

Department of Electrical Engineering GZSCCET, MRSPTU Bathinda

Technical specifications

Sr. No.	Name of Item	Qty.	Specification	Value
31/1	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)
			Test SCR Current Rating	1A to 5A
			Anode Voltage Range	0V to 30V DC (variable via power supply)
			Gate Triggering Voltage	0.5V to 5V (adjustable via gate drive circuit)
			Gate Triggering Current	10mA to 50mA
			Latching Current Measurement	Range: 5mA to 100mA (adjustable resistive load)
			Holding Current Measurement	Range: 2mA to 50mA
			Input Power Supply	230V AC, 50Hz (with internal transformer + DC supply)
			Output Parameters Measured	Anode Current (Ia), Anode-Cathode Voltage (Vak)
			Control Features	Potentiometers for gate voltage & load control
			Protection	Fuse, overcurrent limit, isolation transformer
			Measurement Interface	On-board analog voltmeter & ammeter, or terminals for DMM/oscilloscope
			Test Points	For observing V-I characteristics on CRO
			Construction	PCB with heat-sunked SCR and clearly labeled terminals
			Educational Objective	Study V-I curve, measure Ig, Ilatch, Ihold, observe SCR switching behavior
32/2	Three-Phase Bridge Rectifier Kit Using SCR (with R-L Load)	4	Rectifier Type	Controlled Three-Phase Full Bridge Rectifier (6-SCR configuration)
			SCR Ratings	600V to 1000V, 5A to 10A (with heat sinks and mounting)
			Input Voltage	3-phase AC, 230V line-to-line, 50Hz (lab-grade transformer or mains)
			Input Protection	MCB, fuse, and isolation transformer
			Gate Triggering Method	Synchronised gate pulse generation (phase-locked with AC input)
			Firing Angle Control	0° to 180° (adjustable via digital or analog firing circuit)
			Gate Pulse Generator	6-pulse gate drive, opto-isolated, pulse width 100–200 µs
			Control Interface	Potentiometer / digital controller to adjust firing angle
			Load Configuration	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) Output Current Output Waveform Monitoring Test Points Measurement Parameters Protection Features Educational Use Cooling Mechanism Mounting and Construction Additional Features (Optional)	Varies with firing angle; typical range: 0V to 250V DC Up to 5A continuous (depending on load and input) Terminals for connecting CRO or DSO (voltage & current waveforms) Labeled test sockets for each SCR, triggering signals, and load terminals DC Output Voltage, Average and RMS current, waveform shape, ripple Overload, short circuit, gate-fuse, and thermal cut-off for SCRs Study of SCR triggering, waveform analysis, effect of R-L load, commutation Heat sinks on all SCRs; optional fan cooling for long-duration testing PCB-based on metallic base plate with banana terminals and safety shield Digital firing angle display, onboard voltmeter/ammeter, data logging via USB
33/3	Chopper Kit (Step-Up / Step-Down DC-DC Converter)	4	Input Voltage Range Output Voltage Range Power Output Switching Frequency Converter Type Amplifier Class Support Control Method Efficiency Load Types Supported Inductor Value Range Capacitor Value Range Switching Devices Waveform Monitoring Protection Features User Interface Display Educational Use	5V to 48V DC (adjustable) 1.2V to 60V DC (adjustable) 10W to 200W (suitable for lab experiments) 20kHz to 100kHz (adjustable) Buck (step-down) / Boost (step-up) Class A, B, C, D, E behavior simulations PWM (Pulse Width Modulation) 85% to 95% Resistive (R), Inductive (L), RL, RLC 10 μ H to 1 mH 10 μ F to 470 μ F MOSFETs / IGBTs (with gate drivers) Test points for voltage/current probes Overvoltage, Overcurrent, Short Circuit Potentiometers for duty cycle & voltage Optional digital display for Vout/Iout Demonstrates converter modes & amplifier classes
34/4	kit for simulate single phase inverter using different modulation techniques and	4	Input DC Voltage Output Voltage (AC) Output Frequency Modulation Techniques Load Types Load Power Modulation Frequency	12V to 48V DC (adjustable) 0V to 230V RMS (adjustable) 50Hz to 60Hz (adjustable) PWM, SVM, Trapezoidal, AM/FM Resistive, Inductive, Capacitive, RL, RLC 50W to 500W 5kHz to 20kHz (adjustable)

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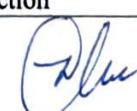
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	obtain load voltage and load current waveform for various types of loads		Efficiency	85% to 95%
			Oscilloscope Integration	For Load Voltage & Current
			Protection Features	Overload, Short-Circuit, Thermal
			User Interface	Digital Display, Remote Control
			Power Output (Load Current)	Up to 5A (adjustable)
35/5	Single-Phase Full-Wave AC Voltage Controller Kit	4	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
			Output Voltage Waveform	Non-Sinusoidal with variable firing angle control; Phase Control
			Load Current Waveform	Observation of current waveform across different loads (R, RL, RLC)
			AC Source Protection	Fuse, Overvoltage Protection, Isolation Transformer
			Gate Pulse Generation	2-pulse gate drive (for two SCRs in a bridge configuration)
			Control Features	Potentiometer for adjusting firing angle or digital interface (optional)
			SCR Gate Triggering	Optocoupler isolated gate driver for SCRs
			Test Points	For voltage and current waveform observations on CRO/DSO
			Educational Use	Demonstrate phase control in AC voltage regulation, observe waveforms
			Protection Features	Overload protection, thermal cut-off, SCR protection via fuses
			Cooling Mechanism	Heat sinks for SCRs or Triacs; optional fan for heavy-duty testing
			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




			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)
			Control Type	Phase Control (Armature Voltage) and Field Control (Flux Control)
			Firing Angle Control	0° to 180° (adjustable via potentiometer or digital 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
			Measurement Interface	Voltmeter and Ammeter for real-time measurement of armature voltage, current
			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
			Type	True RMS Digital Multimeter
			Display	3 1/2 digit, 6000 counts LCD with backlight

			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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40/10	SCR Triggering Kit using R & RC Firing Circuits	4	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	- R Triggering (Resistive phase control) - RC Triggering (Resistive-Capacitive phase shift method)
			SCR Rating	600V – 800V, 4A – 10A (e.g., TIC106, TYN612)
			Gate Trigger Voltage	~0.7V – 1.5V
			Gate Trigger Current	~10mA – 30mA
			Firing Angle Range	0° to 180° (adjustable via potentiometer in R/RC path)
			R Firing Circuit	Variable resistor (typically 10kΩ – 500kΩ) in series with gate
			RC Firing Circuit	- Resistor: 10kΩ – 500kΩ (variable) - Capacitor: 0.1 μF – 1 μF (non-polar)
			Trigger Pulse Shape	- R Circuit: Gradual gate current build-up - RC Circuit: Sharp pulses at firing angle
			Waveform Monitoring	Output terminals provided for connecting to an oscilloscope (observe gate and load voltage)
			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
41/11	Half-Wave Controlled Rectifier Kit for RL Load	2	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	- Variable Resistor (10k–500kΩ) - Capacitor (0.1μF–1μF) - Diode for discharge path

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			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 - Input AC - Gate Trigger Pulse - Output Voltage across RL Load
			Oscilloscope Connectivity BNC or test terminals provided
			Measurement Support Test points for measuring firing angle, load voltage, and gate voltage
			Indicators Power ON LED, optional gate trigger pulse indicator
			Protection Features - Fuse (0.5-1A) - Snubber circuit (optional) - Heat sink on SCR
			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) - Load selector (R only / RL switch) - In-built voltmeter/ammeter display
42/12	Single Phase Full-Wave Controlled Rectifier Kit with R-L Load	2	Purpose To study full-wave controlled rectification using SCRs with R-L load
			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 $\sim 180^\circ$ (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

*John**Frank*



Waveform Observation Points	- Input AC - Trigger pulses - Load voltage (Vo) - Load current (Io)
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 GZSCCET MRSPTU, Bathinda


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