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Question Paper Code: 45301

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. PMOSFET is

   (a) Voltage controlled device (b) Current controlled device
   (c) Power controlled device (d) Impedance controlled device

2. IGBT input impedance is

   (a) low (b) high (c) medium (d) very low

3. The advantage of using free-wheeling diode with bridge type ac/dc converter is

   (a) regenerative breaking (b) reliable speed control
   (c) improved power factor (d) reduced cost of system

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 the SPWM, the modulating signal is

(a) square (b) sinusoidal
(c) triangular (d) saw-tooth

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. The quality of output ac voltage of a cyclo converter is improved with

(a) increase in output voltage at reduced frequency
(b) increase in output voltage at increased frequency
(c) decrease in output voltage at reduced frequency
(d) decrease in output voltage at increased frequency

PART - B (5 x 2 = 10 Marks)

11. Draw TRIAC switching characteristics.

12. What is the effect of source inductance in phase controlled converter?

13. List out the applications of chopper.

14. Compare VSI and CSI.

15. What is integral cycle control in AC to DC converter?

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss the operating principle, output and switching characteristics of BJT (16)

Or

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

17. (a) Describe using a power circuit and relevant waveforms the working of a single phase fully controlled half wave rectifier with RL load and derive its average and RMS output voltage. (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) Explain the working of current commutated chopper with aid of circuit diagram and necessary waveforms. (16)

Or

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

19. (a) With neat diagram describe 180^o mode operation of single phase inverter. (16)

Or

(b) Draw the circuit diagram of voltage 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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