Exam.Code:0935
Sub. Code: 6389

1078
B.E. (Electrical and Electronics Engineering)
Fifth Semester
EE-509: Power Electronics

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit. Assume any missing data.*

x-x-x

I. Attempt the following:-

a) What is a free - wheeling diode?

b) Why equalizing circuits are needed for thyristors connected in series?

c) Why is forced commutation necessary for choppers?

d) What is the difference between the circulating current mode and non-circulating current mode of the dual converter?

e) What is the effect of source inductance on the converter operation? (5x2)

UNIT – I

II. a) Explain the two transistor analogy of a thyristor. Hence explain the turn on process of an SCR.

b) Discuss the turn off timings in a thyristor. Draw graphs of current and voltage during this process. (5,5)

III. a) Draw circuit and explain the operation of a relaxation oscillator using UJT. Show the output voltage wave shape.

b) Draw and explain R.C triggering circuit used for a thyristor. Also draw the relevant waveforms. (5,5)

IV. a) What is meant by the terms natural commutation and forced commutation of thyristors? Explain class D and class E commutation techniques using suitable circuits.

b) In a self-commutation circuit load current is 8 A, supply voltage is 90 V and the required turn off time is 40ps. Find the values of L and C of the commutation circuit. Make suitable assumptions. (5,5)

P.T.O.

UNIT – II

V. Draw the circuit and explain the working of the 3-phase fully controlled bridge converter feeding an R-L-E load. Draw waveforms of input voltage, firing pulses, output voltage, input current and the output current. (10)

VI. Draw of Morgan chopper and explain its working. Draw waveforms of different currents and voltages. (10)

VII. a) A 230 V, 50 Hz ac supply is fed to a fully controlled bridge converter. The firing angle is 45° and the load current is 5 A. Find the output voltage, active power input and the reactive power output.

b) A dc chopper has an input voltage of 200 V and a resistive load of 8 ohm is connected across it. Voltage drop across the thyristor is 2 V and the chopping frequency is 800 Hz. The duty cycle is 0.4. Find (i) average output voltage (ii) rms output voltage (iii) chopper efficiency (iv) input resistance seen by the source. (5,5)

x-x-x