



5E3123-P

Roll No. : _____

Total Printed Pages : **3**

5E3123-P

B. Tech. (Sem. V) (Main/Back) Examination, December - 2011
Electrical Engg.
5EE1 Power Electronics - III (Common with EE, EX)

Time : 3 Hours]

[Maximum Marks : 80

[Min. Passing Marks : 24

Instructions to Candidates :

Attempt any five questions selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

UNIT - I

- 1 (a) Discuss the two transistor model of a thyristor, using teis model, describe the various mechanism of turning on a thyristor. 8
- (b) Describe the Power transistor as a switch. 8

OR

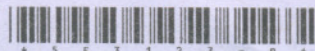
- 1 (a) Explain the constructional details and working of Power MOSFET. 8
- (b) Compare Power MOSFET with BJTs. 8

UNIT - II

- 2 (a) Describe the different modes of operation of a thyristor with the help of its static V-I characteristics. 8
- (b) Explain the gate protection schemes of a thyristor. 8

OR

5E3123-P]



1

[Contd...

- 2 (a) Explain various turning on methods of a thyristor. 8
 (b) Explain series operation of thyristor. 8

UNIT - III

- 3 (a) Draw O/P waveform and an expression for load current of a half wave controlled rectifier with inductive load. 10
 (b) Explain 1- ϕ dual converter. 6

OR

- 3 (a) Draw the circuit diagram of a 1- ϕ semiconverter using thyristor and free wheeling diode, and explain its working with the help of suitable waveform. 10
 (b) A 1- ϕ half wave rectifier circuit using a thyristor is fed by a transformer whose secondary voltage is $400 \sin \omega t$. Find the average load voltage, rms load voltage, average load current and rms load current if the thyristor is fired at 30° in each positive half cycle. The load resistance is 50Ω . 6

UNIT - IV

- 4 (a) Draw the output voltage, output current and i/p current waveform for 1- ϕ fully controlled bridge converter with source inductance. Write the O/P voltage relationship in terms of source inductance and angle of overlap. 8
 (b) Explain the sinusoidal pulse width modulation control scheme for power factor improvement. 8

OR

- 4 (a) Explain Inversion operation in line commutated converter. 8
 (b) Discuss power factor improvement. 8



UNIT - V

- 5 (a) A stepdown chopper circuit is supplied with power from an ideal voltage source of terminal voltage 100 V. The load voltage waveform consist of rectangular pulses across a $1K\Omega$ resistor of duration 1 ms in one cycle of 2.5 ns. Calculate the average value, rms value, ripple factor and output power of the circuit.

8

- (b) Explain CUK Regulator.

8

OR

- 5 (a) Describe the principle of step up chopper. Derive an expression for average output voltage in terms of i/p DC voltage and duty cycle. State the assumption mode.

8

- (b) Explain the voltage communication in choppers.

8

