POWER ELECTRONICS & PLC

IMPORTANT QUESTIONS FOR SEMESTER

Long Questions **10 Marks**

1. Explain the construction, operation of SCR and draw its V-I characteristics curve.
2. With neat circuit diagram & waveforms explain about RC-firing of SCR.
3. Describe the UJT triggering circuit with neat sketch.
4. Explain with circuit diagram & waveforms of the operation of fully (full wave) controlled single phase bridge converter with Resistive load.
5. Draw the diagram of a single phase to single phase step down cyclo-converter (mid-point) with pure Resistive load and explain & draw its waveform.
6. Explain the working of semi converter. Draw & find out the expression for the output voltage.
7. Explain the working of a half wave converter with R-L load, with and without freewheeling diode. Show the o/p wave forms under the above case.
8. Write a short note on the following:
   i) Step-up cyclo-converter
   ii) Series inverter
9. Explain speed control for shunt motor using converter and chopper.
10. Explain switching characteristics of SCR with necessary diagram.
11. Explain the operation of UJT & also justify how it can be used as a relaxation oscillator.
12. Explain the principle of working of UPS with a neat block diagram & state its application.
13. Draw the dynamic characteristics of an SCR and explain in detail.
14. Define UPS & explain the working of on-line and off-line UPS system.
15. Explain briefly the operation of chopper in all four quadrants. Or Describe the different chopper configurations (Class A, Class B, Class C, Class D only)
16. Explain with a neat circuit diagram, Step-up and Step-down midpoint cyclo-converter.
17. Draw the block diagram of PLC system and explain each block in detail.
18. Design a two-way traffic light signaling system with the following 10 requirements.
    1. There should be a START & STOP push button to start the signaling process.
    2. Once ON, side-1 lights should follow the pattern below;
       Side-1: Green light should be ON for 30 seconds
       Then Side-1: Amber light should be ON for 3 seconds
       Then Side-1: Red light should be ON for 30 seconds and the process repeats.

       At the same time Side-2 lights would ON following stages:
       Side-2: Red light should be ON for 33 seconds.
       Then Side-2: Green light should be ON for 27 seconds.
       Then Side-2: Amber light should be ON for 3 seconds and the process repeats.

Short Question **5 Marks**

1. Discuss why TRIAC rarely operate in I quadrant with -ve gate current & in III quadrant with +ve gate current.
2. Discuss the operation of single-phase half wave-controlled converter with RL load with neat diagram.
3. Explain the operation of step up chopper and derive an expression for its output voltage.
4. Explain the operation of step up chopper with restive load with proper circuit diagram and waveform.
5. Explain gate triggering of thyristor by RC firing.

6. Explain single phase full wave AC regulator.
7. Develop ladder diagram of DOL & STAR DELTA starter.
8. Explain CTD & CTU instruction of PLC.
9. Show the two-transistor model of SCR & explain its operation.
10. Explain the static V-I characteristics of SCR.
11. Explain the working of a step-down chopper with a neat diagram.
12. Explain the working of series inverter.
13. What is the basic principle of cyclo-converter?
14. What is PLC? Write down applications of PLC.
15. Describe briefly different Turn ON Methods of SCR.
16. Explain briefly R-firing triggering circuit of SCR.
17. Explain the operation and construction of IGBT and its application.
18. Explain the operation of single-phase half bridge voltage source inverter with resistive load.
19. Draw the schematic diagram of single-phase full bridge inverter (without commutation circuit) and explain its operation.
20. Explain different types of timers in PLC.
21. With neat diagram explain the Class B commutation of SCR.
22. Explain operation of online UPS & offline UPS with neat circuit diagram.
23. Draw the block diagram of SMPS and explain its operation.
24. Draw the ladder diagrams of AND, OR, NAND, NOR, & XOR gates.
25. Explain different parts of PLC by drawing the block diagram and also explain the purpose of each part of PLC.
26. Draw the ladder diagram for full adder circuit.

Very Short Questions **2 Marks**

1) Define pinch off voltage of MOSFET.
2) Why power factor of semi-converter is better than full converter?
3) What is meant by commutation of SCR & list its types.
4) What is meant by phase control?
5) What is constant frequency control of chopper?
6) What is the function of feedback diodes in bridge inverter?
7) What is cyclo-converter? List its types.
8) Name any two applications of SMPS.
9) Draw a neat sketch of battery charger.
10) List any four logical 7 arithmetic instructions in PLC.
11) Write down the firing i.e., triggering methods.
12) What are the turn on methods of SCR?
13) Define latching current & holding current of SCR.
14) What is free wheeling diode & why it is needed?
15) Define chopper & write different chopper configuration.
16) State the advantages of PLC.
17) Define commutation & why it is essential?
18) Write down two factors affecting speed of the AC motors.
19) Write the full form of GTO & IGBT.
20) Define firing angle (α), Conduction angle(β), and Extinction angle(γ).
21) Differentiate between DIAC and TRIAC.
22) Define Snubber circuit.
23) Write down the need of a freewheeling diode in a circuit.

24) Define Inverter and write any two applications of Inverter.
25) Define SMPS and mention any two of its advantages over voltage regulators.
26) Draw the symbols for NO, NC and Output coil.
27) List down any two applications of PLC.
28) What is the purpose of latch coil?
29) What is natural commutation? Where it is used?
30) What are the different modules in PLC?