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BIEL-019

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

00673

June, 2018

BIEL-019 : POWER ELECTRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted. Missing data, if any, may be suitably assumed.*

1. Why is triggering circuit required for SCR ? Describe various triggering circuits with necessary diagrams and waveforms. *10*

2. (a) Draw and explain the current-voltage curves for thyristor. *5*

(b) Explain any one of the turn-off methods for thyristor with suitable waveform and diagram. *5*

3. (a) Draw the circuit diagram of three-phase semi-converter for RL load and explain its working with necessary waveforms for continuous load current. *5*

(b) What is ripple factor ? Differentiate between single-phase and three-phase dual converters. *5*

4. (a) A three-phase full converter is fed by 400 volts, 50 Hz supply. The average load current is 150 A and load is highly inductive. For a firing angle of 60 degrees, *5*

(i) Find average, rms current through thyristor, and

(ii) Output power through thyristor.

(b) Describe the principle of step-up choppers. Derive an expression for the average output voltage in terms of input dc voltage and duty cycle. *5*

5. Explain the operation of Class – C and Class – D types of two quadrant choppers with necessary diagram and waveforms. *10*

6. Describe the working principle of three-phase bridge inverter for 180° conduction mode with required diagrams and waveforms. *10*

7. (a) What are the advantages of PWM control in inverters ? Write down the applications of current source inverters (CSI). 5

(b) A single-phase half bridge inverter has a resistive load of R = 3 Ω and the dc input voltage V = 24 volts. Determine : 5

(i) The output Power, P_0; and

(ii) RMS output voltage at the fundamental frequency, V_1.

8. Explain various schemes for DC motor speed control. How are DC motors different from induction motors ? 10

9. Discuss the method for the variable frequency and rotor resistance control of the induction motor. 10

10. Write short notes on any ***two*** of the following : 2×5=10

(a) Protection Circuits of SCRs

(b) Synchronous Drives

(c) Single-Phase PWM Inverters