CERTIFICATE COURSE IN ELECTRICIAN

(6 MONTHS COURSE)

STATE BOARD OF TECHNICAL EDUCATION & TRAINING

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CERTIFICATE COURSE IN ELECTRICIAN

Duration: Six Months

SUB CODE	NAME OF THE SUJECT	PERIODS/WEEK		TOTAL PERIODS PER 6 MONTHS	SCHEME OF EXAMINATION			
	Theory	Theory	Practicals		Duration Hours	Sessional Marks	End Exam Marks	Total Marks
ET.101	ELECTRICAL WORKSHOP-1	03	--	50	02	--	100	100
ET.102	ELECTRICAL WORKSHOP-2	03	--	50	02	--	100	100
ET.103	ELECTRICAL WORKSHOP lab-1	--	05	75	02	40	60	100
ET.104	ELECTRICAL WORKSHOP Lab-2	--	05	75	02	40	60	100
	TOTAL	06	10	250	--	--	--	400

SUBJECT TITLE : ELECTRICAL WORKSHOP-1
SUBJECT CODE : ET-101
PERIODS/WEEK : 03
PERIODS/YEAR : 50

S.NO.	MAJOR TOPICS	NUMBER OF PERIODS
01	Occupational Safety and Health	05
02	Classification of electrical materials	05
03	Tools : Solders	10
04	Wiring equipment	10
05	Electrical Wire Connections	10
06	Estimation & Cost	10
	TOTAL	50

Unit-1 : Occupational Safety and Health Basic safety introduction, Personal protection. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution and personal safety message. Use of Fire extinguishers. Visit and observation of sections. Various safety measures involved in the Industry. Elementary first Aid. Concept of standardization

Identify and specify of different types of tools used : Cutting Pliers, screw driver set, tester , rawl Plug, Poker, Hand Drill, Power Drill, Concrete Drill,concrete Chipping machine, Continuity tester, crimping tool,Nose plier, Wire splicer, wire gauge, wire cutter

Unit-2 : Classification of electrical materials - Electron theory- free electrons, Definition and properties of conductors, semiconductors and insulators Classification of insulating materials- Voltage grading & Permissible temperature rise.

Identify and specify different types of wires, cables used for different current, voltage ratings
Types of wire joints & their uses. Precautions in using various types of cables

Unit-3 : Solders, flux and soldering technique. Types & properties of resistors - Fundamentals of electricity – Terms & definitions, effects of electric current, EMF, voltage, P.D, Resistance & conductance. Their units. Ohm's Law - Simple electrical circuits Definition of electric circuit, requirements to construct a simple circuit, types of circuits such as open, Close, short & earth/leakage circuit.

Unit-4 : Identify and specify different types of switches - One way and two way switches, Rotary switches (on/off type and pole changing type) modular switches **Identify and specify different types of sockets and plugs** -2-pin, 3-pin and 2 in 1 sockets- **Identify and specify different types of conduits and accessories-** Metal conduit, PVC conduit and Flexible conduits. bends, junction boxes, elbows etc **Identify and specify different types of accessories -** Ceiling rose, round block, concealed and surface switch boards, modular switch enclosures, blank insert-

Study of safety devices and MCB distribution board- Fuses - Materials for fuse wire, Glass cartridge, HRC, Kitkat, round bottle type -Types of fuse units Types of isolators DP & FP- Types of MCB's -SP,DP,TP,FP- Difference between isolator and MCB

Unit-5 : Introduction and explanation of electrical wiring - systems, cleat wiring, casing & Capping, CTS, - Conduit and concealed etc., - I. E. Rules. Related to wiring, Introduction Modified IE Rules National Building - codes for house wiring- specification and types, rating & material, wires and fixtures

Lamp circuits General rules of wiring lighting circuits - Methods of wiring -Joint -box system - Loop in system- Connection of a fluorescent lamp circuit - Connection of a ceiling fan through a electronic regulator

Unit-6 : Concept and Principle of plan, estimation and cost. - Preparation of complete house wiring layout - General rules of wiring power circuits. - Calculation of load current, size of the conductor required, study of specifications printed on wire/ cable boxes

SUBJECT TITLE : ELECTRICAL WORKSHOP-2
SUBJECT CODE : ET-102
PERIODS/WEEK : 03
PERIODS/YEAR : 50

S.NO.	MAJOR TOPICS	NUMBER OF PERIODS
01	**Test On Electrical Energy**	05
02	**Connection of Energy meter and loads**	05
03	**Domestic Appliances**	10
04	**Safety of Electrical loads**	10
05	**3-phase AC Connection**	10
06	**1-phase Induction motor**	10
	TOTAL	50

Unit-1 : Tests to be conducted before energizing a electrical installation - Use of merger for testing - **Earthling** - Principle of different methods of ear thing. i.e. Pipe and plate earthling - Importance of Earthling. - Improving of earth resistance -Use of Earth Leakage circuit breaker (ELCB) and RCB as per BIS codes

Unit-2 : General idea of fixing meter boards & taking service connection. Sealing of I.C. cut out & meters as per I.E. Rules - ***Concept of*** Power drives (SCR Speed controllers etc..) - Introduction, types, advantages & disadvantages. - UPS- Introduction, - Types-On Line & Off line UPS , Load calculation, Back up time calculation, Installation of inverter , Selecting battery capacity

Unit-3 : Study of the following domestic appliances - a) Electric iron box (automatic/non automatic) b) Fan (ceiling/table/pedestal) - c) washing machine d) mixer
Study of the following domestic appliances - Immersion heater - Electric geyser - Induction heater - Electric oven

Unit-4 : Study of the following – Stabilizer – UPS, Inverter – Necessity of Starter - Construction of DOL and Star Delta starters - Function of Contactor and over load relay - Control and Power circuits of DOL and Star Delta starters - Selection of starter for induction motors

Unit-5 : 3-ph A C induction motor construction of induction motor – Stator, Rotor - connect a 3-phase induction motor through a starter -and run the motor in either direction - effect of change in phase sequence - Types of armature winding - Single layer winding, Double layer winding, Three phase winding diagram

Unit-6 : Single phase induction motor- Identify the Parts of single phase induction motor - Single phase capacitor motors - Connection diagram - Identify the Parts of universal motor - Connection diagram

SUJECT TITLE : ELECTRICAL WORKSHOP LAB-1 (PRACTICALS).
SUBJECT CODE : ET 103
PERIODS/WEEK : 05
PERIODS/YEAR : 75

S.NO.	MAJOR TOPICS	NUMBER OF PERIODS
01	**Demonstration of safety measures**	**10**
02	Practice in using cutting pliers, screw drivers	**15**
03	Practice on soldering	**10**
04	Practice on installation electrical accessories	**10**
05	**Practice of wiring on minor work**	**10**
06	**Practice of wiring on major work**	**20**
	TOTAL	**75**

Unit-1 : Safety measures and DO's and DON'T's to be observed & followed in the electrical workshop. Demonstration on elementary first aid. Artificial Respiration. - Practice on use of fire extinguishers. - Demonstration of electrician hand tools. - Use, care & maintenance of various hand tools. Exercises on Measurement of length, depth, diameter etc.,

Unit-2 : Practice in using cutting pliers, screw drivers etc. Identification of simple types of screws, nuts, bolts, clamps, rivets etc. fixing of ceiling bolt hook - Skinning the cables and jointing practice on single strand wire. - Demonstration & Practice on bare conductors joints-such as Britannia, straight, Tee & Western union. -Demonstration and identification of different types of cables. - Demonstration & practice on using standard wire gauge. Practice on crimping thimbles & Lugs. - Examination and checking of cables

Unit-3 : Practice on soldering- Measurement of Resistance. - Verification of Ohm's Law. - Verify the characteristics of series and parallel resistive circuits. - Verification of open circuit and closed circuit network.

Unit-4 : Practice on installation common electrical accessories. - Fixing of switches, holder plugs etc. in T.W. boards, PVC gang boxes and modular switch boards - Practice on installation and testing of safety devices - Fixing of MCB'S in MCB D.B's

Unit-5 : DOMESTIC WIRING - METHODS, - INSTALLATION - Demonstration & Practice on connecting common - electrical accessories in circuits and testing them in series board. Demonstration on Testing & replacement of different types of fuses. Identification of different wiring materials and their specifications. - Removing of insulation from assorted wires and cables. Demonstration and practice crimping thimbles/lugs of various sizes. Jointing practice with single and multi-stranded conductors of different wires and cables. - Layout on wiring boards. Practice in P.V.C. insulated cable wiring on wood buttons with distribution board and number of points. Branching of circuits with respect to loads such as

lighting and power. - CTS/PVC Conduit-surface and concealed/metal conduit/PVC casing and capping. regarding clip distance. Fixing of screws, cable bending etc.

Practice of wiring:

A) One lamp controlled by one SP switch,

(B) Two lamps controlled by two independent switches,

(C) One lamp controlled by two 2way switches (Staircase wiring),

(D)One lamp controlled by intermediate switch from three different locations,

Unit-6 : Hospital wiring, - Godown wiring, -Hostel wiring, - Bell Buzzer Indicator wiring - Domestic wiring practice - Practice on power wiring: Connection of computer switch board - Power circuit for a Air conditioner - Connect and test an air conditioner

SUJECT TITLE : ELECTRICAL WORKSHOP LAB-1I (PRACTICALS).
SUBJECT CODE : ET 104
PERIODS/WEEK : 05
PERIODS/YEAR : 75

S.NO.	MAJOR TOPICS	NUMBER OF PERIODS
01	Wiring Installation	10
02	Industrial Wiring Installation	15
03	Dismantle of Home appliances	10
04	Repair of AC Motors	10
05	Test on Induction motor	10
06	Rewinding of motors	20
	TOTAL	75

Unit-1 : Demonstration of testing of wiring installation : 1.Continuity test 2. Polarity test 3. Insulation resistance test between phase conductor and neutral conductor using merger - **Practice on Earthing** – Different methods of earthing - Measurement of Earth resistance by earth tester. Connection of ELCB and RCCB's.

Unit-2 : Industrial wiring installations for mixed load, both light and power. - Layout of L.V. AC/DC machines and their panels. Wiring of Low power A.C./ D.C. machines in metal conduit system as per I.E. Rules. - Testing of wiring installation = Installation of 1 ph. and 3 ph. on line / off line UPS wiring. Testing of Industrial wiring and UPS wiring installation. - Installation of inverter & its wiring

Unit-3 : Dismantle, Identify the parts, trouble shoot, repair and re-assemble the following: Electric iron box (automatic/non automatic), Fan (ceiling/table/pedestal), washing machine, mixer - Dismantle, Identify the parts, trouble shoot, repair and re -assemble the following: Immersion, heater, Electric geyser, Induction heater, Electric oven

Unit-4 : Trouble shoot and repair the following by Identifying the various components and tracing the circuit of the following: Stabilizer, UPS - Identify the parts, trouble shoot & repair the following AC motor starters - 1-phase and 3-phase DOL starter- Star Delta starter, Inverter

Unit-5 : Identify the parts of a 3-phase squirrel cage induction motor - Testing of AC induction motor stator winding - Practice on rewinding of 3-phase induction motors.

Unit-6 : Practice on rewinding fan motors - Practice on rewinding mixer motors

Reference books:-

1) Basic Wireman Wiring Estimating & Costing by Ml Anwani

2) Electrical Estimating and costing by j.b.gupta

3) Practical motor rewinding by K B Bhatia

4) Electrical technology by BL Teraja or JB Gupta

5) ITI Electrician text books

5) Some circuit diagrams and procedures are available on internet