and circuit diagram explain the operation of 1-ϕ semi converter.
                                                                                       (08 Marks)

OR

6   a. What are the advantages of circulating current mode dual converter?   (04 Marks)
    b. List the applications of A.C. voltage controller.   (04 Marks)
    c. Derive an expression for average value of output voltage in a 1-ϕ full converter.   (08 Marks)

Module-4

7   a. Explain the principle of operation of a step up chopper.   (08 Marks)
    b. A chopper circuit is operating on TRC at a frequency of 2kHz on a 460V supply. If the load voltage is 350 volts. Calculate the conduction period of the thyristor in each cycle. (08 Marks)

OR

8   a. With neat diagram, explain four quadrant operation of a chopper.   (08 Marks)
    b. A d-c chopper has an input voltage of 200V and a load resistance of 8Ω. The voltage drop across the thyristor is 2V and chopper frequency is 800Hz. The duty cycle is 0.4. Find:
        i)   Average output voltage
        ii)   RMS value of output voltage
        iii) Chopper efficiency.   (08 Marks)

Module-5

9 a. Write a note on performance parameters of a inverter.
    i) Harmonic factor of nth harmonic
    ii) Total Harmonic Distortion (THD)
    iii) Distortion Factor (DF)   (08 Marks)
   b. Compare voltage source inverter and current source inverter.   (08 Marks)

OR

10 a. With neat circuit diagram, explain operation of a three phase transistorized inverter in 180° conduction mode with star connected R-load.   (10 Marks)
    b. Derive an expression for RMS value of output voltage in a single phase half bridge inverter.
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