

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION,
MUMBAI - 51**

1	Name of Course	Certificate Course in Electrical Equipment Services							
2	Course Code	302211							
3	Max. Nos. of	25 Students							
4	Duration	1 Year							
5	Type	Full Time							
6	Nos. of Days /	6 Days							
7	Nos. of Hours	7 Hrs							
8	Space Required	Theory Class Room – 200 sqft Practical – 1000 sqft Total – 1200 sqft							
9	Entry Qualification	S.S.C. Passed							
10	Objective of Syllabus/ introduction	1. Knowledge of electrical circuit. 2. Types of electric wiring. 3. Types of electrical appliances							
11	Employment Opportunity	Wage Employment: 1. Assembler of Domestic Appliance 2. Repairer of Domestic Appliance				Self Employment:- 1. To start the repair shop 2. To start the Dealer ship and Agency.			
12	Teacher’s Qualification	Diploma / Degree in Electrical							
13	Training System	Training System Per Week							
		Theory		Practical		Total			
		18 Hours		24 Hours		42 Hours			
14	Exam. System	Sr.	Paper Code	Name of Subject		TH/PR	Hours	Max. Marks	Min. Marks
		1	30221111	Fundamental of Electricity		TH-I	3 hrs.	100	35
		2	30221112	Domestic Appliances		TH-II	3 hrs.	100	35
		3	30221121	Fundamental of Electricity		PR-I	6 hrs.	200	100
		4	30221122	Domestic Appliances		PR-II	6 hrs.	200	100
				Total				600	270

SYLLABUS

Theory - I Fundamental of Electricity

No.	Chapter	Contents
1	Tools	Introduction , identification ,Use & Safety precautions of Tools. – Pliers, Neon Tester , Connector , Screw driver, Knife , S .W .G . Hammers, Hand drill machine , Mallet, Spanners , Bench vice ,Test lamp.
2	Safety Measure	Electric shock : causes of Fire ,& shock , Precautions to avoid Fire & shock . First aid & shock treatment : Treatment for electric shock & burns . Methods of Artificial Respiration.
3	Current electricity	Conductor ,Insulator , Semiconductor . Definition Units Of e. m. f ., P .D , current , resistance , resistance Law , Sp . resistance , Temp . coefficient , work, power and energy.
4	D.C. Circuit	Ohm law with examples ., series circuit , parallel circuit circuit , compound circuit and examples
5	Effects of Current	Physical effect., Heating effect, lighting effect, magnetic effect, X-ray effect. Joule's law, heating coil material and properties, data for designing coil
6	A.C. Circuit	A .C . related Terms – frequency , R .M .S . etc. Types of A .C. circuits, Power factor , relation between kW , kVA , kVAR
7	Measuring Instrument	Classification of instruments, Forces required for instruments ,Types i.e. moving coil, moving iron, hot wire
8	Capacitor	Definition ,Types of capacitor, capacitor in series and parallel ,Uses
9	AC single Phase Motor	Working principle , types & uses i.e. split phase , capacitor , shaded pole , universal motor .
10	DC Motor	Definition ,working principle, parts, types, uses.
11	Transformer	Working principal , construction ,types , transformer ratio (Turns , Voltage , Current) E .M .F . equation , Efficiency , cooling methods . Auto transformer .
12	Battery	Primary cell, Types. Different terms , Secondary cell-Types i.e. Lead acid cell, Nickle iron cell
13	Basic Electronic Components	Semiconductors and types. Diode- working Rectifier -half wave ,full wave, Filters, Transistor & Its type .
14	Poly Phase Circuit	Sine wave of three phase supply, IL,IP,VL,VP in star and delta connection, measurement of power in three phase circuit.
15	Three phase motor	All types of A .C . motors , induction motor working , types of induction motor , , principal of 3 phase induction motor & main parts , synchronous speed , slip .
16	Three Phase Starter	Functions , types , sketches ,

Practical - I

Fundamental of Electricity

1. Study the different Tools
2. Study the insulating materials.
3. Study the conducting materials.
4. Study the different methods of artificial respiration.
5. .Measuring the gauge of different wires.
6. .Study the different lubricants.
7. .Study the different magnetic materials.
8. To verify ohm's law.
9. To study the properties of series circuit.
10. To study the properties of parallel circuit.
11. Connect ammeter and voltmeter in the circuit.
12. Find the wattage of given load.
13. To verify faraday's law of electro-magnetic induction.
14. To study the making of heating element.
15. To connect the energy meter in the circuit.
16. To prepare earthing and earth testing.
17. To study the construction and working of multimeter.
18. To study the construction and working of megger.
19. Control one lamp from one location (Casing Capping wiring)
20. Control two lamp from two location (Casing Capping wiring)
21. Control two lamp from two location (Conduit wiring)
22. Control two lamp from two location (Conduit wiring)
23. To prepare one point series parallel testing board.
24. To prepare two point Extension board.
25. To study the construction and working of electronic Devices
26. To study the construction and working of Half wave rectifier.
27. To study the construction and working of Full wave rectifier.

Theory - II

Domestic Appliances

No.	Chapter	Contents
1	Tube	Introduction , construction, working principle, common faults , causes-Testing and repairs.
2	Iron	Introduction, construction, working principle, Types common faults , causes-Testing and repairs.
3	Toaster	Introduction, construction, working principle, Types common faults , causes-Testing and repairs.
4	Room Heater	Introduction, construction, working principle, Types common faults , causes-Testing and repairs.
5	Stove/ Hot plat/	Introduction, construction, working principle, common faults , causes-Testing and repairs.
6	Electric oven/Electric Ranges	Introduction, construction, working principle, common faults , causes-Testing and repairs .
7	Water heater	Introduction , construction, working principle, Types, common faults , causes-Testing and repairs.
8	Bell/ Buzzer	Introduction , construction, working principle, common faults , causes-Testing and repairs.
9	Emergency light	Introduction , construction, working principle, common faults , causes-Testing and repairs.
10	Fan	Introduction , construction, working principle, Types, common faults , causes-Testing and repairs.
1	Room heater (Blower Type)	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.
2	Hair Dryer	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.
3	Mixer	Introduction , Parts and construction, working principle, common faults ,Speed control methods , causes-Testing and repairs.
4	Room Cooler	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.
5	Vacuum Cleaner	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.
6	Drill Machine	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.
7	Voltage stabilizer	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.
8	Inverter	Introduction , Parts and construction, working principle, common faults , causes-Testing and repairs.

Practical - II

Domestic Appliances

1. Testing of water heater and power calculation.
2. Testing of Rod type room heater.
3. Testing of tube, starter and choke.
4. Connection and installation of tube light.
5. Testing of electric kettle and power calculation
6. To study the parts of electric ordinary iron.
7. Testing and fault finding of ordinary iron.
8. Testing and fault finding of automatic iron.
9. Testing and construction of night lamp/ spot light.
10. Testing , construction and installation of electric bell.
11. Study the construction of electric stove.
12. Testing and fault finding of electric stove.
13. Testing and fault finding of electric Toaster.
14. Testing ,fault finding and installation of sodium vapour lamp.
15. Testing ,fault finding and installation of Mercury vapour lamp.
16. Testing ,fault finding and installation of Neon lamp.
17. Testing and fault finding of Blower type room heater.
18. Repairing the Blower type room heater.
19. Testing and fault finding of ceiling fan.
20. 20.Installation of ceiling fan.
21. Testing and fault finding of Mixer cum grinder.
22. Repairing of Mixer cum grinder.
23. Oscillation mechanism testing and overhauling.
24. Testing and fault finding of Washing machine
25. Testing and fault finding of Room cooler.
26. Testing and fault finding of vacuum cleaner.
27. Testing and fault finding of Table fan
28. Testing and fault finding of Emergency light.
29. Testing and fault finding of Hair Dryer
30. Testing and fault finding of voltage stabilizer.
31. Testing and fault finding of El. Drill machine.
32. Testing and fault finding of motor used in domestic appliance.

List of Materials

Sr. No.	Details of Materials	Quantity
1	Voltmeter a.c. 0—250v	4 No.
2	Voltmeter D.c. 0—250v	4 No.
3	Voltmeter a.c. 0—500v	4 No.
4	Voltmeter D.c. 0—30v	4 No.
5	Ammeter A.C. 0—1 Amp.	4 No.
6	Ammeter A.C. 0—10 Amp.	4 No.
7	Ammeter A.C. 0—5 Amp.	4 No.
8	Ammeter D.C. 0—1 Amp.	4 No.
9	Ammeter D.C. 0—5Amp.	4 No.
10	Speedometer	1 No.
11	Wattmeter 0—250W	1 No.
12	Wattmeter 0—500W	1 No.
13	Wattmeter 0—1500W	1 No.
14	Energy meter 5-15Amp.	1 No.
15	Power Factor meter	1 No.
16	Frequency meter	1 No.
17	Galvanometer	1 No.
18	Rheostat 50 ohm's	4 No.
19	Rheostat 450 ohm's	4 No.
20	Rheostat 1150 ohm's	4 No.
21	D.C. power supply 30V—1Amp.	1 No.
22	Tube fitting	4 No.
23	Ordinary iron	4 No.
24	Automatic iron	4 No.
25	Toaster	2 No.
26	Room heater Rod type	1 No.
27	Electric stove	1 No.
28	Hot plate	1 No.
29	Oven	1 No.
30	Cooking range	1 No.
31	Water heater Immersion type	1 No.
32	Water heater Instant type	1 No.
33	Water heater Storage type	1 No.
34	Bell	2 No.
35	Buzzer	2 No.
36	Emergency light	1 No.
37	Split phase motor	1 No.
38	Capacitor start induction motor	1 No.
39	Permanent capacitor motor	1 No.

40	Shaded pole motor	1 No.
41	Universal motor	1 No.
42	D.C. Series motor	1 No.
43	D.C. Shunt motor	1 No.
44	D.C. Compound motor	1 No.
45	Lead acid battery	1 No.
46	Three phase main switch 16 amp.	2 No.
47	Three phase main switch 32 amp.	2 No.
48	Three phase motor 1 HP	1 No.
49	Three phase motor 3HP	1 No.
50	Three point starter	1 No.
51	D. O.L. starter	1 No.
52	Star Delta starter Manually operated	1 No.
53	Star Delta starter Automatically	1 No.
54	Room Heater Blower type	1 No.
55	Hair Dryer	1 No.
56	Mixer	1 No.
57	Room Cooler	1 No.
58	Vacuum Cleaner	1 No.
59	Electric Hand Drill machine	1 No.
60	Voltage Stabilizer	1 No.
61	Inverter	1 No.
62	Work Bench	4
63	Bench vice	4
64	Pipe vice	1
65	Armature holder	2
66	Steel rules / Measuring Tape	2 each
67	Micrometer / Varnier calipers	2 each
68	S.W.G.	4
69	Filler gauge / Dial Gauge	4 each
70	Multi meter	4
71	Try square	4
72	Pipe cutter	1
73	Hacksaw with blade	6
74	Hand Drill machine	4
75	Chisel /files	4 each
76	Spanner Set (Double Ended ,Ring , Box)	1 each
77	Screw Driver / Pliers/ Tester /Wire stripper	20 each
78	Hammer /Mallet / Electrician knife	10 each
79	Pocker / Firmer chisel / Tennon saw	4 each
80	Tungstan wire /Nicrome wire	As required.

List of Reference Books :

No.	Name of the book	Author
1	Basic Electrical Engineering	M.L. Anwani
2	Study of Domestic Appliances	R.K. Bhatia
3	Electrical wiring Estimating and costing	S.L. Uppal
4	Electrical Appliances	I.M. Anwani
5	Basic Electrical Engineering vol- 1,2,3,4	P.P.Shah
6	Basic Electrical Engineering vol.1,2,3,4	B.L. Thareja
7	Electrical Machine	V.K.Mehata
8	Indian Electricity Rules	Nausheer Bharucha D.B. Taraporewala sons and co.
9	Vidyutshastra vol.1,2,3,4	P.P.Shah
10	Domesric Appliance XI and XII	Shri Bobade
11	Audel's Home Appliance servicing	Edwin P. Anderson
12	Small Appliance vol-2	Jack Darr
13	Small Home Appliance(Book II)	Jack Darr
14	How to repair major appliances	Ernest Tricomi
15	Basic Appliance Repair	Cliff Porter
16	Electrical Appliances: Installation and Maintenance (Second Edition)	E.Molloy
17	Basic Electronics	Berard Grob
18	Electrical Technology	H.Cotton
19	Elementary Electrical Engineering	M.L.Gupta
