

Electric drive lab

S.no.	Name of item	Specification	Qty
1.	To study Single phase bridge converter drive & study ramp comparator firing circuit for same	<p>Power Scope for isolation measurement Provided with DC Shunt Motor Three Phase low voltage Supply for gate circuit Three Phase Firing Circuit provided with pulse isolation Test terminals provided to analyze the waveforms Diagrammatic representation of circuits Motor Specification Type : DC Shunt Motor ; Rating : 0.5HP ; RPM : 1500 Power Scope : Isolated 1500Vmax SCR Rating : SCR TYN616, 600V/16A Diode Rating : 6A10, 1000V/6A ; Firing Angle Control : 30° to 180° Meter : DC Voltmeter : 300V ;DC Ammeter : 5A Single Phase MCB : 2A (SPN) ;Mains : 230 V± 10 % ,50 Hz Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01
2.	To study Single phase Half converter drive & study ramp comparator firing circuit for same	<p>Power Scope for isolation measurement Provided with DC Shunt Motor Three Phase low voltage Supply for gate circuit Three Phase Firing Circuit provided with pulse isolation Test terminals provided to analyze the waveforms Diagrammatic representation of circuits Motor Specification Type : DC Shunt Motor ; Rating : 0.5HP ; RPM : 1500 Power Scope : Isolated 1500Vmax SCR Rating : SCR TYN616, 600V/16A Diode Rating : 6A10, 1000V/6A Firing Angle Control : 30° to 180° Meter : DC Voltmeter : 300V ;DC Ammeter : 5A Single Phase MCB : 2A (SPN) Mains supply: 230 V± 10 % ,50 Hz Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01

S.no.	Name of item	Specification	Qty
3	To study Single phase AC motor control drive by anti parallel SCR & DIAC –TRIAC configuration.	<p>Power Scope for isolation measurement Provided with Three Phase Induction Motor Three Phase low voltage Supply for gate circuit Three Phase Firing Circuit provided with pulse isolation Test terminals provided to analyze the waveforms Diagrammatic representation of circuits Three Phase MachineType : Squirrel Cage Induction Motor Rated Power : 1HP ; Rated Voltage : 415V Power Scope : Isolated 1500Vmax SCR Rating : SCR TYN616, 600V/16A Firing Angle Control : 30° to 150° Meters Used : AC Voltmeter : 0-500V ;AC Ammeter : 0-5A Three Phase MCB : 5A (TPN) ;Mains : 415 V± 10 % ,50 Hz Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01
4	Speed control of FHP synchronous motor using Three phase Cyclo-converter . to observe current and voltage waveform at different frequency	<p>Salient pole three phase FHP (60W/100V/phase) synchronous motor .The panel must have Three phase full bridge cycloconverter comprising 36 SCR's (600V/12A) , Three step down transformers(fractional KVA) in star-delta formation. Variable frequency control potentiometer (8- 25Hz) Cosine wave modulation, Control circuitry based on precision comparators. High frequency carrier gated pulse isolation for thyristors. Three low frequency reference signals(sine)generator. The panel must have digital Backlit LCD display for speed. The panel must have observation sockets should provided for reference wave, output voltage & current for study on CRO. Motor must be fitted on insulated board with speed sensor. Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt.BS 10 type sockets should be used for safety. Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01

S.no.	Name of item	Specification	Qty
5	Speed control of FHP synchronous motor using Three phase VSI Inverter . To observe current and voltage waveform at different frequency.	Salient pole three phase FHP (60W/100V/phase) synchronous motor . The panel must have Three phase bridge inverter comprising 6 VMOS FET (600V/8A), with polarized snubbers. Isolation transformers (fractional KVA). Variable frequency control potentiometer (10-100hz) . Digital control circuitry to generate three 120 degree displaced reference signals for power circuit . Variable DC source using controlled rectification for constant V/F ratio. The panel must have digital Backlit LCD display for speed. The panel must have observation sockets should provided for reference signals, drive signal, output voltage & current for study on CRO. Motor should be fitted on insulated board with speed sensor. BS 10 type sockets should be used for safety. Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt. Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication	01
6	To obtain speed –torque characteristics of 1 H.P DC series motor in Open/close loop using IGBT/MOSFET and to observe current and voltage waveform at different duty factors	DC series motor should be mounted upon iron frame with brake & pulley arrangement(1H.P.) .DC source must have power rectifier with smoothing filter, capacitor(high ripple rated) Chopper (quad A) drive should be based upon MOSFET (600V/80A) or same rated IGBT with snubber circuit. The panel must have switched facility to convert open/close loop drive (□ 0.4 to 0.6);Freewheeling diode 1200V/16A Chopper duty cycle should be 10 – 90% Soft start , Overload and current limit with indication. The panel must have Digital Backlit LCD display for volt & current .The panel must have observation sockets for gate pulse, load output voltage & current. BS 10 type sockets should be used for safety. Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt. Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication	01

S.no.	Name of item	Specification	Qty
7	To draw speed-torque char. Of Three phase Fully controlled rectifier fed 1 H.P separately excited DC motor at different firing angle and To observe current & voltage waveform at different firing angles	<p>DC separately excited motor should be mounted upon iron frame with brake & pulley arrangement(1H.P.)</p> <p>Panel must have three phase full wave fully controlled bridge rectifier (1600V/16A), separate filed supply with field failure protection & indication.</p> <p>Soft start , Overload and current limit with indication.</p> <p>Cosine firing angle control scheme with comparators & flip flops.</p> <p>Pulse isolation using high frequency carrier pulse transformers.</p> <p>The panel must have digital Backlit LCD display for volt & current .The panel must have observation sockets for clock & flip flop , load output voltage & current.</p> <p>BS 10 type sockets should be used for safety.</p> <p>Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt.</p> <p>Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS</p> <p>2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD</p> <p>Interface: USB Host & USB Device& RS 232 interface.</p> <p>32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage</p> <p>Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base.</p> <p>3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100μF</p> <p>Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %.</p> <p>Display : LCD 63X31mm Backlit</p> <p>Accessories :Test leads, Test clips & manuals.</p> <p>Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01
8	To obtain speed –torque characteristics of 1 H.P DC series motor in open/close loop using single phase converter and to observe current & voltage waveform at different firing angles.	<p>DC series motor should be mounted upon iron frame with brake & pulley arrangement (1H.P.)</p> <p>Panel must have single phase full wave fully controlled bridge converter (1600V/16A).</p> <p>Soft start , Overload and current limit with indication.</p> <p>Ramp & comparator firing angle control scheme</p> <p>Pulse isolation using high frequency carrier pulse transformers.</p> <p>The panel must have switched facility to convert open/close loop drive ($\cos \alpha$ 90 to 60 degree)</p> <p>Freewheeling diode 1200V/16A</p> <p>The panel must have digital The panel must have digital Backlit LCD display for volt & current</p> <p>The panel must have observation sockets for control circuit (min. 3 observation points), load output voltage & current.</p> <p>BS 10 type sockets should be used for safety.</p> <p>Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt.</p> <p>Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS</p> <p>2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD</p> <p>Interface: USB Host & USB Device& RS 232 interface.</p> <p>32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage</p> <p>Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base.</p> <p>3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100μF</p> <p>Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %.</p> <p>Display : LCD 63X31mm Backlit</p> <p>Accessories :Test leads, Test clips & manuals.</p> <p>Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01

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9	Speed torque char. of Three phase VSI inverter fed FHP induction motor drive and to observe current and voltage waveform at different frequency.	<p>Squirrel cage three phase FHP (60W/230V/phase) induction motor should be mounted upon insulated frame with brake & pulley arrangement.</p> <p>Three phase VSI inverter comprising 6 VMOS fets (600V/8A), with polarized snubbers. Isolation transformers (fractional KVA). Variable frequency control potentiometer (10-100hz) . Digital control circuitry to generate three 120 degree displaced reference signals for power circuit. Variable dc source using controlled rectification for constant V/F ratio.</p> <p>The panel must have digital The panel must have digital Backlit LCD display for speed and voltage.</p> <p>The panel must have observation sockets should provided for reference signals, drive signal, output voltage & current for study on CRO. Motor should be fitted on insulated board with speed sensor. BS 10 type sockets should be used for safety.</p> <p>Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt.</p> <p>Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01
10	Speed torque char. of Three phase CSI inverter fed FHP induction motor drive and to observe current and voltage waveform at different frequency.	<p>Squirrel cage three phase FHP (60W/230V/phase) induction motor should be mounted upon insulated frame with brake & pulley arrangement. Three phase CSI inverter comprising 6 VMOS fets (600V/8A), with polarized snubbers. Isolation transformers (fractional KVA). Variable frequency control potentiometer (10-100hz) . Digital control circuitry to generate three 120 degree displaced reference signals for power circuit .</p> <p>Variable DC source using controlled chopper with inductor.</p> <p>The panel must have digital The panel must have digital Backlit LCD display for speed and voltage.</p> <p>The panel must have observation sockets should provided for reference signals, drive signal, output voltage & current for study on CRO. Motor should be fitted on insulated board with speed sensor. BS 10 type sockets should be used for safety.</p> <p>Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt.</p> <p>Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS 2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts Display : 7 inches wide Colour TFT LCD Interface: USB Host & USB Device& RS 232 interface. 32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage Triggering Modes : Alternate / Edge /Pulse / Slope / Video. Split screen for FFT, Alternate & Delayed time base. 3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %. Display : LCD 63X31mm Backlit Accessories :Test leads, Test clips & manuals. Other Functions : Diode test, continuity ,relative measurement Data hold, sleep mode, low battery Indication</p>	01

S.no.	Name of item	Specification	Qty
11	Regenerating and Breaking of DC motor using two Quadrant chopper with active load and to draw negative speed torque curve	<p>Object: Regenerating and Breaking of DC motor using two Quadrant chopper with active load and to draw negative speed torque curve</p> <p>DC separately excited motor (1H.P.) should be mounted upon iron frame with active load in form of fly wheel</p> <p>DC source must have power rectifier with smoothing filter, capacitor(high ripple rated) .fired supply with fired failure protection & indication.</p> <p>Chopper (quad A) drive should be based upon mosfet (600V/80A) or same rated IGBT with snubber circuit.</p> <p>Freewheeling diode 1200V/16A</p> <p>Chopper duty cycle should be 50– 90%</p> <p>Soft start , Overload protection with indication.</p> <p>Second chopper (quad B) drive should be based upon mosfet (600V/80A) or same rated IGBT with snubber circuit.</p> <p>Freewheeling diode 1200V/16A</p> <p>Chopper duty cycle proportional to speed to regenerate constant power</p> <p>Lamp load 3x100W .</p> <p>The panel must have digital Backlit LCD display display for volt (V),current (I),RPM(N), regenerated voltage (E)</p> <p>The panel must have observation sockets for gate pulse, load output voltage & current.</p> <p>Three should be keys to operate motoring (mode A) or breaking (mode B)</p> <p>BS 10 type sockets should be used for safety.</p> <p>Block diagram should be printed on panel an supplied with necessary patch cords to conduct the expt.</p> <p>Should be supplied with : 70 MHz /IGs/s RTS/50 GS/s ETS</p> <p>2 Channel Digital Storage oscilloscope ;Memory: 2 Mpts</p> <p>Display : 7 inches wide Colour TFT LCD</p> <p>Interface: USB Host & USB Device& RS 232 interface.</p> <p>32 automatic measurements ,FFT & Math & Pass Fail function;20 setups & 20 waveforms storage</p> <p>Triggering Modes : Alternate / Edge /Pulse / Slope / Video.</p> <p>Split screen for FFT, Alternate & Delayed time base.</p> <p>3 3.4 Digit DMM with embedded holster, Micro Ampere AC & DC current range ;Capacitance : 40nF to 100µF</p> <p>Frequency 10 HZ to 10 MHz ;Duty Cycle : 01. to 99 %.</p> <p>Display : LCD 63X31mm Backlit</p> <p>Accessories :Test leads, Test clips & manuals.</p> <p>Other Functions : Diode test, continuity ,relative measurement</p> <p>Data hold, sleep mode, low battery Indication</p>	01