A 261

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011.

Fifth Semester

Electrical and Electronics Engineering

EE 332 — POWER ELECTRONICS

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a fast recovery diode? Mention its uses.

2. Distinguish between holding current and latching current of SCR.

3. What is dual converter? Mention its uses.

4. Why is pulse triggering preferred over RC triggering?

5. What is meant by load Commutation?

6. Mention the disadvantages of voltage commutated chopper.

7. List the assumptions that are made in modified McMurray half bridge invertor.

8. Define modulation index of PWM. What is its use?

9. What are the effects of load inductance on the performance of ac voltage controllers?

10. How is circulating current eliminated in a single phase cycloconverter?

PART B — (5 × 16 = 80 marks)

11. For a single phase full converter, the load current can be assumed to be continuous and its ripple content is negligible. The turns ratio of the transformer is unity.

(i) Express the input current in a Fourier series. (10)

(ii) Determine the harmonic factor of input current and input power factor. (6)

12. (a) (i) Describe the construction of Triac with aid of diagram. Explain its characteristics. (8)

(ii) Explain the four modes of operation of a triac using diagrams. (8)

Or

(b) (i) Explain the switching characteristics of power MOSFET. (8)

(ii) Explain the transient model of BJT. (8)

13. (a) (i) Draw the power circuit diagram of a buck converter and explain its operation with equivalent circuit for different modes and waveforms. (8)

(ii) Design the filter components for a buck converter which has an input voltage of 12V and output voltage of 5V. The peak to peak output ripple voltage is 20mV and peak to peak ripple current of inductor is limited to 0.8A. The switching frequency is 25 KHz. (8)

Or

(b) Draw the circuit diagram of a load commutated chopper and explain its operation with equivalent circuit for three modes and waveforms. (16)

14. (a) With aid of circuit diagram and relevant waveforms, explain the operation of a PWM converter. (16)

Or

(b) (i) Compare CSI with VSI. (4)

(ii) Explain the operation of a single phase capacitor commutated CSI with R load with equivalent circuit and output waveform. (12)

15. (a) With aid of circuit diagram and waveform explain the operation of

(i) Single phase unidirectional controller (8)

(ii) Single phase bidirectional controller. (8)

Derive the expressions for their rms output voltage.

Or

(b) Draw the circuit diagram of three phase to single phase cycloconvertor and explain its operation with waveforms. (16)
