Exam.Code:0936
Sub. Code: 33768

2015

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) Explain firing angle and conduction angle as associated with an SCR. (2)
(ii) Draw a circuit of an UJT working as relaxation oscillator for an SCR. Draw the waveform of output voltage obtained. (2)
(iii) Discuss the process of Load Commutation for an SCR. (2)
(iv) Draw the circuits of Resistive firing circuit and full wave RC firing circuit. (2)
(v) What is meant by 'Line Commutated Inverter'. (2)

PART-A

2. (i) Draw and explain turn-on characteristics of a thyristor. (5)
(ii) Draw and derive the expression for Static Equalising Circuit for an SCR. (5)

3. (i) For a single-phase full converter with source inductance Ls, explain its working for overlap angle μ and firing angle α=0 degrees. Draw the waveforms for current and voltages. (5)
(ii) Explain the working of single phase full- wave mid-point converter with RL load. Draw the waveform for input and output voltage. Sketch the waveforms for output current for discontinuous current mode($\beta<\pi+\alpha$). (5)

4. (i) For a Buck-Boost DC regulator, explain its working and derive the expression for output voltage. (5)
(ii) For type-A chopper, dc source voltage 230 V , load resistance =10 ohms. Take a voltage drop of 2 V across chopper when it is on. For a duty cycle of 0.4, calculate average and rms values of output voltage. (5)

PART-B

5. (i) Draw the circuit of four quadrant chopper and explain its working in second quadrant.(4)
(ii) Explain the working of voltage commutated chopper and draw the waveform for output Vc, Ic and Vo. (6)

6. (i) A three-phase full converter ,fed from 3-phase,400 V,50 hz source is connected to load with R=10 ohms,E= 350 V and large inductance so that output current is ripple free. Calculate the power delivered to load and input pf for firing angle of 30 degrees. (5)
(ii) For a single phase 2-pulse full wave thyristor converter, draw its circuit ,the three-phase input waveform ,show the table of conduction of thyristors for firing angle=120 degrees, sketch the output voltage and derive its expression . (5)

7. (i) A single phase full converter feeds power to RLE load with R=6 ohms, L=6mH and E=60 V.The ac source voltage is 230V,50 hz.For continuous conduction ,find the average value of load current for a firing angle delay of 50 degrees.In case one of the four SCRs gets open circuited due to a fault,find the new value of average load current. (6)

(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 . (4)

x-x-x