Code No: 125AF/115AF

Answer any five questions
All questions carry equal marks
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1.a) Describe the RC full-wave trigger circuit for one SCR when the load is AC. Also, draw the related voltage waveforms.

  b) Two SCRs are connected in parallel to share a total load current of I_L=600A. The on state voltage drop of one SCR is VT_1 =1.0 at 300A and that of other SCR is VT_2 =1.5V at 300A. Determine the values of series resistances to force current sharing with 10% difference. Total voltage v =2.5V. [8+7]

2.a) Draw and explain circuit diagram for the synchronized UJT triggering. Also, draw and explain the associated voltage waveforms.

  b) The junction capacitance of a SCR can be assumed to be independent of off state voltage. The limiting value of charging current to turn on the SCR is 12mA. If the critical value of dv/dt is 800 V/µs, determine the junction capacitance. [9+6]

3.a) Derive an expression for output voltage of a three phase, fully-controlled bridge converter by conducting the following factors: (i) overlap-angle (ii) source inductance.

  b) A highly inductive load, such that load current can be assumed constant, is to be supplied from a 230V, 50 Hz, single-phase supply by a fully controlled and a half-controlled bridges. Compare the average load. Voltage provided by each bridge at firing angles of 300 and 900. Neglect device voltage drops. [9+6]

4.a) Explain the principle of cosine wave control of firing angle α. Explain anyone suitable triggering circuit based on this principle.

  b) A single phase 230V, 1kW heater is connected across a single phase, 230V, 50Hz supply through an SCR. For firing angle of 45^0 and 90^0, calculate the power absorbed by the heater element. [9+6]

5.a) Mention the advantages of Jones chopper circuit over other chopper circuits. Give the application of this chopper.

  b) A chopper circuit is operating on TRC principle at a frequency of 1 kHz on a 220V dc supply. If the load voltage is 180V, calculate the conducting and blocking period of thyristor in each cycle. [9+6]

6. Draw the schematics of step-down and step-up choppers and derive an expression for output voltage in terms of duty cycle for a step-up and step-down chopper. [15]

7.a) Describe the basic principle of working of a single phase to single-phase cycloconverter for both continuous and discontinuous conductions for a bridge type cycloconverter. Mark the condition of various thyristors also.

b) The load of an ac voltage controller is resistive, with R=1.5Ω. The input voltage is Vs= 120V(rms), 60Hz. Plot the Power factor against the delay angle for single phase half wave and full wave controllers. [9+6]

8.a) What is the need for controlling the output at the output terminals of an inverter? Discuss briefly and compare the various methods employed for the control of output voltage of inverters.

b) Explain sinusoidal pulse modulation as used in PWM inverters. Write the important features of the same. [8+7]

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