

Roll No.

EX-504(N)

B. E. (Fifth Semester) EXAMINATION, Dec., 2010

(New Scheme)

(Electrical & Electronics Engg. Branch)

POWER ELECTRONICS DEVICES AND CIRCUITS

[EX-504(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : There are five Units. Attempt *five* questions taking *one* from each Unit.

Unit-I

1. (a) Explain the snubber circuit for an SCR. A resistor is used in series with the capacitor, why? 5
- (b) Define latching and holding current as applicable to an SCR. Show these currents on its static VI characteristics. 5
- (c) Discuss the methods of turning on of a thyristor. 10

Or

2. Discuss with relevant waveform class A and class D type of commutations employed for thyristors. 20

Unit – II

3. (a) A single phase half wave rectifier feeding resistance load does not need freewheeling diode but the same rectifier feeding R-L load required a freewheeling diode, why ? Explain with the help of diagrams. 5
- (b) What is Semiconverter ? In what respects is the operation of single phase semiconverter different from that of full converter ? 5
- (c) What that the performance of a single phase full converter as effected by source inductance is given by the relation : 10

$$\cos(\alpha + \mu) = \cos \alpha \frac{-\omega L_s I_o}{V_m}$$

Or

4. (a) Discuss the operation of three phase fully controlled bridge converter feeding an RLE load. Draw waveform of input voltage firing pulses and output voltage for $\alpha = 30^\circ$. 10
- (b) 230 V, 50 Hz ac supply is fed to a fully controlled bridge converter. The firing angle is 45° and the load current is 5A. Find the output voltage, active power input, reactive power input. 10

Unit – III

5. (a) Explain the three phase 180° mode USI. 10
- (b) Describe the various methods employed for the control of output voltage of inverters. 10

Or

6. (a) Describe modified McMurray Bedford half bridge single phase inverter with relevant voltage and current waveform. 10

- (b) What are the two main types of inverters ? Distinguish between them explicitly. 10

Unit – IV

7. (a) What is pulse width modulation control of a chopper ? 5
 (b) Describe the second quadrant chopper. 5
 (c) Describe the principle of DC chopper operation. 5
 (d) For type A chopper, dc source voltage = 230 V, load resistance = 10Ω . Take a voltage drop of 2 V across chopper when it is on for a duty cycle of 0.4. Calculate : 5
 (i) Average and r.m.s. value of output-voltage
 (ii) Chopper efficiency

Or

8. (a) Describe a current commutated chopper with relevant current and voltage waveform. 10
 (b) Explain with appropriate waveform the different control strategies used for obtaining variable output voltage from a dc chopper. 10

Unit – V

9. (a) Describe the operating principle of cycloconverter. Give its classifications and application. 10
 (b) Explain the three phase dual converter (circulating current mode). 10

Or

10. (a) Draw and explain the working of a single phase ac voltage regulator feeding an inductive load. 10
 (b) Explain the working of Buck-Boost Regulators and its application. 10