SCHOOL OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF ELECTRICAL AND ELECTONICS ENGINEERING

PG LABS

POWER CONVETERS LABORTARY

Sl.No	Equipment Name	Equipment Stock Number	Equipment Description	Photography	Quantity	Usage
1	**Single phase fully controlled converter**	SPMVV/SoET /EEE/PC-01	power circuit consists of four SCR's connected as Fully controlled bridge converter. A freewheeling diode is provided to observe the effect of freewheeling diode on inductive loads. Each device in the unit is mounted on an appropriate heat sink and is protected by snubber circuit. Short circuit protection is achieved using glass fuses. A circuit breaker is provided in series with the input supply for overload protection and to		1	M.Tech I Year II SEM

			switch ON/OFF the supply to the power circuit. The front panel consists of input and output terminals. The Gate and Cathode of each SCR's brought out on the front panel for firing pulse connection. A Digital Voltmeter and an Ammeter is mounted on the front panel indicates the output voltage and current. A separate full wave bridge rectifier is provided in the unit to get the DC supply for the field of DC Shunt Motors. The power circuit schematic is printed on the front panel.			
2	**Three phase full wave converter with R & RL Load**	SPMVV/SoET /EEE/PC-02	The microcontroller generates the sequence of pulses as required for a six pulse converter and is fed to six optoisolators ,which forms the actual triggering source to the thyristors. Each optoisolator has separate isolated power supply and optoisolators are used for isolation of the triggering circuit from the power circuit. each thyristor conducts for a period of 120 degrees. When thyristor 2 and 3 are conducting, thyristor 2 is supposed to commutate for a period of 120 degrees and thyristor 4 will be the incoming one for conduction. So a pulse must be applied to the		1	M.Tech I Year II SEM

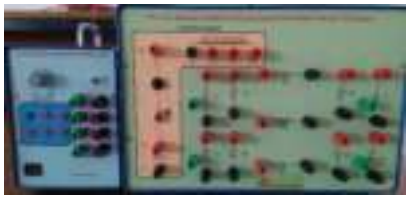
			thyristor which is incoming. But in practice we find that the thyristor which remains conducting during change over from 2 to 4 must also receive a triggering pulse. This ensures that thyristor no 3 does not turn OFF. It means we must generate 12 pulses instead of six only. The three phase fully controlled converter circuit has the advantage that it has less ripple at small conduction angles. Here the thyristors are fired in sequence of every 60 degree and ripple is always six pulses per cycle. System includes Field supply inbuilt for connecting separately excited DC motor.			
3	**Series Resonant Inverter – Series Inverter**	SPMVV/SoET /EEE/PC-03	This unit consists of two SCR's two diodes, A center tapped inductor with tappings and 4 capacitors. Input supply terminals with ON/OFF switch and a fuse is provided. All the devices in this unit mounted on a proper heat sink, snubber circuit for dv/dt protection and a fuse in series with each device for short circuit protection.		1	M.Tech I Year II SEM

4.	**Parallel Resonant Inverter - Parallel Inverter**	SPMVV/SoET /EEE/PC-04	This unit consists of two SCR's, two freewheeling diodes, commutation inductor, Commutation capacitor and a center tapped transformer to be interconnected to make parallel inverter. All the points are brought out to the front panel. A switch and fuse is provided for input DC supply. All the devices are mounted on proper heat sink. Each device is protected by snubber circuit.		1	M.Tech I Year II SEM
5.	**Study of Buck - Boost converter:- MOSFET based DC-DC Buck - Boost converter- 30V/2A**	SPMVV/SoET /EEE/PC-05	The basic buck converter is well designed to deliver 5 Volts DC from 20 to 30 V DC input by using TPS 54160 Step down DC to DC converter device. The device is having a built in integrated high side MOSFET. It is very highly efficient. The switching frequency range is 300 kHz to 2.5 M Hz. The input is adjustable from 20 volts DC to 30 V DC. The Inductor and capacitor in the buck converter output, are designed to reduce the ripple voltage. The variation in PWM can be observed by varying the input potentiometer from 20 to 30 V DC. The variation in PWM can also be observed by varying the output load from 100 m. amps to 1 amp.		1	M.Tech I Year II SEM

6	**Study of step down chopper (Buck converter):- MOSFET based DC-DC Buck converter-30V/2A**	SPMVV/SoET /EEE/PC-06	The basic buck converter is well designed to deliver 5 Volts DC from 20 to 30 V DC input by using TPS 54160 Step down DC to DC converter device. The device is having a built in integrated high side MOSFET. It is very highly efficient. The switching frequency range is 300 kHz to 2.5 M Hz. The input is adjustable from 20 volts DC to 30 V DC. The Inductor and capacitor in the buck converter output, are designed to reduce the ripple voltage. The variation in PWM can be observed by varying the input potentiometer from 20 to 30 V DC. The variation in PWM can also be observed by varying the output load from 100 m. amps to 1 amp.		1	M.Tech I Year II SEM
7	**Single Phase Dual Inverter with R and RL Load Single Phase Dual converter (24V / 2A)**	SPMVV/SoET /EEE/PC-07	Dual converter consists of two converters both are connected to the same load. The purpose of a dual converter is to provide a reversible DC voltage to the load. It is needed for DC motor drives where speed reversal is required. Dual converter provides four quadrant operations hence the name dual. The two modes of operations are the non circulating current mode and circulating current mode. In the former only one bridge is triggered. When reversal of output voltage is required, the firing pulses for concreting bridge are stopped and the second bridge is gated. Since the conducting SCRs in the first bridge will turn off only when the current goes to zero, a small dead time must be allowed		1	M.Tech I Year II SEM

			before the second bridge is gated otherwise; the AC input will be shorted through the two bridges.			
8	**Two quadrant ZVS resonant converter:-** **a. Two quadrant ZVS resonant converter 30V/2A**	SPMVV/SoET /EEE/PC-08	DC/DC power converters have been widely used in industrial applications. Since the classical converters and switched inductor converters have high power losses across the switches during switching-on and switching-off, the power transfer efficiency of these converters is limited. Soft switching technique implements the zero-power-consumption operation during switching-on and switching-off. Therefore, it largely reduces the power losses of the converter. Most of the papers in literature introduce the zero-current-switching (ZCS) and zero-voltage-switching (ZVS) methods in single quadrant operation. This paper introduces a two-quadrant DC/DC zero-voltage-switching (ZVS) quasi-resonant-converter Luo-Converter, which effectively reduces the power losses, and largely increases the power density and power transfer efficiency. Experimental results verified the advantages of this converter		1	M.Tech I Year II SEM

9	**Three phase bridge Inverter with 180 deg. conductions – 3phase PWM inverter with half bridge inverter**	SPMVV/SoET /EEE/PC-09	6 mosfets bridge is connected in half bridge configuration with 1 point being commonly connected to common point of 2 condensers at input stage. The unit supplied involves a d.c. link half bridge three phase bridge inverter using MOSFET in pulse width modulation techniques. It also includes PIC microcontroller for generating desired PWM pulses with phase shift . Two potentiometers are used to control frequency and the pulse width of the waveform in the individual half cycles. Push button switch is provided for reading the values of duty cycle and frequency control potentiometers. If user wants to change the frequency, move potentiometer for frequency and then press push button to effect of the change. Vice versa , if user wants to change PWM , then press the push button and then move the potentiometer for PWM to take the effect.		1	M.Tech I Year II SEM

10	**Current source inverter**	SPMVV/SoET /EEE/PC-10	In the circuit of a Single-phase Current Source Inverter (CSI) a constant current source is assumed here, which may be realized by using an inductance of suitable value, which must be high, in series with the current limited dc voltage source. The thyristor pairs, Th1 & Th3, and Th2 & Th4, are alternatively turned ON to obtain a nearly square wave current waveform. Two commutating capacitors − C1 in the upper half, and C2 in the lower half, are used. Four diodes, D1–D4 are connected in series with each thyristor to prevent the commutating capacitors from discharging into the load. The output frequency of the inverter is controlled in the usual way, i.e., by varying the half time period, (T/2), at which the thyristors in pair are triggered by pulses being fed to the respective gates by the control circuit, to turn them ON, as can be observed from the waveforms (Fig. 39.2). The inductance (L) is taken as the load in this case, the reason(s) for which need not be stated, being well known. The operation is explained by two modes		1	M.Tech I Year II SEM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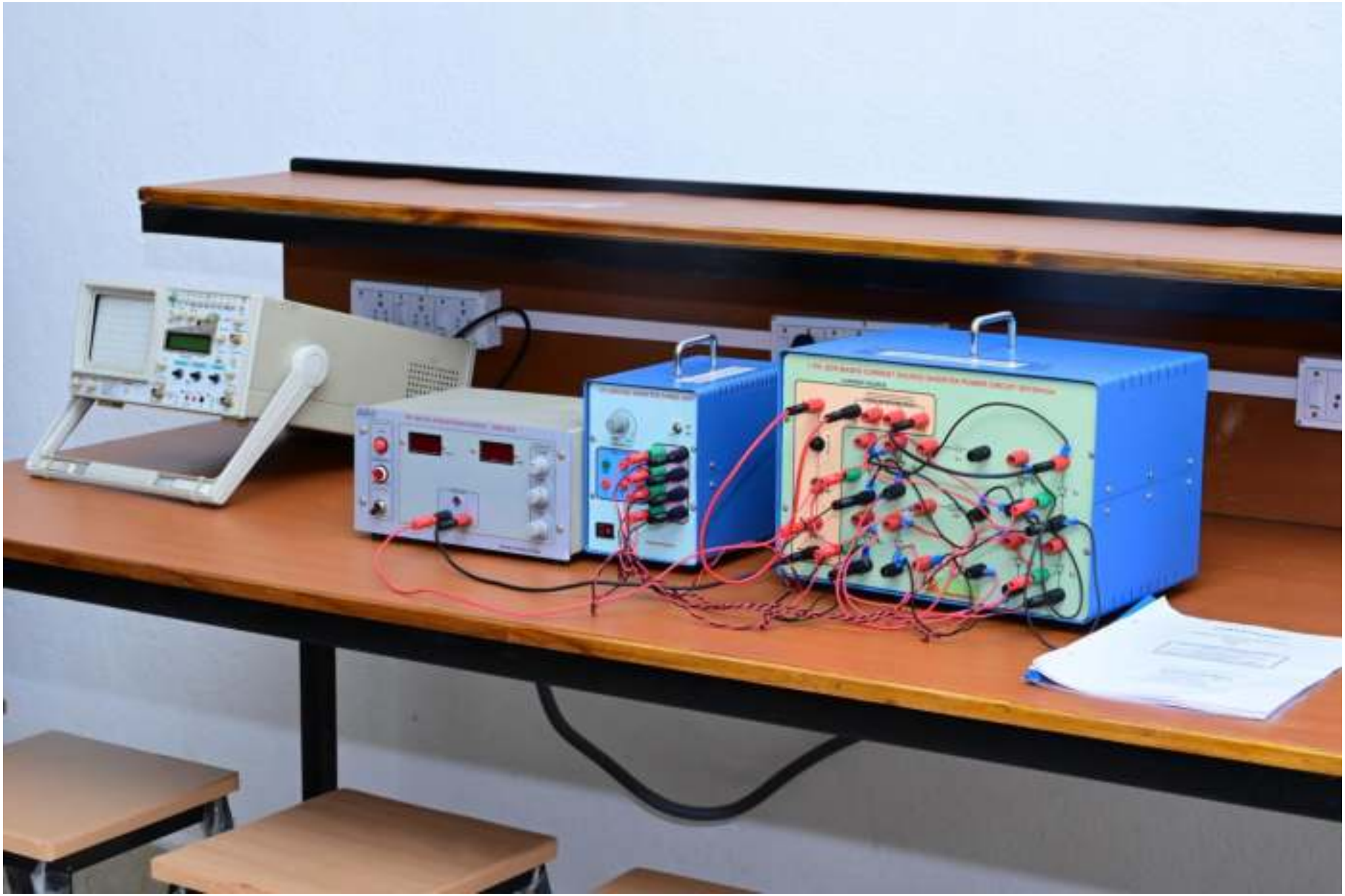

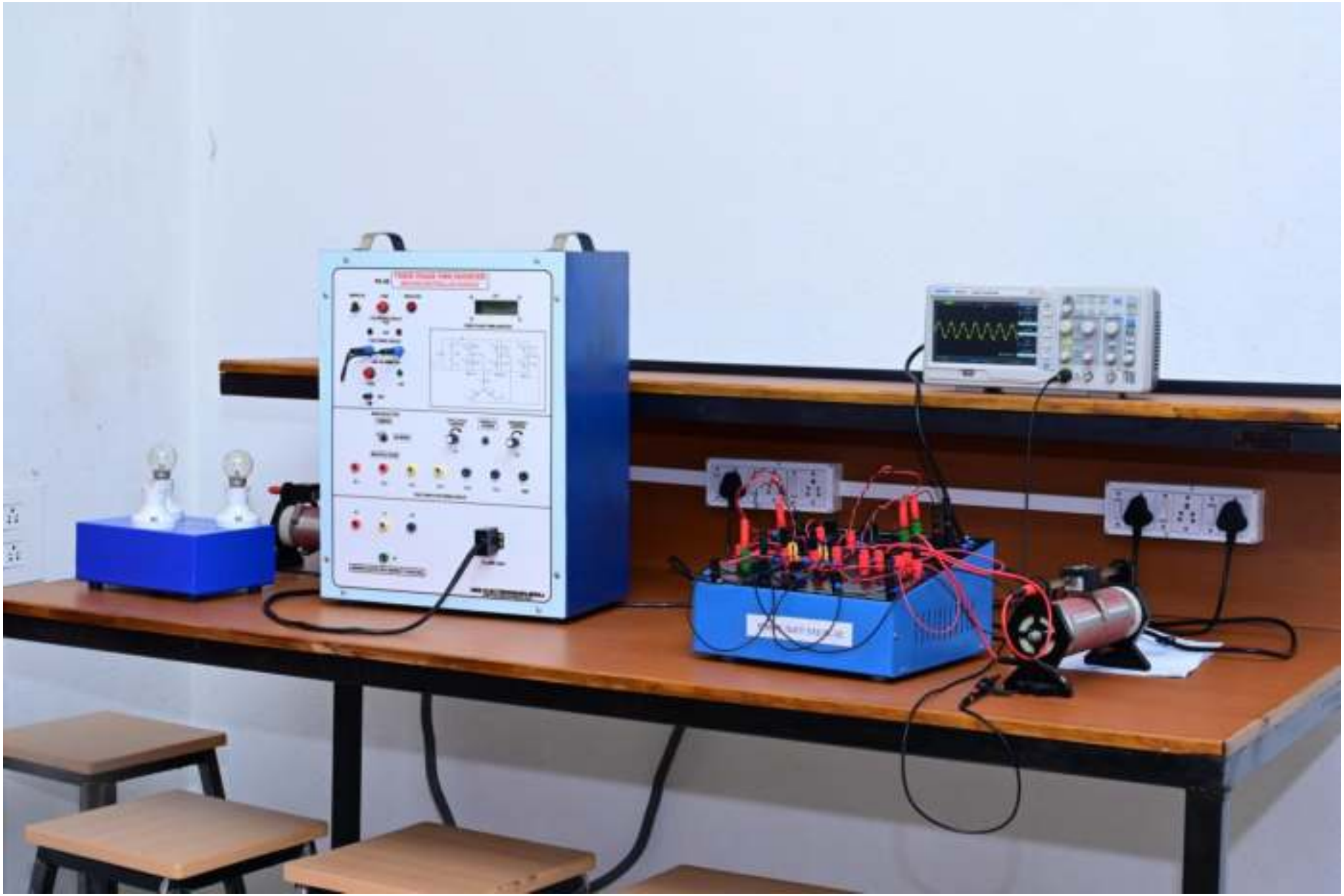


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