Reg. No. : | | | | | | | | | | |

Question Paper Code: 41351

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Fifth Semester

Electrical and Electronics Engineering

14UEE501 - POWER ELECTRONICS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A triac is equivalent to two SCRs

   (a) In parallel (b) In series
   (c) In inverse-parallel (d) None of these

2. The device that does not have the gate terminal is

   (a) Triac (b) FET (c) SCR (d) Diac

3. A converter which can operate in both 3-pulse and 6-pulse modes is

   (a) 1-phase full converter (b) 3-phase half wave converter
   (c) 3-phase semi converter (d) 3-phase full converter

4. In a single-phase full converter, the number of SCRs conducting during overlap is

   (a) 1 (b) 2 (c) 3 (d) 4

5. In dc choppers, per unit ripple is maximum when duty cycle α is

   (a) 0.2 (b) 0.5 (c) 0.7 (d) 0.8

6. Chopper is a

   (a) AC-DC converter (b) AC-AC converter
   (c) DC-AC converter (d) DC-DC converter

7. A single phase voltage–source –square wave inverter feeds pure inductive load. The Waveform of the load current will be

(a) Sinusoidal (b) rectangular
(c) trapezoidal (d) triangular

8. In resonant pulse inverters

(a) DC output voltage variation is wide
(b) the frequency is low
(c) output voltage is never sinusoidal
(d) DC saturation of transformer core is minimized

9. Cyclo converter converts

(a) ac voltage to dc voltage
(b) dc voltage to dc voltage
(c) ac voltage to ac voltage at same frequency
(d) ac voltage at supply frequency to ac voltage at load frequency

10. Power factor of synchronous motor can be made leading by adjusting its

(a) speed (b) supply voltage (c) excitation (d) supply frequency

PART - B (5 x 2 = 10 Marks)

11. What is a snubber circuit?

12. Mention some of the applications of controlled rectifier

13. Give two advantages of CSI.

14. Compare VSI and CSI.

15. What is meant by cyclo-converter?

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss the operation of power MOSFET and explain the transfer, output and switching characteristics of power MOSFET. (16)

Or

(b) Explain the structure, different modes of operation, characteristics and applications of TRIAC. (16)

17. (a) Explain the operation of three phase half wave controlled converter with inductive load. Sketch the associated waveforms. (16)

Or

(b) A three phase half wave rectifier is operated from three phase star connected 208V, 60Hz supply. Load resistance =10 Ohm. If it is required to obtain an average output voltage 50 % of max possible output voltage. Calculate i) delay angle ii) rms value of output current iii) average value of output current iv) thyristor avg and rms current v) efficiency vi) TUF vii) supply power factor. (16)

18. (a) Describe the working principle of boost converter with necessary circuit and waveforms. (16)

Or

(b) What is SMPS? Mention the types of SMPS. Explain flyback SMPS in detail. (16)

19. (a) Explain the operation of 3 phase bridge inverter for 180 degree mode of operation with aid of relevant phase and line voltage waveforms. (16)

Or

(b) Draw the circuit diagram of current source inverter and explain its operation with relevant waveforms. (16)

20. (a) A single phase voltage controller feeds power to a resistive load of 3Ω from 230V, 50 Hz source. Calculate (1) The maximum values of average and RMS thyristor currents for any firing angle θ (2) The minimum circuit turn off time for any firing angle θ 3) the ratio of third harmonic voltage to fundamental voltage for $\theta=60^0$. (16)

Or

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

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