Register Number.....

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Third Semester

MECHATRONICS ENGINEERING

U07MH304: Power Electronics

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

Answer ALL the Questions:-

PART A (10 × 1 = 10 Marks)

1. A cut in voltage of an diode is also known as

   (a) Forward Breakdown voltage (b) Threshold voltage

   (c) Reverse Breakdown voltage (d) Cut off region

2. In BJT,

   (a) $\beta = \alpha/\alpha+1$ (b) $\beta = \alpha/\alpha-1$ (c) $\alpha = \beta/\beta+1$ (d) $\alpha = \beta+1/\beta$

3. A freewheeling diode across inductive load will provide

   (a) quick turn-on (b) slow turn-off

   (c) reduced utilization factor (d) improved power factor

4. In a Three Phase full Converter, output voltage during overlap is equal to

   (a) zero (b) source voltage minus the inductance drop

   (c) source voltage (d) average value of the conducting phase voltage

5. Power semiconductor used for a chopper circuit can be

   (a) Diode (B) IGBT (c) TRIAC (d) SCR

6. A Chopper converts

   (a) fixed DC to Variable DC (b) variable AC to Fixed DC

   (c) variable DC to variable DC (d) fixed AC to variable AC

7. In a 3 phase full converter, the six SCR are fired at an interval of

   (a) 30° (b) 60° (c) 90° (d) 120°

8. A single phase full wave mid point thyristor converter uses a 230/200V transformer with center tap on the secondary side .the P.I.V per thyristor is

   (a) 100V (b) 141.4V (c) 200V (d) 282.8V

9. The cycloconverters require 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

   (d) forced commutation in step down

10. Three phase to 3 phase cycloconverter employing 18 SCR and 36 SCR have the voltage and current rating for their component thyristors. The ratio of power handled by 36 SCR device to that of18 SCR device is

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

PART B (10 x 2 = 20 Marks)

11. What is a snubber circuit?
12. What are the different types of power MOSFET?
13. What is meant by delay angle?
14. What are the advantages of six pulse converter?
15. Define the term duty cycle in DC - DC converter.
16. Write down the expression for average output voltage for step down and step up chopper.
17. List various applications of inverters.
18. How is the inverter circuit classified based on commutation circuitry?
19. What is meant by bidirectional ac voltage controller?
20. Classify cycloconverters.

PART C (5 x 14 = 70 Marks)

21. (a) (i) Explain the static characteristics of SCR. (7)

(ii) Draw the two transistor model of SCR and derive an expression for anode current. (7)

(OR)

(b) Explain the construction and operation of power MOSFET.

22. (a) Explain in detail the principle of operation of single phase full converter bridge with RLE load. Draw the voltage and current waveforms for continuous load current.

(OR)

(b) Describe the working of Dual converter with relevant circuit diagram.

23. (a) Describe the principle of DC chopper operation. Derive an expression for its average DC output voltage and power.

(OR)

With neat voltage and current waveforms explain the voltage and current commutated chopper.

(a) Explain the operation of single phase McMurray half bridge inverter with aid of relevant voltage and current waveforms.

(OR)

(b) Write short notes on

1. Voltage source inverter (7)
2. PWM inverter (7)

5. (a) Explain the types of ac voltage controller with neat diagram.

(OR)

(b) Describe 3 phase to 1 phase and 3 phase to 3 phase Cycloconverter with relevant circuit diagrams.

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