

## TRADE: ELECTRICIAN

<b>TOOL KIT</b>		
Sl. No.	Specification of Items	Qty
1	Steel Tape, 10 m length	17 Nos.
2	Plier Insulated, 150 mm	17 Nos.
3	Plier Side Cutting, 150 mm	17 Nos.
4	Screw Driver, 100 mm	17 Nos.
5	Screw Driver, 150 mm	17 Nos.
6	Electrician Connector, screw driver insulated handle thin stem, 100 mm	17 Nos.
7	Heavy Duty Screw Driver , 200 mm	17 Nos.
8	Electrician Screw Driver thin stem insulated handle, 250 mm	17 Nos.
9	Punch Centre , 150 mm X 9 mm	17 Nos.
10	Knife Double Bladed Electrician	17 Nos.
11	Neon Tester	17 Nos.
12	Steel Rule 300 mm	17 Nos.
13	Hammer, cross peen with handle	17 Nos.
14	Hammer, ball peen With handle	17 Nos.
15	Gimlet 6 mm.	17 Nos.
16	Bradawl	17 Nos.
17	Scriber (Knurled centre position )	17 Nos.
18	Pincer 150 mm	17 Nos.

<b>SHOP TOOLS, INSTRUMENTS &amp; MACHINERY</b>		
1	C- Clamp 200 mm, 150 mm and 100 mm	2 Nos each
2	Spanner Adjustable 150 mm, 15 degree	2 Nos each
3	Blow lamp 0.5 ltr	1
4	Melting Pot	1
5	Ladel	1 No
6	Chisel Cold firmer 25 mm X 200 mm	2
7	Chisel 25 mm & 6 mm	2 Nos each
8	Hand Drill Machine 0 to 6 mm capacity	1
9	Portable Electric Drill Machine 6 mm capacity	1
10	Pillar Electric Drill Machine 12 mm capacity	1
11	Allen Key	1 set
12	Oil Can 0.12 ltr	1
13	Grease Gun	1 No
14	Out Side Micrometer 0 to 25 mm	2
15	Motorised Bench Grinder	1
16	Rawl plug tool & bit	2 set
17	Pully Puller	2
18	Bearing Puller	2
19	Pipe vice	4
20	Thermometer 0 to 100 deg Centigrade	1 No.
21	Scissors blade 150 mm	4 Nos.
22	Crimping Tool	2 sets
23	Wire stripper 20 cm	2 Nos.
24	Chisel Cold flat 12 mm	2 Nos.
25	Mallet hard wood 0.50 kg	4 Nos.
26	Hammer Exeter type 0.40 kg	4 Nos.
27	Hacksaw frame 200 mm 300 mm adjustable	2 Nos. each
28	Try Square 150 mm blade	4 Nos.
29	Outside & Inside Divider Calliper	2 Nos. each
30	Pliers flat nose 150 mm	4 Nos.
31	Pliers round nose 100 mm	4 Nos.
32	Tweezers 100 mm	4 Nos.
33	Snip Straight & Bent 150 mm	2 Nos. each
34	D.E. metric Spanner	2 Nos.

35	Drill hand brace 0 to 100 mm	4 Nos.
36	Drill S.S. Twist block 2 mm, 5 mm 6 mm set of 3	4 Set
37	Plane, smoothing cutters 50 mm	2 Nos. each
38	Gauge, wire imperial	2 Nos.
39	File flat 200 mm 2 <sup>nd</sup> cut	8 Nos.
40	File half round 200 mm 2 <sup>nd</sup> cut	4 Nos.
41	File round 200 mm 2 <sup>nd</sup> cut	4 Nos.
42	File flat 150 mm rough	4 Nos.
43	File flat 250 mm bastard	4 Nos.
44	File flat 250 mm smooth	4 Nos.
45	File Rasp, half round 200 mm bastard	4 Nos.
46	Soldering Iron 25 watt, 65 watt, 125 watt	2 Nos. each
47	Copper bit soldering iron 0.25 kg.	2 Nos.
48	Desoldering Gun	4 Nos.
49	Hand Vice 50 mm jaw	4 Nos.
50	Table Vice 100 mm jaw	8 Nos.
51	Pipe Cutter to cut pipes upto 5 cm. dia	4 Nos.
52	Pipe Cutter to cut pipes above 5 cm dia	2 Nos.
53	Stock and Die set for 20 mm to 50 mm G.I. pipe	1 set
54	Stock and Dies conduit	1 No.
55	<p>Ohm Meter; Series Type &amp; Shunt Type</p> <p><b>Features :</b>  Auto range  200mohms, 2ohms, 20ohms, 200ohms, 2kohms, 20kohms, 200kohms  Resolution 10micro ohms  Single/Repent measuring  Four terminal measuring  Percentage error three steps selectable  Dual Display  +(0.5%+2digit) LED Display sampling rate 17 Times/s</p> <p><b>Technical Specification</b>  Measuring range:200mohm, 2ohm, 20ohm, 200ohm, 2kohm, 20kohm 200kohm  Output current:100mA at 200mohm, 2ohm  :10mA at 20ohm  :1mA at 200ohm  :100microA at 2kohm, 20kohm  :10microA at 200kohm  Resolution: 10micro ohmat 200mohm , 2ohm  :0.1micro ohm at 20ohm  :1mohmat 200ohm  :10mohmat 2kohm  :100mohmat 20kohm  :1ohmat 200kohm  Open circuit voltage : &lt;1.0V  at 200mohm, 2ohm, 20ohm  :&lt;4.0V at 200ohm, 2kohm, 20kohm, 200kohm  Power requirement: 220 VAC +10% , 50 Hz  Weight : 3.0Kg Approx.  Dimensions (mm): 280(L) x 220(B) x 90(H)</p> <p><b>Standard Accessories :</b>  Power cable, Instruction manual</p>	2 Nos. each
56	<p>Multi Meter (analog) 0 to 1000 M Ohms, 2.5 to 500 V</p> <p><b>Technical Specification</b>  Test voltage : 250/500/1000/2500V  Insulation resistance : 0.1Mohm~20Gohm  Accuracy : +(3%Rdg+5Digit)  Resolution : 0.01Mohm  AC Voltage range: 600VAC  Accuracy : +(2%Rdg+5Digit)  Weight : 1.0Kg Approx.</p>	2 Nos.

	Dimensions (mm): 190(L) x 155(B) x 75(H) <b>Standard Accessories :</b> Probes, Batteries, Instruction manual	
57	Digital Multi Meter <b>Features :</b> LCD Display, Max. Upto 1999 Manual operation Diode test, Continuity test, Low Battery indication, Shock protection  Measure AC, DC Voltage & DC Current <b>Technical Specifications:</b> DC Voltage range : 200mV, 2V, 20V, 200V, 600V Accuracy :+(0.5% + 4 Digit) DC Current range: 200mA, 2mA, 20mA, 200mA, 10A Accuracy:+(1.5% + 3 Digit) AC Voltage range:200V , 600V Accuracy:+(1.2% + 10 Digit) Resistance range:200ohm, 2Kohm, 20Kohm, 200Kohm, 20Mohm Accuracy:+(0.8% + 5 Digit) Input impedance:1M ohm Sampling Rate:3s AC Frequency Response :40 ~ 200Hz Power requirement: Battery 9V (Included) <b>Standard Accessories :</b> Probes, Batteries, Instruction manual	6 Nos.
58	A.C. Voltmeter M.I. 0 –500V A.C Housed in a ABS Plastic case precision grade with a Bakelite box terminal	1 No.
59	Milli Voltmeter centre zero 100 – 0 – 100 m volt Housed in a ABS Plastic case precision grade with a Bakelite box terminal	1 No.
60	Milli Voltmeter centre zero 100 – 0 – 100 m volt Housed in a ABS Plastic case precision grade with a Bakelite box terminal	1 No.
61	Ammeter MC 0-5 A, 0- 25 A Housed in a ABS Plastic case precision grade with a Bakelite box terminal	1 No. each
62	A.C. Ammeter M.I.. 0-5A, 0-25 A Housed in a ABS Plastic case precision grade with a Bakelite box terminal	1 No. each
63	Kilo Wattmeter 0-1-3 kw Housed in a ABS Plastic case precision grade with a Bakelite box terminal	1 No.
64	A.C. Energy Meter,Single phase 5 amp. Fitted on Wooden Board and Terminal provided	1 No. each
	A.C. Energy Meter Three Phase 15 amp. Fitted on Wooden Board and Terminal provided	1 No.
65	Power Factor Meter Housed in a ABS Plastic case precision grade with a Bakelite box terminal Three Phase, Four Wire Dynamometer Type Portable Power Factor Meter range : Current Coil/Potential Coil : 2.5A/250V	1 No.
66	<b>Frequency Meter, LCD Type fitted into box 96x96mm</b>	1 No.
67	Flux Meter Digital Gauss meter The Gauss meter operates on the principle of Hall Effect in Semiconductors. The small Hall voltage is amplified through a high stability amplifier that a millivoltmeter connected at the output of the amplifier can be calibrated directly in magnetic Field unit. Technical Specifications : Range : 0-2K gauss and 0-20 Kg Resolution : One Gauss at 0-2 K gauss range Accuracy : ± 0.5% Display : 3 ½ digit 7 seg. (DPM) Detector : Hall probe with an imported hall element Power : 220V, 50 Hz Special : Indicate the direction of the magnetic field.	1 No.

68	<p>Wheat Stone Bridge with galvanometer &amp; battery</p> <p><b>Technical Specification</b>  Series Arm : Four decade dial in steps of 1000 Ohm, 100 Ohm, 10 Ohm , 1 Ohm .  Ratio Arm : The ratio arm of bridge are capable of Selecting multiplying factor of 0.001, 0.01, 0.1, 1, 10, 100,1000 for resistance measurement &amp; varley loop test &amp; ratio M10, M100, M1000 for Murray loop test.  One selectable switch with option for Murray (M) loop &amp; For resistance/Varley (VR) loop test.  One galvanometer fitted inside the box with option of external or internal galvanometer with terminal .  Two press keys provided marked as initial &amp; final.  Two toggle switches are provided one for internal or external battery and other for direct or shunted sensitivity of galvanometer.</p>	1 No.
69	Laboratory Type Induction Coil	1 No.
70	<p>DC Power Supply 0-30V 2 Amp</p> <p><b>Technical Specifications:</b>  Variable Output  Output Voltage :0 ~ 30VDC  Output Current :0 ~ 2A  Source Regulation:&lt; 0.05% +10mV  Load Regulation :&lt; 0.05% +10mV  Ripple &amp; Noise :&lt;1mV (rms)  Digital Display :3 digit voltage &amp; current display  Accuracy :+1%, +1 Digit</p> <p>Fixed Output  Output Voltage :Fixed 5VDC/3.3VDC  Output Current :1A  Source Regulation:&lt;5mV  Load Regulation :&lt;15mV  Ripple &amp; Noise :&lt;2mV (rms)  Power requirement: 220 VAC +10% , 50 Hz  Weight : 4.0Kg Approx.  Dimensions (mm) : 120(L) x 250(B) x 150(H)</p> <p><b>Standard Accessories :</b>  Power cable, Instruction manual</p>	1 No
71	<p>Rheostat</p> <p>0 -1 Ohm, 5 Amp  0 -10 Ohm, 5 Amp  0- 25 Ohm, 1 Amp  0- 300 Ohm, 1 Amp</p>	1 No.
72	<p>1 Phase Variable Auto Transformer</p> <p>Technical Specifications:  Variable Auto Transformer 0-270VAC  Input Single Phase 230V  Output Voltage 0-270VAC  Output Current 2 Amps</p>	1 No.
73	<b>Battery Charger 2-12V/5A</b>	1 No.
74	Hydrometer	1 No.
75	Miniature Breaker 16 amp ( Raw Material)	4 Nos.
76	Working Bench 2.5 m x 1.20 m x 0.75 m	2 Nos.
77	Fire Extinguisher CO2, 2 KG	2 Nos.
78	Fire Buckets	2 Nos each

<b>CTS Second Semester: Electrician SHOP TOOLS, INSTRUMENTS and MACHINERY</b>		
1	<p>Tachometer</p> <p><b>Technical Specification :</b></p> <p>Measuring range : Photo/Laser : 5-99,999 RPM  : Contact : 5-19,999 RPM,  0.05-999.9m/min (0.2-  6,560ft/min)</p> <p>Measuring distance: Photo/Laser : max.2.0 meters</p> <p>Measuring angle: Photo/Laser : 600  : Contact : 1200</p> <p>Resolution :0.1 RPM (&lt; 1000 RPM), 1.0RPM (&gt;1000 RPM)</p> <p>Accuracy : ±0.05% +1 digit</p> <p>Laser output: &lt;1mW, Class II</p> <p>Sampling time: 1 secretary. (over 6 RPM)</p>	1 No.
2	<p>Current Transformer Test Set  secondary rated for 5Amp. Which are intended to be used on 50 Hz.</p> <p>Technical Specification :</p> <p>The Current Transformer Test set provides the following components-</p> <ol style="list-style-type: none"> <li>1. Separate terminals to connect standard C.T. and Test C.T. secondaries.</li> <li>2 Ratio error and phase angle error display</li> <li>3 Range selecting Switch</li> <li>4 Polarity check indicator</li> <li>5 Ammeter to measure current injected in percentage</li> <li>6 Null detector with sensitivity control</li> <li>7 Terminals to connect burden box on both std. &amp; under test</li> <li>8 Aux. power supply to energise electronic null detector</li> <li>9 High permeability magnetic core</li> <li>10. Secondary current selector 1A . or 5A</li> </ol> <p>Current Transformer Test Set</p> <p>Scope of Experimentation:  Draw Magnetising Curve for a Protective CTs, and Check knee Point Voltage</p> <p>Technical Specifications:  Graphical LCD Display.  LED Indication.  Aux. ON/OFF Switch.  Current Range Selection - 1A &amp; 5A AC.  Hold Key.  Standard CT &amp; Burden Terminals.  'X' CT &amp; Burden Terminals.</p> <ol style="list-style-type: none"> <li>A) Percentage Ratio Error : 0 to 50%</li> <li>B) Phase Ratio Error : 0-1000 Minutes</li> <li>C) Input Current : 0.05A to 7.5A AC</li> <li>F) Indication : a) Reverse Polarity  : b) 'Std'C.T. Sec.open  : c) 'X' C.T. Sec. Open  : d) Difference Ratios of 'Std' &amp;'X' CT Hi-imbalance  : e) Over Current  : f) Ratio Error Polarity  : g) Phase lag-lead  : h) Phase Error Over Range</li> </ol> <p>- Light in weight.  - High Accuracy.  - Reverse Polarity indication.  - Direct reading from LCD display.  - The Ratio Error is directly given in percentage.  - The Phase Error is directly given in minute.  - Current Injection Set  - Output Variable Current 100Amps, Provided with Digital Current Meter  - Current Transformer 100:5Amps 3nos.</p>	1 No.
3	<p><b>Potential Transformer 220/110 Single Phase, Housed in strong steel cabinet, With one Analog Meter</b></p>	1 No.

4	Growler	1 No.
5	<p>Tong Tester / Clamp Meter</p> <p><b>Technical Specification :</b></p> <p>DC Voltage range : 400, 600V</p> <p>Accuracy : +1.0%</p> <p>AC Voltage range : 400, 600V</p> <p>Accuracy : + 1.5%</p> <p>AC Current range : 40, 400A</p> <p>Accuracy : + 2.0%</p> <p>Resistance : 400ohms</p> <p>Accuracy : + 1.0%</p> <p>Clamp size : 28mm (max.)</p> <p>Battery : 1.5V x 2 (Included)</p>	1 No.
6	Megger 500 volts Rotary Type Enclosed in Meta Box	1 No.
7	Contactors & auxiliary contacts 3phase, 440volt, 16amp	1 No. each
8	Contactors & auxiliary contacts 3 phase, 440 volt, 32 amp.	1 No. each
9	Limit Switch	1 No.
10	Rotary Switch 16 A	1 No.
11	<p><b>Load Bank 5 KW( Lamp Type)</b></p> <p><b>Resistive Lamp Load 5 KW is steps of 200W housed in wooden cabinet on Bakelite panel.</b></p> <p><b>Steps change with switches</b></p>	1 No.
12	Brake Test arrangement with two spring balance 0 to 25 kg rating	1 No.
13	Knife Switch DPDT fitted with fuse terminals 16 amp, Brass Contacts	4 Nos.
14	Knife Switch TPDT fitted with fuse terminals 16 amp, Brass Contacts	4 Nos.
15	<p>Voltage Stabiliser</p> <p>Input: 150 – 230 volt AC</p> <p>Output: 220 volt AC</p>	1 No.
16	3- point D.C. Starter for Motor Upto 2 HP	1 No.
17	4- point D.C. Starter for Motor Upto 2 HP	1 No.
18	<p>Electrical Machine Trainer</p> <p>Objective:</p> <p>Study the Starting &amp; reversing of single phase induction motor</p> <p>Study of load Characteristic of Single Phase Induction Motor</p> <p>Study of Magnetizing Curve of DC shunt Generator</p> <p>Study of Load Characteristics of three phase Synchronous Generator</p> <p>Study of Three phase Synchronous Motor</p> <p>Study Speed Torque Characteristics of single phase induction motor</p> <p>Features:</p> <p>Compact and Easy to use in Electrical Laboratories</p> <p>Equipped with high Safety Features</p> <p>Portable and Easy to Install</p> <p>Elaborated Instruction Manual with Calculated Values</p> <p>Complete with Panel, Machine etc</p> <p>Supplied with Patch cords for Interconnections &amp; Instruction Manual</p> <p>Control Panel</p> <p>Technical Specifications:</p> <p>Control Panel housed in a wooden cabinet in tapered shape for better view angle. Meters are mounted on thick Bakelite front panel with connection Terminals</p> <p>Meters : 1 No. Voltmeter range 0-500V AC, Size 96X96mm</p> <p>: 3 Nos. Ammeter range 0-3A AC, Size 96X96mm</p> <p>: 2 Nos. Voltmeter range 0-300V DC, Size</p>	1 for 8 (4+4) Units

	<p>96X96mm : 1 No. Ammeter range 0-10A DC, Size</p> <p>96X96mm : 1 No. RPM Meter ,Size 48X96mm</p> <p>DC Source : 0 - 300V DC/4 Amps (Variable)</p> <p>DC Drive : 1 No. Thyristorized DC Drive For Speed</p> <p>Control Starter : 1 No. of Direct Online Starter Suitable up to 3HP</p> <p>Protections : 2 No. MCB / DP of Range 16AMP</p> <p>Power requirement : 440VAC Three Phase</p> <p>Standard Accessories: DC Shunt Motor 2HP 220V, Coupled with AC Alternator</p> <p>0.5 KW &amp; AC Induction Motor 1HP 3Phase 3HP Induction Motor</p> <p>Technical Specifications: DC Shunt Motor Capacity : 1HP Cage : Steel Body Class : E Class RPM : 1500 Approx Shaft : Single Current : 6.3 Amp Max Input Terminal : Armature (A1, A2) , Field (F1, F2) Power Requirement: 220V DC, Single Phase</p> <p>AC Alternator Technical Specifications: Capacity : 0.5 KW Cage : Steel Body Class : E Class RPM : 1500 Approx. Shaft : Single Current : 2.2 Amp Max Input Terminal : R, Y, B and neutral with F1 and F2(Field Terminal) Output Voltage : 415~440V AC, 50Hz, Three Phase</p> <p>Single Phase Induction Motor Technical Specifications: Capacity : 1 HP Cage : Steel Body Class : E Class RPM : 1500 Approx. Shaft : Single Current : 3.2 Amp Max Input Terminal : Phase &amp; Neutral Input Voltage : 220~240V AC, 50Hz, Single Phase</p> <p>Three Phase squirrel cage Induction Motor Technical Specifications: Capacity : 3HP Class : E Class RPM : 1500 Approx. Input Terminal : Phase &amp; Neutral Input Voltage : 440VAC, 50Hz, Single Phase</p>	
19	<p><b>Motor-Generator (AC to DC) consisting of :</b> A laboratory type model for conducting various experiments. <b>Technical Specification :</b> <b>MOTOR :</b></p>	1 No.

	<p>Squirrel cage Induction motor 7 H.P.415 volts,3 phase 50 Hz 1440 R.P.M. type TEFC cont. rating. Insulation class 'F',Horizontal foot mounted. 6 terminals brought out in the terminal box for connection.</p> <p><b>GENERATOR :-</b> D.C.shunt generator : 5 K.W. 440 V. S Self excited : 1440 R.P.M. type continuous rating Insulation class 'F'. Horizontal.</p> <p><b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywoodfitted with 3 mm Ivory colour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti. Educational type bakelite insulated banana terminals provided for supply and motor generator connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc.</p> <p>The Instrument Panel consist of following accessories : A.C.SIDE : 1) Voltmeter M.I.Type 0-500 volts, 96 x 96 mm : 1 no. 2) Ammeter M.I.Type 0-15 Amp.96 x 96 mm : 1 no. 3) Rotary Switch for voltmeter select for OFF/R/Y/B/R 16 Amp.,440 v : 1 no. 4) Automatic STAR / DELTA Starter suitable for above motor flush mounted : 1 no. 5) Bakelite based HRC fuses of suitable capacity : 3 Nos 6) RCCB of Suitable capacity (ISI) marked : 1 no. 7) Indicating lamp LED type 12 mm size Red, Yellow, Blue colour : 1 no.each</p> <p>D.C.SIDE : 1) Voltmeter M.C,Type 0-500 volts,96 x 96mm : 1 no. 2) Ammeter M.C.Type 0-15 Amp.96 x 96 mm : 1 no. 3) Ammeter M.C.Type 0-1.5 Amp.96 x 96 mm : 1 no. 4) Field regulator disc type suitableto decrease field current up to min.Amps :1 no. 5) D.P.S.T. Knife Switch. 20 Amp. 440 v : 1 no. 6) Indicating lamp LED type Red, colour 12mm size : 1 no.</p> <p><b>BASE PLATE :</b> Motor and Generator will be mounted on fabricated base plate of M.S.'C' channel</p> <p><b>COUPLING :</b> Motor and Generator are coupled with a flexible coupling &amp; mounted on a common base plate.Coupling guard &amp; antivibration mounts are also provided.</p>	
20	Used DC Generators-series, shunt and compound type for overhauling practice. Should be in working condition.	1 No. each
21	<p><b><u>D.C. Shunt Generator, 2.5 KW, 220V with control panel</u></b> A laboratory type model for conducting various experiments. <b>TECHNICAL SPECIFICATION :</b></p> <p><b>GENERATOR</b> D.C. Shunt Generator 2.5 kw, 230 volts, 1500 R.P.M., continuous rating, Insulation Class "B", Horizontal foot mounted, All the terminals are</p>	1 No.



	<p>brought out to the terminal box.  Prime Mover:  3 phase 5 hp induction motor as prime mover for generator</p> <p>Control Desk :  The Control desk consist of an Instrument panel and working area.  The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area.  The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm.  The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure.  All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation.  Back side in the form of hinged door with suitable locking arrangement.  The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom.  The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top.  The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.  30 A. Educational type bakelite insulated banana terminals provided for supply and generator connection.  Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc.  The Instrument Panel consist of following accessories :  1) Voltmeter M.C. type 0-300 volts, 96 x 96 mm : 1 no.  2) Ammeter M.C. type 0-15 Amp., 96 x 96 mm : 1 no.  3) Ammeter M.C. type 0-1.5 Amp., 96 x 96 mm : 1 no.  4) Field regulator disc type suitable to decrease field current upto min. Amp : 1 no.  5) DPST Knife Switch- 20 Amps., it mounted on the Panel Board : 1 no.  6) Indicating lamp LED type Red, colour 12mm size : 1 no.  PAINT :  Generator will be painted with two coats of smoke gray oil paint and panel board will be powder coated.</p> <p>BASE PLATE :  Motor &amp; Generator mounted on fabricated base plate of M.S.'C' channel size 75 x 40 x 6 mm thick. Base plate</p>	
22	<p><b>D.C. Compound Generator 2.5 KW</b>  A laboratory type model for conducting various experiments.</p> <p>TECHNICAL SPECIFICATION :  GENERATOR  D. C. Compound Generator 2.5 kw, 230 volts, 1500 R.P.M., continuous rating, Insulation Class "B", Horizontal foot mounted, All the terminals are brought out to the terminal box.  Prime Mover:  3 phase 5 hp induction motor as prime mover for generator</p> <p>Control Desk :  The Control desk consist of an Instrument panel and working area.  The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area.  The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm.  The Box type Instrument Panel above the working area and of size W=900 mm ; D=250 mm ; H=750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure.  All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation.  Back side in the form of hinged door with suitable locking arrangement.  The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom.  The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top.  The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.</p>	1 No.

	<p>30 A. Educational type bakelite insulated banana terminals provided for supply and generator connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc The Instrument Panel consist of following accessories : Voltmeter M.C. type 0-300 volts, 96 x 96 mm : 1 no. Ammeter M.C. type 0-15 Amp., 96 x 96 mm : 1 no. Ammeter M.C. type 0-1.5 Amp., 96 x 96 mm : 1 no. Field regulator disc type suitable to decrease field current upto min. Amp : 1 no. DPST Knife Switch - 20 Amps., it be mounted on the Panel Board : 1 no. Indicating lamp LED type Red, colour 12mm size : 1 no. Fuses H.R.C. Bakelite type base with top 16A 230 V. : 2 nos.</p> <p>PAINT : Generator and pannel board painted with two coats of smoke gray oil paint</p> <p>BASE PLATE : Motor &amp; Generator mounted on fabricated base plate of M.S.'C' channel size 75 x 40 x 6 mm thick. Base plate length 800 mm for Primemover coupling.</p>	
23	<p>Diesel Generator Set with change over switch, over current breaker and water-cooled with armature, star-delta connections AC 3 phase, 5 KVA, 230 volt</p>	1 No.
24	<p><b>Motor series DC, 220 Volt, 0.5 to 2 HP, coupled with mechanical load</b> A laboratory type model for conducting various experiments. <b>TECHNICAL SPECIFICATION :</b> <b>MOTOR :</b> 2 HP,220 volts,1500 RPM coupled with mechanical on load, 'F' class insulation, continuous rating S.P.D.P.type, horizontal foot mounted. Educational type Suitable friction brake Dynamometer set having 2 Nos. spring balances &amp; belt provided with fixed with motor base plate</p> <p>Control Desk : The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.</p> <p>30 A. Educational type bakelite insulated banana terminals provided for supply and motor connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. The Instrument Panel consist of following accessories : 1) Two point starter suitable foe series D.C. motor flush mounted. 2) Indicating lamp, LED type 12mm size for incoming &amp; outgoing supply. 3) DPST knife Switch, 20 A, 4) D.C.M.C. Ammeter 0-10A,96 x 96 mm sq.type, flush type 5) D.C.M.C. voltmeter 0-300 v, 96 x 96 mm sq.type, flush type 6) Fuses kitkat 16 A, 500 v inside the pannel.</p> <p>BASE PLATE : Motor with mechanical load will be mounted on fabricated base plate of M.S. Motor with mechanical load mounted on fabricated base plate of M.S.'C' channel.</p> <p>PAINT : Motor painted with two layers of smoke gray oil paint. &amp; control panel powder coated.</p>	1 No.
25	<p><b>Motor shunt DC 220 Volt, 2 to 3 HP</b></p>	1 No.

	<p><b>TECHNICAL SPECIFICATION :</b></p> <p><b>MOTOR :</b> D.C. Shunt motor 2 H.P., 220 volts,1500 R.P.M., continuous rating class of insulation 'B' S.P.D.P. Type, Horizontal foot mounted, confirming to standards , All the terminals are brought out to the terminal box.</p> <p>Control Desk : The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti. 30 A. Educational type bakelite insulated banana terminals provided for supply and motor connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. The Instrument Panel consist of following accessories : 1) Three point D.C. starter suitable for above motor, flush mounted : 1 no. 2) D.P.S.T. Knife Switch. suitable for above motor : 1 no. 3) Indicating lamp LED type 12 mm size for incoming and outgoing supply of the pannel board : 2 nos. 4) Voltmeter M.C. 0-300 volts D.C. size 96 x 96 mm : 1 no. 5) Ammeter M.C. 0-15 Amp. D.C. size 96 x 96 mm : 1 no. 6) Ammeter M.C. 0-1.5 Amp. D.C. size 96 x 96 mm : 1 no. 7) Field regulator suitable to keep constant rated R.P.M. of the motor at full load. : 1 no.</p> <p><b>BASE PLATE :</b> Motor mounted on fabricated base plate of M.S.'C' channel .</p> <p><b>PAINT :</b> Motor painted with two coats of smoke grey oil paint, panel board and angle stand powder coated.</p>	
26	<p><b>Motor DC compound wound 220 volt 2 to 3 HP with starter and switch</b> A Laboratory Type Model For Conducting Various Experiments.</p> <p><b>TECHNICAL SPECIFICATION :</b></p> <p><b>MOTOR :</b> D.C. compound motor 2 H.P., 220 volts,1500 R.P.M., continuous rating class of insulation 'F' S.P.D.P. type, Horizontal foot mounted, Confirming to I.S. 4722-1992, All the terminals are brought out to the terminal box.</p> <p><b>CONTROL DESK :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.</p>	1 No.

	<p>30 A. Educational type bakelite insulated banana terminals provided for supply and motor connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. The Instrument Panel consist of following accessories :</p> <ol style="list-style-type: none"> <li>1) Four point D.C. starter suitable for above motor, flush mounted : 1 no.</li> <li>2) D.P.S./T. Knife Switch. suitable for above motor : 1 no.</li> <li>3) Indicating lamp LED type 12 mm size for incoming and outgoing supply of the pannel board : 2 nos.</li> <li>4) Voltmeter M.C. 0-300 volts D.C. 96x96mm size : 1 no.</li> <li>5) Ammeter M.C. 0-15 Amp. D.C. 96x96mm size : 1 no.</li> <li>6) Ammeter M.C. 0-1.5 Amp. D.C. 96x96mm size : 1 no.</li> <li>7) Field regulator suitable to keep constant rated R.P.M. of the motor at full load. : 1 no.</li> </ol> <p><b>BASE PLATE :</b> Motor mounted on fabricated base plate of M.S.'C' channel.</p> <p><b>PAINT :</b> Motor painted with two coats of smoke grey oil paint, panel board and angle stand powder coated.</p>	
27	<p><b>SINGLE PHASE TRANSFORMER, AIR COOLED</b> TRANSFORMER SINGLE PHASE 1 KVA A Laboratory Type Model For Conducting Various Experiments.</p> <p><b>TECHNICAL SPECIFICATION :</b> Transformer Single Phase Air cooled capacity 1KVA, Primary 230 Volts, Secondary 0-110-115-120 Volts. The unit must be fitted in MS Box with side ventilation. Top of the box will be of Bakelite sheet and the terminals of primary &amp; secondary will be brought out with Educational type bakelite banana type terminals and proper marking.</p>	1 No.
28	<p><b>Three phase transformer, shell type oil cooled</b> TECHNICAL SPECIFICATIONS</p> <ol style="list-style-type: none"> <li>1) Capacity 3 phase, 5 KVA, 440 / 230 Volts, 50 Hz</li> <li>2) Delta - star connection</li> <li>3) Shell type - Oil cooled (Oil should be supplied by the supplier)</li> <li>4) Totally enclosed, maximum ambient temp 45° C</li> <li>5) Insulation Class 'B'</li> <li>6) Tapping on Secondary Side 50% and 86.6% <ol style="list-style-type: none"> <li>7) Educational type Bakelite insulated banana terminals . With colour code provided on the top of the transformer and on 6mm bakelite sheet</li> <li>8) The tank will be provided oil filling Hole with cap, oil level indicator, drain plug and earthing terminal</li> <li>9) Plain unidirectional Roller will be fitted to the tank for movement</li> </ol> </li> </ol>	1 No.
29	<p><b>Oscilloscope Dual Trace,30 MHZ</b> Features : DC ~ 30MHz Inbuilt 6 Digit seven segment display frequency counter (30MHz)Dual channel, X Y mode 6" display cathode ray tube, sensitivity triggering up to 1mV/divison TV synchronous separation circuit to observe stable TV signal Polarity reversal, CH 1 Sync output</p> <p><b>Technical Specifications :</b> CRT : 6" Rectangular screen with internal graticule, 8 x 10 Div (1Div=1cm)</p> <p>Vertical Deflection Vertical Operation Mode: CH1, CH2, ADD, ALT, CHOP (CH1, CH2) Sensitivity : 5mV/div to 5V/div +3%, 1mV/div to 1V/div +5% (x5),10 steps Rise time : &lt;17.2ns Input impedance : 1Mohm Max. Input voltage: 250V (DC+AC peak value) at 1kHz (250V, DC+AC) Input coupling : AC, DC, GND Polarity selection : +(CH2 only) Display mode : 1, 10, X-Y</p> <p>Horizontal Deflection Sweep time : 0.2micros/div to 0.2s/div Sweep expansion : x10 Accuracy : 3%</p>	1 No.

	<p>Trigger System  Triggering mode : Auto, NORM, TV-V, TV-H  Trigger source : VERT,CH1, LINE, EXT  Sensitivity auto : 20Hz~20MHz(VERT) (Model ME 3020F)  Frequency norm : 0.5div INT, 0.5Vp-p EXT  TV-H : At least 1div or 1Vp-p  Input impedance : 1M ohm  X-Y Phase Difference : &lt;3O, DC-50KHz  Calibration waveform : Frequency: 1kHz 20%, Voltage: 0.5V 1%  Power requirement : 220 VAC +10% , 50 Hz  Weight : 8.0Kg Approx.  Dimensions (mm): 310 (L) x370(B) x 130(H)  Standard Accessories :  Power cable, Probe - 2Nos., Instruction manual</p>	
30	<p>Function Generator  <b>Technical Specifications :</b>  Frequency range:0.1Hz ~ 5MHz  Output waveform : Sine, Triangle, Square, Positive &amp; Negative Pulse, Positive &amp; Negative Ramp  Output impedance : 50ohms + 10%  Amplitude : Not less than 20V p-p (open circuit)  DC voltage : 0~+10V continuously adjustable  Symmetry range: 90:10 – 10:90  Attenuation :20dB, 40dB, 60dB  Rising edge of square: &lt;100ns  Sine characteristics:&lt;1% at 10Hz ~ 100KHzdistortion  Frequency response: 0.1Hz ~ 100kHz :&lt; ± 0.5dB  : 100kHz ~ 5MHz :&lt;± 1dB TTL/CMOS Output level:TTL  low level &lt;0.4V in pulse wave, High level  &lt;3.5V. CMOS low &lt;0.5V in pulse wave, high  level 5V~14V continuously Variable  Rising time :&lt; 100ns  VCF Input  Output voltage : -5V ~ 0V ± 10%  Max. Volt-controlled : 1000:1  Input signal : DC ~ 1kHz</p> <p>Frequency Counter  Measuring range : 1Hz ~ 30MHz  Input impedance : Not less than 1Mohms/ 20pF  Sensitivity : 100mV rms  Max. Input : 150V (AC + DC)  Input attenuation: 20dB  Accuracy : Less than 0.003% ± 1digit  Power requirement: 220 VAC +10% , 50 Hz  Weight : 3.0Kg Approx.  Dimensions (mm): 220(L) x 270(B) x 185(H)  <b>Standard Accessories :</b>  Power cable, BNC to Crocodile Clip Probes - 1No &amp; BNC to BNC Probe - 1No., Instruction manual</p>	1 No.
31	<p><b>Discrete Component Trainer</b>  <b>Technical Specifications :</b>  Inbuilt Variable / Fixed DC Regulated Power Supplies  Output voltages : 0-3VDC : 0-30VDC  : +5VDC</p> <p>Inbuilt AC Power Supplies  Output voltages : 10 - 0 - 10VAC/ 500mA  Glass Epox PCB used as front panel of 270 mm x 170 mm &amp; mounted on light weight shock proof plastic cabinet  Symbol diagram printed on Glass Epox PCB &amp; all important test Points are  brought out on front panel  Power requirement: 230 VAC 10%, 50Hz.  Weight : 2.2 Kg Approx.  Dimensions (mm): 300( L) x 175(B) x 75(H)  List of Experiments under above Topics :  PN Junction Diode V-I Characteristics  Zener Diode V-I Characteristics  Voltage Stabilization of Zener Diode  LED Characteristics  Resistance in Series &amp; Parallel</p>	1 No.

	<p>Charging &amp; Discharging of Condenser  LCR Resonance Circuit  Clipping &amp; Clamping  Half Wave, Full Wave &amp; Bridge Rectifier  Common Base Transistor Amplifier  Common Emitter Transistor Amplifier  Common Collector Transistor Amplifier  RC Coupled Amplifier  Basic Logic Gates  RC Passive Filter Circuits  PROVIDED with Easy log pro software and computer interface unit to show reading and graph between Voltage and Current .  Standard Accessories :  Power cable, Patch Chord &amp; Instruction manual</p>	
32	<p>Linear I.C.Trainer  Technical Specifications :  Inbuilt Variable / Fixed DC Regulated Power Supplies  Output voltages : 0-2.5VDC ( 2 Nos.)  : +15VDC  : -15VDC  : +5VDC.  On Board Digital Panel Meter  Voltmeter : 0-2VDC / 0-20VDC ( Dual Range )  Glass Epoxy PCB used as front panel of 270 mm x 170mm &amp; mounted on light weight shock proof plastic cabinet  Symbol diagram printed on Glass Epoxy PCB &amp; all important test Points are Brought out on front panel  Power requirement : 230 VAC 10%, 50Hz.  Weight : 2.3 Kg Approx.  Dimensions (mm): 300( L) x 175(B) x 75(H)</p>	1 No.
33	<p>Digital I.C.Trainer  Technical Specifications :  Inbuilt Fixed DC Regulated Power Supplies  Output voltages : + 5VDC  On Board Inputs, Switch, Indicators &amp; Clock  Logic Inputs : 8 Nos. logic '0' &amp; logic '1' ( Through SPDT Switches )  Output indicators : 8 Nos.  Clock : 1Hz, 100Hz, 1KHz  Gates &amp; Flip Flops  NAND Gates : 4Nos.  NOR Gates : 4 Nos.  OR Gates : 4 Nos.  AND Gates : 4 Nos.  EX-OR Gates : 4 Nos.  NOT Gates : 6 Nos.  JK Flip Flop : 2 Nos.  RS Flip Flop : 1 No.  D Flip Flop : 1 No.  Glass Epoxy PCB used as front panel of 400 mm x 225 mm &amp; mounted on light weight shock proof plastic cabinet  Symbol diagram printed on Glass Epoxy PCB &amp; all important test Points are Brought out on front panel  Power requirement : 230 VAC 10%, 50Hz.  Weight : 1.7Kg Approx.  Dimensions (mm): 430( L) x 230(B) x 90(H)  Standard Accessories :  Power cable, Patch Chord &amp; Instruction manual</p>	1 No.
34	Oil Testing Kit 60 KVA	1 No.

## CTS Third Semester: Electrician SHOP TOOLS, INSTRUMENTS and MACHINERY

1	<p><b>Hygrometer</b>  <b>Range</b> 0 to 100% rH  <b>Resolution</b> 0 to 100% rH  <b>Accuracy</b> ±2% ±1 digit  <b>Sensor/Input</b> Capacitive  <b>Attributes:-</b>  <b>Humidity measuring and control instrument for refrigeration, food, laboratory, paper, construction and other industry. 0-10 V and 0-20 mA output option.</b>  <b>Special Features</b></p> <ul style="list-style-type: none"> <li>· <b>Housed in box</b></li> <li>· <b>96 x 48 x 110 mm DIN size</b></li> <li>· <b>Calibration Certificate</b></li> </ul>	1 set			
2	<p><u>Relays-</u></p> <p><b>Cut Out Relay</b>  <b>Objective:</b>          ·To study the construction of relay          ·Test an relay in instantaneous Cut Out protection scheme for operating characteristic using current injection  <b>Technical Specifications:</b>          ·Relay Type : Instantaneous Cut Out Relay          (Electromechanical)          ·Terminals : 4mm Terminals for Trip, Current Output and Input          ·Meters (Graphical LCD Display): 1No. AC Current Meter 0 – 20Amps &amp; 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm)          ·Current Injector : Inbuilt variable current injector Amps 20Amps to create Phantom Fault Current          ·Indicators : Provided on front panel for Mains, Current, Trip and Alarm          ·Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF)          ·Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm          ·Dimensions : 700mm x 400mm x 300mm          ·Weight : 30Kgs Approx.          ·Power Requirement : 220VAC +10%, 50Hz</p> <p><b>B) Standard Accessories:</b>          · Power Cords, Patch Cords, Instruction Manual</p> <p><b>Reverse Current Relay</b>  <b>The Experimental Setup consists of the following parts:</b>          Two nos. of Reverse Power Relay provided on the Front Panel.          Two Nos. of Digital Current meter (0-20A) of size 96X 48 mm provided on the Front Panel.          Two Nos. of Digital Timer of size 96X 48 mm provided on the Front Panel          All Meters should be (Graphical LCD Display)  <b>C) Circuit Diagram</b> printed on front panel With Instruments Connecting lamp i.e TRIP, CURRENT &amp; ALARM.          Dimension (mm): 900X600.          Power Requirement : Single Phase 230V/50Hz .          .</p> <p><b>Over Current relay</b>  <b>Objective:</b>          ·To study the operating characteristics of relay          ·To study the time – current characteristics of the given fuse</p> <p><b>Technical Specifications:</b>          ·Relay Type : Thermal Over Load Relay          ·Terminals : 4mm Terminals for Trip, Current Output and Input          ·All Meters should be (Graphical LCD Display): 1No. AC Current Meter</p>	1 No. each			

D)	<p>0 – 20Amps &amp; 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm)</p> <ul style="list-style-type: none"> <li>·Current Injector : Inbuilt variable current injector 20Amps to create Phantom Fault Current</li> <li>·Indicators : Provided on front panel for Mains, Current, Trip and Alarm</li> <li>·Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF)</li> <li>·Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm</li> <li>·Dimensions : 700mm x 400mm x 300mm</li> <li>·Weight : 30Kgs Approx.</li> <li>·Power Requirement : 220VAC +10%, 50Hz</li> </ul> <p>Standard Accessories: ·Power Cords, Patch Cords, Instruction Manual.</p> <p>Under Voltage Relays <b>Objective:</b> ·To study the construction of relay ·Test an relay in over / under voltage protection scheme for operating characteristic using voltage injection ·To obtain the time &amp; current characteristics of a over / under voltage type relay (Static)</p> <p><b>Technical Specifications:</b> ·Relay Type : Over / Under Voltage Relay (Static Type) ·Terminals : 4mm Terminals for Trip, Voltage Output and Input ·All Meters should be (Graphical LCD Display) : 1No. AC Voltmeter Meter 0 – 220V &amp; 1 No. Digital Timer . 0001sec. to 9999sec. (Auto) (96mm x 48 mm) ·Voltage Injector : Inbuilt variable voltage injector 220V to create Fault Voltage ·Indicators : Provided on front panel for Mains, Voltage, Trip and Alarm ·Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) ·Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm ·Dimensions : 700mm x 400mm x 300mm ·Weight : 30Kgs Approx. ·Power Requirement : 220VAC +10%, 50Hz</p> <p><b>Standard Accessories:</b> ·Power Cords, Patch Cords, Instruction Manual</p>				
3	Starters for 2 to 5 H.P. A.C Motors-	1 No.			
	a. Resistance type starter				
	b. Direct on line Starter				
	c. Star Delta Starter- manual,				
	semi-automatic				
	automatic				
	d. Auto Transformer type				
4	<p><b>Motor Generator(DC to AC) set consisting of -</b> A Laboratory Type Model for Conducting Various Experiments. Technical Specification :</p> <p><b>MOTOR</b> 5 H.P., 440 volts, 1500 R.P.M., S.P.D.P. type continuous rating class of insulation 'F'. Horizontal foot mounted, Dynamically balanced. All the terminals are brought out to terminal box. Confirming to provided lifting bolt &amp; earthling terminal.</p> <p><b>ALTERNATOR :</b> 3.5 K.V.A.,415/240 Volts, 50 H.Z., 3 phase 4 wires 0.8 P.F.1500 R.P.M., S.P.D.P. type continuous rating with self static field exciter, self regulation, insulation class 'H' frame , Horizontal foot mounting confirming to Alternator is provided lifting bolt &amp; earthling terminal.</p> <p><b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area.</p>	1 No.			



	<p>The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm.  The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation.  Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom.  The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top.  The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.  . Educational type bakelite insulated banana terminals provided for supply and motor gen.Connection.  Circuit diagram of panel provided inside the panel.  All accessories connected with internal wiring ferrules etc.  The Instrument Panel consist of following accessories :</p> <p>D.C. SIDE</p> <ol style="list-style-type: none"> <li>1)Voltmeter M.C, Type 0-500 volts,96 x 96mm : 1 no.</li> <li>2) Ammeter M.C.Type 0-15 Amp.96 x 96 mm Make Make : 1 no.</li> <li>3) Field regulator disc type 500 ohm,1.5 Amp. : 1 no.</li> <li>4) Indicating lamp LED type Red, colour 12mm size. :1 no.</li> <li>5) D.P.S.T. 20 Amp Knife Switch : 1 no.</li> <li>6) Three Point D.C. Motor Starter Suitable : 1 No.</li> </ol> <p>A.C. SIDE</p> <ol style="list-style-type: none"> <li>1)Voltmeter M.I, Type 0-500 volts,96 x 96 mm Make Make : 1 no.</li> <li>2) Ammeter M.I.Type 0-15 Amp.96 x 96 mm Make Make : 1 no.</li> <li>3) Ammeter M.C.Type 0-1.5 Amp.96 x 96 mm Make Make : 1 no.</li> <li>4) Frequency meter 45-50-55 Hz. 96 x 96 mm Make Make : 1 no.</li> <li>5) Rotary Switch for voltmeter select for OFF/R/Y/B/BR 16 Amp.,440 v : 1 no.</li> <li>6) Indicating lamp LED type R.Y.B.colour, 12mm size : 1 each</li> <li>7) Field regulator disc type suitable to decrease field current up to min.Amps : 1 no.</li> <li>8) Field control separately excited unit suitable for above alternator should be mounted inside the panel board</li> <li>9) Ammeter Selector Switch, Rotary type, Off/R/Y/B, 16 A. 440 V. : 1 no.</li> <li>10) 3 ph. Power Factor Meter, 5 Amp.,440V, 96x96mm : 1 no.</li> </ol> <p>All meters 96 x 96 mm size pannel mounted type maximum in accuracy.</p>				
5	<p><b>A.C. SQUIRREL CAGE INDUCTION MOTOR 3 HP WITH STAR DELTA STARTER</b>  A laboratory type model for conducting various experiments.  <b>TECHNICAL SPECIFICATION :</b>  <b>Motor</b>  A.C. 3 Phase 3 HP 415 volts, 50 Hz, Squirrel cage Induction Motor 1440 RPM, TEFC, class 'F' insulation, frame 100, horizontal foot mounted. Six terminals brought out on terminal box.</p> <p><b>Control Desk :</b>  The Control desk consist of an Instrument panel and working area.  The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area.  The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm.  The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure.  All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation.  Back side in the form of hinged door with suitable locking arrangement.  The working area top fitted in front of the Instrument Panel at a height</p>	1 No.			

	<p>of 750 mm from bottom.  The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top.  The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.  . Educational type bakelite insulated banana terminals provided for supply and motor connection.  Circuit diagram of panel provided inside the panel.  All accessories connected with internal wiring ferrules etc.  The Instrument Panel consist of following accessories :1) Voltmeter M.I. Type 96 mm x 96 mm Sq. 0-500V with selector switch Off/R/Y/B/BR : 1 No.  2) Ammeter M.I. type 96 mm x 96 mm Sq. 0-10A : 1 No.  3) Suitable star delta. Starter : 1 No.  4) TP MCB 16 Amp 415 V. ISI Marked mounted on panel board. : 1 No.  5) Indicating lamp LED type 12 mm size for incoming &amp; outgoing in colour code : 6 Nos.  6) HRC fuses Bakelite type base with top 16 Amp 440 V : 3 Nos.  <b>PAINT :</b>  Motor will be painted with two coats of smoke gray oil paint and panel board will be powder coated.  <b>BASE PLATE :</b>  Motor mounted on fabricated base plate of M.S.'C' channel size 75 x 40 x 6mm thick .</p>				
6	<p>Motor AC phase wound slip ring type 5 HP 400 volts, 30phase, 50 cycles with starter and switch.  <b>Technical Specification :</b>  <b>Motor :</b>  A.C. 3 Phase 5 HP 415 volts, 50 Hz, slip ring Induction Motor 1440 RPM, TEFC, class 'B' insulation, frame 100, horizontal foot mounted. Educational type Bakelite banana type terminals 30 Amps is provided on terminal box. Six terminals are brought out on terminal box. Rugged construction.  <b>Control Desk :</b>  The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm.  The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel is perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement.  The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory coloured sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.  Educational type bakelite insulated banana terminals provided for supply and motor connection.Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc.  The Instrument Panel consist of following accessories :  (1)Voltmeter M.I. Type 96 mm x 96 mm Sq. 0-500V with: 1No.selector switch Off/R/Y/B/BR  (2) Ammeter M.I. type 96 mm x 96 mm Sq. 0-20A: 1 No.  (3) Suitable Rotor Resistance starter : 1 No.  (4) TP MCB 16 Amp 415 V. ISI Marked is mounted on panel board -1No.  (5) Indicating lamp LED type 12 mm size for incoming &amp; outgoing in colour code- 6Nos.  (6) HRC fuses Bakelite type base with top 16 Amp 440 V -3Nos  <b>PAINT :</b>  Motor is painted with two coats of smoke gray oil paint and panel board is powder coated.</p>	1 No.			
7	<p><b>Motor A.C. series type 230V, 50 cycles 1/4 HP with mechanical load</b>  <b>Technical Specification :</b>  AC Series Type Motor 230V, 50 cycles 1/4 HP with Mechanical Load, with  <b>Control Desk :</b></p>	1 No.			

	<p>The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm.</p> <p>The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel is perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement.</p> <p>The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory coloured sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.</p> <p>Educational type bakelite insulated banana terminals provided for supply and motor connection.Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc.</p> <p>Control Panel provided Starter Switch, MCB, Voltmeter, Ammeter, Frequency Meter and Terminals provided for Measurement and Easy Input and Output Connections. Panel fitted on good quality Wooden Box (for Safety), and Tapered Shape for better view Angle. Supplied with required Connection Leads and Instruction Manual.</p>				
8	<p><b>Motor A C single phase 230 volt, 50 cycles 1 HP capacitor type with starter switch 1 HP</b> A laboratory type model for conducting various experiments.</p> <p><b>TECHNICAL SPECIFICATION :</b> <b>MOTOR :</b> A.C. Single Phase Capacitor Start Induction Motor 1 HP 230 volts AC, 50 Hz, 1440 RPM, TEFC, class 'B' insulation, frame 90, horizontal foot mounted. Educational type Bakelite banana type terminals 30 Amps provided on terminal box. Starting winding, running winding with capacitor terminals brought out on terminal box <b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivorycolour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti. 30 A. Educational type bakelite insulated banana terminals provided for supply and motor connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. The Instrument Panel consist of following accessories : 1) Voltmeter M.I. Type 96 mm x 96 mm Sq. 0-300V : 1 No. 2) Ammeter M.I. type 96 mm x 96 mm Sq. 0-10A : 1 No. 3) Suitable D.O.L. Starter Single Phase : 1 No. 4) DP MCB 16 Amp 250 V. ISI Marked mounted on panel board :1 No. 5) Indicating lamp for incoming &amp; outgoing , LED type, 12 mm size : 2 Nos. 6) HRC fuses 16 Amp Bakelite type base : 2 Nos. <b>PAINT :</b> Motor will be painted with two coats of smoke gray oil paint and panel board will be powder coated. <b>BASE PLATE :</b></p>	1 No.			

	Motor mounted on fabricated base plate of M.S.'C' channel size 75 x 40 x 6mm thick			
9	<p><b>Motor universal 230 volt, 50cycles 1/4 HP with starter/switch</b> A Laboratory Type Model For Conducting Various Experiments.</p> <p><b>TECHNICAL SPECIFICATION :</b></p> <p><b>MOTOR :</b> Universal Motor Single Phase, Capacity 750 Watts, 230 volts A.C. / D.C. 1500 RPM (O.L.) 50 Hz, TEFC, class 'B' insulation, frame 100, horizontal foot mounted. Educational type Bakelite Insulated banana type terminals 30 Amps provided on terminal box. Four terminals armature and field brought out on terminal box with marking.</p> <p><b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.</p> <p>Educational type bakelite insulated banana terminals provided for supply and motor connection Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. The Instrument Panel consist of following accessories : Voltmeter M.I. type 96 mm x 96 mm Sq. 0-300V : 1 No. Ammeter M.I. Type 96 mm x 96 mm Sq. 0-5A : 1 No. Suitable D.O.L. Starter : 1 No. DP MCB 16 Amp 230 V mounted on panel board : 1 No. Indicating lamp for incoming &amp; outgoing, LED type, 12 mm size : 2 Nos. HRC fuses 10 Amp, 230 V Bakelite type base : 2 Nos. Change over switch for AC and DC output : 1 No. Suitable Stand by DC Supply provided inside the panel. : 1 No.</p> <p><b>PAINT :</b> Motor will be painted with two coats of smoke gray oil paint and panel board will be powder coated.</p> <p><b>BASE PLATE :</b> Motor mounted on fabricated base plate of M.S.'C' channel size 75 x 40 x 6mm thick</p>	1 No.		
10	<p>Stepper Motor with Digital Controller Microprocessor based stepper motor controller : with a bifilar 2 phase D.C. stepping motor. The stepping motor can be programmed in three parameters namely 1. Speed 2. No. of steps. 3. Direction. It is specially designed low cost yet sophisticated control lab kit the microprocessor system consist of 8085 A CPU 8155 scratch pad and 8279 key board display controller and EPROM The monitor programme in EPROM is used to enter application progra-mme forstepper motor controller. The unit which houses the stepper motor is designed to demonstrate the basic principles of stepper motor with manual switching. The same contains power amplifiers and Regulated power supply with Stepper motor Power amplifier alongwith regulated power driving the stepper motor. Arrangement for manual operation of stepper motor control.</p>	1 No.		
11	Shaded Pole Motor	1 No.		
12	Bath Impregnating	1 No.		
13	Oven Stove, Sixe 300mmx300mmx300mm	1 No.		

## TOOLS AND EQUIPMENT NEEDED ADDITIONAL TO EXISTING TOOLS LIST

1	<p>Synchronous motor 3 Phase, 3 HP, 415V, 50Hz, 4 Pole, with accessories.</p> <p><b>TECHNICAL SPECIFICATION :</b></p> <p><b>MOTOR:</b> Synchronous motor 3 Phase, 3 HP, 415V, 50Hz, 4 Pole,</p> <p><b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm &amp; Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivory colour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti.</p> <p>Educational type bakelite insulated banana terminals provided for supply and motor connection Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. The Instrument Panel consist of following accessories</p> <ol style="list-style-type: none"> <li>1. Three Nos. of Moving Coil Ammeter of Range 10A AC of size 96*96mm provided on the Panel.</li> <li>2. Three Nos. of Moving Coil Ammeter of Range 3A AC of size 96*96mm provided on the Panel.</li> <li>3. One No. of Moving Coil Ammeter of Range 3A DC of size 96*96mm provided on the Panel.</li> <li>4. Two Nos. of Moving Coil Voltmeter of Range 500V AC of size 96*96mm provided on the Panel.</li> <li>5. One No. of Frequency Meter of Range 50/55Hz of size 96*96mm provided on the Panel.</li> <li>6. Two Nos. of Miniature Circuit Breaker of Range 16Amps (MCB/ TPN) Provided on the Input Side &amp; Output Side.</li> <li>7. One No. of Variable Rheostat of Range 250 Ohms/ 200 Watts Provided behind the Front Panel with SPST Switch.</li> <li>8. One No. of Direct On Line Starter of Range 7HP/ 10Amps Provided on the Front Panel.</li> <li>9. One No. of Starter Switch of Range 9 - 14Amps. Provided On the Front Panel.</li> <li>10. Six Nos. of Indicators provided on the Input &amp; Output side.</li> <li>11. Dimensions : 775 x 360 x 560 mm (L x B x H).</li> <li>12. Power Requirement : Three Phase 415V AC</li> </ol>	1 no.		
2	Lux meter Measurement of Light intensity of UV	1 no.		

## CTS Fourth Semester: Electrician SHOP TOOLS, INSTRUMENTS and MACHINERY

1	Inverter- 1 KVA with 12 V Battery Input- 12 volt DC, Output- 220 volt AC	1 No.		
2	<u>Domestic Appliances</u> – a. Electric Hot Plate 1500 watt b. Electric Kettle, 100 watts c. Electric Iron 1200 watts d. Immersion Heater 500/100/2000 watt e. A.C. Fan f. Geyser (Storage type) 15 ltr minimum g. Mixture & Grinder	1 No. each		
3	<b>Thyristor/IGBT controlled D.C. motor drive with tacho-generator feedback arrangement.</b> <b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm & Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivorycolour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti. 30 A. Educational type bakelite insulated banana terminals provided for supply and motor connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc. Digital RPM meter suitable for operation upto 3000 RPM Other Accessories ON / OFF Rotory Switch, '16 Amp, 250 V , Digital Ammeter, Digital Voltmeter, Pot, switches, Indication for Digital input Motor : DC Motor rating 1 HP, 220 V. 4 Amp, 2 Pole.	1 No.		
4	<b>Thyristor/IGBT controlled A.C. motor drive with VVVF control 3 Phase, 3 HP</b> <b>Control Desk :</b> The Control desk consist of an Instrument panel and working area. The control desk made of 30mm x 30mm x 1.6mm tubular mild steel and MS sheet of 1 mm thickness, Siemens Grey colour powder coated with wooden top on the working area. The overall dimensions W = 900 mm ; D = 625 mm ; H = 1500 mm. The Box type Instrument Panel above the working area and of size W = 900 mm ; D = 250 mm ; H = 750 mm & Front side of 6mm thick bakelite sheet of brown colour and fitted at inside of the tube structure. All other sides made of MS sheet, Two sides of the panel are to be perforated for air ventilation. Back side in the form of hinged door with suitable locking arrangement. The working area top fitted in front of the Instrument Panel at a height of 750 mm from bottom. The top of W = 900 mm x D = 375mm and made of 19mm marine plywood fitted with 3 mm Ivorycolour sheet on top. The three sides of the working top lipped using 22mm x 6mm teakwood lipping patti. 30 A. Educational type bakelite insulated banana terminals provided for supply and motor connection. Circuit diagram of panel provided inside the panel. All accessories connected with internal wiring ferrules etc.  Meters :1No. Digital Voltmeter Range 0-300V AC , Size 96X96mm	1 No.		

	<p>96X96mm :1Nos. Digital Ammeter Range 0-10A AC , Size</p> <p>:1No. Digital RPM Meter ,Size 96X96mm</p> <p>IGBT : Thyristor/IGBT AC Drive</p> <p>Protections :Triple pole &amp; neutral isolator (TPN/MCB) 16Amps</p> <p>Power requirement:415~440V AC , 50Hz, 3 Phase</p> <p>Accessories:</p> <p><b>AC Induction Motor 3 Phase 3HP with Sensor Arrangement</b></p> <p>Technical Specifications (Induction Motor):</p> <p>Capacity :3HP</p> <p>Cage :Steel Body</p> <p>Class : E Class</p> <p>RPM : 1500 approx.</p> <p>Shaft :Single</p> <p>Current :6 Amps Max.</p> <p>Windings :Stator winding</p> <p>Input Terminal :6</p> <p>Mounting :Foot Mounted arrangement</p> <p>Power requirement:415~440V AC , 50Hz, 3 Phase</p>			
<b>TOOLS AND EQUIPMENT NEEDED ADDITIONAL TO EXISTING TOOLS LIST</b>				
1		Pentium IV Computer or latest (Server- Linux), 2.8 GHz & above, 1 GB RAM, 80 GB HDD, DVD Combo Drive, 15/17" Monitor, optical scroll mouse, multimedia key board, 32 bit LAN card with UPP port, necessary Drivers, etc.	2 Nos.	
2		Ink jet/ laser printer	1 No.	
3		Washing Machine	1 No.	
4		Motor Pump set 1 HP, 1 Phase, 240 V	1 No.	
5		Pin Type, shackle type & suspension type insulators (Raw Material)	2 Nos. each	