Exam.Code:0936
Sub. Code: 33768

2055
B.E. (Electrical and Electronics Engineering)
Sixth Semester
PC-EE-602: Power Electronics

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

1. (i) Compare the breakdown strengths of the 3 junctions of SCR. (2)
   (ii) Define the significance of firing angle and duty cycle. (2)
   (iii) How does source resistance and source inductance effect the output voltage of Phase controlled rectifier. (2)
   (iv) Explain the essential conditions for a PCR working as Line Commutated inverter. (2)
   (v) How the output voltage of a DC-DC converter can be controlled. (2)

PART-A

2. (i) A three-phase full converter charges a battery from a 3-Ø supply,50 hz. A battery emf is 200 V and its internal resistance is 0.5 ohms. On account of inductance connected in series with battery, charging current is constant at 20 A. Compute the firing angle delay. (5)
   (ii) Explain unequal current distribution, operating problems and remedies as associated with parallel operation of SCR. (5)

3. (i) Draw the circuit of a single-phase bridge type fully controlled rectifier feeding a RLE load. Explain its working and support your answer with output voltage waveform, output current, source current with firing angle as 120 degrees. (5)
   (ii) Draw a three-phase dual converter, its equivalent circuit and explain its operation in circulating current mode. Also derive the condition for firing angles for its operation. (5)

4. (i) Draw and explain the working of two-quadrant chopper with relevant waveforms. (5)
   (ii) Draw the circuit of an UJT working as relaxation oscillator circuit and discuss how output voltage pulse is obtained to trigger the SCR when the value of resistance is high. (5)

PART-B

5. (i) For a Type-A chopper, dc source voltage =230V, load resistance =10 ohms, take a voltage drop of 2V across chopper when it is on. For a duty cycle of 0.4, calculate (a) average and rms values of output voltage (b) efficiency of Chopper. (5)
   (ii) Draw and explain the working of a Class C commutation circuit with relevant waveforms. (5)

6. (i) Explain the working of a Voltage -commutated Chopper. (5)
   (ii)Explain the methods of forward voltage triggering, light triggering and rate of change of voltage triggering as applicable to thyristors. (5)

7. (i) Draw the circuit of a three phase fully controlled rectifier feeding a RLE load. Show the table of conduction of various thyristors and sketch the output voltage waveform for firing angle 60 degrees. (6)

   (ii) Draw and explain the static V-I characteristics of SCR. Explain each mode of operation. (4)

x-x-x