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Reg. No…….

Name…….

M.TECH DEGREE EXAMINATION

First Semester

Model Question Paper -II

Branch: Electrical and Electronics Engineering

Specialization: Power Electronics

MEEPE 103 POWER CONVERTERS

(2013 Admission onwards)

Time: Three hours Maximum: 100 Marks

1. (a) An ac voltage of $230\sqrt{2}$ Sin(314t) V is applied through a single diode to a load of R= 2.3 Ω and L=33 mH connected in series. If load current is continuous, find minimum and maximum values of source current. [6 Marks]

   (b) A load comprises of resistance and capacitance connected in series is fed from voltage source of VmSin(wt) through a diode. Analyze the circuit and draw the waveforms. [12 Marks]

   (c) A resistance of 14 Ω requires average output voltage of 30 volts for a particular application. Resistance is connected to $110\sqrt{2}$ Sin(wt)through a single SCR. Compute input power factor. [7 Marks]

OR

2. (a) A voltage of 230V dc is switched on to a resistance of 100Ω in series with inductance 33mH. Find the magnitude of current at t= 0.23 seconds. [5 Marks]

   (b) A resistance of 100 Ω is connected to a voltage of $230\ \sqrt{2}$Sin(314t) through one SCR., Compute power factor if SCR is fired at π/2. [7 Marks]

   (c) For a thyristor, maximum junction temperature is 125^0C. The thermal resistances for the thyristor sink combinations are 0.16 and 0.08^0C/Watts. For a heat sink temperature of 70^0C, compute the total average power loss in the thyristor sink combination. In case, the heat sink temperature is brought down to 60^0C by forced cooling, find the percentage increase in the device rating. [13 Marks]

3. (a) What is the effect of source impedance on the output voltage of a single phase full converter. [7 Marks]

(b) A three phase full converter is fired at 90 degrees. If the output current is continuous, sketch phase voltages, line voltages, scheme of firing pulses and clearly indicate the output voltage on a graph sheet. [18 Marks]

OR

4. (a) With neat sketches, explain the operation of single phase semiconverter with continuous load current. [7 Marks]

(b) A three phase semi converter is fired at 60 degrees. Sketch firing pulses, line and phase voltages and output voltage. [18 Marks]

5. With neat circuit diagram explain the operation of a boost converter in continuous and discontinuous current modes. [25 Marks]

OR

6. With neat circuit diagram explain the operation of a buck converter in continuous and discontinuous current modes. [25 Marks]

7. (a) With neat circuits and V-I diagrams, Type- A and Type- E dc chopper circuits. [7 Marks]

(b) Explain the voltage commutation in Type-A chopper with neat figures and derivations. [12 Marks]

(c) Explain the operation of multi pulse AC chopper. [6 Marks]

OR

8. (a) Briefly explain the working of half bridge Mc Murray Invereter. [10 Marks]

(b) A three phase voltage source inverter is feeing balanced star connected resistive load and operates in 120 degree mode of operation. Sketch firing signals and phase and line voltages. Provide derivations. [15 Marks]