5TH SEM./ ELE.& MECH./EEE /ELE./ EE(I&C)/ ETC& COMM./E&TC/ 2023(W) NEW

Th-5 Power Electronics & PLC

Full Marks: 80   **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions   2 x 10
    a. Write down the firing i.e, triggering methods.
    b. What are the turn on methods of SCR?
    c. Define latching current of SCR.
    d. What is a free wheeling diode and why it is needed?
    e. Define chopper &write different chopper configuration.
    f. State the classification of inverters.
    g. What is SMPS and why it is preferred in comparison to linear regulator?
    h. State the advantages of PLC.
    i. Define commutation & why it is essential?
    j. Write down two factors affecting speed of the AC motors.

2. Answer **Any Six** Questions   6 x 5
    a. Show the two transistor model of SCR & explain its operation.
    b. Explain the static V-I characteristics of SCR.
    c. Explain the working of a step down chopper with a neat diagram.
    d. Explain the working of series inverter.
    e. What is the basic principle of cyclo-converter?
    f. Explain briefly the operation of chopper in all four quadrants.
    g   What is PLC? Write down applications of PLC.

    Answer Any **Three** Questions

3   Explain the operation of UJT & also justify how it can be used as a relaxation   10
    oscillator.
4   Explain the working of a half wave converter with R-L load, with and without   10
    freewheeling diode. Show the o/p wave forms under the above case.
5   Explain the principle of working of UPS with a neat block diagram & state its   10
    application.
6   Draw the dynamic characteristics of an SCR and explain in detail.   10

7   Design a two way traffic light signalling system with the following   10
requirements.
1. There should be a START & STOP push button to start the signalling
process.
2. Once ON, side-1 lights should follow the patterns 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.