A

Assignment Sheet

Campus: PCE **Course:** B.Tech
Class/Section: VIII
Name of subject: Power Electronics
Date: 30-04-2021
Name of Faculty:
Code: 4EE4-06
Date of Preparation: 29-04-2021
Scheduled Date of Submission: 06-05-2021

Q.No.	Questions	COs	POs	PSOs
1	Describe the switching characteristics of power MOSFET and IGBT and compare them?	2	1	2
2	Draw the gate characteristics of a SCR and explain its importance in the design of gate drive circuit?	3	1	1
3	Explain the operation of single phase full-wave controlled rectifier using center tapped transformer with R-L load under discontinuous mode of operation? Draw the waveforms of output voltage, voltage across SCR and average load current for α = 600?	1	1	2
4	A single phase half wave controlled rectifier without a freewheeling diode is connected to R load of 10 Ω. The converter is supplied from 230 V, 50 Hz ac supply (i) determine average and rms load voltage (ii) if inductive load is added to the resistive load such that R = 10 Ω and L = 6 mH, calculate new values of average and rms load voltages? Assume α = 300	2	1	1
5	Describe the operation of three phase full converter with RL load? Draw the waveforms by choosing firing angle such that output voltage has negative part.	2	1	1
6	A three phase semi converter is connected to a RL load with R=10 Ω. If the firing angle of SCR is α = 600 and it feeds 4 kW power to a resistive load determine the amplitude of maximum per phase input voltage	1	2	2
7	Explain the operation of buck-boost converter in the CCM mode and obtain the expression for amplitude of ripple current	4	2	1
8	A buck converter has the input voltage of 220 V and it operates at 1 kHz, when the average load current is 50 A, the load resistance is 3 Ω. Determine the value of	3	2	1

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Parameter	IGBT	MOSFET
full form	IGBT stand for Insulated Gate Bipolar transistor	Mosfet stands for Metal oxide semiconductor field Effect Transister
Definition	IGBT is a three terminal semiconductor switching device used to the electronic circuits for switching and application of signals.	Mosfet is a ~~full~~ four terminal semiconductor switching device which is also used as switching and amplification.
Terminals	IGBT has three terminal which are emitter, gate and collector	MOSFET has four termi Source, gate, drain and body.
PN Junction	IGBT has PN Junction in its construction	MOSFET does not ha any PN Junction in its constructio
Cost	IGBT is costlier than mosfet	cost is low relatively.

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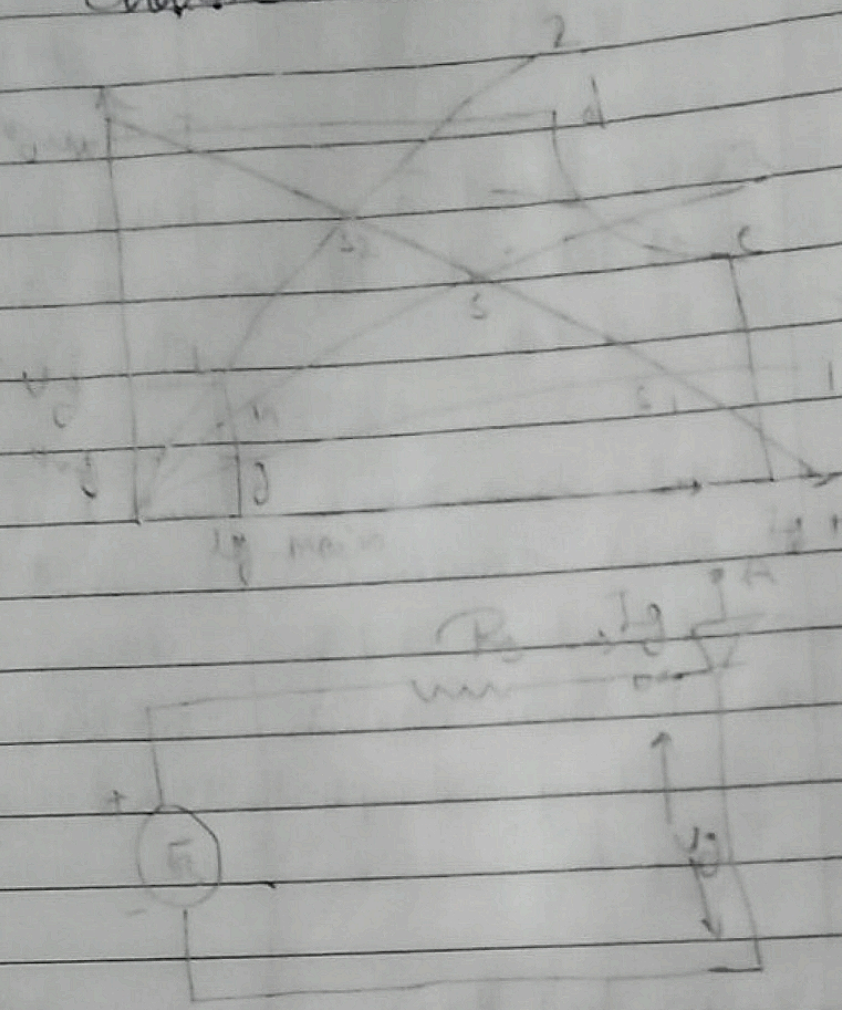
Gate Characteristics of SCR



Gate characteristics of SCR give us a basic operate it within a safe region of applied g and current. At the time of manufacturing as is specified with the maximum gate limit, gate current limit and maxi average gate power dissipation limit. A gate non triggering voltage (Vg mention at the time of manufac of the device.

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Q3 Working of Bnto sequential commutated current source inverter ?:-

The inverter are used to convert the power from dc to ac. the voltage source inverter and current source inverter are two type of inverter, the main difference between voltage and current the output is constant in vai

the current source inverter convert the input direct current into an alternating current. in current source inverter the input current remains constant but this input current is adjustable

Q.4

the Pwm in an inverter comparies of two signals one signals is for the reference and the other will be the carrier. the pulse require for switching the mode of the inverter can be generated by the campariesm among these two signals

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Pwm or pulse width modulation is used to keep the output voltage of the Inverter at the rated voltage (110 V AC / 220 V AC) irrespective of the output load. In a conventional inverter the output changes according to the changes in the load. To nullify effect caused by the changing loads.

Q.5 ripple = $V_o/V_i * (V_i - V_o) / (f_s * L)$

where

- V_o is the output voltage.
- V_i is the input voltage
- f_s is the switching frequency

find out Vdms and ripple factor (γ) using formula for half wave rectifier with filter Vdms : $V_{dc} - \pi/2\sqrt{2}$ and ripple factor (δ) = $1/2\sqrt{3} f' R L$

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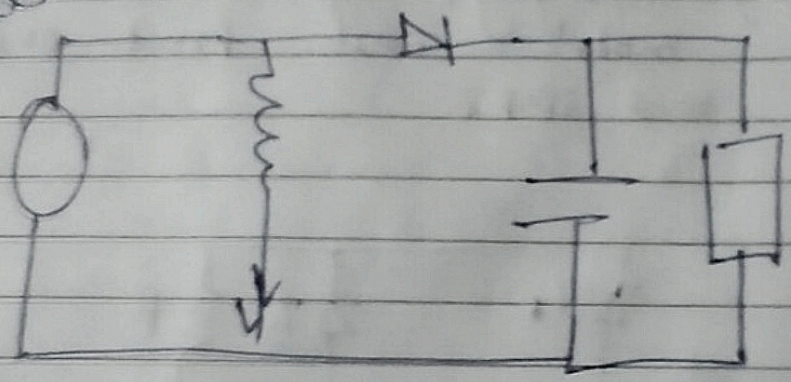
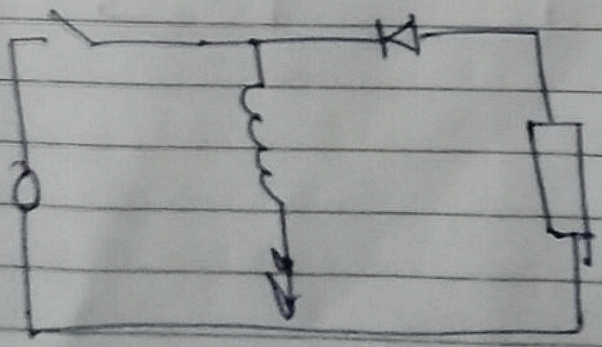
Q.4 A buck boost converter transforms a positive voltage at the input to a negative DC voltage at the output. the circuit operations depends on the 'conduction state of the MOSFET. on state. the current through the inductor increase and the diode is in blocking state.

ON state



off state.



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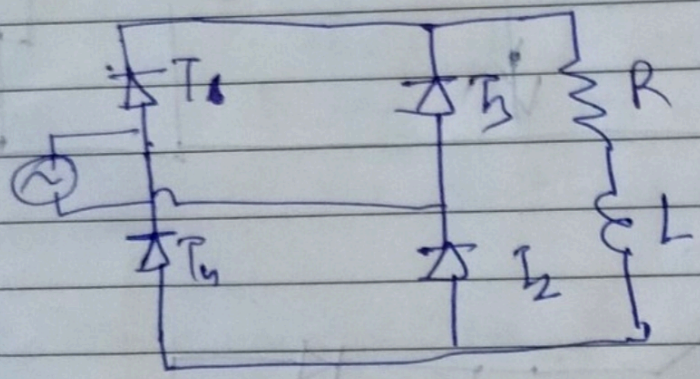
R = 10

α = 60°

the single phase fully controlled rectifier allows conversion of signal phase AC into DC. Normally this is used in various application such as battery charging, speed control of DC motor and front end of UPS and SMPS.



2 A- 1Phase fully wave rectifier is obainted by using two half wave rectifier circuit. the input AC supplied to the full wave rectifier is very high the step-down transformer in the rectifier circuit converts the high

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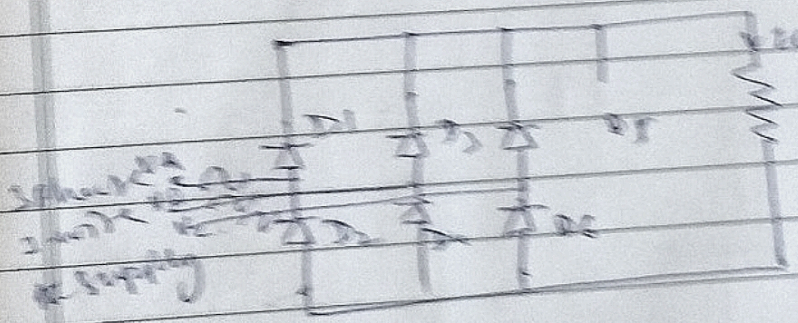
Voltage AC into low voltage AC. The anode of the centre tapped diodes is connected to the transformer. Secondary winding and connected to the load resistor.



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