

# CBSE | DEPARTMENT OF SKILL EDUCATION

## CURRICULUM FOR SESSION 2021-2022

### **ELECTRICAL TECHNOLOGY (Sub. Code - 819)**

**JOB ROLE: FIELD TECHNICIAN**

**CLASS –XI**

#### **1. Introduction**

After successfully completing the two years of Senior Secondary Skill Course the student would have acquired relevant appropriate and adequate technical knowledge together with professional skills and competencies in the field of Electrical Technology so that he/she is properly equipped to take up gainful employment in this vocation.

#### **2. Course Objectives**

##### **A. Understanding of**

1. The relevant basic concepts and principles in basic science subjects (Physics, Chemistry and Mathematics) so that he/she is able to understand the different subjects.
2. The basic concepts in engineering drawing.
3. The concepts, principles of working, maintenance, constructional details and functions of electrical motors, electrical appliances, measuring and testing instruments and electrical circuits.
4. Testing, installation, fault identification and repairing of electrical motors, appliances and instruments.
5. Different types of electrical wiring.

##### **B. Adequate Professional Skills and Competencies in:**

1. Testing, installation, commissioning, fault location, repairing, servicing and major repairs of electrical motors, appliances and instruments.
2. Undertaking complete house wiring jobs, testing, location of faults and repairing of house wiring.

##### **C. A Healthy and Professional Attitude so that He/ She has:**

1. An analytical approach while working on a job.
2. An open mind while locating/rectifying faults.
3. Respect for working with his/her own hands.
4. Respect for honesty, punctuality and truthfulness.

#### **3. Curriculum**

This course is a planned sequence of instructions consisting of Units meant for developing employability and Skills competencies of students of Class XI opting for Skills subject along with general education subjects

Theory	60 marks
Practical	40 marks
<b>Total Marks</b>	<b>100 marks</b>

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**ELECTRICAL TECHNOLOGY (SUB. CODE - 819)**  
**CLASS – XI (SESSION 2021-2022)**

Total Marks: 100 (Theory-60 + Practical-40)

The unit-wise distribution of Periods and marks for Class XI is as follows:

	TERM	UNITS	NO. OF HOURS for Theory and Practical		MAX. MARKS for Theory and Practical	
<b>PART A</b>	<b>Employability Skills</b>					
	<b>Term I</b>	Unit 1 : Communication Skills-III	10		05	
		Unit 2 : Self-Management Skills- III	10			
		Unit 3 : ICT Skills- III	10			
	<b>Term II</b>	Unit 4 : Entrepreneurial Skills- III	15		05	
Unit 5 : Green Skills- III		05				
		<b>Total</b>	<b>50</b>		<b>10</b>	
<b>PART B</b>	<b>Subject Specific Skills</b>		<b>Theory</b>	<b>Practical</b>	<b>Marks</b>	
	<b>Term I</b>	Unit 1: Current Electricity	10	08	04	
		Unit 2: D.C. Circuits	10	08	05	
		Unit 3: Electric Cells	10	08	05	
		Unit 4: Heating and Lighting Effects of Current	10	08	05	
		Unit 5: Capacitors	10	08	04	
		Unit 6: Electromagnetic Effects	05	04	02	
	<b>Term II</b>	Unit 6: Electromagnetic Effects	07	06	03	
		Unit 7: A.C. Circuits	10	12	05	
		Unit 8: Soldering and Brazing	10	10	04	
		Unit 9: Measuring Instruments	08	08	04	
		Unit 10: Electrical Engineering Drawing	08	06	04	
			Unit 11: Electrical Wiring	12	14	05
			<b>Total</b>	<b>110</b>	<b>100</b>	<b>50</b>
<b>PART C</b>	<b>Practical Work</b>					
	Practical Examination				15	
	Written Test				10	
	Viva Voce				05	
		<b>Total</b>			<b>30</b>	
<b>PART D</b>	<b>Project Work/ Field Visit/ Practical File/ Student Portfolio</b>				10	
			<b>Total</b>			<b>10</b>
		<b>GRAND TOTAL</b>	<b>260</b>		<b>100</b>	

## 4. CONTENTS

### CLASS XI

#### PART A: EMPLOYABILITY SKILLS

	Units
1.	Communication Skills –III
2.	Self-management Skills –III
3.	Information and Communication Technology Skills – III
4.	Entrepreneurial Skills – III
5.	Green Skills – III

Detailed curriculum of Employability Skills is available separately on the CBSE website

#### PART B – SKILLS

##### 1. Current Electricity

Electricity as a source of energy, Definition of Resistance, Voltage, Current, Power, Energy and their units, Relation between electrical, mechanical and thermal units, Factors affecting resistance of a conductor, Temperature co-efficient of resistance, Difference between AC and DC voltage and current.

##### 2. D. C. Circuits

Ohm's Law, Series – parallel resistance circuits, calculation of equivalent resistance, Kirchhoff's Laws and their applications

##### 3. Electric Cells

Primary cell, wet cell, dry cell, battery, series and parallel connections of cells, Secondary cells, Lead Acid Cell, Discharging and recharging of cells, common charging methods, preparation of electrolyte, care and maintenance of secondary cells

##### 4. Heating and Lighting Effects of Current

Joule's Law of electric heating and its domestic applications, heating efficiency, lighting effect of electric current, filaments used in lamps, and gaseous discharge lamps, their working and applications.

##### 5. Capacitor

Capacitor and its capacity, Concept of charging and Discharging of capacitors, Types of Capacitors and their use in circuits, Series and parallel connection of capacitors, Energy stored in a capacitor.

##### 6. Electromagnetic Effects

Permanent magnets and Electromagnets, their construction and use, Polarities of an electromagnet and rules for finding them.

Faraday's Laws of Electromagnetic Induction, Dynamically induced e.m.f., its magnitude and induction, Static induction, self-induced e.m.f., its magnitude and direction, inductance and its unit. Mutually induced e.m.f., its magnitude and direction, Energy stored in an inductance.

Force acting on a current carrying conductor in magnetic field, its magnitude and direction, Torque produced on a current carrying coil in a magnetic field, Principles and construction of dynamo.

## **7. A.C Circuits**

Generation of A.C. voltage, its generation and wave shape. Cycle, frequency, peak value (maximum value), average value, instantaneous value, R.M.S. value, form factor, crest factor, phase, phase difference, power and power factor, A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and capacitance, Q factor of R.L.C. series circuits.

## **8. Soldering and Brazing**

General characteristics of soldering & Desoldering, tools & procedures, adopted for soldering & Desoldering, brazing joints, processes and their characteristics, brief description of soldering and brazing tools equipment, types of solders and fluxes and their uses, soldering defects and their remedies, brazing materials, advantages and disadvantages of soldering and brazing.

## **9. Measuring Instruments**

Construction and working principles of moving iron and moving coil voltmeters and ammeters, dynamometer type wattmeter, ohm meter, megger and induction type energy meter- their circuit connection and application for measurement of electrical quantities, Digital Multimeter.

## **10. Electrical Engineering Drawing**

Schematic and wiring diagram for domestic simple wiring, symbols used for different electrical devices and equipments.

## **11. Electrical wiring**

Types of wiring – cleat wiring, casing and capping, C.T.S./T.R.S. wiring, metal sheath wiring, conduit wiring and concealed wiring – their procedure.

Factors of selection of a particular wiring system, importance of switch, fuse and earthing of wiring system, types of faults, their causes and remedies.

Types of earthing- plate earthing and Pipe earthing, their procedure and application.

Methods of finding numbers of circuits and circuit distribution by distribution board system, loop in system of wiring connections IE rules related to wiring.

# **5. TEACHING ACTIVITIES**

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

### **CLASSROOM ACTIVITIES**

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained teachers. Teachers should make effective use of a variety of instructional or teaching aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

### **PRACTICAL WORK IN LABORATORY/WORKSHOP**

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the teacher to the Head of the Institution.

### **SKILL ASSESSMENT (PRACTICAL)**

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators. The same team of examiners will conduct the viva voce.

**Project Work** (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

**Student Portfolio** is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

**Viva voce** allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

## **6. ORGANISATION OF FIELD VISITS/ EDUCATIONAL TOURS**

In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

## **7. PRACTICAL GUIDELINES**

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross-sectional area of the conductor.
2. Verification of Ohm's Law.
3. Verification of temperature co-efficient of resistance:
  - (i) Positive for Tungsten and Nichrome and
  - (ii) Negative for carbon.
4. Study of series resistive circuits.
5. Study of parallel resistive circuits.
6. Study of series and parallel connection of cells in circuits.
7. Preparation of Electrolyte for lead acid battery and its charging and measurement of Specific gravity with the help of hydrometer.
8. To find heat efficiency of an electric kettle.
9. Charging and Discharging of a capacitor.

10. Verification of magnetic field of a Solenoid with.
  - (i) Iron core and
  - (ii) Air core.
11. Verification of Faraday's Laws of electromagnetic induction.
12. Verification of Torque development in a current carrying coil in magnetic field.
13. Study of R.L. series circuit and measurement of power and power factor.
14. Study of R.C. series circuit and measurement of power and power factor.
15. Study of R.L.C. series circuit and measurement of power and power factor.
16. Study of R.L.C. series circuit for calculation of inductive reactance, capacitive reactance, impedance and Q- Factor.
17. Measurement of resistance by ammeter and voltmeter method and Ohm meter.
18. Dismantling and reassembly of dynamo.
19. Calibration of ammeter, voltmeter and wattmeter with the help of standard meters.
20. Calibration of single phase energy meter with the help of standard wattmeter and stop watch.
21. Controlling lamps in series, parallel and series parallel.
22. Controlling lamps for two or three places.
23. Drawing schematic diagram to give supply to consumers.
24. Practice on casing and capping wiring.
25. Practice on cleat wiring.
26. Practice on CTS/TRS wiring.
27. Practice on metal sheet weather proof rigid PVC wiring.
28. Practice on conduit wiring.
29. Practice on concealed wiring.
30. Measurement of insulation resistance of wiring installation by megger.
31. Polarity test of wiring installation.
32. Testing of wiring installation.
33. Installation of pipe earthing for wiring installation.
34. Installation of plate earthing for wiring installation
35. Soldering & Desoldering of LED, switch, IC, Resistor, Capacitors etc.
36. Study the effect of brazing on various joints

**Note:**

- The marks for sessional work will be awarded by the teacher concerned and included in the final award.
- Students may be asked to perform any one of the experiments above.

***BIS regulations, recommendations and NE pertaining to wiring installation IE regulation related to Earthing.***

## 8. LIST OF EQUIPMENT AND MATERIAL

1. Work Bench 1.8 m × 1.2 m and 1.5 m × 1.5 m, Heavy duty legs 7.5 cm × 7.5 cm with one 2.5 cm thick top of Shisham and hard wood with spirit polish.

2. Bench Vice –	1 No. 6 each	2 No. 6 each	3 No. 2 each	4 No. 2 each	Size	
3. Pipe Vice : 2 nos., size -	1 No.					
4. Hammers Ball Pien, 100 gms	6 each					
Ball Pien, 0.25 kg	6 each					
Ball Pien, 0.5 kg	4 each					
Ball Pien, 1 kg	2 each					
Ball Pien, 2.5 kg	1 No.					
5. Mallets of wood different size.	6 each					
6. Hammers of Plastic head (Plastic Mallets) of different size	3 each size					
7. Micrometer 0 to 25 mm Japanese Mitutoyo.	2 No.					
8. Inside Micrometer 5 to 30 mm Japanese Mitutoyo.	2 No.					
9. Depth gauge 20 cm Mitutoyo.	1 No.					
10. Try Square 15 cm Japanese or English	6 No.					
11. Marking Blocks Adjustable	2 sets					
12. V. Block 7.5 cm one set with clamp	2 sets					
13. Surface plate 45 cm × 45 cm	1 No.					
14. Centre Punch 10 cm length	10 No.					
15. Wire gauge SWG	1 No.					
16. Files of different length, grade and shapes Length (10 cm to 30 cm), Grade Bastered, smooth dead smooth. Shapes flat, Round, Half round, Triangular, Square, knife edge, Mill file, wooden file (Rasp file)	6 each					
Needle files of different shapes	3 each					
17. Cold Chiesel 15 cm to 20 cm Taparia/Jhalani or other standard make	6 Nos.					
18. Drills High speed steel 0.5 mm to 6 mm, 1/6 I.T. Make 6 mm to 18 mm, 1/4" to 3/4"	3 + 3 set					
	1 + 1 set					
19. Crimping Tools	2 No.					
20. Diamond Tip Glass Cutter	2 No.					
21. Hand Reamers 20 mm or other required size	1 No.					
22. Tap sets with handle 1/8" to 3/8" BSW	1 Set					
Tap set with handle 3/16" to 3/8" BSF	1 Set					
Tap sets with handle 0" to 10" BA	1 Set					

23. Dies sets with stocks 1/8" to 3/8" BSW	1 Set
Dies sets with stocks 3/16" to 3/8" BSF	1 Set
Dies sets with stocks 0" to 10" BA	1 Set
24. Screw Driver Non breakable handle Assorted	2 Set
25. Philips Head Screw Driver—Set of 10 Nos.	2 Sets
26. Pliers—Combination Insulated 15 cm, Long Nose, 15 cm, Side Cutting,	
Pliers 15 cm, Flat Nose 15 cm, Round Nose 15 cm	10 Nos. each
Bend Nose 15 cm	2 No
27. Round Nose Seal Remover Pliers 20 cm	2 No.
28. Adjustable Wrench 25 cm–30 cm	2 each
29. Pipe Wrench 25 cm–2.5 cm	2 Nos. each
30. Pipe type spanner set of 8—Spanners—SURA make	1 Set
31. Double End open spanner set of 12 spanners	2 Sets
32. Ring Spanners set of 24 spanners	1 Set
Make Jhalani/Taparia	
33. Box Spanner—set of 24 spanners	1 Set
Make Jhalani/Taparia or imported	
34. T. spanner set from 4 No. to 13 No.	2 Set
35. Allen Key set - Set of 12 pcs.	1 Set
36. Bearing/Pulley Puller	1 No.
37. Grease Gun manual Operated	1 No.
38. Oil cane	1 No.
39. Oil Stove	1 No.
40. Blower Stove	2 No.
41. Scissor 20 cm	6 Nos.
42. Sheet cutter 25 cm Blade length	2 Nos.
43. Rawl Plugs	5 Sets
44. Wooden saw 30 cm to 45 cm	10 Nos.
45. Adjustable Hacksaw	10 Nos.
46. Fix Hacksaw	10 Nos.
47. Junior Saw	2 Nos.
48. Wooden Chisels (Sathari)/ (Chaursi)	10 each
49. Electrician Knife	20 Nos.
50. Photo cutter (9" and 1")	1 each
51. Poker	20 Nos.
52. Scale 15 cm and 30 cm stainless steel Japanese make	10 each



53. Wooden Planer Wood	10 Nos.
Steel Planer (Anant Make)	5 Nos.
54. Wooden Planner for Design for one sided for groove with accessories	2 Sets
55. Phase or Neon tester (Taparia)	20 Nos.
56. Morce Taper Socket 2.3 for drill machine	1 No
57. Soldering Iron 35 Watts to 120 Watts, 35 Watts and 65 Watts (make Raj/Toni) 10 Nos. each	
120 Watts (Raj/Toni make)	2 Nos.
15 WAtts	10 Nos.
58. Thermocouple prone type for temp. control	2 Nos.
Thermocouple rod type for temp. control	2 Nos.
59. Bimetallic relay (Faridge and other relays)	2 Nos.
60. Thermostat for refrigerator, for Geyser, for Hot case	2 Nos. each
61. Dynamo D.C. small (Cycle Dynamo)	5 Nos.
62. Universal motor — 1/4 HP and 1/2 HP	1 No. each
63. Soldering Iron stand	20 Nos.
64. Demonstrational Transformer Ratio 1 : 1 230/230 V with 25%, 50%, 85.6% voltage tapping on both side	3 Nos.
65. Air Break Contractor	2 Nos.
66. Voltage Transformer 440 V/110 V	2 Nos.
67. Current transformer 5/100 amps.	2 Nos.
68. Auto Transformer 0 to 270 V 15 amps.single phase AE	2 Nos
69. Electrical Sprayer Pilot—make 800 gram capacity	1 No.
70. D.O.L. Starter—Make GEC, Crompton, Kirlosker, ABB upto 5 HP 3	3 Nos.
71. Star Delta Starter—Manually operated upto 15 HP	2 Nos.
72. Star Delta Starter—Semi Automatic upto 15 HP	2 Nos.
73. Star Delta Starter—Fully automatic with additional accessories upto 10 HP	2 Nos.
74. Torch of 4 cells portable	2 Nos.
75. Flourescent Tube Fixture with choke and starter complete	10 Nos.
76. Heating Element of different types used in industrial closed type Heating elements as Round Kettle and type other shapes	2 each
77. 3 Phase Reversing switch L & T, other best make	2 each type
78. Rotary Switches of different types as AGI make R 416, R 316, R 216, 216 K, 216 KF, RT 415, R 415 F, R 415 D	2 Nos. each
79. I.C.T.P. and I.C.D.P. Main switches	4 each

80. Distribution Boards	2 Nos.
81. Bus Bar	2 Nos.
82. Old Ceiling fan with complete parts	4 Nos.
83. Old Table fan with complete parts	4 Nos.
84. Exhaust fan with complete parts	4 Nos.
85. Old Shaded pole Motor 1/2 HP	4 Nos
86. Different types of Centrifugal Switch Assembly complete make Crompton/GEC etc.	4 Nos. each
87. Single Phase capacitor start capacitor run Motor	2 Nos.
88. Single Phase 1440 RPM old motor with complete parts	2 Nos.
89. A.C. Induction squirrel cage 3 phase motor 1440 RPM old with complete parts	2 Nos.
90. Hand drill Machine 6 mm capacity	10 Nos.
91. Electrical Gun drill machine-portable 6 mm max. capacity High speed with accessories	1 No.
92. Electrical Gun drill machine portable 12 mm capacity low speed with accessories	1 No.
93. Bench Drill machine pillar type capacity upto 12 mm or 18 mm Taper Drill and 9 mm Drill chuck capacity with all accessories and Drill chuck with key with motor single phase or 3 phase 1 HP as per facility of electricity available in the lab.	1 No.
94. Bench Grinder 1 HP 220 V, Single Phase, Three Phase power 2880 RPM with one smooth and one medium grinding wheel of Carborundum	1 No.
95. Electrical Welding machine upto 250 Amp.capacity single phase 250 Volt AC supply oil filled tank type or air cooled type with all accessories as screen, welding lead and holder, earth clamp etc.	1 Set
96. Winding Machine for Motor coil winding Hand operated	2 Nos.
97. Winding Machine for Transformer winding hand operated single coil	1 No.
98. D.C. Motor series – 1 HP, D.C. Motor Shunt-1 HP RMP 1500	1 No.
D.C. Motor Compound – 1 HP RMP 1500	1 No.
99. A.C. Motor, Single Phase, condenser Start Motor 1/2 HP and 1 HP	1 each
100. Single phase condenser run motor Fractional H.P.	3 Nos.
101. Three Phase Induction Motor 2 HP, 410 V, 1450 RMP	1 No.
102. Shade Pole Motor 1/2 HP, 1/4 HP or small	2 each
103. Demonstrational AC Single phase Squirrel cage induction conden Run F.H.P. Motor all terminal of Motors. Condenser mounted on Bakelite plate of 12 mm thickness fitted with motor on separate Mild Steel Channels	2 Nos.

104. Demonstrational type A.C. Single phase squirrel cage induction condenser start Motor 1/2 HP terminals of running winding, starting winding, condenser and centrifugal switches, mounted on bakelite 12 mm thick plate fitted with motor on separate mild steel channels 2 Nos.
105. Demonstrational Model for study of Transistor circuits (circuit fitted on sun mica 3 mm board with proper terminals I. common base, II. common emitter, III. common collector 2 Nos.
106. Demonstrational Model for study of Transistor Amplifier circuit I common base II common Emitter III common collector. Circuit fitted on sun mica board with proper Terminals 2 Nos.
107. Solenoid coil of copper wire (HTP) Highly insulated bobbin (Formula R of coil) made of mica and bakelite operating on 220 V. Copper Wire 29 SWG, length of coil at least 10 cm with two terminals mounted on side of coil. Coil will be fixed on 12 mm ply and sunmica table or 2 mmsunmica Board with 50 cm wooden or plastic rule and Core Material Free Cutting Grade Steel, Cost Iron, Copper, Brass, Aluminium, Carbon Steel one each. 2 Nos.
108. Apparatus for comparison of Aluminium and copper conductivity, resistivity and magnetic field strength. Design-table bedsize 45 cm × 30 cm of 12 mm ply with sunmica/bakelite sheet 3 mm fitted with identical coils (one copper coil wounded and one coil aluminium wounded gauge and turn of wire will be same operating on 220 V one metre rule of wood or plastic will be fitted with screws on both side of coil. Both coils having two terminals on side for connection, core will be permanently fitted inside the coil, core material wrought iron/free cutting grade of steel 2 Nos.
109. Two heating coils wounded on china clay or procelain rod one coil Ureka/ Constantan and one Nichrome wire of same gauge and same wire of length fitted on 30 cm × 38 cm board of bakelite and asbestos sheet fitted on 12 mm Ply board with brass terminal insulated for connection 2 Nos.
110. Half wave rectification model with filer circuit condenser 25 V 1000 MFD transformer 12–0–12 V I amp. output, one 50 VAC Diode 5408 and 6 terminals, fitted on sunmica board with lead and plug 2 Nos.
111. Full wave rectification model with center gap earth and filter circuit. Condenser 25 V/1000 Mfd., Transformer 12–0–12 V Amp. output, two Diode 5408–50 VAC, 6 Terminal fitted on Sunmica Board with lead and plug.
112. Full wave rectification model with full wave rectifier bridge (Bridge of 4 Diode) and II Filter Circuit Transformer 12–0–12 V 1 Amp.output, 4 Diode (No. 5408) 50 VAC Condensor 25 V/1000 Mfd. II Filter Circuit with two condensor and choke of 1 Amp. capacity 6 terminal fitted on Sunmica Board with lead and plug.

## B. Measuring Instruments

1. Ammeter MI type 0–5–10 Amps.	4 Nos.
2. Ammeter MC type 0–1–5 Amps.	2 Nos.
3. Voltmeter MI type 0–300 Volts	4 Nos.
4. Voltmeter MI type 0–600 volts	2 Nos.
5. Voltmeter MC type 0–300 volts	2 Nos.
6. Voltmeter MC type 0–15 volts	4 Nos.
7. Watt metre Dynameter type 0–300 5 amp./10 amp.	2 Nos.
8. Energy meter 230 V, 5 amps.	2 Nos.
9. Insulation megger – 500 volts	2 Nos.
10. Earth tester	1 No.
11. Neon tester	2 Nos.
12. Multimeter	2 Nos.
13. Clip on meter	2 Nos.
14. Growler inside and outside	1 No.
15. Phase sequence indicator	2 Nos.
16. Frequency meter Pointer type	1 No.
17. Frequency meter digital type	1 No.
18. Power factor meter	1 No. each
(i) Dimmerstat 230/0–270 V 4 amp.	
(ii) Rheostat (a) 1 amp. 50 ohm, (b) 10 amp. 8 ohm	
(iii) Variable Single Phase Inducter 5/10 amps.	
(iv) Capacitor 50 MF, 400 Volts	
19. Conduct Pipe Tee	6 Nos.
20. Bulbs 60 Watts	1 Dozen

## C. Consumable Material

1. P.V.C. wire 3/22	4 coils
2. Wooden Batten 12 mm × 18 mm	100 meter each size
3. Casing Copping (Standard Size)	100 meter
4. Link Clips Standard size	2 Gross

5. Nail Standard size 12 mm	1 Kg
6. Wooden screws standard size	4 Dozen each size
7. Round Blocks standard size	1 Gross
8. Wooden Board standard size	2 Dozen each size
9. Insulation Tape	1 Dozen
10. 5 Amps Switch	2 Dozen
11. 15 Amps Switch	1 Dozen
12. Batton Holder	2 Dozen
13. Pendant Holder	1 Dozen
14. Angle Holder	1 Dozen
15. 5 Amps 2 way switch	1 Dozen
16. Intermediate Switch	6 Nos.
17. 5 Amps 3 pin plug	2 Dozen
18. 15 Amps 3 pin plug	1 Dozen
19. 5 Amps 3 pin shoe	1 Dozen
20. 15 Amps 3 pin shoe	1 Dozen
21. Electric Press Connector	6 Nos.
22. Piano Type Switch Saps	1 Dozen
23. Conduit Pipe 18 mm, 25 mm	50 each
24. Junction Box	6 Nos.
25. Conduit Pipe Tee	6 M Nos.
26. Bulbs 60 Watts	1 Dozen
27. Grease	2 Kg.
28. Lubricating Oil	5 Litre
29. Insulating Varnish	