

HSC
VOCATIONAL

STANDARD XI

ELECTRICAL WIRING



O. B. CHAUDHARI

According to New Revised Syllabus

**Minimum Competency Vocational Course
(MCVC)
(T-4) Electrical Technology**

A Text Book of

**ELECTRICAL
WIRING**

PAPER - I

Standard XI

Prof. O. B. CHAUDHARI

B.E. (E & TC)

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PREFACE

I am glad to introduce this book entitled '**Electrical Wiring, Paper - I**' for the students of Standard XI (F.Y.J.C.) taking Minimum Competency Vocational Course of Electrical Technology. This book is written according to new revised syllabus effective from 2016 - 2017.

While writing this book, more attention is placed on explaining basic principles of Electrical Wiring. I hope that this book will provide necessary and sufficient information of this subject.

I acknowledge sincere efforts taken by Hon. Shri. Dineshbhai Furia, Jignesh Furia and Staff of Nirali Prakashan for bringing out this book in a short period.

I am thankful to all my family members for their interest, patience and encouragement.

I will be grateful to receive any comment about the contents of this book. It will help to improve the contents in its formatting edition.

November, 2016

Author

SYLLABUS

1. Safety Precautions and Shock Treatment

Shop discipline, electrical shocks and procedure for separating person from contact with live wire, first Aid different methods of artificial respiration, electrical fire, fire extinguisher.

2. Electrical Common Tools

Electrical tools, pliers, combination, side cutting, round nose, long nose, Screw drivers, connectors, electrical knife, neon tester, test lamp, series test lamp, Pincer, line dori, plumb bob, steel rule, Tenon saw, Hacksaw, Hammer, symbols used in electrical technology, reading of electrical drawing.

3. Current Electricity

Introduction, generation of electricity, types of electricity, effect of electricity and appliances, different energy sources, E.M.F., potential difference, current, voltage, resistance, conductance, power, energy, specific resistance, energy billing for a month, direct current and alternating current.

4. D. C. Circuits

Ohm's law, series circuit, parallel circuit, series and parallel combination, types of electrical circuit.

5. A. C. Circuits

Introduction, importance, star delta, capacitor, fundamental of A.C. circuits, introduction of different circuits, power factor, classification of materials, cables and wires, insulation low, medium, high voltage.

6. Fuse and Soldering

Introduction, common fusing material, miniature circuit breaker (MCB), molded case circuit breaker (MCCB), earth leakage circuit breaker (ECB), soldering equipment precautions.

7. Common Electrical Wiring Accessories

Wire accessories, lamp, holders, other accessories, distribution board, types of wiring, types of wires.

8. Domestic Wiring (House Wiring)

Introduction and necessity of wiring, selection of wiring, types of wiring, IE rule of domestic wiring, testing and installation of domestic wiring, earthing formats for electrical connection.

9. Illumination

Introduction, lighting and fixtures.



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1

Safety Precautions and Shock Treatment

- 1.1 Shop discipline
- 1.2 Safety precaution regarding electric shocks
- 1.3 First Aid different methods of artificial respiration
- 1.4 Electrical fire
- 1.5 Fire extinguishers

INTRODUCTION

Electric shop should have all the facilities and technician should be familiar about the safety precautions. The owner of shop should provide all types of fire extinguishers, artificial respiration system and all necessary tools in good condition to technicians. In this chapter, we will study some safety precautions, different methods of artificial respiration and fire extinguishers.

1.1 SHOP DISCIPLINE

Before starting a electrical shop one should have knowledge about the Government IE rules, safety precautions and tools used. Some of the disciplines are listed below :

- i) All the electric shops should have government licence including CST, BST and PAN or TAN number.
- ii) All the shops should have three phase and single phase supply.

- iii) All the shops should provide different types of technicians for installing different electric home appliances.
- iv) Shop should provide different tool boxes for technician to install the home appliances at far away place.
- v) Tools used in tool box should be insulated, tight and sharp.
- vi) Technician should have enough knowledge of installing appliances and must be experienced from supply.
- vii) Field technician should be used insulated things and tools to keep away himself from mains supply.

● **Discipline Regarding the Persons Working in Shop**

- i) All the technicians should attend the shop regularly in time with well dressed uniform.
- ii) Clean the place of work and then switch ON the supply.
- iii) All the sockets of supply should to check the electric be properly earthed.
- iv) There should be series and parallel test point sockets to check the electric appliances.
- v) There should be a separate compartment for all the electric assessories.
- vi) Flexible wires should be wound on rounded wood box and hang on the top.
- vii) There should be facility for checking tubelights and other gadgets.
- viii) The technicians or workers should be polite to the customers.
- ix) They should show the accessories whatever the customer want and notify the rates whatever rates are marked on accessories.

1.2 SAFETY PRECAUTIONS REGARDING ELECTRIC SHOCKS

1. Person working on electric wiring may get electric shocks.
2. If a person is in contact with live electric conductors or any appliance, firstly switch OFF mains.

3. If main switch is at far away place then firstly insulate yourself with rubber or dry wood then try to separate him from supply with help of dry wood.
4. While working on overload line, switch OFF the main supply and keep the fuse with you and keep the damage board near the place that the person is working on electric supply.
5. Person getting electric shock can not be kept live for long time through artificial respiratory system. First call the Doctor and arrange for artificial respiration system.
6. Artificial respiratory system should be kept on unless the Doctor declare that person is dead.
7. Person working on electric poles should keep first Aid box with him like rubber, gloves, belt etc.
8. While working on overload line, keep away your body or head from conducting wire.
9. While working on overload line, short the line with iron rod to earth.
10. While wiring the place, earthed the open conductor properly.
11. Live conductor should be control through switch.
12. Loose insulated tools and wire should not be used.
13. Switch ON or OFF the supply confidently, do not hesitate to switch ON or OFF the supply.
14. Do not pull the flexible wire to disconnect the supply to the appliance, always disconnect it by pulling out holder firmly.
15. Follow all the rules while working on live circuit and insulate yourself with rubber and canvas shoes.
16. Do not touch any live conductor unless you do not know whether it is properly earthed or not.
17. Do not use the fired fuse unless you knew the purpose of firing.
18. Do not switch ON the supply for which circuit is control by it.

19. Unauthorised person should not be allow to touch electric appliances which are not working properly.
20. While preparing electrolyte do not add water to acid. Add small amount of acid to large quantity of water.
21. Do not bring any fire article near the battery.
22. Do not through water immediately on the appliance which are in contact with fire.
23. First switch OFF mains and use fire extinguisher to remove fire from the appliances.
24. Earthed properly all the electric sockets.

● **Procedure for Separating the Person From Contact with Live Wire**

1. Switch OFF the mains supply.
2. If mains are at long distance than firstly insulate yourself through rubber sheet or rubber shoes and then try to separate the person through dry wood.
3. Pull the person loose part of dry shirt and try to separate him from supply.
4. Even if person does not appear hurt he still need medical treatment.
5. After separating the person from electric shock check its vital signs such as breathing, heart beats etc.
6. Check the injuries and apply cold running water on burnt wounds for ten minutes.
7. If the person is bleeding, apply pressure and elevate the wounded area.
8. If spinal injury is suspected from a fall avoid moving head or neck of person.
9. Arrange for artificial respiration system if person become unconscious.

1.3 FIRST AID DIFFERENT METHODS OF ARTIFICIAL RESPIRATION

(I) Schafers Prone Pressure Method

- i) Lay the patient on his belly, (see in position 1) one arm extended directly overhead and other arm bent at elbow with face turned outward and resting on second hand or forearm so that nose and mouth are free for breathing.



Position 1



Position 2



Position 3

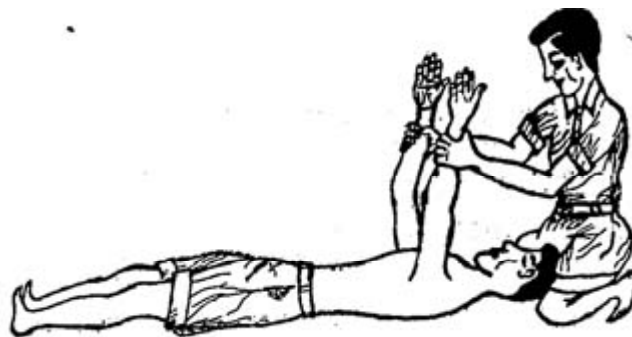
Fig. 1.1 : Schafers Prone Pressure Method

- ii) Kneel, straddling the patient's thighs, with your knees placed at such a distance from the hip bones as will allow you to assume position 1 in figure. Place the palms of the hands on the small of back with fingers resting on the ribs, the little finger just touching the lowest rib with

the thumbs and finger in natural position and tips of finger just out of sight.

- iii) With arms held straight, swing forward slowly so that weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of forward swing (see in position 2 of Fig.1.1) Do not bend your elbows. This operation takes two seconds. Now immediately swing backward so to remove pressure (see in position 3 in Fig. 1.1). Repeat the procedure 12 to 15 times a minute. Pressure should be according to patient body size.
- iv) As soon as artificial respiration has been started and while it is being continued, an assistant should loosen any tight clotting about patient neck. Do not give any liquid whatever by mouth until patient is fully conscious.
- v) To avoid strain on heart when the patient revives. He should be kept lying down and not allowed to stand or sit up. If Doctor has not arrived by the time the patient has revived, he should be given some stimulant such as teaspoonful of aromatic spirit of ammonia in small glass of water or tea or coffee to keep patient warm.
- vi) Artificial breathing should be continue until natural respiration is not certain indication.

(II) Silverter's Method



Position 1



Position 2

Fig. 1.2 : Silverter's method

The patient is laid on his back. His arms are grasped above the wrist and drawn first upward and then above the head until they touch the floor. Then they are brought back to chest and pressure is exerted in downward direction. The main defect of this method is that the tongue which is boneless mass of muscle, having lost its tongue due to lack of respiration, tends to fall back and block the wind pipe in about 50% of cases, causing choke so, a second operator has to pull out tongue and hold it. But some time no second man may be available. If, however a large thick pad is placed behind the shoulder so that the head lies dangling downward the tongue does not seem to obstruct.

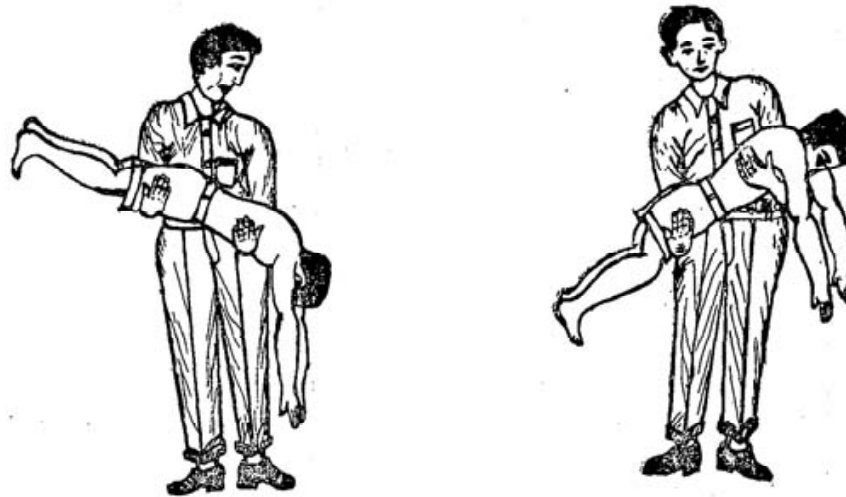
(III) Eve's Rocking Method



Position 1

Position 2

For adults



Position 1

Position 2

For children

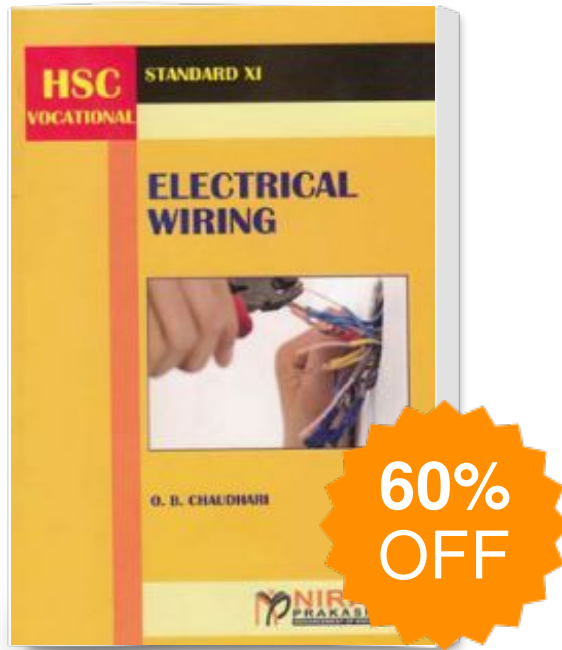
Fig. 1.3 : Eve's Rocking Method

In this method, the patient is placed prone on a stretcher and his hands tied to its frame. He is then rocked by tilting the stretcher 45° down and 45° up repeatedly. Such special rocking stretchers are unlikely to be available readily. It may, however, be possible to use light two-wheeled hand carts for this purpose. This method is very easy for children. The operator stands holding the child in his hand and rock in this manner. It has been claimed that the rocking which is peculiar to this method induces great circulation of blood in body and brain helping earlier recovery.

(IV) Mouth to Mouth Method

- i) Place the victim on his back. Place his head slightly downhill if possible a folded coat under victim's shoulder will help to maintain proper position. Tilt head back so that chin points straight upward.
- ii) Grasp the victim's jaws (see position '1' in Fig.1.4) until lower teeth are higher than upper teeth. Otherwise place fingers on both sides of jaws near ear lobes and pull

Electrical Wiring Paper - I



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