Register Number……

B.E. DEGREE EXAMINATIONS: APRIL/MAY 2012

Eighth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EIE11: Power Electronics

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

Answer All Questions:-

PART A (10 x 1 = 10 Marks)

1. Which of the following device has bidirectional current flow?

   (A) SCR (B) Diode (C) Triac (D) BJT

2. High frequency operation of a circuit is limited by

   (A) On state loss in the device (B) Off state loss in the circuit

   (C) Switching losses in the device (D) All the above

3. A freewheeling diode is placed across the dc load

   (1) To prevent reversal of load voltage

   (2) To transfer the load current away from the source

   (3) To transfer the load current away from the conducting thyristor

   (4) The correct statements are

   (A) 1, 3 (B) 2, 3 (C) 1, 2 (D) 1, 2, 3

4. In a single phase full wave converter the output voltage during overlap is equal to

   (A) Zero (B) Source voltage

   (C) Source voltage minus the inductance drop (D) Inductance drop

5. In dc choppers if Ton is the ON period and f is the chopping frequency, then output voltage in terms of input voltage Vs is given by

   (A) $V_s \cdot T_{on}/f$ (B) $V_s \cdot f/T_{on}$ (C) $V_s/f \cdot T_{on}$ (D) $V_s \cdot f \cdot T_{on}$

6. A step down chopper is operated in the continuous conduction mode in steady state with a constant duty ratio D. If Vo is the magnitude of the dc output voltage and if Vs is the magnitude of the dc input voltage , the ratio Vo/Vs is given by

   (A) D (B) 1-D (C) 1/(1-D) (D) D/(1-D)

7. A single phase full bridge converter can operate in load commutated mode in case load consists of

   (A) RL (B) RLC underdamped

   (C) RLC overdamped (D) RLC critically damped

8. Simplest method of eliminating third harmonic from the output voltage waveform of a single-phase bridge inverter is to use

(A) Inverters in series (B) Single-pulse modulation

(C) Stepped wave inverters (D) Multiple pulse modulation

9. SMPS are superior to linear power supplies in respect of

(A) Size and efficiency (B) Efficiency and regulation

(C) Regulation and noise (D) Noise and cost

10. Bulk power transmission over long HVDC lines are preferred on account of

(A) Low cost of HVDC terminals (B) No harmonic problems

(C) Minimum line power losses (D) Simple protection

PART B (10 x 2 = 20 Marks)

11. Name some methods to turn on a thyristor.
12. Define rise time of BJT.
13. Define commutation angle or overlap angle.
14. Compare single phase full wave converter and single phase semi converter.
15. Write short notes on time ratio control.
16. What is meant by DC-DC chopper?
17. What is meant by SPWM technique?
18. List some applications of current source inverters.
19. Write down the factors that influence the capacity of the battery in a UPS system?
20. What is the use of static VAR controllers?

PART C (5 x 14 = 70 Marks)

21. a) (i) Describe the switching characteristics of power MOSFET. (8)

(ii) Compare power MOSFET with BJT. (6)

(OR)

b) (i) Explain the different modes of operation of a thyristor with the help of its static I-V characteristics. (8)

(ii) Write short notes on

1) dv/dt triggering (3)

2) temperature triggering (3)

22. a) A single phase full converter, connected to 230V, 50Hz source, is feeding a load R=10Ω in series with a large inductance that makes the load current ripple free. For a firing angle of 45˚, calculate the input and output performance parameters of this converter.

(OR)

b) Describe the effect of source inductance on the performance of single phase full wave converter with necessary waveforms.

23. a) With the help of neat circuit diagram and necessary waveform explain step-up chopper and step-down chopper.

(OR)

b) For a boost converter, derive the expressions for peak-peak ripple current and ripple voltage in terms of circuit components, frequency, supply voltage and duty ratio.

24. a) How multiple pulse modulation technique is used in PWM inverters? Explain.

(OR)

b) Explain single phase full bridge inverters in detail.

25. a) What is an UPS? Describe short - break static and no - break static UPS configurations.

(OR)

b) What are the merits of HVDC transmission system over AC transmission system? Describe both the types of HVDC links with relevant circuits.

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