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Question Paper Code: 45301

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fifth Semester

Electrical and Electronics Engineering

14UEE501 - POWER ELECTRONICS

(Regulation 2014)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

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 α 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 (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Discuss the Turn-on and Turn-off characteristics of SCR in detail. (8)
12. Describe the principle of working of 3-pulse converter in detail. (8)
13. Describe the principle of working of forced commutated chopper, briefly. (8)
14. Explain the operation of 3 phase bridge inverter for 180 degree mode of operation with aid of relevant phase and line voltage waveforms. (8)
15. 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 $\theta=60^\circ$. (8)