KUMARAGURU
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Register Number:……..

B.E DEGREE EXAMINATIONS: NOV / DEC 2014

(Regulation 2009)

Fourth Semester

MECHATRONICS ENGINEERING

MCT106 **:** Industrial Electronics

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In a thyristor , anode current is made up of
   a) Electrons only b) Electrons or holes
   c) Electrons and holes d) Holes only
2. Triacs are most suitable when the supply voltage is
   a) DC b) Low frequency AC
   c) High frequency AC d) Full wave rectifier AC
3. In a single-phase full converter, for continuous conduction each pair of SCRs conduct for a period of
   a) $\pi - \alpha$ b) π
   c) α d) $\pi + \alpha$
4. A free wheeling diode across inductive load will provide
   a) Quick turn-on b) Slow turn-off
   c) Reduced utilization factor d) Improved power factor
5. A chopper can be used with
   a) Pulse-with modulation b) Frequency modulation only
   c) Amplitude modulation only d) Both PWM and FM
6. A single-phase CSI has capacitor C as the load. For a constant source current the voltage across the capacitor is
   a) Square wave b) Triangular wave
   c) Step function d) Pulsed wave

7. A single-phase voltage controller feeds power to a resistance of 10 ohm. The source voltage is 200 Vrms. For a firing angle of 90^o, the rms value of thyristor current in ampere is

   a) 20 b) 15

   c) 10 d) 5

8. The cycloconverter requires natural or forced commutation as under

   a) natural commutation in both step-up and step-down b) Forced commutation in both step-up and step-down

   c) Forced commutation in step up cycloconverter d) Forced commutation in step down cycloconverter

9. The di/dt rating of an SCR is specified for its

   a) Decaying anode current b) Decaying gate current

   c) Rising gate current d) Rising anode current

10. A delta connected induction motor being fed by a 3 phase ac to dc inverter and operated in constant v/f control mode, resulting a

    a) Constant Torque for range 25-60Hz b) Constant flux

    c) Noiseless operation d) Constant current

PART B (10 x 2 = 20 Marks)

11. List out the classification of power electronics circuits.
12. Differentiate holding current and latching current.
13. Define line commutation.
14. What is the purpose of freewheeling diode?
15. What is the purpose of PWM control?
16. What is meant by duty cycle?
17. What is meant by cycloconverter?
18. List out various applications of phase controlled converter.
19. What is the basic principle of dielectric heating?
20. List out some applications of induction heating.

PART C (5 x 14 = 70 Marks)

21. a) Explain the switching characteristics of the SCR with neat circuit diagram and waveform.

(OR)

b) Explain the operation of IGBT with the help of neat a structural diagram and suitable waveform.

22. a) Explain the working of 1- phase full converter with RL load and derive the expression for the average and rms value.

(OR)

b) Explain the different types of thyristor triggering methods with a circuit.

23. a) Describe the operation of single phase auto sequential commutated current source inverter (CSI) with power circuit and waveform.

(OR)

b) Discuss the principle of operation of step down and step up chopper with suitable waveform. Derive an expression for its average DC output voltage.

24. a) Explain the principle of single phase to single phase step down cycloconverter with power circuit and waveform.

(OR)

b) Explain the working of multistage sequential control of AC voltage controller.

25. a) Explain the different types of relays used in industries, and compare their characteristics.

(OR)

b) Explain the principle of induction heating with relevant application.

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