

GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL
TRAINING AUTHORITY



CURRICULUM FOR
STEEL FIXER
(3 – Month Course)

Revised AUGUST - 2024

CURRICULUM SECTION
ACADEMICS DEPARTMENT

96-H, GULBERG-II, LAHORE

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TRAINING OBJECTIVES:

The objective of this course is to impart theoretical and practical knowledge about steel fixing so that the trainee may be able to work as do jobs of steel fixing for civil works and earn his livelihood by offering his skills.

At the end of the course a trainee will be familiar with basic terminology used in steel fixing, in concrete structure and structural drawing of different structural members as well as calculating cutting length of steel bar etc. Trainee will have complete command over operations like cutting, bending binding, placing of steel bar as per drawings / bar bending schedule etc.

CURRICULUM SALIENTS:

Entry Level	Middle
Duration of course	3-Month
Total training hours	400 Hours
	7- hours/day –(5 Hours on Friday)
	6 Days per Week
Training methodology	Practical 90%
	Theory 10%
Medium of instruction	Urdu/ English

SKILL COMPETENCY DETAILS:

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

1. Use the tools and instruments for steel fixing.
2. Measure, cut and bend the bars.
3. Prepare Bends, hooks and overlaps of bars.
4. Bind the steel bars.
5. Calculate cut, length of bars / preparation of bar bending schedule.
6. Draw the structural drawing of different structural members.
7. Fix / fabricate the steel bars for different structural members of concrete structures.

KNOWLEDGE PROFICIENCY DETAILS:

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

1. Explain the Selection and use of proper tools.
2. Explain the safety precautions.
3. Describe the different types of concrete and steel.
4. Describe the prerequisite of steel fixing.
5. Define the basic drawing.
6. Define the structural drawing.
7. Explain the preparation of bar bending schedule.
8. Explain the tension and compression in concrete and role of steel in concrete.
9. Describe the different terms used in concrete and steel.

SCHEME OF STUDIES**Steel Fixer
(3 - Month Course)**

Sr. No.	Subject	Theory Hours	Practical Hours	Total Hours
1.	Steel	2	1	3
2.	Concrete	1	-	1
3.	Tools & Machinery used in Steel Fixing	3	-	3
4.	Basic arithmetic	1	9	12
5.	Measurement system	2	6	8
6.	Basic Mensuration	1	10	15
7.	Building drawing	2	6	8
8.	Role of steel in concrete construction	1	-	3
9.	Improved safety practices	1	-	3
10.	Measuring practice	2	12	14
11.	Cutting & bending practice	2	30	36
12.	Binding practice	1	14	15
13.	Column base	2	15	16
14.	Column	2	20	25
15.	Beams	2	33	34
16.	RCC slabs	2	31	32
17.	Retaining wall	1	18	19
18.	Raft foundation	1	21	22
19.	Pile foundation	1	25	27
20.	RCC arches	1	18	19
21.	RCC stairs	1	33	35
22.	Domes & shell structures	1	21	22
23.	RCC water tank	1	15	16

24.	Inspection Tools	1	10	11
25.	Work Ethics	0	12	12
26.	Soft Skills	06	-	06
Total		40	360	400

DETAIL OF COURSE CONTENTS**Steel Fixer**
(3 – Month Course)

Sr. No.	Detail of Topics	Theory Hours	Practical Hours
1.	Steel 1.1. Introduction, types and Grades 1.2. Types and Sizes of bar	2	1
2.	Concrete 2.1. Introduction Types: PPC, RCC, prestressed concrete, precast concrete and cast in situ concrete.	1	-
3.	Tools & Machinery used in Steel Fixing 3.1. Introduction to tools & machinery used in steel fixing. 3.2. Used of advance steel cutting and bending machine, and steel uplifting machine. 3.3. Care and maintenance of tools and machinery	3	-
4.	Basic Arithmetic 4.1. Exercise of Addition, subtraction, division & multiplications of whole member, fractions and decimals 4.2. Angles laying 30°, 45°, 90° angles	1	9
5.	Measurement System 5.1. Foot pound system, part / fractions of inches and feet 5.2. Metric system of measurements 5.3. Conversion of foot pound to metric system vise versa. 5.4. Exercise to solve problem regarding addition	2	6

	& subtraction of measurements.		
6.	Basic Mensuration 6.1. Area of rectilinear plane geometrical figures & circle practice in calculating areas of different plain figure. 6.2. Volume of simple geometrical solids. Practice in calculating volume different geometrical solids. 6.3. Weight & specific weight. Practice to calculate weight of different materials on the basis of volume and density.	1	10
7.	Building Drawing 7.1. Term used in building, structure, terms, hours planning terms. 7.2. Components of building. 7.3. Introduction to plan, elevation & section, types of drawings. 7.4. Reading exercise of working & structure drawing of different building. 7.5. Prefer to use digital tools for a paperless approach	2	6
8.	Role of Steel in concrete construction 8.1. Tension and compression in concrete, bends, hooks and overlaps of bars , Concrete cover, effective depth, overall depth, main bars, distribution bars, stirrups, dowel bars, chairs and effective span etc.	1	-
9.	Improved safety practices 9.1. Used of PPE e.g safety helmet, earmuffs, face shield, safety signs, safety gloves, shoes, goggles and safety belts.	1	-

	9.2. Safety precautions during steel bending, cutting and fixing / fabrication 9.3. First Aid		
10.	Measuring Practice 10.1. Measuring the diameter of the bar and length of bars. 10.2. Quality control while cutting the bars.	2	12
11.	Cutting & Bending Practice 11.1. Cutting practice of different types and sizes of steel bar. 11.2. practice of making hooks and bends. 11.3. Practice of making bend up bar at 45° , 30°	2	9 11 10
12.	Binding Practice 12.1. Introduction to binding wires (size, quality). 12.2. Different methods of binding the bars. 12.3. Practice of bar binding with binding wire.	1	6
13.	Column Base 13.1. Introduction of structure drawing of column base 13.2. Calculation of cut lengths of bars (as like bars bending schedule) 13.3. Practice of cutting, making bands, placing and binding of steel bars for column base as per drawing or bar bending schedule	1	4 11
14.	Column 14.1. Introduction of Structural Drawing of column 14.2. Calculation of cut lengths and no of bars and stirrups / rings for simply supported column (as like bars bending schedule) 14.3. Practice of making ring / stirrups as per	2	4 6

	drawing. 14.4. Practice of cutting, making bends, placing and binding of steel bars and ring / stirrups for column as per drawing or bar bending schedule 14.5. Prefer to use prefabricated components to reduce wastage		10
15.	Beams 15.1. Introduction of structural drawing of simply supported continuous and cantilever beam. 15.2. Calculation of cut lengths and no of bars for simply supported beam. (as like bars bending schedule) 15.3. Practice of cutting, making bends, bend-up bars and stirrups, placing and binding of steel bars for simply supported beam as per drawing or bar bending schedule. 15.4. Calculation of cut lengths bars and stirrups and no of bars for continuous beam (as like bars bending schedule) 15.5. Practice of cutting, making bands, stirrups and bend-up, placing and binding of steel bars for continuous beam as per drawing or bar bending schedule.	2	4 12 6 6 6
16.	RCC Slabs 16.1. Introduction of structural drawing of slabs (simply supported, continuous, cantilever). 16.2. Calculation of cut lengths and no of bars for simply supported and cantilever slab. (as like bars bending schedule) 16.3. Practice of cutting, making bends and bend-	2	5 11

	up bars, placing and binding of steel bars for simply supported slab as per drawing or bar bending schedule.		8
	16.4. Practice of cutting, making bends and bend-up bars, placing and binding of steel bars for cantilever slab as per drawing or bar bending schedule.		7
17	Retaining Wall 17.1. Study of structural drawing of retaining wall 17.2. Calculation of cut lengths, curtailing and no of bars for R.C.C retaining wall. (as like bars bending schedule) 17.3. Practice of cutting, making bends placing and binding of steel bars for R.C.C retaining wall as per drawing or bar bending schedule.	1	6 12
18	Raft Foundation 18.1. Introduction of structural drawing of Raft foundation. 18.2. Calculation of cut lengths, and no of bars for Raft foundation (as like bars bending schedule) 18.3. Practice of cutting, making bends, chairs, placing and binding of steel bars for Raft foundation as per drawing or bar bending schedule. 18.4. Eco-friendly material usage and waste management	1	6 8 7
19	Pile Foundation 19.1. Introduction of structural drawing of pile foundation. 19.2. Calculation of cut lengths of bars and rings	1	4

	and no of rings for a small pile (as like bars bending schedule)		9
	19.3. Practice of making rings for pile.		12
	19.4. Fabrication of cage for small as per drawing.		
20.	RCC Arches 20.1. Introduction of structural drawing of RCC Arch and calculation of cut length and no of bars etc. 20.2. Practice of cutting, bending, placing and binding of bars for R.C.C Arch as per drawing or bar bending schedule	1	6 12
21.	RCC Stairs 21.1. Introduction of structural drawing of different types of R.C.C stairs. 21.2. Calculating of cut lengths and no of bars for single flight stair. 21.3. Practice of cutting, bending placing and binding of bars for single flight stair. 21.4. Calculating of cut lengths and no of bars for dog legged stair. 21.5. Practice of cutting, bending, making stirrups/ rings placing and binding of bars for dog legged stair 21.6. Prefer to use recycle scrap materials	1	6 9 6 12
22.	Domes & Shell Structures 22.1. Introduction of structural drawing of dome and shell structure and study of bar bending schedule. 22.2. Practical of cutting bending, placing & binding of steel bars for of dome and shell structure.	1	6 15
23.	RCC Water Tank		

	23.1. Introduction of structural drawing of water tank. Study of bar bending schedule. 23.2. Practical of cutting bending, placing & binding of steel bars for a small water tank 23.3. Use energy efficient materials, water overflow management	1	12
24	Inspection Tools Introduction of inspection tools e.g Rebar gauge, Rebar Locator, Torque wrench, Rebar Corrosion Detector, concrete cover meter. Uses and practice of inspection tools e.g Rebar gauge, Rebar Locator, Torque wrench, Rebar Corrosion Detector, concrete cover meter.	1	10
25.	Problem Solving Approach Team Building Communication Skills	06	
26.	Work Ethics	-	12
TOTAL		40	360

LIST OF TOOLS & EQUIPMENT (FOR CLASS OF 25 STUDENTS)

Name of Trade	Steel Fixer
Duration of Course	3 – Months

Sr.No	Item Description	Specifications	Quantity	Unit
1	Measuring Tape	<u>STEEL TAPE</u> . Length 30 m, 13 mm wide . stainless steel with vinyl coating . Both face marking, one in m (0.1, 0.01, and 0.005m) and other in ft (inches & half) . first decimeter also marked for 0.001m and first ft marked for 1/8 . button arrangement for quick release / winding . non-corrosive metal cover,	10	Nos.
2	Pliers	8" End Cutting Plier wire snips manufactured with special high grade Tool steel, high strength with plastic grip	10	Nos.
3	Hammer	<u>Brick Hammer</u> Forged steel rectangle head and tapered tip weight = 3000 gm Wooden handle (60cm long) with moulded vinyl grip	10	Nos.
4	Tongue(Sunhy)	18" Long	10	Nos.
5	Steel Bender Steel Rod(Manual)	1" dia Galvanised steel pipe with bending Tooth	6	Nos.
6	Electric Rebar Bender	Rebar Bender, 900 watt hydraulic 5/8" ,bending angle 0-130 degree	1	Nos.
7	Rebar Cutter	Rebar cutter with cutting speed 1-1.5 sec, cutting upto 5/8"	1	Nos.
8	Bench Grinder	220 V Bench Grinder for sharpening tools	1	Nos.
9	Pincer	Carpenter Pincer 150mm Size, steel	6	Nos.
10	Anvil	Cast Iron 10 Kg ,Single Horn anvil with large counter top and stable base ,high	5	Nos.

		hardness,rugged round		
11	Wire Twisting Tool	10" Stainless steel rebar wire twister	12	Nos.
12	Empty Tool Box	U Safe Iron metal Tool Box,Size 17"	1	Nos.
13	Claw Lever (Bari)	2.5' Long 250 mm dia	10	Nos.
14	Knipex(7",10",12")	3 Piece cobra plier (7",10",12" size)	5	Set
15	Spanner	8 Imperial Set	1	Set
16	Haksaw	Haksaw steel cutting with blade size 12"	25	Nos.
17	Hoist and Crane Machine	Voltage:220V-240V~50HzInput power:900W Lifting weight:250Kgs(Single line)500Kgs(Double line) Lifting height:18m(Single line),9m(Doubleline) Lifting speed:8m/min(Singleline),4m/min(Double line) Upper and lower limit device Emergency stop switch Thermal protection terminal Packed by carton box	01	Nos.
18	Rebar Gauge	Diameter Range: Rebar gauges are designed to measure a range of standard rebar sizes. Common sizes range from 6 mm (1/4 inch) to 50 mm (2 inches) in diameter. Increment: The gauge typically includes incremental measurements that correspond to standard rebar sizes, such as 6 mm, 8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, and 50 mm.	25	Nos.
19	Rebar Locator	A rebar locator typically detects rebar at depths of 10 mm to 200 mm with an accuracy of ± 1 mm for cover thickness and rebar size. It features an LCD display, user-friendly interface, and options for data storage and connectivity via USB or Bluetooth. Powered by rechargeable batteries, it offers 8-20 hours of operation in a compact, durable design.	01	Nos.
20	Torque Wrench	Thin profile, sealed, teardrop head design offers improved access and durability for highly effective application Torque accuracy of +/- 3% CW between 20% and 100% of wrench capability Pull adjustment collar feature allows you to	02	Nos.

		make quick and easy torque setting changes		
21	Rebar Corrosion Detector	ZBL-C310A is a specialized apparatus; it is designed according to the electrochemical testing method (natural potential method) of "construction testing technical standard". By using the electrode polarization theory, C310A tests the potential of concrete surfaces through a Cu/CuSO₄ reference electrode, and determines the level of rebar corrosion with the commonly used natural potential method. Powerful professional analysis-process software facilitates the generation of test reports automatically The device generates rebar distribution maps and rebars corrosion potential contour graphs; Data transfer to usb-thumb drive is available, very convenient for field work;	02	Nos.
22	Concrete cover depth meter	Detection Depth: Measures concrete cover from 10 mm to 200 mm with ± 1 mm accuracy. Rebar Size Detection: Detects rebar diameters from 6 mm to 50 mm. Display & Interface: Backlit LCD screen with audio/visual alerts for rebar location and depth.	02	Nos.
23	Electric Grinder Small 4"	Hand Held Mini Electric 100 mm angle grinder machine with 6 pieces wheel/disc for cutting, 4", 850 W, 220V	5	Nos.
24	Rebar Tier	Rebar Tier upto 16mmx 19mm with 0.8 mm wire with battery operated	1	Nos.
Sub Total (Estimated cost in Rs.)				

LIST OF CONSUMABLE MATERIALS

Sr.No	Item Name	Specifications	Quantity	Unit
1	Tools Belts	STEELFIXER BACK SUPPORT TOOL BELT Dimensions. 30 × 20 × 4 cm	25	No
2	Safety Shoes	minimum impact resistance of 200 Joules and compressive strength of at least 15 kN at the toe cap, in addition to other characteristics such as being antistatic.	25	No
3	Safety Belt	Belt Width: up to 2" (51 mm). • Belt Connection: slotted. • Overall Size: 6-3/4" (171 mm) x 10" (254 mm). • Weight (lbs.): .56	25	No
4	Binding Wire	The binding wire should be gauge wire. It shall be free from rust, oil, paint, grease, loose mill scale	40	kg
5	Chalk	Chalk (white & Yellow), cylindrical, extruded, length approx. 80 mm, diameter 10 mm	5	Box
6	Cutting Disc	4" Size 6 Pieces Set	10	Set
7	Steel Bars 8mm	Length of steel Bars= 40ft, Gade 60,Tensile Strength = 60000 psi	75	kg
8	Steel Bars 12mm	Length of steel Bars= 40ft, Gade 60,Tensile Strength = 60000 psi	114	kg
9	Steel Bars 18mm	Length of steel Bars= 40ft, Gade 60,Tensile Strength = 60000 psi	140	kg
10	Steel Bars 25mm	Length of steel Bars= 40ft, Gade 60,Tensile Strength = 60000 psi	140	kg

11	Gloves	Rexine with Good Quality	25	No
12	Structural Drawings	As per requirement	25	No
13	Haksaw blades	Haksaw blade 12"	25	No
14	Safety Signs	18"x24"	25	No
15	Safety Hamlet	Straps should be fitted such that minimum clearance be at least 30 mm and maximum clearance more than 80 mm. Chin strap should have minimum width of 19 mm and directly attached to shell. Nape strip should have minimum depth of 115 mm. The mass of helmet without attachments should be 400 g.	25	Nos.
16	Earmuffs	Noise Reduction Rating (NRR) values ranging from 21 to 31 Db	25	Nos.
17	Goggles	Color: White, lens center thickness of 2.5 mm, weight 26 gr. Per piece in a plastic bag	25	Nos.
18	Face Shields	Face Shield Dimensions: 360mm Width x 240mm Height. Face Shield Material: Transparent Polyethylene terephthalate (PET), 0.51mm thick. Frame Material: Low- Density Polyethylene. Strap Material: Rubber band, not made with natural rubber latex.	25	Nos.
19	First Aid Kit	All necessary materials required in emergency	2	Nos.

EMPLOYABILITY OF PASS OUTS:

After completion of course the trainee may find job / employment in the following areas/sectors:

1. Work as steel fixer in R.C.C. structures with contractors.
2. Work as steel fixer with public & Private sector construction companies.
3. Work as steel fixer with construction companies abroad.

REFERENCE BOOKS

1. Instructor Manual & Trainee Manual
2. G-III Level (Development Cell)
3. Steel Fixer by Mr. Ikhlas Khan

MINIMUM QUALIFICATION OF TEACHER / INSTRUCTOR

- DAE in (Civil / Mechanical) Technology With 2-Years relevant experience.

OR

Two Years certificate in related field with 6-Years' experience in relevant field

OR

Industrial / Domestic Worker with atleast 10-years related work experience.

CURRICULUM REVISION COMMITTEE**Steel Fixer (3-Months Course)**

Sr.No	Name and Designation	Status
1	Mr. Tahir Mehmood, Instructor Civil, GCT sialkot	Convener
2	Mr.Ali Sardar Instructor Plumbing GTTI Mughalpura,Lahore	Member
3	Mr.Abdul Rauf Instructor Civil, GCT sialkot	Member
4	Muhammad Ibraheem Instructor Civil, GCT Rawalpindi	Member
5	Muhammad Ishaq Section Incharge Water Cooling Industry Lahore	Member
6	Waqas Ali Civil Advisor Silver Star Construction,Sialkot	Member