GOVERNMENT OF THE PUNJAB

TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY

CURRICULUM FOR

MOTOR WINDER

(6 – Months Course)

Revised April 2016

APPROVED
Date: 7-4-16
Sign:

CURRICULUM SECTION
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TRAINING OBJECTIVES

Electrical power has basic & fundamental role for the functions of industry as all the industry based on it all over the world. Most of the machines are operated by the electrical power in the industry and the electric motors are playing the continuous fundamental character / role. This curriculum for motor winder having duration of six months is developed / devised keeping in view the demand of the job market & its trends by more focusing on practical and necessary required theoretical knowledge along with work ethics.

This curriculum covers the major topics of work shop practice (bench fitting), electric circuits, generators, measuring instruments, transformer, winding of motors & their connections , winding technology, mathematics, drawing along with Functional English and Information Technology.

CURRICULUM SALIENTS

Name of the course	Motor Winder
Entry Level	Middle
Duration of Course	6 – Months
Total Training Hours	800 Contact Hours
Training Methodology	Practical 80% Theory 20%
Medium of Instruction	Urdu / English

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SKILL PROFICIENCY DETAILS

On successful completion of the course, is trainee should be able to: -

1. Use and care of hand tools and bench tools
2. Mark sawing, filing, drilling and threading safely
3. Make of terminal plates, making of complete terminal plate box, making of clamps.
4. Use and application of soldering irons and soldering bit.
5. Solder and join exercises i.e. joining sheets, jointing of cables and wire, soldering of terminals and cable lugs (thimbles).
6. Handle the wires, lying of wires, shaping of wires, lacing of wires.
7. Trim, strip of single wire, stripping of cable, bend of single strand and stranded wire to make eyes.
8. Use and care of AVO -meter (Ohm meter, volt Mater, Ampere meter) Megger,
9. Use the growler, tachometer, vernier caliper and micrometer.
10. Adopt & interpret the information in the name plate of electric motor.
11. Record pertinent data from D.C armature.
12. Care and use the coil winding machine.
13. Draw of winding diagram and symbols.
14. Trace simple machine winding connections and preparing the corresponding diagram.
15. Repair the fan regulators, chokes, miniature transformer (Bell transformer, voltage regulator).
16. Prepare the coils according to the old winding proper looping of coil sets and connecting to main terminals.
17. Prepare the commentator segments and connections
18. Prepare and form (pattern) according to the span (coil pitch).
19. Prepare the coils with the help of form (pattern) according to the coil pitch.
20. Prepare the coils with the help of the pattern (Single coils or set of coils).
21. Prepare the slots insulation and placing them in the slots.
22. Prepare the single or set of coil according to the coal division and embedding slots insulation a placing in the slots.
23. Divide the pole division and embedding in the slots.

24. Strip the winding wire ends.
25. Correct lacing or taping of end coils and use proper sleeves.
26. Correct procedure of dismantling and assembling of single-phase motors and connection of capacitors.
27. Dismantle and assemble of 3 phase motors and removing of burnt winding.
28. Loop according to the diagram of old winding and final connection to the terminal plate.
29. Make the final connection to the terminal plate of split phase motors.
30. Correct jumper of coil groups (per pole and per phase).
31. Prepare the terminals and terminal plates of motor / generator according to the international standard.
32. Dry, varnish and baking windings and coils
33. Test of starting switches, solid-state switch etc.
34. Correct handling and testing the bearings including correct procedure of removing and installing them.
35. Use the puller properly.
36. Make series and parallel connection of winding coils
37. Make the connections of terminal of wires in the armature winding to the appropriate communicator segments.

KNOWLEDGE PROFICIENCY DETAILS

On the successful completion of the course the trainee should be able to: -

1. Explain the adoption of the workshop safety rules and regulations including safety during the use of tools and equipment.
2. Explain the use of mathematics.
3. Express the elementary concept of electricity and magnetism.
4. Express the properties of magnets and electromagnets.
5. Define the Fleming left and right hand rule.
6. Define the source of Energy.
7. Explain the properties of conductors, insulator and meaning of semi-conductor.
8. Explain the winding wires (metric sizes and temperature ratings).
9. Describe the insulating materials, types and application classification of insulation.
10. Describe the circuit elements, resistors inductors a capacitor, their effects in winding.
11. Express the methods of joining circuit elements.
12. Express the short circuit, Open circuit and grounding.
13. Define the ohms law and its application.
14. Define the basic electrical units and their relationship with each other, i.e. volts amperes, ohms, watts.
15. Explain the calculation relating to series, parallel and series parallel circuits.
16. Explain the principles of operation of motors and generators.
17. Describe the basic components of motors and generators.
18. Describe the source of heating and cooling on motors and their effects.
19. Express the different types of small motors and their windings.
20. Express the method of reversing the direction of rotation of AC motors.
21. Define the working principles of regulators, choke and transformers.
22. Define the transformer windings – turn ration / voltage ratio.
23. Explain the term use in winding system of electrical machines.
24. Describe the basic concept of starting winding.
25. Describe the types and construction of simple D.C machines.
26. Define the different classifications and connections of armature windings.

27. Define the determination of pole pitch and commentator pitch in armature windings.
28. Describe the types and application of varnish during the winding.
29. Explain the correct procedures for dying, varnishing and baking.
30. Explain the common defects in motor, generators and transformers.

SCHEME OF STUDIES

Motor Winder

(6 – Months Course)

S. No.	Main Topics	Theory Hours	Practical Hours	Total Hours
1.	Workshop Practice	10	60	70
2.	Basic Electricity	14	50	64
3.	Alternating Current	14	30	44
4.	Magnet	14	20	34
5.	Transformer	4	10	14
6.	Electric Motor	20	62	82
7.	Generator & Three Phase Supply	10	10	20
8.	Measuring Instruments	10	10	20
9.	Winding	20	292	312
10.	Technical Mathematics - I	10	0	10
11.	Technical Drawing - I	10	0	10
12.	I.T Fundamentals	8	32	40
13.	Functional English	16	64	80
Total		**160**	**640**	**800**

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DETAIL OF COURSE CONTENTS

Motor Winder

(6 – Months Course)

Sr. No.	Detail of Topics	Theory Hours	Practical Hours
1.	**Workshop Practice**	10	60
	1.1. **Introduction (Workshop, Work Place, Tools)**		
	1.1.1. Order of workplace		
	1.1.2. Introduction to general tools used in the metal workshop, their care and proper use		
	1.1.3. Safety precautions		
	1.2. **Measuring (General Introduction)**		
	1.2.1. Purpose of measuring and checking tools		
	1.2.2. Accuracy of measuring		
	1.2.3. Linear measuring (steel rules, calipers, vernier calipers)		
	1.2.4. Measuring Faults		
	1.2.5. Care and Maintenance of Measuring tools		
	1.3. **Marking**		
	1.3.1. Necessity of marking		
	1.3.2. Common marking tools (scriber, steel rule, & centre punch)		
	1.4. **Filing**		
	1.4.1. Process of filing		
	1.4.2. Types of files with regards to cut and shape		
	1.5. **Sawing**		
	1.5.1. Cutting principle (rake angle)		
	1.5.2. The saw blade (pitch of teeth, setting of teeth and tightening the blade in the frame)		

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	1.6. **Drilling** 1.6.1. Drilling of thought holes (effect of movements of the drill, cutting process) 1.6.2. Main parts (their name and function) 1.6.3. Clamping and removing of twist drills 1.6.4. Drilling faults 1.7. **Reaming** 1.7.1. Purpose and process of reaming 1.7.2. Types of reamers (Hand reamers, machine reamers and adjustable reamers) 1.8. **Counter Sinking and Counter boring** 1.8.1. Counter sinking tools, purpose and procedure 1.8.2. Size / No. of Counter bore 1.9. **Filing Exercise – I** 1.9.1. Filing of Channel 1.10. **Marking Exercise** 1.10.1. Flat Filing 1.10.2. Marking 1.10.3. Centre Punching 1.11. **Filing Exercise – II** 1.11.1. Flat Filing 1.11.2. Square Filing 1.12. **Sawing Exercise** 1.12.1. Sawing and Square Filing within size 1.13. **Sheet Metal Box – I** 1.13.1. Filing 1.13.2. Marking 1.13.3. Shearing 1.14. **Drilling Exercise** 1.14.1. Marking		

	1.14.2. Center Punching 1.14.3. Drilling 1.14.4. De burring		
2.	**Basic Electricity**	14	-
	2.1. Atom		
	2.1.1. Definition		
	2.1.2. Atomic Structure		
	2.1.3. Electric charge		
	2.1.4. Unit of charge		
	2.1.5. Kinds of charge		
	2.2. Electrical Quantities		
	2.2.1. Electric Current		
	2.2.2. Electric pressure		
	2.2.3. Resistance		
	2.2.4. Conductance (Definitions, symbol measuring unit and measuring instrument)		
	2.3. Generation of Voltage		
	2.3.1. Voltage source		
	2.3.2. AC		
	2.3.3. DC		
	2.4. Electrical Materials		
	2.4.1. Conductors		
	2.4.2. Semi-conductors		
	2.4.3. Insulators		
	2.5. Ohm's law		
	2.5.1. Definition		
	2.5.2. Formula		
	2.5.3. Calculation		
	2.6. Series connection of Resistances		
	2.6.1. Definition of series circuit		
	2.6.2. Circuit drawing		
	2.6.3. Laws of series circuit		

	2.6.4. Formula		
	2.6.5. Calculation		
	2.7. Parallel connection of Resistances		
	2.7.1. Definition of parallel circuit		
	2.7.2. Laws of parallel circuits		
	2.8. Power and Energy		
	2.8.1. Definitions		
	2.8.2. Units		
	2.8.3. Energy meter drawing		
	2.9. Wire Handling		05
	2.9.1. Electrical Circuit		
	2.9.2. Handling of wire		
	2.9.3. Stripping of wire		
	2.9.4. Making of eyes		
	2.9.5. Bending of wire		
	2.9.6. Laying of wire		
	2.9.7. Lacing of wire		
	2.10. Basic Electrical Circuits		06
	2.10.1. Lamp control with single pole switch		
	2.10.2. Lamp control with two way switch		
	2.10.3. Socket control with a Switch		
	2.10.4. Series board circuit		
	2.10.5. A lamp in series with a socket controlled by a switch		
	2.11. Electrical Measurements		05
	2.11.1. Use of voltmeter		
	2.11.2. Use of ampere meter		
	2.11.3. Use of Ohm meter		
	2.11.4. Use of wattmeter		
	2.11.5. Use of tachometer		
	2.11.6. Use of frequency meter		
	2.11.7. Use of growler		
	2.11.8. Use of Megger		

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	2.12. Winding 2.12.1. Record keeping 2.12.2. Understand name plate of motor		02
	2.13. Winding Diagram 2.13.1. Understand winding 2.13.2. Symbol 2.13.3. Draw the winding drawing 2.13.4. Electrical symbols		05
	2.14. Coil Making 2.14.1. Winding machine 2.14.2. Type of winding machine 2.14.3. Forma making according to pitch span 2.14.4. Making of coil according to old data		05
	2.15. Core insulating 2.15.1. Cutting of paper 2.15.2. According to slot 2.15.3. Banding of paper laying of paper in slot		05
	2.16. Placing of coil in slot 2.16.1. Place of coil 2.16.2. Set of coil according to pitch in slots and insulate them		02
	2.17. Stripping of wire and connection 2.17.1. Stripping of winding wire each and connect them according to drawing sleeving and tapping		02
	2.18. Binding of winding 2.18.1. Dismantling of Fan Motors 2.18.2. Ceiling fans 2.18.3. Pedestal Fan 2.18.4. Exhaust fan 2.18.5. Universal Motors		03

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	2.19. Assembly of Fan Motors		10
	2.19.1. Repairing of		
	2.19.2. Rewinding of motors		
	2.19.3. Replacing of		
	2.19.4. Bearings		
	2.19.5. Replacing of Bushes		
	2.19.6. Greasing Oiling		
	2.19.7. Fan revolving system		
	2.19.8. Repairing		
3.	**Alternating Current**		
	3.1.1. Principal of Alternating Current (A.C)	01	-
	3.1.2. Definition		
	3.1.3. Sine wave		
	3.1.4. Time period		
	3.1.5. Frequency		
	3.1.6. Maximum value		
	3.1.7. Effective value		
	3.1.8. Calculations		
	3.2. Dependence of motor speed	02	-
	3.2.1. Frequency		
	3.2.2. No. of poles		
	3.2.3. Formula		
	3.2.4. Calculation		
	3.3. Generation of Alternating Current	02	-
	3.3.1. Coil movement in a magnetic field.		
	3.3.2. Coil with less No. of turns		
	3.3.3. Coil with large No. of turns.		
	3.4. Measurements	03	10
	3.4.1. Measurement with volt meter		
	3.4.2. Measurement with oscilloscope		
	3.4.3. Sine wave		
	3.4.4. Maximum values		
	3.4.5. Effective value		

	3.4.6. Time / period.		
	3.5. Dependence of motor speed	02	10
	3.5.1. Variation by poles		
	3.5.2. 2 poles motor		
	3.5.3. 4 poles motor		
	3.5.4. 8 poles motor		
	3.6. Variation by frequency	02	10
	3.6.1. Supply frequency		
	3.6.2. Change through frequency		
	3.6.3. Frequency generator		
	3.6.4. Low speed		
	3.6.5. Medium speed		
	3.6.6. High speed		
4.	**Magnet**		
	4.1. Magnet	02	
	4.1.1. Magnet and magnetic properties		
	4.1.2. Definition		
	4.1.3. Types		
	4.1.4. Magnetic material		
	4.1.5. Magnetic filed & the rotating magnetic field		
	4.1.6. Magnetic flux		
	4.1.7. Flux density		
	4.1.8. Magnetic circuit		
	4.1.9. Reluctance		
	4.2. Electromagnet	02	
	4.2.1. Definition		
	4.2.2. Residual magnet		
	4.2.3. Magnetic pressure (M.M.F)		
	4.2.4. Magnetizing force		
	4.3. Inductance	01	
	4.3.1. Definition		
	4.3.2. Unit		

	4.3.3. Self inductance		
	4.3.4. Mutual inductance	01	
	4.4. Capacitor		
	4.4.1. Definition		
	4.4.2. Types		
	4.4.3. Connection		
	4.4.4. (Series and parallel)		
	4.5. A.C Resistances	1	
	4.5.1. Inductive reactance		
	4.5.2. Capacitive reactance		
	4.5.3. Ohmic resistance		
	4.5.4. Impedance		
	4.5.5. Power factor		
	4.5.6. Formulae		
	4.6. A.C Power	1	05
	4.6.1. Apparent Power		
	4.6.2. True Power		
	4.6.3. Reactive Power		
	4.6.4. Power Factor		
	4.6.5. Power Factor Improvement		
	4.6.6. Formula		
	4.6.7. Calculations (True Power)		
	4.7. Choke	01	05
	4.7.1. Working principle		
	4.7.2. Construction		
	4.7.3. Function & circuit		
	4.7.4. Revision		
	4.7.5. Midterm Test		
	4.8. Magnetic Field	01	05
	4.8.1. Properties		
	4.8.2. Magnetic materials		
	4.8.3. Magnetic flux		
	4.8.4. Magnetic circuit		

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	4.9. Electromagnet 4.9.1. Magnetic field 4.9.2. Poles of electromagnet 4.9.3. Change of poles 4.9.4. Magnitude of electromagnet F = I x N 4.9.5. Residual Magnet	02	05
	4.10. Capacitor 4.10.1. Charging of capacitor 4.10.2. Discharging of capacitor 4.10.3. Function of capacitor in Motor 4.10.4. Measurement of power factor 4.10.5. Improvement of power factor	01	05
	4.11. Choke 4.11.1. Construction 4.11.2. Function 4.11.3. Use in a circuit	01	05
5.	**Transformer** **5.1. Definition** 5.1.1. Working Principle, Faraday's law 5.1.2. Construction 5.1.3. Transformation Ratio 5.1.4. Simple calculation 5.1.5. Losses in transformer 5.1.6. Types of transformer 5.1.7. Cooling method **5.2. Transformer & Electric Motors** 5.2.1. Dismantling of Single Phase Motors 5.2.2. Washing machine motor 5.2.3. Donkey Pump motor 5.2.3.1. Injector Pump motor 5.2.3.2. Motor with running and starting capacitors	04	10

	5.2.3.3. Shaded Pole Motors 5.2.3.4. Drill machine Motors **5.3. Assembling of single Phase Motors** 5.3.1. Preparing of winding 5.3.2. Varnish of winding 5.3.3. Baking of winding 5.3.4. Repairing of centrifugal switch 5.3.5. Connection of capacitors 5.3.6. Running capacitors 5.3.7. Reassembly of motors 5.3.8. Connection on terminal plate		
6.	**Electric Motors** **6.1. Definition** 6.1.1. Working Principle, torque on a current carrying rectangular coil 6.1.2. Left hand rule] 6.1.3. Main parts 6.1.4. Starting torque 6.1.5. Types of motors (A.C & D.C) **6.2. DC Motor** 6.2.1. Series Motor 6.2.2. Shunt Motor 6.2.3. Compound Motor **6.3. Single Phase Motor (A.C)** 6.3.1. Split phase motor 6.3.2. Starting winding 6.3.3. Running winding 6.3.4. Capacitor in motor 6.3.5. Shaded pole motor 6.3.6. Series motor (commentator motor) 6.3.7. Universal Motor 6.3.8. All drawing	 02 02 06	

	6.4. Three phase motor (A.C)	10	
	6.4.1. Induction motor		
	6.4.2. Types of induction motor		
	6.4.3. Synchronous motors		
	6.4.4. Star Delta Connection		
	6.4.5. Introduction motor torque speed x tics & equivalent circuit		
	6.5. Maintenance Of Electric Motors		10
	6.5.1. Dismantling Of Three Phase Motors		
	6.5.2. Dismantling of motor, Trace the connection and repair the winding		
	6.6. Connection of Motors According to Pole		08
	6.6.1. Connection of 2 pole		
	6.6.2. Motor – single		
	6.6.3. Parallel connection		
	6.6.4. Two parallel connections		
	6.7. Connection of motor according to speed		08
	6.7.1. Connection of 4 pole motor with 6 sets		
	6.7.2. Connection of 4 pole motor with 12 sets		
	6.7.3. Single parallel connection		
	6.7.4. Two parallel connection		
	6.7.5. Four parallel connection		
	6.7.6. Connection of 8 pole motor with 12 sets		
	6.7.7. Chain winding		
	6.7.8. Set winding		
	6.8. Connection of 6 Pole Motor		08
	6.8.1. Connection of 6 pole motor with 18 sets		
	6.8.2. Single parallel connection		
	6.8.3. Two parallel connection		
	6.8.4. Four parallel connection		

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	6.8.5. Six parallel connection 6.8.6. Connection of 12 pole motor with sets 6.8.7. Connection of 6 pole motor with 9 sets		
	6.9. Connection of 8 pole motor 6.9.1. Connection of 8 pole motor with 24 sets 6.9.2. Single parallel connection 6.9.3. Two parallel connection 6.9.4. Four parallel connection 6.9.5. Eight parallel connection		10
	6.10. Multi speed motor 2/4 pole 6.10.1. Connection of two speed motor internal connection 6.10.2. Star connection 6.10.3. Delta connection		10
	6.11. Multi speed motor 4/8 pole 6.11.1. Connection of two speed motor internal connection 6.11.2. Star – delta		05
	6.12. Multi speed motor 6/12 6.12.1. Connection of two-speed motor. 6.12.2. Internal connection 6.12.3. Star delta 6.12.4. Varnish of winding 6.12.5. Drying of winding 6.12.6. Baking of winding		05
7.	**Generator & Three Phase Supply**		
	7.1. Generator 7.1.1. Definition main parts 7.1.2. Working principles 7.1.3. Dependence of induced voltage $E = BlV$ 7.1.4. Right hand rule	04	

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	7.1.5. Lenz's law		
	7.2. Three Phase Supply	04	3
	7.2.1. Star connection		
	7.2.2. Delta connection		
	7.2.3. Three phase power		
	7.2.4. Formula		
	7.2.5. Simple calculation		
	7.2.6. Phase wave diagram		
	7.3. AC Winding Test	02	03
	7.3.1. Testing of winding		
	7.3.2. Short circuit test		
	7.3.3. Open circuit test		
	7.3.4. Earth test		
	7.3.5. Growler test		
	7.4. Regulator and choke		04
	7.4.1. Maintenance of choke		
	7.4.2. Repairing of chock winding		
	7.4.3. Maintenance of fan regulator		
8.	**Measuring**	10	10
	8.1. Measuring Instruments		
	8.1.1. A-v-o meter		
	8.1.2. Am-meter		
	8.1.3. Volt-meter		
	8.1.4. Ohm-meter		
	8.1.5. Megger		
	8.1.6. Tongue Tester		
	8.1.7. Tachometer		
	8.1.8. Growler		
	8.1.9. Micrometer		
	8.1.10. S.W.G Winding		
	8.2. Usage Of Measuring Instruments		
	8.2.1. Volt meter		
	8.2.2. Ampere meter		

	8.2.3. Ohm meter		
	8.2.4. Megger		
	8.2.5. Earth tester		
	8.2.6. Digital Multi meter		
9.	**Winding**		
	9.1. Winding material	04	
	9.1.1. Winding wire		
	9.1.2. Insulating paper		
	9.1.3. Warmish		
	9.1.4. Sleeves		
	9.1.5. String		
	9.1.6. Wedge		
	9.2. Winding tools	07	
	9.2.1. Combination plier		
	9.2.2. Long nose plier		
	9.2.3. Side cutter		
	9.2.4. Screw Driver		
	9.2.5. Files		
	9.2.6. Scriber		
	9.2.7. Hammer (Center punch)		
	9.2.8. Metal- hand shear		
	9.2.9. Tapes		
	9.2.10. Drill machine		
	9.2.11. Scissors – try square		
	9.2.12. Soldering iron etc.		
	9.3. Winding Safety precaution	03	
	9.3.1. Electric shock		
	9.3.2. First aid		
	9.3.3. Safety rules in a work Shop		
	9.4. Winding terms	06	
	9.4.1. Rotor stator		
	9.4.2. Pitch		
	9.4.3. Pole pitch		

	9.4.4. Back pitch		
	9.4.5. Back pitch		
	9.4.6. Coil		
	9.4.7. Set		
	9.4.8. Calculation of winding		
	9.4.9. Set winding		
	9.4.10. Lap winding		
	9.4.11. Chain winding (Drawings)		
	9.5. Winding Connection		100
	9.5.1. Series connection		
	9.5.2. Parallel connection		
	9.5.3. Two parallel connection		
	9.5.4. Four parallel connection		
	9.5.5. Multi speed motor connection		
	9.6. Winding Faults		51
	9.6.1. Bearings		
	9.6.2. Cross-winding		
	9.6.3. Short winding		
	9.6.4. Starting switch		
	9.6.5. (Centrifugal switch)		
	9.6.6. Capacitor		
	9.6.7. Connections		
	9.7. Protection method		51
	9.7.1. Fuse		
	9.7.2. Over load thermal relay		
	9.7.3. Protection switch		
	9.7.4. Earthing		
	9.8. Winding Connections		90
	9.8.1. Types		
	9.8.2. Series winding		
	9.8.3. Parallel winding		
	9.8.4. Compound winding		
	9.8.5. Lap winding		

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	9.8.6. Over lap winding 9.8.7. Starting winding 9.8.8. Running winding 9.8.9. Winding Test 9.8.10. Protection of winding		
10.	**Technical Mathematics** **10.1. Introduction of** 10.1.1. Whole Number 10.1.2. Decimal Fraction 10.1.3. Fraction 10.1.3.1. Proper Fraction 10.1.3.2. Improper Fraction 10.1.3.3. Compound Fraction **10.2. Addition** 10.2.1. Addition of Whole Number 10.2.2. Addition of Decimal Fraction 10.2.3. Addition of Fraction 10.2.4. Addition of Algebraic Expression 10.2.4.1. Law of Addition 10.2.4.2. Commutative Law of Addition 10.2.4.3. Associative Law of addition	06 04	-
11.	**Technical Drawing** **11.1. Draftsman Instruments** 11.1.1. Introduction of instruments and their use 11.1.2. Care of drawing instruments and equipments **11.2. Lettering** 11.2.1. Types of Lettering 11.2.2. General Propositions 11.2.3. Conventions 11.2.4. Lettering Techniques	06 04	-
	Total	**136**	**544**

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LIST OF PRACTICAL'S

Motor Winder
(6 – Months Course)

Sr. No.	Detail of Topics
1	1. Use of hand tools 2. Linear measurements with steel rules, calipers, micrometer 3. Marking practice 4. Filling practice 5. Cutting practice 6. Drilling practice 7. Reaming practice 8. Preparation of metal box 9. Preparation of motor terminal plate
2	1. Handling of wire 2. Stripping of wire 3. Making of eyes 4. Bending of wire 5. Laying of wires 6. Lamp control with single pole switch 7. Lamp control with two way switch 8. Socket control with switch 9. Series board circuit 10. Use of Voltmeter, ampere meter, Ohm meter, watt meter, tachometer, frequency meter, growler & Megger 11. Practice of recording winding data 12. Drawing winding diagrams 13. Forma making according to pitch span 14. Making of coil 15. Cutting of insulating paper 16. Putting coils in slots 17. Connecting different coils 18. Dismantling of fan motor 19. Assembling of fan motor
3	1. Measurement with oscilloscope 2. Variation of speed of motor with poles 3. Variation of speed of motor with frequency
4	1. Calculation of apparent, reactive and true power 2. Calculation of power factor 3. Winding of choke 4. Study of magnetic field properties 5. Study of electromagnet 6. Charging and discharging of capacitor 7. Use of choke in circuit

5	1. Calculation of transformer 2. Dismantling of single phase motor 3. Assembling of single phase motor
6	1. Dismantling of three phase motor 2. Assembling of three phase motor 3. Connection of two pole motor 4. Connection of four pole motor 5. Connection of six pole motor 6. Connection of eight pole motor 7. Connection of multi speed two and four pole motor 8. Connection of multi speed four and eight pole motor 9. Connection of multi speed six and twelve pole motor 10. Varnishing of motor 11. Baking of motor
7	1. Calculation of star and delta connection 2. Testing of winding (Short circuit, Open Circuit and Earth test) with growler 3. Repairing of choke winding
8	1. Practice of using AVO meter, tong tester, Micro meter, SWG and earth tester
9	1. Calculation of different winding pitches 2. Practice of winding connections (Series, parallel, two parallel and four parallel) 3. Maintenance of centrifugal switch 4. Study of fuse, thermal relay and earthing 5. Practice of fault findings in winding, protective equipment

SCHEME OF STUDIES

I.T. Fundamentals

S.No	Main Topics	Theory Hours	Practical Hours	Total Hours
1.	Introduction to Computers	2	6	8
2.	Typing - Microsoft Word	4	14	18
3.	Internet & Electronic Mail	2	12	14
Total		**8**	**32**	**40**

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DETAIL OF COURSE CONTENTS

I.T Fundamentals

S. No	Detail of Topics	Theory Hours	Practical Hours
1	**Introduction to Computers** 1.1 What is a computer- Definition, functions and general features? 1.2 What is Hardware – 1.2.1 Computer parts and units 1.2.1.1 Input Unit - Keyboard, Mouse etc. 1.2.1.2 Central Processing Unit 1.2.1.3 Output Unit 1.3 What is Software – 1.3.1 Electronic Parts of a Pc it is 1.3.1.1 Software and Its types 1.3.1.2 System Software, Application software and its functions 1.4 Working with windows Operating System 1.4.1 How does windows desktops work? 1.4.2 Setting desktop, background and wall papers etc. 1.4.3 Viewing directories – List of files and folders different styles. 1.5 What are the Icons, Shortcuts and other graphic, 1.5.1 How to see computer contents on different drives etc.	2	6
2	**Typing and Word processing (MS Word)** 2.1 Proper way of typing correct and speedy - getting familiar with the keys 2.2 Where to type in computer? How to save a file? How to get it back? Where to find your saved work? 2.3 Formatting in MS Word Bold, Italic, page setup, setting shades and colors. 2.4 Working with saved work, opening and moving files. 2.5 How to get it printed?	4	14

3	**Emailing and Internet Surfing** 3.1 How to go to Internet, what is required for an internet connection etc. 3.2 How to use email? How to search on web? Etc 3.3 How to make new email account, login and logout an email account etc.? 3.4 Downloading and uploading attachments etc.	**2**	**12**
	Total	**8**	**32**

LIST OF PRACTICALS

I.T Fundamentals

S. No.	Name of Practical
1.	Turn On/Off and setting of power supply
2.	Accessing The Desktop
3.	Using of Icons and Shortcuts
4.	Setting / customizing the desktop
5.	Viewing the contents of computer – Directory
6.	Setting the view of a folder
7.	Copying, Deleting and Moving Files in a folder
8.	Working with different Applications
9.	Opening MS Word for typing
10.	First lesson of Typing A S D F
11.	Second Lesson of typing J K L ;
12.	Third Lesson U I O P
13.	Fourth Lesson R E W Q
14.	Fifth Lesson N M , .
15.	Sixth Lesson V C X Z
16.	Seventh Lesson All letter using R index Finger
17.	Eighth Lesson All letter using L index Finger
18.	Formatting in MS Word Bold, Italic etc.
19.	Page Setting/ Page Layout
20.	Using Internet
21.	Opening Email, making new account
22.	Sending Receiving Emails
23.	Downloading and uploading attachments etc.

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SCHEME OF STUDIES
Functional English

S.No	Main Topics	Theory Hours	Practical Hours	Total Hours
1.	Use of past indefinite tense	2	6	8
2.	Use of 'was' 'were' ' questions and negatives	3	6	8
3.	Explaining a situations/ analysis	2	6	8
4.	Communication in writing	2	6	8
5.	Comprehension	1	6	7
6.	Application/ C.V.	1	6	7
7.	Dialogues	1	9	10
8.	Understand vocabulary	1	3	4
9.	Writing complaints/ answers to complaints	1	9	10
10.	Interviews	2	7	10
Total		**16**	**64**	**80**

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DETAIL OF COURSE CONTENTS

Functional English

S. No	Detail of Topics	Theory Hours	Practical Hours
1	**Use of past indefinite tense** 1.1 Describing past events	2	6
2	**Use of 'was' 'were' ' questions and negatives**	2	6
3	**Explaining a situations/ analysis** 3.1 Making a plan 3.2 Visiting factory area 3.3 Giving justifications	2	6
4	**Communication in writing** 4.1 Asking for list of stationery items 4.2 Submitting report of performance of team of technicians 4.3 Submitting joining report	2	6
5	**Comprehension: practice sets**	2	6
6	**Job application/C.V.**	1	6
7	**Dialogues**	1	9
8	**Understand vocabulary**	1	3
9	**Writing complaints/ answers to complaints**	1	9
10	**Interviews**	2	7
Total		**16**	**64**

LIST OF PRACTICALS

Functional English

S. No.	Practical
1.	Group discussion
2.	Interviews
3.	Role play

LIST OF LABS

Motor Winder

- Winding Lab / Workshop

I.T Fundamentals

- Computer Lab

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LIST OF TOOLS / MACHINERY & EQUIPMENT

(For a class of 25 students)

Name of Trade	Motor Winder
Duration of Course	6 – Months

Sr. No.	Name of Tools / Machinery & Equipment	Quantity
1.	Combination Plier 6"	25 Nos.
2.	Long Nose Plier 6"	25 Nos.
3.	Flat Nose Plier 6"	25 Nos.
4.	Round Nose Plier 6"	25 Nos.
5.	Screw Driver Set (Assorted Size)	25 Nos.
6.	Scissors	25 Nos.
7.	Tweezers	25 Nos.
8.	Hummer 500 grams	25 Nos.
9.	Mallet / Rubber Hammer	25 Nos.
10.	Hammer 1000 Grams	10 Nos.
11.	Flat Chisel	25 Nos.
12.	Scriber	25 Nos.
13.	Center Punch	25 Nos.
14.	Vernier Caliper	25 Nos.
15.	Standard Wire Gauge	25 Nos.
16.	Micrometer (mm)	02 Nos.
17.	Micrometer Inch size	02 Nos.
18.	Steel rule 300 mm	25 Nos.
19.	Try Square 150 mm	06 Nos.
20.	Bearing Puller (Assorted Size)	02 Nos.
21.	Grease Gun	02 Nos.
22.	Oil Gun	02 Nos.
23.	Spanner Set Assorted Size	02 Nos.
24.	Adjustable screw wrench	04 Nos.
25.	Pedestal Drill Machine	01 Nos.
26.	Drill Set (Assorted Size)	01 Nos.

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27.	Tape Set (Assorted Size)	05 Nos.
28.	Motor with out winding 36 Slots	12 Nos.
29.	Motor without Winding 48 Slots	12 Nos.
30.	Motor without Winding 24 Slots	12 Nos.
31.	Pedestal Fan Motor (24 Slots)	15 Nos.
32.	Ceiling Fan Motor (36 Slots)	15 Nos.
33.	Exhaust fan motor(24 Slots)	15 Nos.
34.	Soldering Iron (Assorted Wattage)	10 Nos.
35.	Regulator Core Laminations	25 Set
36.	Choke Core Laminations	25 Set
37.	MEM Starter (Star-Delta+)	04 Nos.
38.	Transformer (single phase, three phase)	02 Nos.
39.	Voltmeter	06 Nos.
40.	Ampere meter	06 Nos.
41.	Ohm meter	06 Nos.
42.	Watt meter	06 Nos.
43.	Tachometer	02 Nos.
44.	Frequency meter	02 Nos.
45.	Growler	02 Nos.
46.	Megger	02 Nos.
47.	Tong tester	02 Nos.
48.	Digital multi-meter	02 Nos.
49.	Farma (equal size)	06 Nos.
50.	Farma (un-equal size)	06 Nos.
51.	Shaded pole motor	02 Nos.
52.	Universal motor	02 Nos.
53.	Washing machine motor	15 Nos.
54.	Coil Winder Machine	02 Nos.

COMPUTER LAB

S. No.	Tools / Equipment	Quantity
1.	**Desktop computer (Specifications as per notification issued by MIS Section, TEVTA)**	26 (1 for each student & 1 for the teacher)
2.	Printer (Laser)	01
3.	Scanner	01
4.	Internet Connection (At least 1 MB speed)	01
5.	UPS 10 KVA	01
6.	Air Conditioner 1 ½ Ton	02
7.	Multimedia Projector	01

LIST OF CONSUMABLE MATERIALS

(For a class of 25 students)

Name of Trade	Motor Winder
Duration of Course	06 – Months

Sr. No.	Name of Consumable Material	Quantity
1.	Winding Wire 22 SWG	03 Kg
2.	Winding Wire 24 SWG	03 Kg
3.	Winding Wire 26 SWG	03 Kg
4.	Winding Wire 28 SWG	03 Kg
5.	Winding Wire 30 SWG	03 Kg
6.	Winding Wire 32 SWG	03 Kg
7.	Winding Wire 34 SWG	03 Kg
8.	Leatheroid Paper 10 No. 4 x 4 ft.	04 Sheets
9.	Sleeve 1 No.	20 Nos.
10.	Sleeve 2 No.	20 Nos.
11.	Sleeve 3 No.	20 Nos.
12.	Sleeve 4 No.	20 Nos.
13.	Varnish	10 Quarters
14.	Cotton Tape ¾"	36 Roll
15.	Insulation Tape ¾"	10 Roll
16.	Binding Thread	20 Roll
17.	Hacksaw Blade 12"	03 Nos.
18.	Emery Paper	06 Nos.
19.	Solder	200 Grams
20.	Soldering Paste	06 Packets
21.	PVC Insulated Flexible Cable 40/0.0076"	01 Coil
22.	PVC Insulated Single Core Cable 7/0.029"	01 Coil
23.	Bamboo Wedges	20 Nos.
24.	Grease	01 Packet
25.	Lubricating Oil	100 ml
26.	Kerosene Oil	05 Liters

Functional English

S. No.	Item	Quantity
1.	Stationary	As per requirement
2.	Board Markers	As per requirement

I.T Fundamentals

S. No.	Item	Quantity
1.	Printing Paper	As per requirement
2.	Printer Toner	As per requirement

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REFERENCE BOOKS

1. Motor Winding Published by TEVTA
2. Trainee Manual T.T.P. No.64 by Development Cell – Manpower & Training, Punjab.
3. Fundamental of Electrical Engineering-I by District – Manpower & Training, Punjab.
4. Motor Winding by Tawanger Hussain.
5. Kuliyat Motor Wining by Naeem Pervaiz Khokar,

Functional English

1. High School English Grammar By Wren & Martin
2. Oxford English Grammar

I.T Fundamentals

1. Introduction to Computer by Peter Norton
2. 2007 Microsoft® Office System Step by Step by Joyce Cox, Steve Lambert and Curtis Frye
3. Internet and E-mail with Windows 7 by Studio Visual Steps

MINIMUM QUALIFICATION OF INSTRUCTOR

- D.A.E. in Electrical Technology with 2- Years experience in the relevant field

OR

- Two Years certificate of Electrician (G-II Level) and one year certificate of Motor Winding Course (G-III) with 6-Years experience in the relevant field.

Functional English

- M.A (English)

I.T Fundamentals

- DAE CIT/ BCS from HEC recognized university

EMPLOYABILITY OF PASS-OUTS

The pass outs of this course may find the job / employment opportunities in the following areas / sectors: -

1. Motor / generator, Manufacturing Industry
2. Transformer manufacturing industry
3. Purchase & Sale Market of equipments
4. Motor winder / mechanic in government organizations.
5. Motor generator repair workshop
6. Fan manufacturing industry
7. Teaching

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LIST OF TRADE RELATED JARGON

General Vocabulary Words

Bradawl	سوا	Magnitude	مقدار
Capacitance	ظرفیت	Making	بنانا
Checking	جانچنا	Measurement	پیمائش
Components	حصے	Multiplication	ضرب
Conductance	ایصا لیت	Parallel	متوازی
Conductivity	کرنٹ گزانے کی صلاحیت	Percentage	فی صد
Conductor	موصل	Plier	پلاس
Connecting	جوڑنا	Power	طاقت
Consumer	صارف	Principle	اصول
Current	برقی رو	Protective Device	حفاظتی آلہ
Cutting	کاٹنا	Removing	ختم کرنا
Decimal	اعشاریہ	Resistance	مزاحمت
Diagram	شکل	Resistivity	مزاحمت کی صلاحیت
Energy	توانائی	Reversing	سمت تبدیل کرنا
Equipment	آلات	Scissor	قینچی
Faults	نقائص	Screw Driver	پیچ کس
Files	ریتی	Semi-Conductor	نیم موصل
First Aid	ابتدائی طبی امداد	Series	سلسلہ وار
Fixing	لگانا	Soldering	ٹانکا لگانا
Hacksaw	لوہا کاٹنے والی آری	Specific Resistance	مزاحمت مخصوصہ
Hammer	ہتوڑا	Structure	ساخت
Handling	کنٹرول	Tools	اوزار
Identification	شناخت	Tracing	تلاش کرنا
Installation	لگانا	Tri square	گنیا
Insulation	حاجز تہہ	Understanding	سمجھنا
Insulation Remover	حاجز تہہ اتارنے والا آلہ	Vernier Caliper	ورنیر کیلیپر
Insulator	حاجز	Voltage	وولٹیج
Magnet	مقناطیس	Work	کام

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SPECIFIC VOCABULARY WORDS

Alternating Current	متغیر کرنٹ	Magnetizing Force	مقناطیسی طاقت
Armature	آرمیچر	Maintenance	دیکھ بھال
Assembling	جوڑنا	Maximum Value	انتہائی قدر
Capacitor	کپیسٹر	Movement	حرکت
Ceiling Fan	چھت والہ پنکھا	Repair	مرمت
Centrifugal Switch	سنٹری فیوگل سوئچ	Rotor	روٹر
Coil	کوائل	Shaded Pole Motor	شیڈڈ پول موٹر
Commutator	کاموٹیٹر	Slot	سلاٹ
Dependence	زیر اثر	Sleeve	سلیو
Direct Current	یکساں کرنٹ	Split Phase Motor	سپلٹ فیزموٹر
Dismantling	کھولنا	Squirrel Cage Motor	پنجھرہ نما موٹر
Effective Value	اصل قدر	Stator	سٹیٹر
Electromagnet	برقی مقناطیس	Tachometer	ٹیکو میٹر
House Hold Appliances	گھریلو آلات	Thermometer	تھرمومیٹر
Jointing	جوڑنا	Thimble	تھمبل
Leatheroid Paper	لیدر آیئڈ کاغذ	Terminal	ٹرمینل
Laying	بچھانا	Variations	اتار چڑھاؤ
Micrometer	مائیکرو میٹر	Washing Machine	کپڑے دھونے والی مشین
Magnetic Flux	مقناطیسی فلکس	Wedge	پھانس

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Curriculum Revision Committee

1.	**Muhammad Mahboob Butt,** Chief Instructor, GCT Sahiwal	**Convener**
2.	**Mr. Asif Mahmood,** Deputy Manager, GSTC Gulberg-II, Lahore	**Member**
3.	**Muhammad Ashraf,** Chief Instructor (Electrical), GTTI Mughalpura, Lahore.	**Member**

APPROVED
Date: 7-4-16
Sign: