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**Reg. No. :**

**Question Paper Code: 45031**

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

Fifth Semester

Mechanical Engineering

14UEE501 – POWER ELECTRONICS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

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

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

2. IGBT input impedance is

(a) Low (b) High (c) Medium (d) Very low

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

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

4. 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

5. A chopper can be used on

1. Pulse-width modulation only (b) frequency modulation only

(c) Amplitude modulation only (d) both PWM and FM

6. Chopper is a

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

7. A PWM switching scheme is used in single-phase inverters to

(a)Reduce the total harmonic distortion with modest filtering

(b)Minimise the load on the dc side

(c)Increase the life of the batteries

(d)Reduce low-order harmonics and increase high-order harmonics

8. 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

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

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

10. A 3-phase to 3-phase cycloconverter requires

1. 18 SCRs for 3-pulse device
2. 18 SCRs for 6-pulse device
3. 36 SCRs for 3-pulse device
4. 36 SCRs for 6-pulse device

From these, the correct statements are

1. 1, 3 (b)2, 3 (c) 3, 4 (d)1,4

PART - B (5 x 2 = 10 Marks)

11. What is a snubber circuit?

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

Or

(b)Describe IGBT switching characteristics. (16)

17. (a) Describe principle of working of 3-pulse converter. (16)

Or

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

18. (a) Describe principle of working of forced commutated chopper. (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) Explain working of single phase current source inverter. (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 θ=600.

(16) Or

(b) Explain working of matrix converter. (16)