

Syllabus for Assistant Bar Bender & Steel Fixer

Course Name	Assistant Bar Bender & Steel Fixer
Course Code	CON/2023/ABSF/145
Sector	Construction
Level	3
Occupation	Bar Bending and Steel Fixing
Job Description	<ol style="list-style-type: none"> 1. To work as a skilled Bar Bender & Steel Fixer and perform work such as reading of routine drawing/sketches, bar bending schedule. 2. Cutting and bending of rebars using power tools, fabricate, place and fix reinforcement for R.C.C. structures, like – Footing, Column, Beam, Slab, Retaining Wall, Open water drain under and etc. experienced supervision. 3. Tie Reinforcement bar using different types of ties. 4. Erect and dismantle temporary scaffold of 3.6 m height. 5. Work according to personal health, safety, and environment protocol at construction site.
Course Duration	Total Duration 390 Hrs. (T-90, P-180, OJT-60 and ES-60)
Trainees' Entry Qualification	Grade 10 OR Grade 8 with two years of (NTC/ NAC) after 8 th OR Grade 8 pass and pursuing continuous schooling in regular school with vocational subject. OR 8th grade pass with 2 yrs. relevant experience OR Previous relevant Qualification of NSQF Level 2 with one yr. experience OR Previous relevant Qualification of NSQF Level 2.5 with 6 months experience
Trainers Qualification	BE/B.Tech in Civil Engineering / Construction Engineering with 1Yr experience. OR Diploma in Civil Engineering with 2 Yrs. experience. OR GRADE 12 Pass + 3 Years experience with Reinforcement fitter of NSQF Level 4 qualified.

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
1	Introduction to Trade Safety	Optimize productivity by following safe working practices.	10	20	30
2	Tools Introduction	Identify different types of Tools and their uses.	10	20	30

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
3	Construction Materials	Identify different types of Reinforcements visually and Rebar fixing for different RCC structures.	10	20	30
4	Tying of Reinforcement	Tie Reinforcement bar using different types of ties.	10	20	30
5.	Fabrication and fixing of reinforcement.	Fabricate and fix reinforcement for complex structures as per drawings, BBS, and standard codes provision.	50	100	150
6.	OJT			60	60
7.	Employability Skill		--	--	60
TOTAL:			90	240	390

SYLLABUS:**Module No. 1: Introduction Trade & Safety****Outcome**

Optimize productivity by following safe working practices.

Theory Content:

- Bar Bending & Steel fixing
- Bar Bending Trade Specific Safety
- Transportation Safety
- Loading & Unloading of Bars
- Cutting & Bending of Bars manually
- Cutting & Bending of Bars machine
- Stacking of Bars
- Benefit of Housekeeping

Practical Content:

- 1.1 Identify and report any hazards, risks in site safety to the appropriate authorities.
- 1.2 Follow emergency and evacuation procedures in case of accidents, fires, natural calamities.
- 1.3 Electrical Safety: Selection and use of electrical fixtures to assemble & maintain temporary electrical panel for construction work.
- 1.4 Follow recommended safe practices in handling construction materials, including chemical and Hazardous material whenever applicable.

- 1.5 Use appropriate Personal Protective Equipment (PPE) as per work requirements including:
- Head Protection (Helmets)
 - Ear Protection
 - Fall protection
 - Foot protection
 - Face and Eye Protection
 - Hand and Body Protection
 - Respiratory Protection (if required)

Module No. 2: Tools Introduction

Outcome

Identify different types of Tools and their uses.

Theory Content:

- What is Hand tools & Power Tools
- Types of Hand tools & their use in Bar Bending work
- Type of power tools & their use in Bar Bending work
- Different types of Checking tools
- Laser tools
- Safety in using the Power tools

Practical Content:

- Hand tool's & Power Tool's Uses in Different Work
- Types of Hand tools & their use in Bar Bending work
- Type of power tools & their use in Bar Bending work
- Safety in using the Power tools
- Uses of Checking tools
- Uses of Laser tools

Module No. 3: Construction Materials

Outcome

Identify different types of Reinforcements visually and Rebar fixing for different RCC structures.

Theory Content:

- **Reinforcing bar:** Mild Steel, HYSD bar (TMT)
- **Consumables:** Different types of consumables materials.
- **Cold Twisted Bar:** Rolled mild steel bars which have been twisted when cold to increase their strength.
- **Cold Drawn Wire:** Wire which has been drawn through a die at normal temperature.
- **Binding Wire:** Wire usually soft iron, used for tying reinforcement steel work together.
- **High Tensile Reinforcement:** Reinforcement made up of steel containing not more than 0.30% of carbon.

- **Mild Steel Reinforcement** - Reinforcement made up of steel containing approximately 0.12 to 0.25% carbon.

Practical Content:

- Steel Selection (visual) and Shifting of Bar.
- Straightening & Stacking of Bars.
- Bending Links & Hooks.
- Bending Cranks/Shear, Spacer and Chair Bars.

Module No. 4: Tying of Reinforcement

Outcome

Tie Reinforcement bar using different types of ties.

Theory Content:

- **Different types of binding wires** – M.S.Wire & G.I.Wire. The wire used for tying of rebars are known as binding wire. Normally we use 16/18 standard wire gauge (S.W.G.) mild steel wire, or galvanized wire for tying purpose.
Each tie is formed from a short length of wire and tightened by twisting and purchasing the nips against the bars. Position the wire around the bars.
Use just enough pressure to hold the ends without cutting them and twist the hooks to tighten the tie by “heeling” against the top bars.
- **Different types of ties and their application** - Slash tie, Ring Slash tie, Hair pin tie, Ring hair pin tie, Crown tie, Splice tie.
- Concept of spacing of rebars & how to understand BBS.
- **General abbreviations:**
RC - Reinforced concrete
BWK - Brickwork
DRG - Drawing
FS - Full size
N.T.S - Not to scale.
FFL - Finished floor level
SFL - Structure floor level
EL - Existing level
HOR - Horizontal
VER - Vertical
DIA – Diameter
- **Relating to reinforcement:** -
EW - Each way
EF - Each face
FF - Far face
NF - Near face
B - Bottom
T - Top
C/C - Center to center.
- Importance of proper tying of rebars and

Practical Content:

- Bar Tying by manual and machinery.
- Cutting of Binding Wire according to the cutting list.
- Marking & Placing of Rebars according to the given sketch or drawing.

Module No. 5: Fabrication and fixing of reinforcement.**Outcome**

Fabricate and fix reinforcement for complex structures as per drawings, BBS, and standard codes provision.

Theory Content:

- Understanding of Numeration/General arrangement drawing, Reinforcement drawing.
- Understanding of Bar Bending Schedule (Bar mark, bar detail, bar shape, cutting length etc.)
- Cutting length calculation from drawings and bar bending schedules for various R.C.C structural elements.
- Introduction to automatic bar tying machine, its accessories.
- Types of power tools for cutting of reinforcement steel (Circular cutting machine, Shear cutting machine)
- Power tools for bending of reinforcement steel (Bending machine and its accessories)
- **Bending Pin** - The pin or mandrill propelled around the former to bend a bar.
- **Chair** - A member for holding top and bottom reinforcement sections apart; and ensuring correct cover.
- **Cage** - A rigid assembly of reinforcement ready for placing in position.
- **Main Reinforcement** - Bar which resist the main tensile or compression stresses.
- **Mat** - Bars tied together to form a flat layer.
- **In-Situ** - In the position it is to occupy permanently.
- **Helical Reinforcement** - Steel reinforcement spring shape.
- **Cover** - The minimum distance between the face of concrete and the position of steel.
- **Tolerance** - The greatest allowable variation from a given dimension.
- **Starter Bar** - Bar left projecting from concrete in order to locate and provide continuity with other reinforcement.
- **Profile** - A shape or form for testing the accuracy of unusual shapes.
- **Prefabrication** is the practice of assembling components of a structure in a factory or other manufacturing site, and transporting complete assemblies or sub-assemblies to the construction site where the structure is to be located.

Practical Content:

- Prefabricate Cage for Column & Base & Set Into Position.
- Prefabricate and Set in Situ Cage for -Footing & Column.
- Prefabricate Cage for Column Incorporating -Crank Bars.
- Prefabricate Cage for Beam.
- Prefabricate and Set in Situ Cage for - Lintel Beam With Chajja.
- Prefabricate Cage for Beam with Stub - Column.
- Prefabricate Cage for Beam with Shear Bars.

- Prefabricate Cage for Column Incorporating -Corbels.
- Prefabricate Cage for Beam with Alteration in -Section Along Length.
- Prefabricate Precast Elements (Slabs).
- Prefabricate and Set in Situ Cage for -Slab.
- Prefabricate and Set in Situ Cage for - Staircase.
- Prefabricate and Set in Situ Cage for - Retaining Wall.
- Prefabricate and Set in Situ Cage for -Open Water Drain (Surface).
- Basics scaffolding works for supporting activity
- Importance of Rebar Tying Machine and Its Uses

Module No. 6: Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).

Outcome:

Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain.

Theory Content:

Practical Content:

Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for 60 Hours.)

Module No. 7: Employability Skills

Key Learning Outcomes

Introduction to Employability Skills Duration: 1.5 Hours

After completing this programme, participants will be able to:

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.

7. Describe the benefits of continuous learning.

Basic English Skills Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e-mail using basic English

Career Development & Goal Setting Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy Duration: 5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

Customer Service Duration: 5 Hours

30. Describe the significance of analyzing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a professional

manner.

32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for apprenticeship & Jobs Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
 34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
 35. Discuss the significance of maintaining hygiene and confidence during an interview
 36. Perform a mock interview
 37. List the steps for searching and registering for apprenticeship opportunities

Tools & Equipment needed:

Hand Tools & materials –

1. Trowel
2. pointing Trowel
3. Shovel
4. mortar Pan
5. spade
6. pickaxe
7. GI bucket 5L capacity
8. wheelbarrow
9. lime powder
10. wooden pegs
11. hammer
12. hard broom
13. source of water
14. ladder

Measuring Instruments –

15. Measuring tape
16. Spirit level
17. Plumb-bob
18. Mason's line

Learning Outcome – Assessment Criteria

Module No.	Outcome	Assessment Criteria
1	Optimize productivity by following safe working practices.	1.1 Understand about trade 1.2 New words & activities about trade. 1.3 Identify EHS requirements. 1.4 Importance of Housekeeping <ul style="list-style-type: none"> • Identify and report any hazards, risks in site safety • Follow emergency and evacuation procedures in case of accidents, fires, natural calamities.

Module No.	Outcome	Assessment Criteria
		<ul style="list-style-type: none"> • Select and use of electrical fixtures to assemble & maintain temporary electrical panel for construction work. • Follow recommended safe practices in handling construction materials, including chemical and Hazardous material whenever applicable. • Use appropriate Personal Protective Equipment (PPE) as per work requirements including: <ul style="list-style-type: none"> • Head Protection (Helmets) • Ear Protection • Fall protection • Foot protection • Face and Eye Protection • Hand and Body Protection • Respiratory Protection (if required)
2	Identify different types of Tools and their uses.	<p>2.1 Use of Hand Tools & Power Tools.</p> <p>2.2 Handle materials carefully.</p> <p>2.3 Use Mechanized Tools.</p>
3	Identify different types of Reinforcements visually and Rebar fixing for different RCC structures.	<p>3.1 Explain different types and uses.</p> <p>3.2 Explain how to reduce wastage of consumables.</p> <p>3.3 Cutting of binding wire according to Cutting list.</p> <p>3.4 Visual Selection of Steel.</p> <p>3.5 Explain how to stack materials.</p> <p>3.6 Explain how to cut & bend rebars manually and by machines.</p>
4	Tie Reinforcement bar using different types of ties.	<p>4.1 Cutting of binding wire according to Cutting list.</p> <p>4.2 Explain different types of ties & their application</p>
5.	Fabricate and fix reinforcement for complex structures as per drawings, BBS, and standard codes provision.	<p>5.1 Explain method of fabricating different R.C.C. structures.</p> <p>5.2 Explain proper methods of fixing rebars by maintaining sequence.</p> <p>5.3 Explain steps to be followed for preparation of R.C.C. structures.</p> <p>5.4 Explain how to read and prepare BBS as per Drawing or any specific sketch.</p>
6.	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain.
7.	Employability Skill	As per NCVT guided curriculum

List of Tools, Equipment & materials needed for 30 Trainees (Practical)

Sl No	Items Name	Specification	Qty
HAND TOOLS			
1	BAR BAENDING LEVER	8mm Dia	5
2	BAR BAENDING LEVER	10mm Dia	5
3	BAR BAENDING LEVER	12mm Dia	2
4	BAR BAENDING LEVER	16mm Dia	2
5	BAR BAENDING LEVER	20mm Dia	2
6	BINDING HOOKS	(MS -10mm Dia) 300mm Long	10
7	CHISEL	1"(25MM)W * 8"(200MM)L - TAPARIA MAKE	5
8	SLEDGE HAMMER		5
9	RAIL PIECE/ANVIL		2
10	HACKSAW FRAME AND BLADE		10
11	BALL PEEN HAMMER (TAPARIA MAKE)		5
12	CUTTING PLIER	250 MM (10") IS -TAPARIA MAKE	5
13	WORKING TABLE WITH PIN PLATE		5
14	ENGINEER'S FLAT FILE	ROUGH 300 MM(TAPARIA MAKE)	2
15	ENGINEER'S FLAT FILE	SMOOTH 300 MM	2
16	WATER LEVEL PIPE	10MM DIA- PVC	1
17	LINE THREAD	(POLISTER) 2mm Dia	24
18	PLUMB BOB	250 GM	5
19	RIGHT ANGLE (TRY SQUARE)	450 MM (18") IS- STEEL BODY	5
20	RIGHT ANGLE (TRY SQUARE)	300MM (12")- STEEL BODY	5
21	SPANNER (SET)		1
22	STEEL SCALE		5
23	SPIRIT LEVEL	450 MM (18")	5
24	STEEL MEASURING TAPE	5 MTRS	5
25	STEEL MEASURING TAPE	15 MTR	1
26	STANDARD WIRE GAUGE		1
POWER TOOLS (ONE TIME)			
27	BAR BENDING MACHINE		1
28	BAR CUTTING MACHINE		1
29	BAR TYING MACHINE		1
30	CHOPSAW MACHINE		1
31	CHOPSAW MACHINE BLADE		2
REQUIRED PPEs			
32	COTTON HAND GLOVES		30
33	SAFETY HELMET		30
34	SAFETY SHOES		30
35	FULL BODY HARNESS		10
36	SAFETY GOGGLES		10
37	EAR PLUGS		10
38	REFLECTIVE JACKETS		10
39	FIRE PREVENTION KIT		1
40	SAFETY NET		1
41	SHOULDER PAD		10
42	NOSE MASK		10
43	SAFETY RIBON		2
CONSUMABLE & MATERIALS			
44	BINDING WIRE	(MS WIRE & GI WIRE)	KG -100
45	STEEL (TOR STEEL)	8MM dia	KG - 2
46	STEEL (TOR STEEL)	10MM dia	KG - 2
47	STEEL (TOR STEEL)	12MM dia	KG - 2

Sl No	Items Name	Specification	Qty
48	STEEL (TOR STEEL)	16MM dia	KG - 2
49	STEEL (TOR STEEL)	20MM dia	KG - 2
50	COTTON WASTE		KG - 1
51	RED OXIDE (PAINT)		Ltr. - 5
52	TIMBER BEAM/SLEEPER		5
53	COVER BLOCKS		100
54	THINNER FOR RED OXIDE PRIMER		Ltr. -4

MARKS DISTRIBUTION

OUTCOME	OUTCOME CODE	TOTAL TH. NUMBER	TOTAL PR. NUMBER
Optimize productivity by following safe working practices.	CON/0817/OC1	20	110
Identify different types of Tools and their uses.	CON/0817/OC2	20	110
Identify different types of Reinforcements visually and Rebar fixing for different RCC structures.	CON/0817/OC3	20	120
Tie Reinforcement bar using different types of ties.	CON/0817/OC4	20	110
Fabricate and fix reinforcement for complex structures as per drawings, BBS, and standard codes provision.	CON/0817/OC5	70	200
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	CON/0817/OC6	0	150
Employability Skill-60 Hrs	DGT/VSQ/N0102	50	0