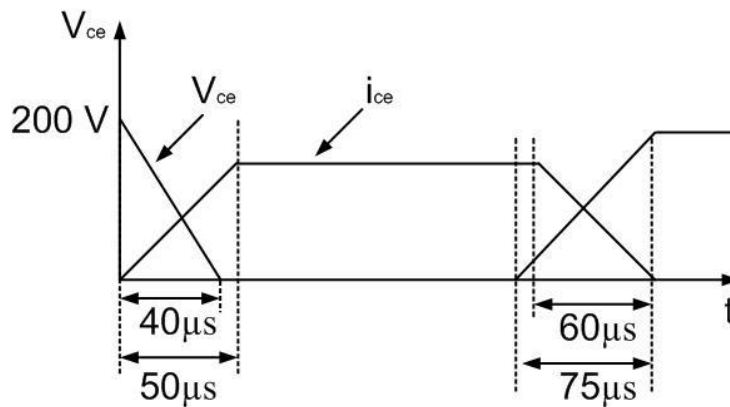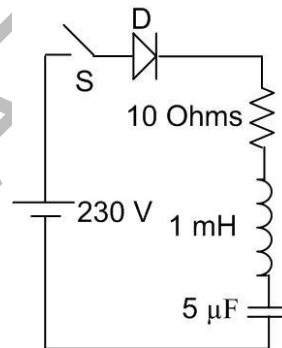**GATE ECE Coaching By IITians GATE CLASSES**

Power Electronics Assignment

1) A power transistor has switching waveform as shown in figure below. Find the total energy loss in one cycle.

2) For the diode circuit shown in figure below. Find the diode conduction time

3) A thyristor converter of 415 V, 100 A is operating at rated load. Details of the thyristor used are as follows: ON state power loss = 150 W, Thermal resistances, junction to case = 0.01 degree centigrade/W, case to sink = 0.08 degree centigrade/W, sink to atmosphere = 0.09 degree centigrade/W. Assume ambient temperature as 35 degrees centigrade. The junction temperature for 100% load in degrees centigrade is
   a) 48.5
   b) 54.5
   c) 60
   d) 62

4) A DC source of 100 V supplies a purely inductive load of 0.1 H, the controller is an SCR in series with source and load. If the specified latching current is 100 mA, then the minimum width of the gating pulse to ensure turn on of SCR would be.
   a) 50 micro seconds
   b) 75 micro seconds
   c) 100 micro seconds
   d) 125 micro seconds

5) Find the expressions for active and reactive power taken by a full wave fully controlled converter with continuous conduction.

6) A single phase full converter feeds power to RLE load with R = 10 Ohms, L = 10 mH, and E = 50 V, the AC source voltage is 230 V, 50 Hz. For continuous conduction, what is the average value of load current for a firing angle delay 0f 60 degrees?
   a) 4.63 A
   b) 6 A
   c) 6.5 A
   d) 5.35 A

7) If the commutation angle of a diode rectifier is μ, then the inductive voltage regulation will be

8) A step up copper is fed from a 220 V dc source to deliver a load voltage of 660 V. If the non-conduction time of the SCR is 100 micro seconds, then the required pulse width will be
   a) 100 micro seconds
   b) 200 micro seconds
   c) 220 micro seconds
   d) 660 micro seconds

9) Compared to a single phase half bridge inverter the output power of a single phase full bridge inverter is higher by a factor of
   a) 12
   b) 8
   c) 4
   d) 2

10) A single phase half bridge inverter has input voltage of 48 V DC, inverter is feeding a load of 2.4 Ohm. The RMS output voltage of fundamental frequency is
   a) 30.55
   b) 21.6
   c) 43.21
   d) 10.8

11) A single phase AC regulator fed from 50 Hz supply feeds a load having 4 Ohm resistance and 12.73 mH inductance. The control range of firing angle will be
   a) 0 to 180 degrees
   b) 45 to 180 degrees
   c) 90 to 180 degrees
   d) 0 to 45 degrees

CDQ - A DC battery of constant emf (E = 150 V) is charged through a resistor (R = 8 Ohm) by using single phase half wave diode rectifier connected to 230 V, 50 Hz supply.

12) Find the value of average charging current
   a) 3.9 A
   b) 4.9 A
   c) 5.9 A
   d) 6.9 A

13) Calculate the supply power factor
   a) 0.67 Lag
   b) 0.67 Lead
   c) 0.57 Lag
   d) 0.57 Lead

14) For the circuit shown in figure below calculate the maximum value of $\frac{di}{dt}$ and $\frac{dv}{dt}$.