Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(EE)/(Pow Engg.)   (Sem.–1)
ADVANCED POWER ELECTRONICS
Subject Code : ELE-503/PEE-503
Paper ID : [E0483]

Time : 3 Hrs.   Max. Marks : 100

INSTRUCTION TO CANDIDATES :
 1.   Attempt any FIVE questions out of EIGHT questions.
 2.   Each question carries TWENTY marks.

1.   a) Describe the structural feature of power diode, how do these differ from signal diode.

 b) Discuss the power loss in a diode during the reverse recovery transients.

2.   An SCR has a V_g - I_g characteristics given as $V_g = 1.5 + 8 I_g$. In a certain application, the gate voltage consists of rectangular pulses of 12 V and of duration 50 μs with duty cycle 0.2.

 a) Find the value of R_g series resistance in gate circuit to limit the peak power dissipation in the gate to 5 watt.

 b) Calculate average power dissipation in the gate.

3.   a) Explain static equalization circuit of thyristor for equal voltage sharing with neat diagram, also derive the expression for equalizing resistance R?

 b) Two thyristors having difference of 2 mA in latching current are connected in series in a circuit. The voltage across the thyristors are 400 V and 380 V respectively. Determine the required equalizing resistance.

4.   Design a relaxation oscillator circuit using UJT which has the following specifications :

 η = 0.65, I_p = 0.65mA, V_p = 12 V, I_v = 2.0 mA, V_v = 1.5 V, R_{BB} = 4.5 kOhm, and leakage current is 3mA when, emmiter open circuit.

 The firing frequency is 2.5 kHz. Value of C= 0.047μF.

5. a) Enumerate Advantages of MOSFET over (a) bipolar junction transistor (b) Conventional thyristor and also give the application of MOSFET.

    b) Explain 1GBT with construction diagram also give the VI and switching characteristics.

6. A single phase PWM inverter is fed from 220V dc supply and it is connected to a RL load with R = 10 Ohm L = 10 mH. Determine the total harmonic distortion in the load current. Assume width of each pulse is $\pi/2$ and the output frequency is 50 Hz.

7. Explain the operation of step down chopper with circuit and wave diagram also do the steady state analysis to find out the maximum and minimum value of current.

8. a) Draw the circuit diagram of single phase practical dual converter and explain the operation of circulating current mode.

    b) Explain the operation of single phase step up cycloconverter with circuit and wave diagram.