

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What is a power converter? List the different types of power converters and mention their conversion function. (10 Marks)
b. Explain the control characteristics of IGBT and SCR. (05 Marks)
c. Discuss the peripheral effects of power-electronic equipments. (05 Marks)

OR

- 2 a. With the help of switching waveforms explain the switching characteristics of power MOSFET. (06 Marks)
b. Give the comparison between BJT, MOSFET and IGBT. (06 Marks)
c. For the transistor switch shown in Fig.Q2(c).
i) Calculate forced beta Bf of transistor
ii) If the manufacturer's specified beta is in the range 8 to 40, calculate the minimum overdrive factor (ODF)
iii) Obtain the power loss PT of the transistor.

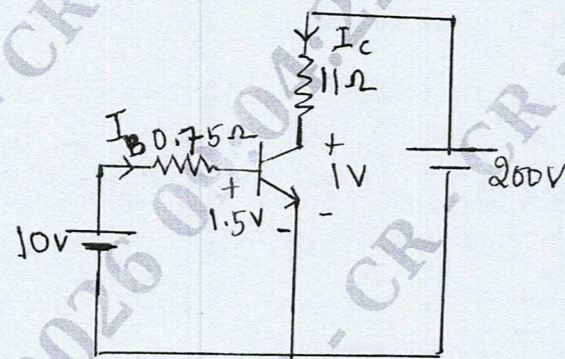


Fig.Q2(c)

(08 Marks)

Module-2

- 3 a. Explain two transistor model of SCR and derive an expression for anode current in terms of transistor parameters for a thyristor. (10 Marks)
b. Explain static anode-cathode characteristics of SCR. (10 Marks)

OR

- 4 a. Explain gate characteristics of SCR with a neat diagram. (10 Marks)
b. Explain different turn-on methods of SCR. (05 Marks)
c. Differentiate between natural and forced commutation. (05 Marks)

Module-3

- 5 a. With circuit diagram, explain single phase full converter with RL load derive equation for average output voltage and rms output voltage. (10 Marks)
b. With neat diagram and waveforms, explain the principle of phase controlled converter operation. (08 Marks)
c. What is the role of freewheeling diode in controlled rectifiers with R-L load? (02 Marks)

OR

- 6 a. An ac voltage controller has resistance load R = 10 ohm and root mean square input voltage (rms) is Vs = 120V, 60Hz. The thyristors switch is 'ON' for n = 25 cycles and is 'OFF' for m = 75 cycles. Calculate i) The rms output voltage Vo ii) The input power factor (PF) iii) The average and rms current of thyristors. (Refer Fig Q6(a))

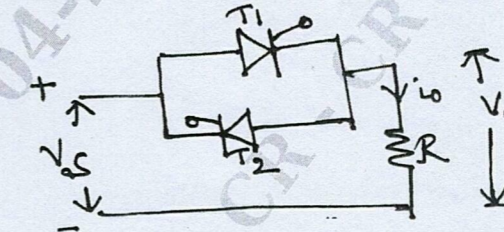


Fig Q6(a)

(06 Marks)

- b. Explain the principle of phase control, with the help of waveforms and obtain an expression for average value of output voltage. (08 Marks)
c. Explain the operation of a single phase bidirectional controller with resistive load and write an equation for rms output voltage. (06 Marks)

Module-4

- 7 a. Explain the operation of a step down chopper with RL load and also derive an expression for peak-peak output ripple current. (10 Marks)
b. Explain the principle of operation of a step-up chopper. (05 Marks)
c. What are the applications of choppers? (05 Marks)

OR

- 8 a. Explain the classification of choppers. (10 Marks)
b. Explain the operation of boost regulation with circuit and waveforms. (10 Marks)

Module-5

- 9 a. Explain single phase half bridge inverter with neat circuit diagram and waveforms. (10 Marks)
b. The single-phase half-bridge inverter has a resistive load of R = 2.4 ohm and the dc i/p v/g Vs = 48v. Determine i) the rms o/p v/g at the fundamental frequency V01, ii) the output power Po iii) average and peak currents of each transistor iv) the peak reverse blocking voltage VBR of each transistor. (10 Marks)

OR

- 10 a. Explain dc switches with neat circuit diagram. (06 Marks)
b. Outline various performance parameters used for inverters. (08 Marks)
c. Explain single phase AC switches. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

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