Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

PEPC101

1st Semester M Tech Regular/ Back Examination 2015-16

POWER CONVERTER - I

BRANCH(S): POWER ELECTRONICS AND DRIVES

Time: 3 Hours

Max marks: 70

Q.CODE:T1001

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) In a 3-Φ full converter, if the load current is I and ripple free, then the average what is the average thyristor current?

b) A chopper has V_s as the source voltage, R as load resistance and α as the duty cycle. What is the rms value of the output voltage?

c) In a single pulse modulation of PWM inverters, the pulse width is 120^0. For an input voltage of 220V dc, what is the rms output voltage?

d) A three phase to three phase cycloconverter requires how many SCRS for 6-pulse operation?

e) What are the various types of voltage source inverters?

f) What is the output voltage ripple in a step up chopper?

g) Draw the phasor diagram of single phase converter operating in inverter mode feeding a lagging load.

h) What is the difference between unipolar and bipolar switching in SPWM?

i) What are various control technique used in voltage regulators and which one is better?

j) Derive the expression of output voltage in a three phase full converter.

Q2 a) Find the expression of load current of a single phase full converter with a RL load. (5)

b) A single phase semi converter using two thyristor and twodiode is supplied from 230V, 50Hz source. The load consists of R=10Ω, E=100V and a large inductance so as to render the load current level. For a firing delay angle of 30^0, determine a) average output voltage b) average output current c) average and rms value of thyristor current d) average and rms value of diode currents. (5)

Q3 A 3-Φ full converter charges a battery from a 3-Φ supply of 230V, 50Hz. The battery emf is 200V and internal resistance is 0.5Ω. On account of inductance connected in series with the battery, charging current is constant at 20A. Compute the firing angle delay and the supply power factor. In case it is desired that power flows from DC source to AC load, find the firing angle delay for the same current. (10)

In case 3-Φ full converter is replaced by a 3-Φ semi converter, compute the firing angle delay and the supply power factor in the above problem.

Q4 a) A single phase full wave AC voltage controller controls power flow from a 230V, 50Hz ac source into a resistive load. The maximum desired output power is 10kW. Calculate a)the maximum rms current ratting of thyristor I_{RM} b)the maximum average current rating of thyristor I_{AM} c) the peak current of thyristorI_p . (5)

b) Explain principles of ON-OFF and phase angle control in voltage regulators.

Q5 a) Find the output performance of a type –A chopper. (5)

b) For type-A chopper feeding an RLE load, obtain maximum value of average current ratting for the thyristor in case load current remains constant. (5)

Q6 a) Describe the operation of push-pull inverter with neat circuit and waveforms. (5)

b) Find the maximum switch utilization ration three phase inverters. (5)

Q7 a) Find the ripples in the output of a three phase inverter and also the dc side current (10)

Q8 Write short notes on any (5 x 2)

a) Four quadrant chopper
b) Three phase cyclo converter
c) Choice of carrier frequency in SPWM
d) Non circulating current mode dual converters