ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : MAY / JUNE 2010

REGULATIONS : 2007

SIXTH SEMESTER – ELECTRICAL & ELECTRONICS ENGINEERING

070280036 - POWER ELECTRONICS

TIME : 3 Hours

Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. List the types of SCR turn on methods?
2. Give any two important features of IGBT?
3. What is the drawback of SCR over BJT
4. Define Safe Operating Area (SOA)?
5. Define extinction angle
6. List the control strategies available for control of ac voltage controllers.
7. Write the expression of average output voltage of the single phase full converter?
8. What is a line commutation?
9. Draw a simple step down chopper?
10. Define duty cycle of a chopper?
11. Give the relationship between input and output voltage of step up chopper?
12. List two applications of DC chopper circuits?
13. What is a line commutated inverter?
14. What is the need of return current diode in a parallel inverter?
15. Mention two advantages of current source inverters?
16. Why transistor switches are preferred in inverters than thyristor?
17. List the various types of PWM techniques
18. What is meant by multistage sequence control?
19. Bring out two advantages for HVDC system over HVAC system?
20. What are the advantages of solid state speed control?

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. a) Discuss with neat sketch, series and parallel operation of thyristors?   6

    b) Explain about the dv/dt and di/dt protection in an SCR   6

22. a) Draw the symbol and structure of TRIAC. Explain all the four modes of operation with neat sketch.   8

    b) What is DIAC and how it differ from SCR?   4

23. A single phase semiconverter is operated from 230V, 50Hz supply. The load current with an average value if I_a is continuous with negligible ripple content. The turn's ratio of transformer is unity. If the delay is $\alpha = \pi/3$, calculate a) the harmonic factor of input current b) displacement factor and c) the input power factor

24. a) Explain the effect of source impedance on the performance of converters.   6

    b) Explain the principle of operation of a single phase to single phase cycloconverter using bridge configuration   6

25. a) With relevant sketches explain the operation of a voltage commutated   6
       chopper?

    b) Derive an expression for the input frequency in a series inverter.   6

26.   In a chopper circuit, the average value of the output voltage = 120 V.
       If the voltage drop across the chopper switch be 1.5 volt, load resistance =
       14 ohms; freq=2.3 kHz; duty cycle = 50%. Find (i) the supply voltage (ii)
       r.m.s. value of the voltage, (iii) chopper efficiency (iv) input resistance and
       (v) r.m.s. value of the fundamental component of the output harmonic
       voltage.

27. a) Compare voltage source and current source inverters.   6
    b) A single phase ac voltage controller has an input voltage of 150 V and load
       resistance of 8 Ohm. The firing angle of thyristors is 60°.
       Find (i) Average output voltage. (ii) RMS output voltage   6

28.   Draw the block Diagram of UPS and explain briefly the function of each
       block?

*****THE END*****