Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. .....

EX–504(N)

B. E. (Fifth Semester) EXAMINATION, June, 2011

(Electrical & Electronics Engg. Branch)

POWER ELECTRONICS DEVICES AND CIRCUITS

[EX–504(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. All questions carry equal marks.

Unit–I

1. (a) Mention the various conditions to turn-on the thyristor and enumerate the requirement of Idial firing circuit. 10

   (b) Compare the various power devices like Triac, G. T. O. and power transistor in tabular form. 10

Or

2. (a) Draw the complete turn-on and turn-off characteristics of an S. C. R. and explain them. 10

   (b) What are the different methods of commutation of S. C. R. ?

   Explain any *one* method with waveform. 10

Unit–II

3. (a) Draw and explain single-phase full wave half controlled rectifier with R-L load. Draw the waveforms across the load and device. 10

   (b) A 3-phase full converter charges a battery from a 3-phase supply of 230 V, 50 Hz. The battery e. m. f. is 200 V and its internal resistance is 0·5 Ω. On account of inductance connected in series with the battery, charging current is constant at 20 Amps. Compute the firing angle delay and supply power factor. 10

Or

4. (a) What is free-wheeling diode ? What are its functions in converter circuit ? Show that free-wheeling action is inherent in a single phase half controlled bridge. 10

   (b) Discuss the effect of source inductance on the performance of a single-phase full converter. 10

Unit–III

5. (a) Explain the three-phase thyristorised bridge inverter with star-connected resistive load assuming 120° mode of conduction. 12

   (b) Describe the working of McMurray Bedford half bridge single-phase inverter with relevant voltage and current waveforms. 8

Or

6. (a) What is the need for controlling the voltage at the output terminals of an inverter ? Compare various methods employed for the control of output voltage of inverters. 12

(b) Describe the working of single-phase series inverter with appropriate circuit and waveforms. 8

Unit – IV

7. (a) Explain the different control strategies used for obtaining variable output voltage from a D. C. chopper with appropriate waveforms. 10

(b) A step up chopper has input voltage of 220 V and output voltage of 660 V. If the conducting time of thyristor chopper is 100 μs, compute the pulse width of output voltage. If the output voltage pulse width is halved for constant frequency operation, find the new average output voltage. 10

Or

8. (a) Explain with suitable waveforms the working of current commutated chopper. 10

(b) Describe the working of type D chopper with appropriate waveforms to demonstrate its operation in first as well as fourth quadrant. 10

Unit – V

9. (a) Explain the principle of working of a single phase bridge type step down cycloconverter with waveforms. 10

(b) Draw and explain the working of a single-phase a. c. voltage regulator feeding an inductive load. 10

Or

10. (a) What are the control strategies for the regulation of output voltage in an a. c. voltage controller ? 10

(b) Explain with relevant waveforms the working of Buck-Boost regulators. 10