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**Question Paper Code: 45301**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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 dual converter, the circulating current
  - (a) allows smooth reversal of load current, but increase the response time
  - (b) allows smooth reversal of load current with improved speed of response
  - (c) does not allow smooth reversal of load current, but reduces the response time
  - (d) flows if there is no interconnecting inductor
5. In dc choppers, per unit ripple is maximum when duty cycle  $\alpha$  is
  - (a) 0.2
  - (b) 0.5
  - (c) 0.7
  - (d) 0.8

6. A chopper can be used on
- |                                 |                               |
|---------------------------------|-------------------------------|
| (a) Pulse-width modulation only | (b) frequency modulation only |
| (c) Amplitude modulation only   | (d) both PWM and FM           |
7. In the SPWM, the modulating signal is
- |                |                |
|----------------|----------------|
| (a) square     | (b) sinusoidal |
| (c) triangular | (d) saw-tooth  |
8. Single phase VSI are mainly used in
- |                              |                   |
|------------------------------|-------------------|
| (a) power supplies           | (b) UPS           |
| (c) multilevel configuration | (d) all the above |
9. Which stage of the power supply uses a Zener as the main component?
- |               |                     |
|---------------|---------------------|
| (a) rectifier | (b) voltage divider |
| (c) regulator | (d) filter          |
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. What is space vector modulation?
15. What is integral cycle control in AC to DC converter?

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss the Turn-on and Turn-off characteristics of SCR in detail. (16)

Or

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

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

Or

(b) Explain the operation of three phase full converter and also derive the expression for its advantage output voltage. (16)

18. (a) Describe the principle of working of forced commutated chopper, briefly. (16)

Or

(b) Explain the operation of boost and buck-boost converter with neat circuit diagrams and waveforms. (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  $3\Omega$  from 230V, 50 Hz source. Calculate (1) The maximum values of average and RMS thyristor currents for any firing angle  $\theta$  (2) The minimum circuit turn off time for any firing angle  $\theta$  3) the ratio of third harmonic voltage to fundamental voltage for  $\theta=60^\circ$ . (16)

Or

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

