

Department of Electrical Engineering GZSCCET, MRSPTU Bathinda

Meet - 301
28/01/2020

Technical specifications

Sr. No.	Name of Item	Qty.	Specification	Value
3/1	SCR Kit (V-I Characteristics, Latching & Holding Current Measurement)	4	SCR Type	Unidirectional Thyristor (General Purpose)
			Test SCR Voltage Rating	600V to 1000V (typical lab-grade SCR)
			Anode Voltage Range	1A to 5A
			Gate Triggering Voltage	0V to 30V DC (variable via power supply)
			Gate Triggering Current	0.5V to 5V (adjustable via gate drive circuit)
			Latching Current Measurement	10mA to 50mA
			Holding Current Measurement	Range: 5mA to 100mA (adjustable resistive load)
			Input Power Supply	Range: 2mA to 50mA
32/2	Three-Phase Bridge Rectifier Kit Using SCR (with R-L Load)	4	Output Parameters Measured	230V AC, 50Hz (with internal transformer + DC supply)
			Control Features	Anode Current (Ia), Anode-Cathode Voltage (Vak)
			Protection	Potentiometers for gate voltage & load control
			Measurement Interface	Fuse, overcurrent limit, isolation transformer
			Test Points	On-board analog voltmeter & ammeter, or terminals for DMM/oscilloscope
			Construction	For observing V-I characteristics on CRO
			Educational Objective	PCB with heat-sunked SCR and clearly labeled terminals
			Rectifier Type	Study V-I curve, measure Ig, Ilatch, Ihold, observe SCR switching behavior
			SCR Ratings	Controlled Three-Phase Full Bridge Rectifier (6-SCR configuration)
			Input Voltage	600V to 1000V, 5A to 10A (with heat sinks and mounting)
			Input Protection	3-phase AC, 230V line-to-line, 50Hz (lab-grade transformer or mains)
			Gate Triggering Method	MCB, fuse, and isolation transformer
			Firing Angle Control	Synchronised gate pulse generation (phase-locked with AC input)
			Gate Pulse Generator	0° to 180° (adjustable via digital or analog firing circuit)
			Control Interface	6-pulse gate drive, opto-isolated, pulse width 100–200 µs
			Load Configuration	Potentiometer/ digital controller to adjust firing angle
			R-L Load:	R-L Load:
			- Resistor (R):	10Ω to 100Ω adjustable
			- Inductor (L):	10mH to 100mH (air-core or laminated core)

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		Output Voltage (DC)	Varies with firing angle; typical range: 0V to 250V DC
	Output Current	Up to 5A continuous (depending on load and input)	
	Output Waveform Monitoring	Terminals for connecting CRO or DSO (voltage & current waveforms)	
	Test Points	Labeled test sockets for each SCR, triggering signals, and load terminals	
	Measurement Parameters	DC Output Voltage, Average and RMS current, waveform shape, ripple	
	Protection Features	Overload, short circuit, gate-fuse, and thermal cut-off for SCRs	
	Educational Use	Study of SCR triggering, waveform analysis, effect of R-L load, commutation	
	Cooling Mechanism	Heat sinks on all SCRs; optional fan cooling for long-duration testing	
	Mounting and Construction	PCB-based on metallic base plate with banana terminals and safety shield	
	Additional Features (Optional)	Digital firing angle display, onboard voltmeter/ammeter, data logging via USB	
33/3 Chopper Kit (Step-Up / Step-Down DC-DC Converter)	Input Voltage Range	5V to 48V DC (adjustable)	
	Output Voltage Range	1.2V to 60V DC (adjustable)	
	Power Output	10W to 200W (suitable for lab experiments)	
	Switching Frequency	20kHz to 100kHz (adjustable)	
	Converter Type	Buck (step-down) / Boost (step-up)	
	Amplifier Class Support	Class A, B, C, D, E behavior simulations	
	Control Method	PWM (Pulse Width Modulation)	
	Efficiency	85% to 95%	
	Load Types Supported	Resistive (R), Inductive (L), RL, RLC	
	Inductor Value Range	10 μ H to 1 mH	
34/4 kit for simulate single phase inverter using different modulation techniques and	Capacitor Value Range	10 μ F to 470 μ F	
	Switching Devices	MOSFETs / IGBTs (with gate drivers)	
	Waveform Monitoring	Test points for voltage/current probes	
	Protection Features	Overtvoltage, Overcurrent, Short Circuit	
	User Interface	Potentiometers for duty cycle & voltage	
	Display	Optional digital display for Vout/Iout	
	Educational Use	Demonstrates converter modes & amplifier classes	
	Input DC Voltage	12V to 48V DC (adjustable)	
	Output Voltage (AC)	0V to 230V RMS (adjustable)	
	Output Frequency	50Hz to 60Hz (adjustable)	
34/4	Modulation Techniques	PWM, SVM, Trapezoidal, AM/FM	
	Load Types	Resistive, Inductive, Capacitive, RL, RLC	
	Load Power	50W to 500W	
	Modulation Frequency	5kHz to 20kHz (adjustable)	

	obtain load voltage and load current waveform for various types of loads	Efficiency	85% to 95%
		Oscilloscope Integration	For Load Voltage & Current
		Protection Features	Overload, Short-Circuit, Thermal
		User Interface	Digital Display, Remote Control
	Power Output (Load Current)	Up to 5A (adjustable)	
	Input Voltage	Single-Phase AC, 230V RMS, 50Hz (mains supply)	
	Rectifier Type	Full-Wave AC Voltage Controller using Thyristors (SCRs) or Triacs	
	Thyristor Rating	600V to 1000V, 5A to 10A (with heat sinks for SCRs)	
	Control Method	Phase-Controlled Triggering of SCRs (or Triacs)	
	Firing Angle Range	0° to 180° (adjustable via potentiometer or digital control)	
	Firing Angle Control	Analog/digital control for continuous adjustment of triggering angle	
	Load Types Supported	Resistive (R), Inductive (L), Resistive-Inductive (RL), and RLC Loads	
	Load Voltage (AC)	Variable from 0V to ~230V RMS (depending on firing angle and load type)	
	Load Current	Up to 5A (for typical lab power ratings)	
	Waveform Monitoring	Oscilloscope connections for both load voltage and load current	
	Load Measurement	Digital voltmeter and ammeter for real-time measurements	
35/5	Single-Phase Full-Wave AC Voltage Controller Kit	Output Voltage Waveform	Non-Sinusoidal with variable firing angle control; Phase Control
4	Load Current Waveform	AC Source Protection	Observation of current waveform across different loads (R, RL, RLC)
	Gate Pulse Generation	Gate Pulse Generation	Fuse, Overvoltage Protection, Isolation Transformer
	Control Features	Control Features	2-pulse gate drive (for two SCRs in a bridge configuration) Potentiometer for adjusting firing angle or digital interface (optional)
	SCR Gate Triggering	SCR Gate Triggering	Optocoupler isolated gate driver for SCRs
	Test Points	Test Points	For voltage and current waveform observations on CRO/DSO
	Educational Use	Educational Use	Demonstrate phase control in AC voltage regulation, observe waveforms
	Protection Features	Protection Features	Overload protection, thermal cut-off, SCR protection via fuses
	Cooling Mechanism	Cooling Mechanism	Heat sinks for SCRs or Triacs; optional fan for heavy-duty testing
	Construction	Construction	Robust PCB with clearly labeled test points for easy student usage

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		Safety Features	Insulation, Shockproof design, Short-circuit Protection
		Optional Features	Digital control with display (digital oscilloscope), waveform visualization, and data logging
		Input Voltage	Single-Phase AC, 230V RMS, 50Hz (mains supply)
		Cycloconverter Type	Single-Phase to Single-Phase Cycloconverter (using SCRs or Triacs)
		SCR Rating	600V to 1000V, 5A to 10A (with heat sinks)
		Control Method	Phase-Controlled Conversion (using SCR firing control)
		Output Frequency Range	0Hz to 50Hz (adjustable; output frequency is lower than input frequency)
		Firing Angle Control	0° to 180° (adjustable via potentiometer or digital control)
		Output Voltage Control	Continuous control via firing angle (adjustable voltage magnitude)
		Waveform Monitoring	Oscilloscope connections for observing output voltage and current
		Load Types Supported	Resistive (R), Inductive (L), RL, RLC Loads
		Input Frequency	50Hz (standard for single-phase AC mains in India)
		Load Voltage	Variable AC output, up to 230V RMS (dependent on firing angle and load)
		Load Current	Up to 5A (depending on the power rating of the kit)
		Test Points	For observing input voltage , output voltage , and output current
		Measurement Interface	Digital voltmeter and ammeter for real-time measurement of load voltage and current
		Phase Shift Control	Adjustable phase control to achieve desired frequency conversion
		Cooling Mechanism	Heat sinks for SCRs; optional fan cooling for extended testing
		Control Features	Potentiometer for adjusting firing angle, phase, and load conditions
		Gate Pulse Generation	2-pulse or 4-pulse gate drive for SCRs (with optocoupler isolation)
		Output Waveform Characteristics	Distorted output waveform (with harmonics) depending on firing angle and load
		Input Protection	Fuse, Overvoltage protection, and Isolation Transformer for safety
		Educational Use	Study the working of Cycloconverters , control techniques, and frequency conversion
		Protection Features	Overload protection, short-circuit protection, and thermal cut-off for SCRs
		Construction	Robust PCB with clearly labeled terminals for easy student connection

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		Safety Features	Shockproof design, insulation, and short-circuit protection
		Optional Features	Digital display for output frequency, data logging, and waveform analysis
		Input Voltage	230V AC, 50Hz (standard for Indian mains)
		DC Motor Rating	12V DC Motor, up to 4A (varies based on motor rating)
		Motor Control Method	Thyristor-based speed control (using phase control for armature voltage)
		Thyristor Rating	600V, 5A (with heat sinks and proper mounting)
		Firing Angle Control	Phase Control (Armature Voltage) and Field Control (Flux Control)
		DC Motor Speed Control	Speed control through armature voltage variation
		Output Voltage to Motor	Adjustable DC voltage for speed variation (0 to rated motor voltage)
		Motor Speed Range	0 RPM to rated speed (depending on motor type and voltage)
		Feedback Control	Optional tachometer for speed feedback (for closed-loop control)
		Control Interface	Potentiometer for firing angle and speed control
		Gate Pulse Generation	Phase-controlled firing pulse generation for the thyristors
		Load Type	DC motor connected to the system as the load
		Voltmeter and Ammeter	Voltmeter and Ammeter for real-time measurement of armature voltage, current
		Measurement Interface	Adjustable load (frictional, resistive) to simulate real-world motor load
		Speed Measurement	Tachometer (or digital display) for direct speed reading
		Protection Features	Overcurrent protection, SCR thermal protection, and short-circuit protection
		Cooling Mechanism	Heat sinks for SCRs, fan for extended testing periods
		Motor Characteristics	Adjustable load (frictional, resistive) to simulate real-world motor load
		Waveform Monitoring	Oscilloscope probes for armature voltage and current waveforms
		Safety Features	MCB for overcurrent protection, fuse for SCR protection, insulated design
		Control Circuit Type	Analog or digital control (based on the kit version)
		User Interface	Simple controls for firing angle adjustment and motor speed monitoring
		Educational Objective	Learn and study phase control techniques, observe motor speed variation , understand thyristor switching behavior
		Additional Features	Optional tachometer feedback, digital speed control, or data logging via USB
38/8	5	Type	True RMS Digital Multimeter
38/8	5	Display	3 ^{1/2} digit, 6000 counts LCD with backlight

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		DC Voltage Range	0.1 mV to 600 V
		AC Voltage Range	0.1 mV to 600 V RMS (True RMS)
		DC Current Range	0.01 μ A to 10 A (10 A max for 30 seconds)
		AC Current Range	0.01 μ A to 10 A RMS (True RMS)
		Resistance Range	0.1 Ω to 40 M Ω
		Continuity Check	Yes, with audible beep when resistance < 30 Ω
		Diode Test	Yes, displays forward voltage drop
		Frequency Measurement	5 Hz to 50 kHz
		Capacitance Measurement	1 nF to 9999 μ F
		Display Hold	Yes
		Auto-Ranging	Yes
		Input Impedance (Voltage)	Approximately 10 M Ω
		Overload Protection	Yes, with internal fuse protection
		Battery	Two AA alkaline batteries
		Battery Life	Approximately 400 hours
		Safety Rating	CAT III 600 V, CAT IV 300 V
		Operating Temperature	0 °C to 50 °C
		Storage Temperature	-40 °C to 60 °C
		Additional Features	Min/Max/Average recording, Relative mode, Low battery indicator, Backlight
		Purpose	Generate triggering pulses for SCR gate using UJT relaxation oscillator
		SCR Type Supported	General Purpose SCRs (e.g., TIC106, 2N6509, C106)
		Input Supply Voltage	0 – 30 V DC regulated
		Trigger Pulse Output Voltage	Approx. 5 V to 15 V (adjustable)
		Trigger Pulse Frequency	Adjustable from 10 Hz to 10 kHz (via variable resistor)
		Pulse Width (Duration)	Typically 10 μ s to 100 μ s (adjustable)
		Triggering Method	UJT Relaxation Oscillator based pulse generator
		Control Components	UJT (e.g., 2N2646), Potentiometer (for frequency control), Resistors, Capacitors
		Load	SCR Gate terminal connected to the pulse output
		Oscillator Circuit Parameters	- Timing Capacitor: 0.01 μ F to 0.1 μ F - Timing Resistor: 10 k Ω to 500 k Ω (variable)
		Power Supply for Kit	230 V AC to 0-30 V DC power supply (built-in or external)
		Output Waveform	Sharp triggering pulses (positive pulses to SCR gate)
		Pulse Isolation	Typically none; output connected directly to SCR gate
		Panel Indicators	Power ON LED, Trigger pulse indicator LED
		Safety Features	Fuse protection on supply input
		Usage	For experiments on SCR triggering, latching, and firing angle control
		Additional Features	Frequency and pulse width adjustment knobs

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**SCR Triggering
Pulse Kit using
UJT Relaxation
Oscillator**

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			Purpose	To generate SCR gate triggering waveforms using R and RC phase control methods
			Input AC Supply	230V AC, 50 Hz (standard Indian supply)
			Triggering Techniques	<ul style="list-style-type: none"> R Triggering (Resistive phase control)
			SCR Rating	<ul style="list-style-type: none"> RC Triggering (Resistive-Capacitive phase shift method)
			Gate Trigger Voltage	600V – 800V, 4A – 10A (e.g., TIC106, TYN612)
			Gate Trigger Current	~0.7V – 1.5V
			Firing Angle Range	~10mA – 30mA
			R Firing Circuit	0° to 180° (adjustable via potentiometer in R/RC path)
			RC Firing Circuit	Variable resistor (typically 10kΩ – 500kΩ) in series with gate
			SCR Triggering Kit using R & RC Firing Circuits	<p>40/10</p> <ul style="list-style-type: none"> RC Firing Circuit SCR Triggering Kit using R & RC Firing Circuits
			Trigger Pulse Shape	- Resistor: 10kΩ – 500kΩ (variable) - Capacitor: 0.1 μF – 1 μF (non-polar)
			Waveform Monitoring	- R Circuit: Gradual gate current build-up - RC Circuit: Sharp pulses at firing angle
			Load Type Supported	Resistive Load (e.g., Lamp or Heater)
			Output Voltage Control	Variable based on firing angle adjustment
			Indicators	Power ON LED, Triggering indication LED (optional)
			Isolation	Transformer-based isolation from mains
			Safety Features	Fuse, current-limiting resistors, shockproof casing
			Test Points	For Gate, Anode, Load Voltage, and Control Input
			Construction	PCB-mounted with clearly labeled sections (R and RC separately)
			Educational Use	Demonstrates basic SCR firing techniques, firing angle control, and load response
			Optional Features	Load lamp or heater, digital voltmeter for output voltage monitoring
			Purpose	To study SCR-based half-wave controlled rectification with resistive-inductive (RL) load
			Input AC Voltage	230V AC, 50 Hz (isolated through step-down transformer)
			Step-Down Transformer	230V / 18V – 24V AC, 2A (isolated secondary for SCR triggering and safety)
			SCR Used	600V–800V, 4A–10A SCR (e.g., TYN608, TIC106D)
			Triggering Method	RC Phase Control (adjustable firing angle using variable resistor)
			Firing Angle Control Range	0° to 180° (approx.)
			Control Circuit Components	<ul style="list-style-type: none"> Variable Resistor (10k–500kΩ) Capacitor (0.1 μF–1 μF) Diode for discharge path
41/11	2	Half-Wave Controlled Rectifier Kit for RL Load		

		Load Type	RL Load: Typically 100Ω resistor and 100mH inductor (or lamp + choke)
		Output Voltage	Controlled pulsating DC depending on firing angle
		Output Current	Depends on load; typically up to 1–2A
		Waveform Observation Points	<ul style="list-style-type: none"> - Input AC - Gate Trigger Pulse - Output Voltage across RL Load
		Oscilloscope Connectivity	BNC or test terminals provided
		Measurement Support	<ul style="list-style-type: none"> Test points for measuring firing angle, load voltage, and gate voltage
		Indicators	<ul style="list-style-type: none"> Power ON LED, optional gate trigger pulse indicator - Fuse (0.5–1A) - Snubber circuit (optional) - Heat sink on SCR
		Protection Features	
		Enclosure Type	Shockproof acrylic or metal cabinet with labeled terminals
		Safety	Transformer isolation, low-voltage test points, proper insulation
		Educational Objective	Study SCR triggering and output waveform distortion with inductive loads
		Additional Features (Optional)	<ul style="list-style-type: none"> - Load selector (R only / RL switch) - In-built voltmeter/ammeter display <p>To study full-wave controlled rectification using SCRs with R-L load</p>
		Purpose	
		Input Voltage	230V AC, 50 Hz (with isolation transformer for safety)
		Step-Down Transformer	230V / 18V–24V center-tapped, 2A (typical)
		Configuration Type	Full-Wave Controlled Rectifier using two SCRs in center-tap transformer setup
		SCR Used	600V–800V, 4A–10A (e.g., TIC106D, TYN608)
		Firing Circuit	RC Phase Control Circuit with dual triggering for both SCRs
		Firing Angle Range	0° to ~180° (adjustable via potentiometers)
		Trigger Pulse Generator	RC-based phase-shift circuit with pulse transformer isolation (optional)
		Load Type	R-L Load (e.g., 100Ω resistor + 100mH inductor)
		Output Voltage	Pulsating DC with full-wave symmetry and variable average voltage
		Output Current	Depends on load, typically 1–2A
4.2/12	2	Single Phase Full-Wave Controlled Rectifier Kit with R-L Load	

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Waveform Observation Points	- Input AC - Trigger pulses - Load voltage (V _o) - Load current (I _o)
Waveform Output Terminals	BNC or 2mm test terminals for connecting to oscilloscope
Indicators	Power ON LED, Gate Trigger indicator (optional)
Snubber Circuit	Optional R-C snubber across SCRs
Protection Features	Fuse, diode protection, heat sink on SCRs
Voltage Adjustment	Potentiometer to vary firing angle and control output
Enclosure	Insulated cabinet with banana/binding posts and labeled sections
Safety	Transformer isolation, fuse, insulated terminals
Educational Objective	Analyze SCR operation, effect of RL load on conduction, firing angle control
Additional Features (Optional)	Built-in analog/digital voltmeter, load selector (R or RL), waveform chart

Technical Conditions:

1. The company/Firm will have to provide demonstration/training to operate instruments at Electrical Engineering Department GZSCCET MRSPTU, Bathinda.
2. The company/Firm will have to provide two copies of instructions/operating manuals according to our lab curriculum along with reading table.
3. The company/Firm will have to provide 3 – 5 years technical support/repair/replacement of defected components without any cost at Electrical Engineering

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