Register Number……

B.E. DEGREE EXAMINATIONS: APRIL/ MAY 2010

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EE602: Power Electronics

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

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. The SCR is turned off when the anode current falls below

   (a) forward current rating (b) break-over voltage (c) holding current (d) latching current

2. Snubber circuit is used to limit the rate of

   (a) decrease in current (b) conduction period

   (c) rise of voltage across SCR (d) turn off time

3. In single-phase full-wave controlled bridge rectifier, maximum output voltages is obtained at conduction angle ____ and minimum output voltage at conduction angle_____.

   (a) 0^0, 180^0 (b) 180^0, 0^0 (c) 0^0, 0^0 (d) 180^0, 180^0

4. The effect of source inductance on the performance of single –phase and three-phase full converters is to

   (a) Reduce the ripples in the load current (b) Make discontinuous current as continuous

   (c) Reduce the output voltage (d) Increase the load voltage

5. In DC Chopper if T is the chopping period, then the output voltage can be controlled by PWM by varying

   (a) T keeping T_{ON} constant (b)T_{ON} keeping T constant

   (c) T keeping T_{OFF} constant (d) T_{OFF} keeping T constant

6. Which of the following regulator can provide output voltage more than or less than the input voltage?

   (a) Buck regulator (b) Boost regulator (c) Buck-Boost regulator (d) AC voltage ontroller

7. In resonant pulse inverters

   (a) DC output voltage variation is wide (b) The frequency is low

   (c) The output voltage is never sinusoidal (d) DC saturation of transformer core is minimized

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. Static VAR Compensator is used for

(a) Series Compensation (b) Shunt-Series Compensation

(c) Absorbing reactive power (d) Shunt Compensation

10. Converter used in HVDC is

(a) 6 pulse converter (b) 3 pulse converter (c) 12 pulse converter (d) 2 pulse converter

PART B (10 x 2 = 20 Marks)

11. What is holding current of SCR?
12. Define pinch off voltage of MOSFET?
13. What is the inversion mode of rectifiers?
14. Define Total Harmonic Distortion (THD)
15. Write any two salient features of buck converter?
16. What is the need for a filter at the output of a step up DC chopper?
17. List four applications of CSI
18. What are the main differences between current-driven and voltage-driven inverters?
19. Name any two types of FACT devices
20. Mention the different types of HVDC link.

PART C (5 x 14 = 70 Marks)

21. (a) (i) Explain the switching characteristics of IGBT. (8)

(ii) How does the concept of saturation differ in MOSFET with BJT? (6)

(OR)

(b) (i) Describe the snubber circuit for MOSFET. (7)

(ii) Describe the construction of TRIAC with aid of diagram and explain its characteristics. (7)

22. (a) (i) Discuss the effect of source inductance in a controlled rectifier. (7)

(ii) A single phase half wave converter is operated from 150V, 50Hz, supply. If the load is resistive of value 10Ω and delay angle is 60^0, determine.

(i) The efficiency (ii) Form factor (iii) Ripple factor

(iv) Transformer utilization factor (v) PIV of thyristor. (7)

(OR)

(b) (i) With necessary circuit and waveforms, explain the principle of operation of 6-pulse converter. Derive the expression for average output voltage in it. (10)

(ii) A three phase half wave controlled rectifier has a supply of 150V per phase determine load voltage for delay angle of 0^o, 45^o, 60^o. Assuming a thyristor voltage drop of 2V and continuous load current. (4)

23. (a) (i) A DC chopper has an input voltage of 200V and a load of 20Ω resistance. When chopper is ON, its voltage drop is 1.5V and chopping frequency is 10KHz. If the duty cycle is 80%, find

(i) Average output voltage

(ii) RMS output voltage

(iii) Chopper ON time (7)

(ii) Explain the operation of cuk converter. (7)

(OR)

(b) (i) Explain the operation of step up chopper with the help of waveforms. (7)

(ii) With the help of neat diagram and wave forms explain the operations of fly back converter. (7)

24. (a) Explain with neat diagrams and waveform three phase voltage source inverter in 180^0 degree conduction mode. Also obtain the expression for RMS value of output voltage.

(OR)

(b) Explain various pulse width modulation techniques used to control the output voltage of inverters

25. (a) Explain different topologies of UPS?

(OR)

(b) Write short notes on

(i) HVDC Transmission System. (7)

(ii) UPFC (7)

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