Name: **Enrolment No:**	

UPES

End Semester Examination, December 2023

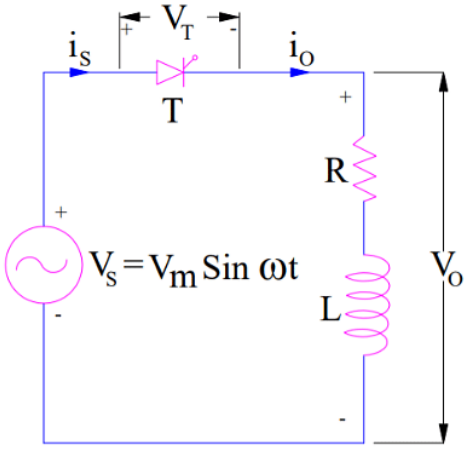
Course: Power Electronics **Semester: V**

Program: B.Tech (Electrical Engineering) **Time : 03 hrs.**

Course Code: ECEG3031 **Max. Marks: 100**

Instructions: Assume the data if missing.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Define holding current and latching current of SCR. Show these currents on the static v-i characteristics of SCR.	**4**	**CO1**
Q2	Draw and explain the circuit for obtaining the input & output characteristics of the following devices: A) Power Diode B) TRIAC	**4**	**CO1**
Q3	Describe a single-phase full converter feeding an RL load. Draw the waveform of input voltage, output voltage, load current and voltage across the thyristor.	**4**	**CO2**
Q4	Identify the circuit shown below and draw the input & output waveforms. 	**4**	**CO1**

Q5	In a dc chopper, the average load current is 30 Amps, chopping frequency is 250 Hz. Supply voltage is 110 volts. Calculate the ON and OFF periods of the chopper if the load resistance is 2 ohms.	**4**	**CO2**
SECTION B (4Qx10M= 40 Marks)			
Q6	Design a UJT triggering circuit for one thyristor and explain the operation with the help of circuit diagram and waveform.	**10**	**CO2**
Q7	It is required to operate 200 A SCR in parallel with 300 A SCR with their respective ON – State voltage drop of 2 V and 1.2 V. Calculate the value of resistance to be inserted in series with each SCR so that they share the total load of 500 A in proportional to their current ratings – (in mΩ).	**10**	**CO4**
Q8	For a type A chopper, the dc source voltage is 200 V, load resistance 5 Ω, drop across the switch is 1Vand duty cycle 0.5. Calculate average and RMS value of output voltage and chopper efficiency.	**10**	**CO3**
Q9	Illustrate different regions of single-phase dual converter without circulating current mode. Explain the working of same with the help of circuit diagram.	**10**	**CO2**
SECTION-C (2Qx20M=40 Marks)			
Q 10	Design a circuit that will deliver 100 W to a 48 V dc source from a 120 V rms 60 Hz ac source. Give alternative circuits that could be used to satisfy the design specifications and give reasons for your selection. OR Show that the controlled half-wave rectifier and full wave rectifier with a resistive load have the power factor of $pf_{HW} = \sqrt{\frac{1}{2} - \frac{\alpha}{2\pi} + \frac{\sin 2\alpha}{4\pi}}$ and $pf_{FW} = \sqrt{1 - \frac{\alpha}{\pi} + \frac{\sin 2\alpha}{2\pi}}$ Also, explain the significance of power factor in rectifier circuits.	**20**	**CO3**
Q11	A single-phase voltage controller is employed for controlling the power flow from 230V, 50Hz source into a load circuit consisting of R=6 Ω and L=8 Ω. Calculate (i) the range of firing angle (ii) the maximum value of rms load current (iii) the maximum power and power factor (iv) The maximum values of average and rms thyristor currents.	**20**	**CO4**