(Following Paper ID and Roll No. to be filled in your answer book)

Paper ID: Roll No

M.Tech
FIRST SEMESTER EXAMINATION, 2008-2009
POWER CONVERTER -I

Time: 3hrs. *Max. Marks:100*

Note: Attempt All questions. All questions carry equal marks.

Q1. Attempt any Two parts of the following : [10x2]

(a) Explain the necessity of over voltage protection of a SCR, Discuss with neat circuit diagram the scheme for the Gate protection of a SCR.

(b) How does GTO differs from a conventional thyristor. Describe with neat circuit diagram the turn – on and turn – off phenomena of a GTO.

(c) Discuss with schematic diagram the operational behaviour of a TRIAC. Also describe its I- V Characteristics.

Q2. Attempt any Two parts of the following : [10x2]

(a) Describe single phase semi converter with neat circuit diagram and relevant waveforms for R – L – Eb load, where load inductance is infinite and devices are ideal.

(b) The effect of source-inductance is to reduce the output voltage of a converter. Discuss this effect for single phase full converter and derive the relevant expression, in support of answer.

(c) The full converter shown in figure 1 is connected to a 220 V, 50 Hz supply. The load current Ia is continuous and ripple free. The turn – ratio of the transformer is unity.

(i) Express the input current in Fourier – series. Determine the HF of input current DF and input power factor.

(ii) If the delay angle is $\alpha = \pi/3$, Calculate HF, DF and input powe factor.

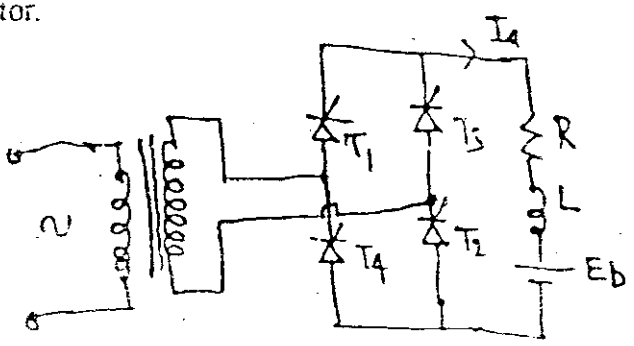

Figure 1

Attempt any One parts of the following [20x1]

Describe with circuit diagram and relevant output voltag waveforms, three phase semiconverter when load is R – L – Eb an current is ripple free. Also draw the waveforms of input currents.

Discuss the necessity of power factor control of the converters an describe any two methods to control the power factor.

Attempt any Two parts of the following [10x2]

Describe single phase dual – converter with relevant waveform Also derive the expression for circulating current.

Discuss single phase A.C controller for R – L load. Also deriv the expression for output current as a functions of time and firin angle α.

A single phase full wave a.c controller has a resistance load of 1 Ω and the input r.m.s. Voltage is 230 V, 50 Hz. The delay angl of the thyristor T_1 and T_2 are equal $\alpha_1 = \alpha_2 = \pi/2$. Determine (i) The r.m.s output voltage (ii) the input power factor (iii) The average current of the thyristor (iv) The r.m.s current of the thyristor