

CBCS SCHEME

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15EC73

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 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 is a converter? How are power converters classified? Explain briefly. (08 Marks)
b. Give symbol, characteristic features of the following devices:
GTO, TRIAC, MOSFET, UJT (08 Marks)

OR

- 2 a. With necessary waveforms, explain the steady state characteristics of a power transistor. (08 Marks)
b. Draw the switching model of MOSFET and explain its switching characteristics with neat figure. (08 Marks)

Module-2

- 3 a. With a neat figure, explain the dynamic turn-on and turn-off characteristics of a thyristor. (08 Marks)
b. Derive expression for anode current using two-transistor model in case of SCR. (08 Marks)

OR

- 4 a. What is forced commutation? With the help of circuit diagram and waveform, explain the operation of class-A commutation. (08 Marks)
b. With neat circuit diagram and waveforms, explain RC – Half wave firing circuit. (08 Marks)

Module-3

- 5 a. With a circuit diagram and waveform, explain the working of a single-phase full converter with RL load. Derive an expression for the average voltage across the load. (08 Marks)
b. What is a dual converter? Explain its operation with a neat circuit diagram. (08 Marks)

OR

- 6 a. What is an AC voltage controller? With the help of waveform, explain ON-OFF AC voltage controller. (08 Marks)
b. Explain the operation of single phase bi-directional AC voltage controller for inductive load with the help of circuit diagram and waveforms. (08 Marks)

Module-4

- 7 a. Explain the working principle of step-down chopper and derive expression for :
(i) Average output voltage
(ii) Output power
(iii) Effective input resistance in terms of chopper duty cycle. (08 Marks)
b. Explain the operation of a step-up chopper with resistive load. (08 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.

OR

- 8 a. With the help of circuit diagram, explain four quadrant type E Chopper. (08 Marks)
b. With the help of circuit diagram and waveforms, explain the working of a Buck regulator. (08 Marks)
Derive the expression for peak-peak-ripple current of the inductor. (08 Marks)

Module-5

- 9 a. Explain the operation of single-phase half bridge inverter with feedback diodes, derive the expression for r.m.s output voltage. (08 Marks)
b. With the help of circuit diagram and waveform, explain the operation of transistorized current source inverter. What are the advantages and disadvantages of CSI? (08 Marks)

OR

- 10 a. Explain the performance parameters of inverters. (08 Marks)
b. Explain the variable DC link inverter with circuit diagram and waveforms. (04 Marks)
c. Write short note on static switches. (04 Marks)
