Register Number: ……

B.E. DEGREE EXAMINATIONS: NOV/DEC-2010

Third Semester

MECHATRONICS ENGINEERING

U07MH304: Power Electronics

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

Answer ALL Questions

PART A (10 x 1 = 10 Marks)

1. Reverse recovery current in a diode depends upon

A) Forward field current B) Storage charge C) Temperature D) PIV

2. A power semiconductor may undergo damage due to

A) high di/dt B) low di/dt C) high dl/dt D) low dv/dt

3. In a 3-phase full converter the six SCRs are fired at an interval of

A) 30º B) 60º C) 90º D) 120º

4. In single phase full converter, if load current is I and ripple free then average of thyristor current is

A) ½ I B. ¾ I C. ¼ I D. I

5. In dc choppers the output voltage in terms of input voltage V_s is given by

A) $V_s.T_{on}/f$ B) $V_s.f/T_{on}$ C) $V_s/f.T_{on}$ D) $V_s.f.T_{on}$

6. A chopper, where voltage as well as current remain negative, is known as

A) type-A B) type-B C) type-C D) type-D

7. In single pulse modulation of PWM inverters, the pulse witdh is 120º for an input voltage of 220v dc, the r.m.s. value of output voltage is

A) 179.63V B) 254.04V C) 127.02V D) 185.04V

8. In a CSI, if frequency of output voltage is f Hz, then frequency of voltage input to CSI is

A) f B) 2f C) f/2 D) 3f.

9. A single phase ac voltage controller connected R load. If SCR fired at 90º, what is load voltage

A) peak voltage B)1/π .peak voltage C) ½ . peak voltage D) zero

10. A cycloconverter is a

A) frequency converter B) voltage converter C) current converter D)V/f converter

PART B (10 x 2 = 20 Marks)

11. What are the types of power diodes?

12. What are the advantages of MOSFETs?
13. What is commutation? Mention its types.
14. What is the principle of phase control?
15. What do you mean by chopper?
16. Define duty cycle of chopper.
17. What are the types of inverter?
18. What are the advantages of current source inverter?
19. Name the types of AC voltage controller.
20. What is cycloconverter? State the advantage of cycloconverter.

PART C (5 x 14 = 70 Marks)

21. (a) (i) Draw and explain the V-I characteristics of the SCR. (7)

(ii) Explain the operation of the MOSFETs with the circuit diagram. (7)

(OR)

(b) Compare BJT, MOSFET and IGBT devices.

22. (a) Explain the operation of the single phase full converter with RL load.

(OR)

(b) Explain the operation of the 3 phase full converter with R load.

23. (a) With circuit diagram explain the step-up and step-down choppers.

(OR)

(b) Explain the operation of the four quadrant chopper (class-E).

24. (a)With neat sketch explain the 3 phase voltage source inverter at 180^{o} mode operation.

(OR)

(b) Draw and explain the 3 phase current source inverter.

25. (a) Draw and explain the single phase AC voltage controller

(OR)

(b) Draw and explain the single phase to single phase cycloconverters.

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