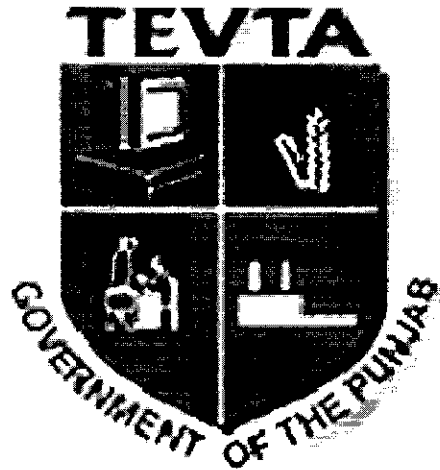


GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL
TRAINING AUTHORITY



CURRICULUM FOR

MOTOR WINDER

(3 – Month Course)

Revised April 2016

APPROVED

Date: 7-4-16

Sign: 

CURRICULUM SECTION
ACADEMICS DEPARTMENT

96-H, GULBERG-II, LAHORE

Ph # 042-99263064, 92963055-59

gm.acad@tevta.gop.pk, manager.cur@tevta.gop.pk

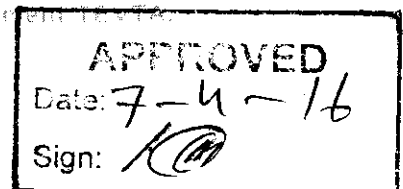
TRAINING OBJECTIVES

This curriculum is designed / developed keeping in view the local job market and industrial requirements to carryout manufacturing operations and maintenance tasks of winder of single phase and three phase electrical motors of the common brands available in Pakistan.

This curriculum covers basic fitting jobs, electrical technology, electrical instruments, trimming, soldering, motor winder, transformer winder and servicing of AC motors.

CURRICULUM SALIENTS

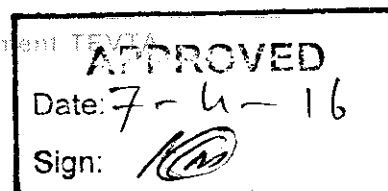
Entry level	:	Middle
Duration of course	:	03-months
Total training hours	:	400 Contact Hours
Training methodology	:	Practical 80%
		Theory 20%
Medium of instruction	:	Urdu / English



SKILL PROFICIENCY DETAILS

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

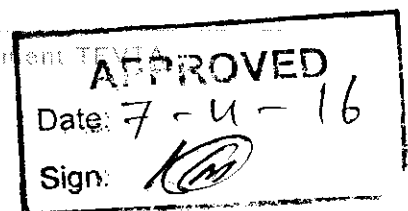
1. Identify the commonly used electrical symbols.
2. Measure the resistance with an ohmmeter.
3. Measure the current in a circuit with ampere meter
4. Measure the voltages of both A.C. and D.C. circuits with multi-meter.
5. Use the tools required for motor winder.
6. Select the required items for motor winder.
7. Identify the method of selection for size of winder wire.
8. Cut the leather-rit paper for slot insulation.
9. Twist the coils according to the requirement.
10. Make the lap winder, double lap & wave winder.
11. Dry the coils after applying varnish.
12. Insulate the iron cores.
13. Make the AC stator coils manually prepared.
14. Make the winder of small size AC motor. i) Split phase ii) Capacitor type iii) Shaded pole.
15. Make the winder of three phase motor.
16. Make the winder of small size three phase AC motor.
17. Make the double layer type winder of AC motor.
18. Perform the testing of AC motors.
19. Trace the faults and remedies of various types of AC (stator winder)
20. Repair and maintenance of AC motors.
21. Do the maintenance of AC fans (ceiling, pedestal, exhaust & motors)
22. Make the selection & use of proper tools and instruments for repairing of electric machines.
23. Make the estimate of repairing cost for the equipment.
24. Prepare / make planning of parts, tools, equipment required for workshop & layout of service workshop.



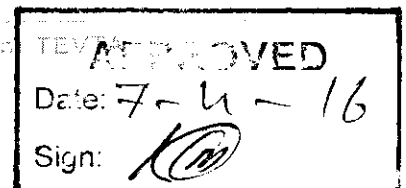
KNOWLEDGE PROFICIENCY DETAILS

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

1. Explain the safety precautions for personal and equipment.
2. Explain the first aid for Electric Shock.
3. Describe the treatment of Electric Shock.
4. Define the use & care of testing equipment & tools
5. Explain the electricity & electrical measuring instruments
6. Explain electrical circuit & short circuit.
7. Describe the conductor, insulator & resistor.
8. Describe the ohm's law & voltage drop.
9. Describe the series and parallel circuit.
10. Define the power and energy.
11. Define the magnetism & electromagnetism.
12. Explain the working principle of AC motor.
13. Explain the introduction of ac motors.
14. Explain the former wound coil or spool wound coil.
15. Explain the introduction of lap winder.
16. Describe the method for calculation of full pitch & core pitch.
17. Describe the advantages of lap winder.
18. Describe the introduction of wave winder.
19. Define the comparison of lap & wave winder.
20. Define the conversion of star connection into delta connection.
21. Define the double layer type winder.
22. Explain the connections of chain winder.
23. Explain the coil winder of induction motor.

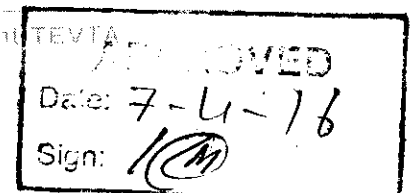


24. Explain the voltmeter, ampere meter, energy meter, watt meter and frequency meter
25. Describe the operation & working principle of mugger.
26. Describe the electrical symbols & diagrams of lap & wave winder.
27. Describe the diagrams of fan & washing machine.
28. Define the diagrams of 3-phase ac stator winder.
29. Define the fault finding & trouble shooting techniques.



SCHEME OF STUDIES
Motor Winder
(3-Month Course)

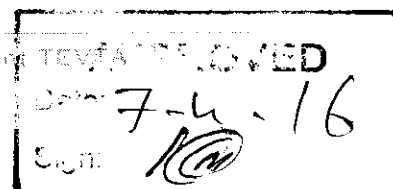
S. No	Main Topics	Theory Hours	Practical Hours	Total Hours
1.	Safety Precaution	2	10	12
2.	Basic Electrical Theory	16	-	16
3.	Electrical Instruments	4	32	36
4.	Electrical Circuits & Electrical Wiring	-	60	60
5.	Motor Winding	6	130	136
6.	Repair & Maintenance Of Electric Motors	-	80	80
7.	I.T Fundamentals	4	16	20
8.	Functional English	15	25	40
Total		47	353	400




DETAIL OF COURSE CONTENTS**Motor winder
(3-Month Course)**

S. No.	Detail of Topics	Theory Hrs	Practical Hrs
1	Safety Precautions		
	1.1. First aid for Elect. Shock	1	10
	1.2. Treatment of Elect. shock	1	
2	Basic Electrical Theory		-
	2.1. Electricity	1	
	2.2. Electrical circuit & short circuit	1	
	2.3. Conductor, insulator, resistor and conductance	1	
	2.4. Ohm's Law	1	
	2.5. Voltage drop.	1	
	2.6. Series & parallel circuit	2	
	2.7. Power & energy	2	
	2.8. Magnetism & electromagnetism	2	
	2.9. Basic Electrical Circuits		-
	2.10. Single Pole switch-socket circuit	2	
	2.11. Single Pole switch-lamp circuit	2	
2.12. Test board	1		
3	Electrical Instruments		
	3.1. Volt-meter	½	32
	3.2. Ampere-meter	½	
	3.3. AVO-meter	1	
	3.4. Watt-meter	1	
3.5. Muger	1		
4	Electrical Circuits & Electrical Wiring		
	4.1. Introduction & use of the tools used for winder.		4
	4.2. Selection of items / material for winder		3
	4.3. Method of selection of size of wire for winder		3
	4.4. Single pole switch-lamp circuit		3
	4.5. Test board		3
	4.6. Terminal plate		3
	4.7. Making clamp		2
	4.8. Bending of eyes		2
	4.9. Soldering lap-joint		2
	4.10. Spot soldering		2
	4.11. Cutting of leather rite paper for slot		3
	4.12. Twisting the coils		2
4.13. Regulator winder		2	

	4.14. Set winder & chain winder, wave winder & Lap winder,		2
	4.15. Insulating the coils with varnish		2
	4.16. Drying the coils after varnish		2
	4.17. Insulating the core		2
	4.18. Manually preparing the coil of AC stator		3
	4.19. Winder of small size AC stator		2
	4.20. Single layer & double layer winder		2
	4.21. Winder of single phase AC motor i.e. split phase, capacitor type & shaded pole motors.		3
	4.22. Winder a three phase motor of small size		3
	4.23. Winder of small size three phase AC motor		2
	4.24. Double layer wave & lap winder		3
5	Motor Winder		
	5.1. Basic Winder	$\frac{1}{2}$	18
	5.1.1. Winder terminology		
	5.1.2. Introduction to AC winder		
	5.1.3. Types of winder connection/Diagrams		
	5.2. Basic Motor Theory	$\frac{1}{2}$	18
	5.2.1. Principle of 1 phase AC motors		
	5.2.2. Principle of 3phase AC motors		
	5.2.3. Types of motors:		
	5.2.3.1. Split phase motors		
	5.2.3.2. Capacitor type motors		
	5.2.3.3. Shaded pole motors		
	5.2.3.4. Asynchronous motors		
	5.3. Regulator Winder	1	18
	5.3.1. Pedestal fan winder with taping for speed control.		
	5.4. Set Winder	1	18
	5.4.1. Exhaust fan winder		
	5.4.2. Ceiling fan winder		
	5.5. Chain Winder	1	18
	5.5.1. Pedestal fan winder		
	5.5.2. Washing machine winder		
	5.6. Single Phase Motor Winder	1	20
	5.6.1. Single layer winder (split phase winder)		
	5.6.2. Double layer winder		




	5.6.3. Two voltage (Low & High) winder 5.7. Three Phase Winder 5.7.1. Instruction sheet for 3 phase winder 5.7.2. Single layer winder 5.7.3. Double layer wave winder 5.7.4. Double layer lap winder	1	20
6	Repair & Maintenance of Electric motors 6.1. Dismantling & assembling of ball bearing. 6.2. Removing & installing of ball bearing. 6.3. Removing & installing of bushes & sleeve bearing 6.4. Faults & remedies of AC stator winder 6.5. Repair & maintenance of AC machines 6.6. Repair & maintenance of split phase, cap type & shaded pole motors.	-	80
Total		28	312

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APPROVED
 Date: 7-6-15
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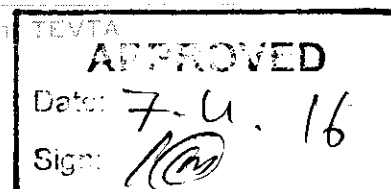
LIST OF PRACTICALS

1	Practice of treatment of electric shock
2	Practice of use of voltmeter, Ammeter, AVO meter, wattmeter and Megger
3	<ol style="list-style-type: none"> 1. Practice of use of winding hand tools 2. Measurement of size of winding wire 3. Preparation of single pole switch lamp circuit 4. Preparation of series board 5. Preparation of motor terminal plate 6. Practice of bending of eyes of cables 7. Practice of soldering 8. Practice of cutting of Leatheroid paper 9. Practice of twisting of coils 10. Practice of inserting of coils in slots 11. Practice of connections of coils 12. Practice of binding of coils 13. Practice of Varnishing 14. Practice of baking 15. Dismantling of motor 16. Assembling of motor
4	<ol style="list-style-type: none"> 1. Study of different types of motors 2. Drawing winding diagrams 3. Dismantling and assembling of pedestal fan 4. Dismantling and assembling of washing machine 5. Dismantling and assembling of three phase motor
5	<ol style="list-style-type: none"> 1. Dismantling and assembling of ball bearing 2. Dismantling and assembling of brushes and sleeve bearing 3. Fault tracing and repairing of stator winding 4. Repair and maintenance of split phase and shaded pole motors

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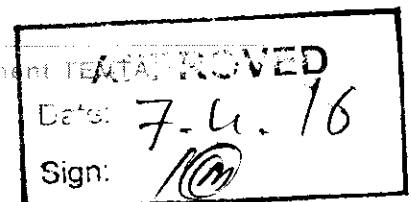
SCHEME OF STUDIES
I.T Fundamentals

S.No	Main Topics	Theory Hours	Practical Hours	Total Hours
1.	Introduction to Computers	1	4	5
2.	Typing - Microsoft Word	2	6	8
3.	Internet & Electronic Mail	1	6	7
Total		04	16	20



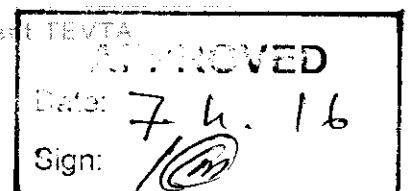
DETAIL OF COURSE CONTENTS
I.T Fundamentals

S. No	Detail of Topics	Theory Hours	Practical Hours
1	<p>Introduction to Computers</p> <p>1.1 What is a computer- Definition, functions and general features?</p> <p>1.2 What is Hardware –</p> <p style="padding-left: 20px;">1.2.1 Computer parts and units</p> <p style="padding-left: 40px;">1.2.1.1 Input Unit - Keyboard, Mouse etc.</p> <p style="padding-left: 40px;">1.2.1.2 Central Processing Unit</p> <p style="padding-left: 40px;">1.2.1.3 Output Unit</p> <p>1.3 What is Software –</p> <p style="padding-left: 20px;">1.3.1 Electronic Parts of a Pc it is</p> <p style="padding-left: 40px;">1.3.1.1 Software and Its types</p> <p style="padding-left: 40px;">1.3.1.2 System Software, Application Software</p> <p>1.4 Working with windows Operating System</p> <p style="padding-left: 20px;">1.4.1 How does windows desktops work?</p> <p>1.5 What are the Icons, Shortcuts and other graphic,</p> <p style="padding-left: 20px;">1.5.1 How to see computer contents on different drives etc</p>	1	4
2	<p>Typing and Word processing (MS Word)</p> <p>2.1 Proper way of typing correct and speedy - getting familiar with the keys</p> <p>2.2 Where to type in computer? How to save a file? How to get it back? Where to find your saved work?</p> <p>2.3 How to get it printed?</p>	2	6
3	<p>Emailing and Internet Surfing</p> <p>3.1 How to go to Internet, what is required for an internet connection etc.</p> <p>3.2 How to use email? How to search on web? Etc</p> <p>3.3 How to make new email account, login and logout an email account etc.?</p>	1	6
Total		04	16



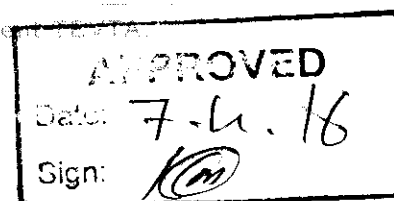
LIST OF PRACTICALS
I.T Fundamentals

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.	Copying, Deleting and Moving Files in a folder
7.	Working with different Applications
8.	Opening MS Word for typing
9.	First lesson of Typing A S D F
10.	Second Lesson of typing J K L ;
11.	Third Lesson U I O P
12.	Fourth Lesson R E W Q
13.	Fifth Lesson N M , .
14.	Sixth Lesson V C X Z
15.	Seventh Lesson All letter using R index Finger
16.	Eighth Lesson All letter using L index Finger
17.	Formatting in MS Word Bold, Italic etc.
18.	Using Internet
19.	Opening Email, making new account
20.	Sending Receiving Emails



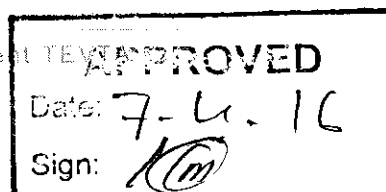
SCHEME OF STUDIES
Functional English

S.No	Main Topics	Theory Hours	Practical Hours	Total Hours
1.	Introduction of English Sentence Structure	2	3	5
2.	Use of present indefinite tense	2	3	5
3.	Use of 'is' 'are' 'am' questions and negatives	2	3	5
4.	Ask questions	2	3	5
5.	Express daily routines	2	3	5
6.	Know how to address people	1	2	3
7.	Provide written feedback	1	2	3
8.	Dialogues	1	2	3
9.	Understand vocabulary	1	2	3
10.	Application/C.V.	1	2	3
Total		15	25	40




DETAIL OF COURSE CONTENTS
Functional English

S. No	Detail of Topics	Theory Hours	Practical Hours
1	Introduction of English sentence structure	2	3
2	Use of present indefinite tense with exercises	2	3
3	Use of 'is' 'are' 'am' questions and negatives	2	3
4	4.1 Ask questions 4.1.1 At work place 4.1.2 In the market 4.1.3 In classroom	2	3
5	5.1 Express daily routines 5.1.1 Before going to college 5.1.2 Dealing with colleagues 5.1.3 Going to market	2	3
6	6.1 Know how to address people 6.1.1 In Meetings 6.1.2 In class	1	2
7	7.1 Provide written feedback 7.1.1 After visiting the market 7.1.2 On some official task	1	2
8	8.1 Dialogues 8.1.1 With colleague 8.1.2 Teacher/student 8.1.3 Employer/employee 8.1.4 Booking on railway station	1	2
9	Understand vocabulary	1	2
10	Application / C.V.	1	2
Total		15	25



LIST OF PRACTICALS
Functional English

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

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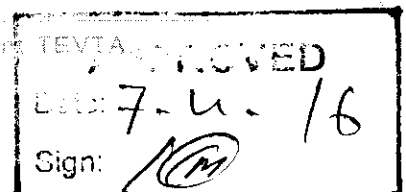
LIST OF LABS

Motor Winder

- Winding Lab / Workshop

I.T Fundamentals

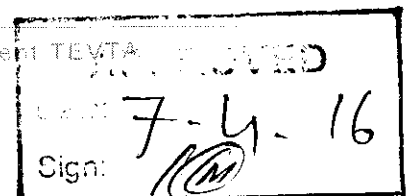
- Computer Lab



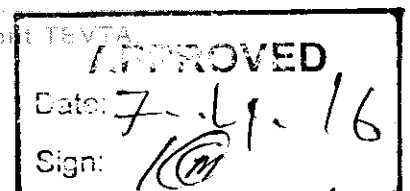
LIST OF MACHINERY / EQUIPMENT / TOOLS ETC**(For a Class of 25 Students)**

Name of Trade	Motor Winder
Duration of Course	3-Months

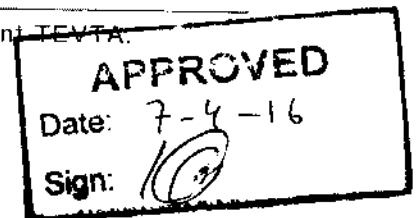
S. No.	Nomenclature of Equipment / Tools	Quantity
1.	Combination pliers (8")	25
2.	Coil winder machine (10")	02
3.	Cutter pliers (6")	25
4.	Nose pliers (8")	25
5.	Coil pulling machine (9")	05
6.	Grip pliers (8")	25
7.	Grinding Machine (4" disc)	01
8.	Flat screw driver (4")	25
9.	Flat screw driver (6")	25
10.	Flat screw driver (8")	25
11.	Flat screw driver (12")	25
12.	Philips screw driver (4")	25
13.	Philips screw driver (6")	25
14.	Philips screw driver (8")	25
15.	Philips screw driver (12")	25
16.	Steel rule	25
17.	Micrometer (0-1")	02
18.	Star kit set	05
19.	Electric blower (1/8" hp)	02
20.	Hand drill Machine (1/4")	02
21.	Saw	05
22.	Paper cutter	02
23.	Hammer (1/2 Kg)	05



24.	Hammer (1 Kg)	05
25.	Rubber hammer (6")	05
26.	AVO-meter	05
27.	Voltmeter (0-250 Volts)	05
28.	Soldering Iron (75 Watts)	05
29.	Ampere meter (0-30 Amperes)	05
30.	Bench vice (4")	13
31.	Flat file (8")	25
32.	Half round file (8")	25
33.	Round file (8")	25
34.	Pipe wrench (6")	05
35.	Pipe wrench (8")	25
36.	Adjustable wrench (6")	05
37.	Adjustable wrench (12")	05
38.	Wire gauge (mm & size)	10
39.	Tin cutter (6")	05
40.	Tin cutter (12")	05
41.	Coil slider	05
42.	Coil scraper	05
43.	Scissors	25
44.	Allen key set	02
45.	Spanner set	02
46.	Oil can	05
47.	Grease gun	02
48.	Bearing puller (4")	02
49.	Bearing puller (6")	02
50.	Bearing puller (12")	02
51.	Tong Tester (0-750 Volts)	05
52.	Megger	02



53.	Motor without winding 36 Slots	05
54.	Motor without Winding 48 Slots	05
55.	Motor without Winding 24 Slots	05
56.	Farma (Equal Size)	03
57.	Farma (Un-Equal Size)	03
58.	Ceiling Fans, 56" (Old / used) for training purpose	02
59.	Pedestal Fans, 1kw (Old / used) for training purpose	02
60.	Domestic Water Pumping motors, 1 HP, Single Phase, (Old / used) for training purpose	04
61.	Shaded Pole Motors	02
62.	Universal Motors	02



FURNITURE

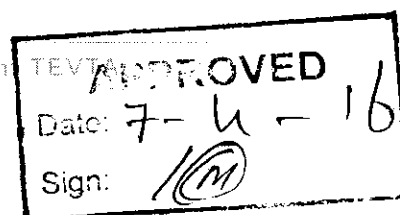
S.No.	Name of Article	Quantity
1.	Working bench	10
2.	Wooden stool (for students)	20
3.	Chair for teacher	02
4.	White board (3 ½ x 5ft) with stand	01
5.	Steel Elmira (4 x 7 ft.)	04
6.	Instructor table with 3 drawers	01

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**Motor Winder**

S. No.	Name of Consumable Material	Quantity
1.	Winding Wire 22 SWG	02 Kg
2.	Winding Wire 24 SWG	02 Kg
3.	Winding Wire 26 SWG	02 Kg
4.	Winding Wire 28 SWG	02 Kg
5.	Winding Wire 30 SWG	01 Kg
6.	Winding Wire 32 SWG	01 Kg
7.	Winding Wire 34 SWG	01 Kg
8.	Leatheroid Paper 10 No. 4 x 4 ft.	02 Sheets
9.	Sleeve 1 No.	10 Nos.
10.	Sleeve 2 No.	10 Nos.
11.	Sleeve 3 No.	10 Nos.
12.	Sleeve 4 No.	10 Nos.
13.	Varnish	06 Quarters
14.	Cotton Tape ¾"	18 Roll
15.	Insulation Tape ¾"	05 Roll
16.	Binding Thread	10 Roll
17.	Hacksaw Blade 12"	02 Nos.
18.	Emery Paper	03 Nos.
19.	Solder	100 Grams
20.	Soldering Paste	03 Packets
21.	PVC Insulated Flexible Cable 40/0.0076"	01 Coil
22.	PVC Insulated Single Core Cable 7/0.029"	01 Coil
23.	Grease	01 Packet
24.	Lubricating Oil	50 ml
25.	Kerosene Oil	03 Liters

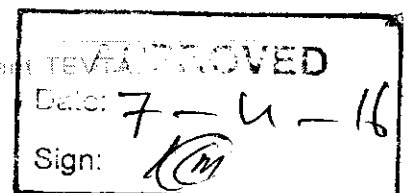


Functional English

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

I.T Fundamentals

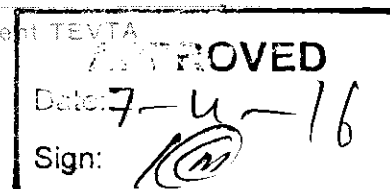
S. No.	Item	Quantity
1.	Printing Paper	As per requirement
2.	Printer Toner	As per requirement



EMPLOYABILITY OF PASS-OUTS

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

- Vendors of Electrical Concerns
- Service Shops
- Fan Factories



REFERENCE BOOKS

Motor Winder

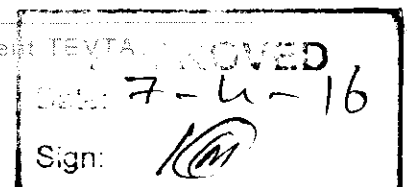
- 1 Motor winding, Published by TEVTA
- 2 Motor Winder Guide By Sarfraz Ahmed
- 3 Motor Winder Guide By Abdul Ghaffar Sheikh

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

Motor Winder

- D.A.E in Electrical with 2 year relevant experience

OR

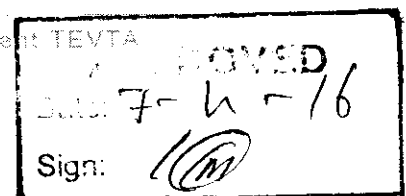
- year proficiency certificate with 6 year relevant experience

Functional English

- M.A. (English)

I.T Fundamentals

- DAE CIT/ BCS from HEC recognized university



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	ایصالیت	Parallel	متوازی
Conductivity	کرنٹ گزارنے 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	نقص	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	ھتوڑا	Structure	ساخت
Handling	کنٹرول	Tools	اوزار
Identification	شناخت	Tracing	تلاش کرنا
Installation	لگانا	Tri square	گتیا
Insulation	حاجز تہ	Understanding	سمجھنا
Insulation Remover	حاجز تہ اتارنے والا آلہ	Vernier Caliper	ورنیئر کیلیپر
Insulator	حاجز	Voltage	وولٹیج
Magnet	مقناطیس	Work	کام

SPECIFIC VOCABULARY WORDS

Alternating Current	متغیر کرنٹ	Magnetizing Force	مقناطیسی طاقت
Armature	آرمیچر	Maintenance	دیکھ بھال
Assembling	جوڑنا	Maximum Value	انتہائی قدر
Capacitor	کیپیسٹر	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 فیز موٹر
Dismantling	کھولنا	Squirrel Cage Motor	پنجھره نما موٹر
Effective Value	اصل قدر	Stator	سٹیٹر
Electromagnet	برقی مقناطیس	Tachometer	ٹیکو میٹر
House Hold Appliances	گھریلو آلات	Thermometer	تھر مومیٹر
Jointing	جوڑنا	Thimble	تھمبل
Leatheroid Paper	لیڈر اینڈ کاغذ	Terminal	ٹرمینل
Laying	بچھانا	Variations	اتار چڑھاؤ
Micrometer	مائیکرو میٹر	Washing Machine	کپڑے دھونے والی مشین
Magnetic Flux	مقناطیسی فلکس	Wedge	پھانس

Curriculum Revision Committee

1. **Muhammad Mahboob Butt,** **Convener**
Chief Instructor,
GCT Sahiwal

2. **Mr. Asif Mahmood,** **Member**
Deputy Manager,
GSTC Gulberg-II,
Lahore

3. **Muhammad Ashraf,** **Member**
Chief Instructor (Electrical),
GTTI Mughalpura, Lahore.

