E 1409 (Pages : 3) Reg. No.....

Name.....

C.B.C.S.S. – B.Sc. DEGREE EXAMINATION, APRIL 2011

Second Semester

Vocational Course – POWER ELECTRONICS

(For the vocational subject Applied Electronics of Model–II B.Sc. Physics)

Time : Three Hours Maximum Weight : 25

Part A (Objective Type Questions)

Answer **all** *questions.*

Weight 1 *for each bunch.*

BUNCH I

1. The number of stable switching states of a thyristor is :

   (a) 1. (b) 2.

   (c) 3. (d) 4.

2. A silicon bilateral switch consists of two :

   (a) unilateral switches. (b) silicon unilateral switches.

   (c) silicon switches. (d) none of these.

3. The maximum anode current at which SCR is turned OFF is called :

   (a) forward current rating. (b) holding current.

   (c) peak anode current. (d) all the above.

4. The average value of load current in case of a full wave SCR rectifier is :

   (a) $V_m R_L \cos \alpha$. (b) $V_m R_L (1 + \cos \alpha)$.

   (c) $\frac{Vm}{\pi R_L} (1 + \cos \alpha)$. (d) $V \cos \alpha$.

BUNCH II

5. Phase control can be achieved by using :

   (a) SCR. (b) triac.

   (c) diac. (d) all the above.

6. The value of intrinsic stand off ratio is between :

   (a) 0.5 and 0.8. (b) 0.8 and 1.2.

   (c) 1.2 and 1.6. (d) 1.6 and 2.0.

Turn over

7. The voltage at which the triac is turned ON depends on :
   (a) gate voltage. (b) gate current.
   (c) gate resistance. (d) all the above.
8. When the SCR firing angle is zero, the power delivered to the load is :
   (a) minimum. (b) maximum.
   (c) zero. (d) none of these.

BUNCH III

9. Which of the following is equivalent to UJT ?
   (a) two diodes and two resistors. (b) two resistors.
   (c) a diode. (d) a diode and two resisters.
10. In the cut off region of a UJT, the emitter voltage is :
   (a) below the peak point voltage. (b) above the peak point voltage.
   (c) equal to the emitter voltage. (d) none of these.
11. The gate current flows for the entire period of SCR conduction in :
   (a) pulse triggering. (b) amplitude triggering.
   (c) ON position. (d) all the above.
12. The triggering circuit for SCRs and triacs is :
   (a) CA 3059. (b) C 3059.
   (c) CA 4059. (d) CA 5059.

BUNCH IV

13. A triac can be triggered into conduction by applying :
   (a) only positive voltage at the gate.
   (b) negative voltage at the gate.
   (c) positive or negative voltage at either terminal.
   (d) both (a) and (c).
14. Silicon controlled switch has a :
   (a) fast turn OFF. (b) slow turn OFF.
   (c) turn OFF. (d) all the above.
15. The firing angle of a 90° variable HW rectifier depends upon the value of :
   (a) fixed resistance. (b) variable resistance.
   (c) current. (d) voltage.
16. The intrinsic stand off ratio for a UJT is 0.6 if the inter base resistance is 10kΩ, the values of R_{B1} and R_{B2} are :
   (a) 4kΩ , 6kΩ . (b) 6kΩ , 3kΩ.
   (c) 6kΩ, 4kΩ. (d) 4kΩ , 4kΩ.

(4 × 1 = 4)

Part B (Short Answer Questions)

Answer any **five** *questions.*

Weight 1 *each.*

17. How does SCR act as a switch ?
18. Explain the working of a triac.
19. List the various applications of SCR.
20. What are the advantages of a UJT ?
21. Distinguish between SUS and SBS.
22. Give the merits of thyristors.
23. How power control is achieved by SCR ?
24. Give the working of a SCR full wave rectifier.

(5 × 1 = 5)

Part C (Short Essay / Problems)

Answer any **four** *questions.*

Weight 2 each.

25. Bring out the forward and reverse characteristics of SCR and explain the effect of gate current on the working.
26. Explain the construction of a SCR.
27. Sketch the equivalent circuit of a UJT and arrive at the expression for intrinsic stand off ratio.
28. The forward break down voltage of an SCR is 150 volts when a gate current of 1 mA flows in the gate circuit. Calculate the firing angle, average output voltage and current for a load resistor of 200 ohms when a sinusoidal voltage of 400 volts peak is applied to it.
29. The intrinsic stand off ratio for a UJT is 0.6. If the inter base resistance is 10 kΩ, determine the values of R_{B1} and R_{B2}.
30. Describe gate triggering of a thyristor. Does the gate current has any effect on the forward break over voltage ?

(4 × 2 = 8)

Part D (Essay)

Answer any **two** *questions.*

Weight 4 *each.*

31. Discuss on the equivalent circuit of an SCR and its current voltage characteristics.
32. Discuss on push pull inverters with theory.
33. Describe the construction, operation, characteristics and uses of a UJT.

(2 × 4 = 8)