

CURRICULUM FOR

FITTER GENERAL

(WITH SPECIALIZATION IN COTTON GINNING)

1-YEAR
(Diploma course)

National Vocational & Technical Training Commission, Islamabad (February, 2012)



CONTENTS

Training Objectives.....	3
Curriculum Salient Points.....	3
Skill Competency details.....	4
Knowledge Proficiency Details.....	4
Curriculum Delivery Structure.....	5
Scheme of Studies.....	6
Detail of Course Contents.....	7
List of Tools / Machinery / Equipments.....	16
Employability of Pass Outs.....	21
Minimum Qualification of Instructors.....	21
Reference Books.....	22
National Curriculum & Review Committee Members.....	23

TRAINING OBJECTIVES

The major Objectives of this course are to:

- Produce skilled workers who can carryout routine maintenance of Cotton ginning machinery
- Learn about tools, their uses, measurement, fastening method, hand operations techniques, drill & lathe machine operations etc. along with ethical values.

CURRICULUM SALIENT POINTS

Entry level	:	Middle (Preferably Matric)
Duration	:	1-Year (2-Semesters)
Training hours	:	1600 Hours (800 Hours/ Semester) 40 Hours per week 7 Hrs per day (Friday 5 Hours)
Training Methodology	:	Practical 80%
	:	Theory 20%
Medium of Instruction	:	Urdu / English

SKILL PROFICIENCY DETAILS

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

1. Use measuring tools & fitting tools
2. Sketch and draw different work diagrams and views of an object
3. Prepare jobs on lathe machine
4. Drill different size of holes on drill machine
5. Perform bench & maintenance work
6. Observe safety rules and precautions relating to ginning machinery
7. Carry out replacement of gin saws and ribs and their adjustments
8. Apply shutdown procedure

KNOWLEDGE PROFICIENCY DETAILS

After successful completion of this course the trainee will have the knowledge about:

1. Safety precautions and measures pertaining to the trades
2. The basic mathematics.
3. The reading of measuring & checking tools.
4. The name, identify hand tools, fitting tools and maintenance tools.
5. Safety precautions for bench work
6. The lathe machine (introduction, parts and operations)
7. The drill machine (introduction, parts and operations)
8. Identification of different materials
9. Basic drawing
10. Introduction of workshop items, tools and machine parts, mounting and dismounting of bearing, gears, pulleys and sprockets
11. Function and standardized setting of gin saws (teeth) of ginning machine

CURRICULUM DELIVERY STRUCTURE

1ST SEMESTER

	Course Delivery	Co Curricula Activities / Vacations	Test	Total
Week	1-20	21-25	26	26
	20	5	1	

2ND SEMESTER

	Course Delivery	Co Curricula Activities / Vacations	Final Test	Total
Week	1-20	21-25	26	26
	20	5	1	

SCHEME OF STUDIES

Fitter General
(1-Year Course)

1ST SEMESTER

Sr. No.	Main Topics	Theory Hours	Practical Hours.	Total Hours
1.	Introduction of workshop, workplace and tools	09	20	29
2.	Measuring-1	14	80	94
3.	Hand Operation Techniques – I	21	320	341
4.	Drill Machine Operation Techniques	18	120	138
5.	Fastening Methods (Riveting)	18	80	98
6.	Technical Math – I	20	-	20
7.	Technical Drawing – I	20	-	20
8.	Functional English	40	-	40
9.	Work Ethics	-	20	20
Total		160	640	800

2ND SEMESTER

Sr. No.	Main Topics	Theory Hrs.	Practical Hrs.	Total Hrs.
1.	Measuring- II	10	60	70
2.	Temporary Fastening Methods	14	60	74
3.	Lathe Machine Operations	20	150	170
4.	Hand Operation Techniques -II	15	270	285
5.	Materials (Iron + Steel)	10	-	10
6.	Technical Math – II	15	-	15
7.	Technical Drawing – II	16	-	16
8.	Introduction to Ginning (Allied Training)	12	56	68
9.	Ginning Machinery Model Layout & Its Operational Maintenance Requirements – I	8	24	32
10.	Functional English	40	-	-
11.	Work Ethics	-	20	20
Total		160	640	800

DETAIL OF COURSE CONTENTS

Fitter General (1-Year Course)

1ST SEMESTER

Sr. No.	Detail of Topics	Theory Hours
1.	Introduction of workshop, workplace & tools 1.1. Workshop, workplace, safety precaution (general) 1.2. Characteristics of metal 1.3. Workshop tools 1.4. Power : Machine power Muscular power	03 02 02 02
2.	Measuring –I 2.1. General introduction 2.2. System of Units (FPS & MKS System) 2.3. Calipers – gauges 2.4. D-Type Bevel Protractor and spirit level 2.5. Vernier caliper 2.6. Care and safety precautions of instruments	02 01 04 02 04 01
3.	Hand Operation Technique I 3.1. Marking, Letter & Number Punching (Straight & Angular) 3.2. Chipping and cutting 3.3. Sawing 3.4. Chiseling 3.5. Shearing 3.6. Filing 3.7. Scraping 3.8. Tapping 3.9. ISO fits	02 03 02 03 03 02 02 02 02
4.	Drill Machine Operation Techniques 4.1. Drilling (Types) 4.2. Counter sinking 4.3. Counter boring 4.4. Reaming 4.5. Die & Tapping by (hand & machine)	10 02 02 02 02

5.	Fastening Methods (Riveting)	
	5.1. Introduction of fastening	02
	5.2. Types of screw, nuts & bolts	03
	5.3. Joining of parts with screw	02
	5.4. Riveting (Types)	02
	5.5. Standardization of thread	03
	5.6. Size of screw, bolt and nut	02
	5.7. Thread cutting tools	04
6.	Technical Math – I	
	6.1. Whole Number (Addition & Subtraction)	02
	6.2. Multiplication & Division	02
	6.3. Fraction (Addition & Subtraction of common Fractions)	02
	6.4. Proper fraction, improper fraction mix numbers	
	6.5. Multiplication and division of fraction	02
	6.6. Decimal system of measurement meter – gram – liter	02
	6.7. Multiples and parts of units	02
	6.8. Addition and subtraction	
	6.9. Multiplication and division	02
	6.10. Conversion of FPS into MKS System	02
		02
		02
7.	Technical Drawing – I	
	7.1. Introduction to technical drawing	01
	7.2. Drawing instruments	01
	7.3. Kinds of lines	01
	7.4. Lettering	02
	7.5. Views (introduction and types)	02
	1 st & 3 rd angle projection	02
	7.6. Representation in three views	02
	7.7. Assembling bodies	02
	7.8. Completion of missing views visible edges	02
	7.9. Work pieces with cover edges	01
	7.10. Dimensioning	02
	7.11. Draw true scale	02
	7.12. Drawing of radial	
Total		120

2ND SEMESTER

Sr. No.	Detail of Topics	Theory Hours
1.	Measuring -II	
	1.1. Introduction of micrometers (outside – inside depth)	02
	1.2. Care and applications of micrometers	01
	1.3. Reading of micrometers	02
	1.4. Thread gauges (Metric - British)	01
	1.5. Snap and plug gauges	01
	1.6. Gauge blocks	01
	1.7. Dial indicators	01
	1.8. Profile gauge	01
2.	Temporary Fastening Methods	
	2.1. Joining of parts with nut & bolt	03
	2.2. Types of nut and bolt	02
	2.3. Motions and forces at threads	02
	2.4. Representation of forces on threads by means of drawing	02
	2.5. Screw jack	02
	2.6. Types of keys	03
3.	Lathe Machine Operations	
	3.1. Introduction of center lathe machine	02
	3.2. Types of lathe machine	02
	3.3. Turning operation	03
	3.4. Turning tools	02
	3.5. Threading operation (inside / outside)	04
	3.6. Boring operation	03
	3.7. Knurling operations	02
	3.8. Taper turning	02
	3.8.1. (Compound slide, tail stock & taper turning attachment)	
4.	Hand Operations Techniques -II	
	4.1. Bending process	01

	4.2. Bending effect	01
	4.3. Bending tools and devices	01
	4.4. Bending machines	02
	4.5. Bending of pipes and sheets	01
	4.6. Bending by hand	01
	4.7. Bending by machine	02
	4.8. Hammering and straightening	02
	4.9. Stretching and up setting	02
	4.10. Clamping	02
5.	Materials (iron + steel)	
	5.1. Introduction of metals	01
	5.2. Characteristics of metals	01
	5.3. Ferrous and non ferrous metals	01
	5.4. Pure and alloy metals	01
	5.5. Base metals	01
	5.6. Use of grey cast iron and steel	01
	5.7. Non ferrous metal with use	01
	5.8. Properties of metals & Elementary metals alloys	01
	5.9. Crystal structure of metals	01
	5.10. Hardness of material	01
6.	Technical Math – II	
	6.1. Angle units (degree –minutes - second)	02
	6.2. Conversion of degrees into minutes and seconds	02
	6.3. Calculation of angles, addition – subtraction – multiplication –division	03
	6.4. Calculation of tolerance	03
	6.5. Calculation of maximum and minimum size	03
	6.6. Calculation of surface area	02
7.	Technical Drawing – II	
	7.1. Inclined surface	02
	7.2. Cylindrical work pieces	02
	7.3. Centerline dimensioning	02
	7.4. Draw three views	02
	7.5. Surface symbols	02
	7.6. Assembling of two parts	02
	7.7. Tolerance (entry of tolerance in drawing)	02

	7.8. Measuring of sizes	02
8.	Introduction to Ginning (Allied Training)	
	8.1. Introduction of ginning operation its requirements & essentials.	1
	8.2. History & development of ginning techniques.	1
	8.3. Modernization of ginning techniques processes, induction of special equipment to improve their working efficiencies.	2
	8.4. Common standard types of ginning processes used in Pakistan i.e. roller ginning, saw ginning etc.	2
	8.5. Description of roller ginning process. Its merits & demerits, limitations.	2
	8.6. Explanation of saw ginning process its merits demerits, preferences	2
	8.7. Comparison of saw & roller Ginning processes.	2
9.	Ginning Machinery Model layout & its operational maintenance requirements – I	
	9.1. Requirement & types of maintenance i.e. routine, periodic & scheduled maintenance. Special overhauling, emergency repair etc.	3
	9.2. Daily, weekly & monthly checking of shafts, bearings & oil level of various points etc.	3
	9.3. Basic Machine elements and their pairs, assembling-disassembling i.e. shaft & pulleys gears, sprockets & chains, their types & fitting techniques use of gear puller etc.	2
Total		120

DETAIL OF COURSE CONTENTS

Fitter General
(1-Year Course)

1ST SEMESTER

Sr. No	Detail of Topics	Practical Hours
1.	Introduction to Work Bench Tools 1.1. Uses of workshop tools	02
2.	Work Bench Tools 2.1. Files – steel rule – scribe 2.2. Centre punch 2.3. Hammers – chisel – hacksaw 2.4. Scraper 2.5. Number & Letter Punch Set (Removal of Tri Square)	18
3.	<u>Basic</u> Measurement 3.1. Application of steel rule (Metric+ British) 3.2. Application of vernier caliper (Depth caliper) 3.3. Application of Tri square 3.4. Application of bevel protector 3.5. Application of outside caliper 3.6. Application of inside caliper 3.7. Application of steel tap 3.8. Calculation of center distance of holes 3.9. Application of work bench tools	08 08 16 08 08 06 18 08
4.	Hand Operation Techniques I 4.1. Filing exercise 4.2. Marking exercise (Letter & Number Punch Set) 4.3. Stretching exercise 4.4. Sawing exercise 4.5. Filing of thin & thick work pieces 4.6. Filing of sheet metal 4.7. Riveting exercise 4.8. Chipping exercise	320

	4.9. Shearing exercise 4.10. Tapping exercise 4.11. Simple assembling	
5.	Drill Machine Operations 5.1. Application of drill 5.2. Exercise of drilling blind hole 5.3. Exercise of drilling through hole 5.4. Exercise of drilling counter sinking 5.5. Exercise of drilling counter boring 5.6. Exercise of reaming 5.7. Exercise of tapping 5.8. Exercise of drilling use of clamping devices in drilling operations (5.1 Word "Work" deleted)	120
6.	Fastening Methods 6.1. Application of fasting (Riveting) 6.2. Exercise of external threads 6.3. Exercise of joining of parts with screws and pins 6.4. Exercise of joining of parts with rivets	88
Total		620

2nd SEMESTER

Sr. No	Detail of Topics	Practical Hours
1.	Measuring – II	
	1.1. Application of micrometers	04
	1.2. Practice of outside micrometer	04
	1.3. Practice of inside micrometer	05
	1.4. Practice of depth micrometer	05
	1.5. Care of micrometers	02
	1.6. Application of gauges	02
	1.7. Practice of thread gauges	04
	1.8. Practice of snap gauges	04
	1.9. Practice of plug gauges	04
	1.10. Practice of gauge blocks	06
	1.11. Practice of dial indicators	06
	1.12. Practice of universal bevel protractor	10
	1.13. Practice of spirit level	04
2.	Temporary Fastening Methods	
	2.1. Practice of joining nut & bolts	06
	2.2. Application of screws	06
	2.3. Exercise of center square	08
	2.4. Exercise of tap handles	08
	2.5. Exercise of punch fitting	08
	2.6. Exercise of fitting hacksaw frame	08
	2.7. Exercise of fitting rocker arm	08
	2.8. Exercise of fitting table lamp	08
3.	Lathe Machine Operations	
	3.1. Application of centre lathe	
	3.2. Turning operation exercise	
	3.3. Taper turning operation exercise	
	3.4. Threading operation exercise	
	3.5. Boring operation exercise	150
	3.6. Exercise of bolt	

	<p>3.7. Exercise of step bolt</p> <p>3.8. Exercise of conical work piece</p> <p>3.9. Exercise of locking spindle and pressure discs</p> <p>3.10. Exercise of taper turning</p>	
4.	<p>Hand Operation Techniques II</p> <p>4.1. Application of square fitting</p> <p>4.2. Exercise of dove tail fitting</p> <p>4.3. Exercise of fitting of different parts</p> <p>4.4. Exercise of preparing table lamp</p>	270
5.	<p>Ginning processes</p> <p>5.1. Exercise of ginning operations.</p> <p>5.2. Exercise of ginning techniques.</p> <p>5.3. Demonstration of modern and special equipment.</p> <p>5.4. Exercise of Roller and Saw Ginning. (The theory questions are transferred into practical and 5.5 to 5.7 are deleted & their numbers are added above)</p>	<p>16</p> <p>16</p> <p>16</p> <p>08</p>
6.	<p>Ginning Machinery Model layout & its operational maintenance requirements -I</p> <p>6.1. Practice of different types of requirement of maintenance i.e. routine, periodic & scheduled maintenance. Special overhauling, emergency repair etc.</p> <p>6.2. Daily, weekly & monthly checking of shafts, bearings & oil level of various points etc.</p> <p>6.3. Basic Machine elements and their pairs, assembling-disassembling i.e. shaft & pulleys gears, sprockets & chains, their types & fitting techniques use of gear puller etc</p>	<p>8</p> <p>10</p> <p>6</p>
Total		640

LIST OF TOOLS / MACHINERY / EQUIPMENT

(For the class of 25 students)

Sr. No	Equipment / Tools	Quantity
1.	Work Bench with vice 5"	25 Nos. each
2.	Flat File; 300*1 250*1 200*1 150*1 250*3 200*3 150*3	25 Nos. 25 Nos. 25 Nos. 25 Nos. 25 Nos. 25 Nos. 25 Nos.
3.	Half Round File; 250*1 250*3 200*1 200*3 150*1 150*3	25 Nos. 25 Nos. 25 Nos. 25 Nos. 25 Nos. 25 Nos.
4.	Round File; 200*1 200*3 150*1 150*3	25 Nos. 25 Nos. 25 Nos. 25 Nos.
5.	Square File; 200*1 200*3 150*1 150*3	25 Nos. 25 Nos. 25 Nos. 25 Nos.

6.	Triangle files; 200*1 200*3 150*1 150*3	25 Nos. 25 Nos. 25 Nos. 25 Nos.
7.	Try Square 100x150mm	25 Nos.
8.	Steel Rule 12"	25 Nos.
9.	Vernier Caliper 160mm (6")	25 Nos.
10.	Line scribe (Double edge)	25 Nos.
11.	Center punch 100mm	25 Nos.
12.	Back square 100 x 150 mm,	25 Nos.
13.	Flat chisel 150mm	25 Nos.
14.	Grove cut chisel	25 Nos.
15.	Cross cut chisel 150mm	25 Nos.
16.	Spring divider 6"	25 Nos.
17.	Bench hammer 500 grams (Cross pin)	25 Nos.
18.	Bench hammer 300 grams (Cross pin)	25 Nos.
19.	Hack saw frame 12" (Haw deleted)	25 Nos.
20.	Dust brush, File Brush (<i>Each</i>)	25 Nos.
21.	Flat scraper 12"	12 Nos.
22.	Half Round scraper 8"	12 Nos.
23.	Key file set (set of 6 pieces)	12 Nos.
24.	Needle file set (set of 100x 12 pieces)	12 Nos.
25.	Drill set 1 to 10 mm fraction 0.1	10 sets.
26.	Drill set 1 to 13 mm fraction 0.5	10 sets
27.	Reamer also set 3H ₇ , 4 H ₇ , 5H ₇ , 6H ₇ , 8H ₇ , 10H ₇ , 12H ₇ , 14H ₇ , 16H ₇ with drill	10 Nos. each
28.	Adjustable reamer ¼ to 1 ½ "	2 sets
29.	Tap set M3 to M20	3 sets

30.	Die set M3 to M20	3 sets
31.	Tap handle 0, 1, 2 No.	10 Nos. each
32.	Tap extractor	6 sets
33.	Screw extractor	6 sets
34.	Hand vice 6"	10 Nos.
35.	Oblique clamp 6"	10 Nos.
36.	Screw driver 10", 8", 6", 4"	5 Nos. each
37.	Master tri square 100 x 150 & 150 x 200	5 Nos. each
38.	Straight edge 100 & 150	5 Nos.
39.	Tap extension M4, M5, M8, M6, M10	4 Nos. each
40.	Rivet forming tools 3, 4, 5, 6, 8	6 sets
41.	Rivet cleaning set 3, 4, 5, 6, 8	6 sets
42.	Combination pair 6", 8"	6 Nos.
43.	D type bevel protractor	6 Nos.
44.	Universal bevel protractor	2 Nos.
45.	Radius gauge 1 to 7 mm	6 Nos.
46.	Wooden melt	6 Nos.
47.	Aluminum melt	6 Nos.
48.	Sledge hammer 5 kg	2 Nos.
49.	Hand shear (straight) 8"	6 Nos.
50.	Micrometer 0-25 & 25-50, 50-75 (2 Each)	6 Nos.
51.	Oil cane (Pump type)	8 Nos.
52.	Shaper machine with accessories, 14"	2 Nos.
53.	Pedestal Grinder machine 8" Wheels	2 Nos.
54.	Bench drill machine with accessories	2 Nos.
55.	Pillar drill machine with accessories 1" Dia	2 Nos.

**List of Machinery / Equipment
For Cotton Ginning Lab
(For the Class of 25 Students)**

The following machinery / equipment etc. would be required for effective and comprehensive training of the trainees at the institute level / their timely modifications, improvements and innovations are also recommended. Miniature sectional working models of plants machinery/ equipment are preferred.

Sr. No.	Nomenclature of Equipments / Tools	Quantity
1	Seed Cotton Cleaning And Ginning Plant (Live)	One complete set
2	Condenser along with all accessories	1 No.
3	Cleaning Module consisting on: -	
i.	Rock catcher with all accessories of different nos.	1 No.
ii.	Separator (with Vacuum Box) and all accessories	1 No.
iii.	Flat cleaner	1 No.
iv.	Incline cleaner with all accessories.	1 No.
v.	Stick machine with all accessories	1 No.
vi.	Feeder extractor cleaner (FEC)	1 No.
vii.	Belt conveyor with all accessories	1 No.
viii.	Screw conveyer with all accessories	1 No.
ix.	Dust collector (Cyclone)	1 No.
x.	Lint cleaner	1 No.
xi.	Fan / blowers	2 Nos.
xii.	Ducts	10 Nos.
xiii.	Plate valves	10 Nos.
xiv.	Dragon machine	1 No.
xv.	Suction Fan with all accessories	1 No.
4	Ginning Module:-	
i.	Saw ginning machine (Gin-stand) with all accessories of different nos. and spare parts.	1 No.
ii.	Gin saws	20 Nos.
iii.	Ribs (various sizes and designs)	40 Nos.
iv.	Roller ginning machine	1 No.
5.	Packing Module:-	

i.	Hydraulic press	1 set
ii.	Hydraulic pump station	1 No.
iii.	Baling unit	1 set.
iv.	Weighting unit	1 set.
6	Over Head Crane 5 Ton	1 No.
7	Fork Lifter 5 Ton	1 No.
8	Power Saw Machine with accessories	1 No.

EMPLOYABILITY OF PASS OUTS

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

1. HMC Taxila
2. Atomic Energy Commission
3. Packages Ltd. Lahore
4. Refrigeration & Air Conditioning Industry
5. Cycle Industry
6. Mechanical repairing workshops
7. Any seasonal Cotton Ginning Factory
8. Steel Mill
9. Oil Refineries
10. Railway Locomotive Sheds (Workshop)
11. Textile Industries
12. All industries in Pakistan

MINIMUM QUALIFICATION OF INSTRUCTOR

- DAE in (Mechanical Technology) with two years industrial experience.

OR

- Two years proficiency certificate of Fitter General or Fitter Millwright with six years relevant experience.

REFERENCE BOOKS

- Manual on metallurgy II-year mechanical
- Manual on workshop practice-II mechanical technology NISTE-Islamabad.
- Gear ling about machine tools
- Fundamental of metal trade
- Ginning Manual

NAMES OF NATIONAL CURRICULUM & REVIEW COMMITTEE MEMBERS

Their names, designations, positions and cell numbers are shown below:

Sr #	Name	Sr #	Name
1	S.M. Wasi Zaidi, Associate Professor (Mechanical), P.S.I.T. Landhi, Karachi Cell # 0301-2847825	2	Engr. Muhammad Arshad, Principal, Government Technical Training Institute, Gulberg, Lahore Cell # 0333-4330778
3	Engr. Ghulam Abbas Channa, Principal, Govt. Polytechnic Institute, Asu Goth, Malir, Karachi Cell # 0300-7012344	4	Liaqat Ali Jamro, Deputy Director (M&E), TEVTA, Gulshan-e-Iqbal, Block 6, St. 19, Near NIPA, Karachi Cell # 0333-2606334
5	Asif Quddus, Senior Instructor, Technical Training Centre, Quetta Cell # 0333-7929275	6	Nasir Ahmed, Chief Instructor (Mechanical), Govt. Technical Trg. Institute, Gulberg, Lahore Cell # 0333-4287063
7	Muhammad Mumtaz, Senior Instructor, Govt. Technical Training Institute, Mirpur, Azad Kashmir Cell # 0346-5170024	8	Abdul Jabbar Kasi, Instructor, Technical Training Centre, Quetta Cell # 0321-8007928
9	Qaisra Sheikh, C/o General Industries, Lahore		