B.Tech. Degree IV Semester Examination, April 2009

EB/EC/EI/EE 406 INDUSTRIAL AND POWER ELECTRONICS

(2006 Scheme)

Time: 3 Hours Maximum Marks: 100

PART – A

(Answer all questions)

(8 x 5 = 40)

I a) Explain the turn-off mechanism of an SCR.

b) Draw and explain half wave RC trigger circuit for an SCR.

c) Explain the difference between a half controlled bridge and fully controlled bridge.

d) Explain the function of a freewheeling diode, showing how it is connected in the circuit.

e) Explain auxiliary commutation scheme for SCR.

f) Explain various PWM techniques used in inverters.

g) Explain with circuit, $\frac{dv}{dt}$ protection for thyristors.

h) What is dielectric heating? Write applications

PART – B

(4 x 15 = 60)

II Draw the V.I characteristics of a TRIAC and explain its working in each of the four modes using appropriate diagrams. (15)

OR

III a) What are the various methods to turn-on an SCR. (7)

b) Explain the working principle of thyristars using two-transistor analogy. Also device necessary equations. (8)

IV Draw and explain the various voltage wave forms of a single phase full wave controlled rectifier (with discontinuous load current) with the armature of a d.c. Motor as load. (15)

OR

V Draw the circuit of a three phase full wave rectifier with R load and explain its working. With suitable waveforms. (15)

VI a) Explain the working of Jones Chopper. (10)

b) Explain the working of single-phase series inverter. (5)

OR

VII a) Briefly explain the concept of slip power recovery scheme in the speed control of Induction Motors. (10)

b) Describe the principle of d.c. Chopper operation. (5)

VIII a) Explain online and off line UPS with the help of block diagram. (8)

b) A Boost regulator has an input voltage of $v_{in} = 15V$. The average output voltage is $v_{av} = 25V$ and average load current $I_{av} = 0.5A$. If $L = 150\,\mu H$ and $C 200\,\mu F$ determine

i) Duty cycle

ii) Ripple current in inductor

iii) Ripple voltage of filter capacitor

Assume the switching frequency as 25 KHz. (7)

OR

IX a) What is induction heating? Explain its principle. Briefly explain any *two* applications of induction heating. (10)

b) What is a static switch? List the merits of static switches over mechanical switches. (5)

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