\National Vocational Certificate Level 4 in Construction Sector

(Steel Fixer& Erector Supervisor)

(Curriculum)

National Vocational and Technical Training Commission (NAVTTC)

Government of Pakistan

National Vocational Certificate Level 4 in Construction Sector (Steel Fixer & Erector Supervisor)

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Introduction

Definition/Description of training program (Steel Fixer& Erector*Supervisor*)

Construction sector is one of the booming industries of Pakistan. There is an increasing demand of the Steel Fixer& Erector Supervisor. Therefore, the skills are required to be inducted in the future generation. If an individual is planning to pursue a career in construction, this program will be helpful in targeting various commercial and non-commercial projects etc. If an individual is planning to take up Steel Fixer& Erector course, this course will help him weigh their choices better.

Keeping in view of the above the competency based national vocational qualifications have been developed by NAVTTC to train the unskilled human resource on the technical and entrepreneurial skills to be employed / self-employed and inevitably set sustainable impact on their lives by increasing their livelihood income.

Training Course is based on competency standards which are defined by the industry and the traditional role of a trainer changes and shifts towards the facilitation of training. A trainer encourages and assists trainees to learn for themselves. Trainees are likely to work in groups (pairs) and all doing something different. Some are doing practical tasks in the workshop, some writing, some not even in the classroom or workshop but in another part of the building using special equipment. As trainees learn at different pace they might be at different stages in their learning, thus learning must be tailored to suit individual needs. The following facilitation methods (teaching strategies) are generally employed.

Purpose of the training program:

The purpose of the training is to provide skilled manpower to improve the existing construction industry. More than 96 % of the Pakistani manpower is working in GCC countries where Saudi Arabia (50.90%)) and UAE (33.10%) are the largest destination countries followed by Oman (7.26%), Kuwait (1.90%), Bahrain (1.58%), and Qatar (1.41%). The overseas Pakistanis are playing a pivotal role to support the economy in the form of remittances. According to new labor

laws, a large number of skilled labor is demanded by Saudi Government especially for the construction sector. For this purpose, new qualifications have been developed by NAVTTC on CBT&A mode in order to train the unskilled human resource with employable skills and cater the demand of Saudi Government. Moreover, the availability of skilled professionals will bring socio-economic benefits to all stakeholders.

Overall objectives of training program:

The main objectives of the National Vocational Certificate Level 4 in Construction Sector (Steel Fixer & Erector Supervisor)are as follows:

- Improve the professional competence of Steel Fixing work
- Capacitate the local community and trainers in modern CBT training, methodologies and processes as envisaged under NVQF
- Provide flexible pathways and progressions in the construction sector
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training for Steel Fixing work across globe

Competencies to be gained after completion of course:

At the end of the course, the trainee has attained the following core competencies:

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1. Plan and supervise work
2. Manage safety at construction Site
3. Prepare bar bending schedule
4. Perform 2D Engineering Drawings using CAD Software
5. Fabricate steel reinforcement for bridges

6. Perform basic green skills for steel fixing
7. Perform Computer Applications
8. Execute steel work in confined spaces
9. Fabricate steel reinforcement for pre stressed Structure Member
10. Execute Splicing and Anchoring using Mechanical Methods
11. Practice entrepreneurial skills

Possible available job opportunities, available immediately and later in the future:

Possible Career paths

- Steel Fixer/Erector Supervisor

Trainee entry level:

The entry level for National Vocational Certificate Level 4 in Construction Sector **(Steel Fixer & Erector Supervisor)** is given below:

Title	Entry requirements
National Vocational Certificate Level 4 in Construction Sector **(Steel Fixer & Erector Supervisor)**	The entry requirement for this qualification would be Assistant Steel Fixer Level-3or equivalent

Minimum qualification of trainer:

A. Must be a holder of DAE/Level 5 Diploma in Civil Technology with at least 2 years relevant experience

OR

B. BSc Engineering Technology (Civil) / B.E Civil /BSc Civil Engineering

Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this program is 1 trainer for 25 trainees.

Medium of instruction i.e. language of instruction:

Instructions will be in Urdu/ English/ Local language.

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Duration of the course (Total time, Theory & Practical time):

The distribution of contact hours is given below:

Total - 1200 hours

Theory - 255hours (21.25%)

Practical - 945 hours (78.75%)

Proposed Course Duration-12 Months

Sequence of modules:

0732CM-19	Plan and supervise work
Module 4.1	Manage safety at construction Site
0732CM-20	Prepare bar bending schedule
0732CM-21	Perform 2D Engineering Drawings using CAD Software
0732CM-22	Fabricate steel reinforcement for bridges
Module 4.2	Perform basic green skills for steel fixing
Module4.3	Perform Computer Applications
0732CM-23	Execute steel work in confined spaces
0732CM-24	Fabricate steel reinforcement for pre stressed Structure Member
0732CM-25	Execute Splicing and Anchoring using Mechanical Methods
Module 4.4	Practice entrepreneurial skills

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Summary template-overview of the curriculum:

Following is the structure of the course:

Sr No	Code	Competency Standards	Occupation	NVQF Level	Category	Estimated Contact Hours			Cr Hr
						Th	Pr	Total	
Level 4									
1	0732CM-19	Plan and supervise work	**Steel Fixer & Erector Supervisor**	4	Technical	28	42	70	7
2	Module 4.1	Manage safety at construction Site		4	Functional	17	63	80	8
3	0732CM-20	Prepare bar bending schedule		4	Technical	40	120	160	16
4	0732CM-21	Perform 2D Engineering Drawings using CAD Software		4	Technical	19	81	100	10
5	0732CM-22	Fabricate steel reinforcement for bridges		4	Technical	29	141	170	17

6	Module 4.2	Perform basic green skills for steel fixing		4	Generic	12	48	60	6
7	Module 4.3	Perform Computer Applications		4	Technical	25	75	100	10
8	0732CM-23	Execute steel work in confined spaces		4	Technical	20	90	110	11
9	0732CM-24	Fabricate steel reinforcement for pre stressed Structure Member		4	Technical	28	132	160	16
10	0732CM-25	Execute Splicing and Anchoring using Mechanical Methods		4	Technical	25	105	130	13
11	Module 4.4	Practice entrepreneurial skills		4	Generic	12	48	60	6
		Total				**255**	**945**	**1200**	**120**
		Percentage				**21.25**	**78.75**		

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0732CM-19: Plan & Supervise work

Objective: This module covers the skills and knowledge required to plan and supervise of steel erection.

Duration: 70 Hours **Theory: 28 Hours** **Practice: 42 Hours** **Credit Hours: 7**

Learning Unit	Learning Outcomes	• Learning Elements	Duration	Materials Required	Learning Place
LU1.Plan for on-site operations.	**Trainee will be able to:** 1. Consult with the client or site in-charge and obtain relevant information, including the level of supervision required, drawings and specifications 2. Recognize the quality standards and the requirements stipulated within the standards to perform the particular job, like equipment, personals, physical facilities and storage capacity etc.	• Define Principles of planning and project management • Explain the importance of project management. • Describe the Engineering properties of civil construction materials • Define Roles and responsibilities for different levels of site supervision. • Describe the type of hazards • Describe work sequance flow diagram	**Theory-**6Hrs **Practical-**6Hrs **Total-**12 Hrs	Consumable • Notebooks • Pencils • Whit board marker • Duster Non Consumable • White board • Multimedia • Internet • Computer system	• Class Room

	3. Prepare the process flow diagram in order to achieve Quality outcome. 4. Identify site hazards and the personal protective equipment (PPE) and safety procedures specified for job 5. Organize site induction for self and support personnel as required 6. Clarify allocated work targets and timelines set by Management 7. Prepare Break down work of activities into small achievable components and efficient sequences 8. Plan housekeeping activities prior to and post completion of work	• Describe risk • Define Personal Protective Equipment's (PPE's) **<u>Practical Activity:</u>** • Practice to break down the job into activities and draw the process flow chart			

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LU 2. Supervise work activities to achieve desired results	**Trainee will be able to:** 1. List and arrange required resources prior to commencement of work 2. Identify the areas of work, which could result in a delay of work, wastage of material or damage to tools. 3. Allocate appropriate responsibility to appropriate team member to avoid conflicts. 4. Review work plan in response to new information, urgent requests, changed situations or instructions from appropriate personnel 5. Arrange the facilities of team member's Capacity development and training 6. Provide guidance to the	• Describe the procedure to collect the information relevant to inspection activities • Describe the documentation and record system of inspection body. • Describe resources. • Explain types of delays • Explain conflict **Practical Activity:** • Develop work plan and assign task to the team members for specific steel fixing job, trace out the weak areas of the work and review the work plan	**Theory-**5Hrs **Practical-**9Hrs **Total-**14 Hrs	Consumable • Notebooks • Pencils • Whit board marker • Duster Non Consumable • White board • Multimedia • Internet • Computer system	• Class Room

	subordinates to obtain desired outcome 7. Cooperate with team members to negotiate and achieve agreed outcomes, timelines and priorities				
LU 3. Perform on-site inspection.	**Trainee will be able to:** 1. Conduct physical inspection of processes &materials in accordance with the inspection plan 2. Identify the defects and deficiencies in product &processes and record with evidence 3. Perform test as per standard procedure for determining the physical properties of materials and product.	• Describe the information relevant to inspection activities and document preparation for recoding inspection results. • Differentiate various types of deficiencies in inspection activities • Describe site problems and recommended corrective actions	**Theory-**6Hrs **Practical-9**Hrs **Total-** 15Hrs	Consumable • Notebooks • Pencils • Whit board marker • Duster Non Consumable • White board • Multimedia • Internet • Computer system	• Class Room

	4. Collect the samples of materials &products for lab testing as per sampling procedure & rules 5. Pack and seal the sample & sub-samples in the presence of witnesses according to sampling rule and procedure 6. Complete the sampling document; fill in the sample date, time, and weight/volume, sample ID, preservative used, sample location and sampler name etc 7. Ensure activities at site are as per approved method statement such as material storage, tools &plants conditions, workmanship and safety measures etc.	Describe the procedure to perform on- site inspection **Activity:** • Conduct inspection of workshop to find out deficiencies and defects in process & production and collect pictorial evidence etc.			

LU 4. Prepare the inspection report	**Trainee will be able to:** 1. Ensure evidence of inspection ,observations and findings 2. Verify the integrity of information supplied by other party as a part of the inspection process. 3. Collect and review the information relevant to inspection activities for recoding inspection results 4. Suggest the necessary corrective actions for tackling the identified problems	• Explain the procedure to prepare the inspection report. • Understanding about third/other party inspection process • Explain reporting standards **Activity:** • Prepare inspection report with collected information	**Theory-**6Hrs **Practical-**9Hrs **Total-** 15Hrs	Consumable • Notebooks • Pencils • Whit board marker • Duster Non Consumable • White board • Multimedia • Internet • Computer system	• Class Room/site area

LU 5 Organize project data and report	**Trainee will be able to:** 1. Document the site results in accordance with workplace practices 2. Maintain security and confidentiality of workplace information 3. Prepare and issue a final project report detailing supervision and statement of compliance and relevant tables and plans as required.	• Describe types of reports. • Explain steps of report writing • Describe corrective actions to identify the problems **Activity:** • Prepare a project report for supervision,statement of compliance and relevant tables and plans.	**Theory-**5Hrs **Practical-**9Hrs **Total-** 14Hrs	Consumable • Notebooks • Pencils • Whit board marker • Duster Non Consumable • White board • Multimedia • Internet • Computer system	• Class Room/site area

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Module 4.1: Manage Safety at Construction Site

Objective: This module covers the skills and knowledge required to evaluate hazards and risk at workplace, maintain safety at height, ensure electrical safety at workplace, maintain safety for confined space, safety measures in trenches, reporting & investigating incident/accident.

Duration: 80 Hours **Theory: 17 Hours** **Practice: 63 Hours** **Credit Hours: 8**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Evaluate hazards and risk at work place	**Trainee will be able to:** 1. Identify physical hazards at work place 2. Evaluate risk present at workplace 3. Examine the storage of hazardous materials as per MDSD 4. Take corrective/preventive action to mitigate the risk 5. Record your findings	• Knowledge about the hazards and risk at workplace • Understanding about the identification of potential hazards and risk • Describe the hierarchy of control • Knowledge about MSDS **Practical Activity:** • Perfrom the activity of hazard identification at particular workpalce	**Theory-3**Hrs **Practical-6**Hrs **Total-9**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Safety tape Non Consumable • White board • Multimedia	Class Room /Workshop

				• Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	
LU2. Maintain safety at height.	**Trainee will be able to:** 1. Identify hazards and risk associated to work at height activity 2. Use proper personal protective equipment 3. Select anchorage as per standard safety procedures	• Knowledge about working at height procedures • understanding about full body harness and its use • knowledge about personal protective equipment **Practical Activity:**	**Theory-2**Hrs **Practical-12**Hrs **Total-14**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard	Class Room /Workshop

	4. Select the suitable lanyard (shock absorbing, self-retaining and positioning) according to situation. 5. Inspect the lanyard and relevant accessories prior to the activity 6. Fix the connectors (snap hook and lanyard) with anchorage and body harness. 7. Wear full body harness and check the connections.	• Perform activity of work at height using fall protection system		marker • Duster • Safety tape Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	

LU3 Ensure electrical safety at workplace	1. Check earthing of power equipment. **2.** Determine safest supply and route for electrical supply 3. Check and select leads & switch boards accordingly. 4. Check the overhead electrical wires (10 feet away from worker) **5.** Report electrical hazards	• Explain the process of earthing • Describe different methods of earthing • Knowledge about the potential electricity hazards **Practical Activity:** Prepare a list of potential electricity hazards at the particular workplace	**Theory-2**Hrs **Practical-12**Hrs **Total-14**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Safety tape Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest	Class Room /Workshop

				system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	
LU4 Maintain safety for confined spaces	1. Select& wear PPEs 2. Mark check list includes: a. Oxygen level b. Respiratory protective equipment (if required) c. Testing and monitoring of the atmosphere d. Clear mode of Communication e. Escape Plan f. Emergency Plan 3. Use work equipment safely	• Knowledge about the confined space • Describe different methods to check potential hazards in confined space • Understanding of personal protective equipment **Practical Activity:** • Practice to mark check list • Practice to use different work equipment safely	**Theory-2**Hrs **Practical-12**Hrs **Total-14**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Safety tape Non Consumable • White board • Multimedia	Class Room /Workshop

				• Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	
LU5 Take Safety Measures in Trenches	1. Identify soil type for working site 2. Check weather condition before working in trenches (i.e., rain or storm) 3. Keep heavy equipment away from the trench edges 4. Locate all buried services (electricity, gas, water,	• Knowledge about the trenches • Understanding about slopping & benching • Knowledge about the shoring	**Theory-2**Hrs **Practical-9**Hrs **Total-11**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard	Class Room /Workshop

	telecommunication lines) 5. Ensure access points (slopping or benching when the depth greater then 5ft) 6. Apply bracing (when soil is loose, width greater than 3ft,heavy vibration nearby) 7. Mark check list includes: g. Oxygen level h. Respiratory protective equipment (if required) i. Testing and monitoring of the atmosphere j. Clear mode of Communication k. Escape Plan l. Emergency Plan 8. Use work equipment safely 9. Apply barricading around the work area as per requirement	• Understanding about the potential hazards in trenches • Difference between bracing and trench shield **Practical Activity:** Perform barricading activity around a trench		marker • Duster • Safety tape Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	

LU6. Report and Investigate the accident at construction site.	1. Identify any injured employee and check severity of the injury 2. Provide first aid treatment if required 3. Apply barricading tape around the incident/ accident area 4. Interview injured person and other involved personnel in the accident 5. Collect all information related to the incident/accident at workplace 6. Record all the finding related to the incident/accident 7. Develop the incident report along with the corrective measures to avoid future accidents	• Understanding about the incident/accident investigation process • Knowledge about the reporting of incident/accident procedure • Knowledge about the type of barricading tape used at workplace **Practical Activity:** Write investigation report for a given emergency situation (mock activity)	**Theory-3**Hrs **Practical-6**Hrs **Total-9**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Safety tape Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest	Class Room /Workshop

				system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	
LU7. Implement safe work practice at site	1. Carryout tool box talks related to the critical safety matters and hazardous site conditions pertaining to particular work. 2. Use required personal protective equipment properly 3. Implement health and safety practices and ensure it is followed by subordinates 4. Implement safe handling stacking methods at workplace/store 5. Perform required posting of safety signs and boards at	• Describe the tool box talks • Knowledge about safety signs and symbol used at the workplace • Explain the procedure of safe handling and storage of materials • Understanding about the near miss • Importance of near miss reporting • Describe the emergency response procedures **Practical Activity:**	**Theory-3**Hrs **Practical-6**Hrs **Total-9**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Safety tape Non Consumable • White board • Multimedia	Class Room /Workshop

	designated places. 6. Barricade all un-protected opening at the workplace 7. Implement and check the near miss reporting 8. Provide safe access at workplace for movement of workers and material 9. Conduct emergency response drill for enhancing importance of safety among the workers as per the policy of the organization	Perform the activity of tool box talk on given activity		• Computer • PPEs • Barriers • Lux meter • Slings • Hooks / Anchors • Chain Hoist • Fall arrest system • Stretcher • First aid Box • Board of Safety instructions • Hygrometer • Oxygen monitor • Sound level meter	

0732CM-20: Prepare Bar Bending Schedule

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to prepare bar bending schedule

Duration: 160 Hours **Theory: `42 Hours** **Practice: 118 Hours** **Credit Hours: 16**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place

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LU1. **Interpret drawing**	**Trainee will be able to:** 1. Identify direction and position of rebars from the drawing 2. Calculate number of chairs and spacer rebars 3. Identify size and type of cover block	• Define bar bending schedule and its advantages • Describe development length • Define codes for Reinforcement. • Basic principle of measurement, arithmetic and geometric calculations • Units weight of reinforcement steel of different diameter • Define chairs, spacers and cover blocks **Practical Activity:** • Practice to identify direction and position of rebars and cover blocks as per drawing • Practice to calculate number of chairs and spacers as per drawing	**Theory- 12**Hrs **Practical 24**Hrs **Total- 36**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker • Duster • USB Non Consumable • White board • Multimedia • Internet • Computer system • Printer	Class Room Training Workshop

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LU2. Prepare schedule	**1. Trainee will be able to:** 2. Identify types, diameter& shape of rebars 3. Calculate cutting length of straight rebars, bent up rebars, stirrups, rings and ties of concrete structure 4. Calculate the number of each shape of rebars 5. Calculate unit weight for each dia. of rebar 6. Calculate the total length of each type of rebars 7. Calculate the total weight of rebars for each dia of rebars	• Explain procedure of preparation of bar bending schedule • Describe common mistakes in the preparation of bar bending schedule • Describe basic principal of measurement, arithmetic and geometric calculations **<u>Practical Activity:</u>** • Practice to calculate cut length of rebars, stirrups, rings and ties as per drawing • Practice to calculate number of different shape of rebars and their unit length • Practice to calculate total length and weight of rebars and fill the table	**Theory- 30**Hrs **Practical- 94**Hrs **Total- 124**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Duster • White board marker • USB Non Consumable • White board • Multimedia • Internet • Computer system • Printer	Class Room Training Workshop

		• Prepare bar bending schedule for isolated base and column • Prepare bar bending schedule for isolated slab • Prepare bar bending schedule for continuous beam • Prepare bar bending schedule for single flight stair • Prepare bar bending schedule for dog legged stair • Prepare bar bending schedule for bifurcated stair • Prepare bar bending schedule for a circular overhead water tank • Prepare bar bending			

		schedule for shell roof • Prepare bar bending schedule for dome • Prepare bar bending schedule for piles and pile cap • Prepare bar bending schedule for two span RCC deck slab bridge • Prepare bar bending schedule for transom with pier			

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0732CM-21: Perform 2D Engineering Drawings using CAD Software

Objective: The aim of this module to get knowledge, skills and understanding to Perform 2D and 3D Engineering Drawings using CAD Software.

Duration: 100Hours **Theory: 19 Hours** **Practice: 81 Hours** **Credit Hours: 10**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Draw 2D shapes	**Trainee will be able to:** 1. Setup user interface settings for required drawing. 2. Create different 2D shapes with given measurements. 3. Edit different 2D shapes to meet requirement. 4. Insert dimensions and symbols as per requirement 5. Save the file in different drawing formats	• Explain import export of drawing sketch in different formats in CAD Software • Explain 2D setup • Functions of Creating and Editing tools • Dimensions and Symbols • Different file extensions for saving files (JPEG, PDF, etc.) **Activity:** • Draw and practice of different civil drawings related to steel fixing	**Total:** 40hrs **Theory: 10hrs** **Practical:** 30hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White Board marker • Duster • USB Non Consumable • White board • Multimedia • Internet • Computer system • Printer	Computer Lab

LU2. Prepare final sets of 2D drawings	**Trainee will be able to:** 1. Develop 2D Drawing with given project specification and measurements. **2.** Plot drawing on scale according to required size & orientation	• Knowledge of scale and unit • Procedure to prepare 2D drawing according to given scale **Activity:** • Draw and practice a layout of different civil structures	**Total:**60hrs **Theory:9hrs** **Practical:**51hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White Board marker • Duster • USB Non Consumable • White board • Multimedia • Internet • Computer system • Printer	Computer Lab

0732CM-22: Fabricate Steel Reinforcement for Box Culverts/Bridges

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to fabricate steel reinforcement for box culverts/bridges

Duration: 170 Hours **Theory: 29 Hours** **Practice: 141 Hours** **Credit Hours: 17**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare the reinforcement for foundation of abutment/pier	**Trainee will be able to:** 1. Identify sizes of piers and its location 2. Interpret drawing for length and diameter of rebar 3. Measure and mark the required cut length of main and spiral tie bar 4. Bind the pile reinforcement with spiral at specified spaces	• Describe types and components of bridges • Explain operating procedure of various bar cutting tools. • Understanding of structural drawings. • Define different types of piers and its locations • Explain fixation of steel reinforcement in foundation of abutment / pier **Practical Activity:** • Practice to identify sizes of piers	**Theory-**5Hrs **Practical-18**Hrs **Total-23**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape Non	Class Room Training Workshop Lab/ Field Visit

		and its location as per drawing • Practice to prepare cut length of main and spiral tie bars • Practice to bind the rebars with spiral tie bars as per drawing		Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring	

				tape(100') • Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU2. Prepare the reinforcement for pile and pile cap.	**Trainee will be able to:** 1. Identify length, width and depth of pile and pile cap and its location. 2. Mark and cut rebars of required length 3. Bend the spirals and tie bars as per bending dimension 4. Make the bundle of prepared spirals, tie bars and rebar and mark the bar code by using tag for reference. 5. Bind the rebar with pile and pile cap mould. 6. Prepare pile reinforcement as per drawing	• Understanding of structural drawings • Describe pile and its types • Define pile cap • Define reinforcement details of pile and pile cap as per drawing • Explain procedures of various rebar cutting, bending stirrups and measuring of rebar as per drawing. • Define the tagging codes • Explain fixing of spacers	**Theory-**4Hrs **Practical-18**Hrs **Total-22**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	Class Room Training Workshop Lab/ Field Visit

	7. Fix concrete spacer in bottom, sides of pile cap. 8. Insert dowel bars on pile cap	• Define dowels bars **Practical Activity:** • Practice to prepare reinforcement for pile • Practice to identify length, width and depth of pile cap and its location • Practice to prepare the rebar for pile cap • Practice of fixing concrete spacer as per requirements		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU3. Prepare reinforcement for wing wall, abutment of bridge.	**Trainee will be able to:** 1. Mark and cut the required length on rebar, as per bar bending schedule 2. Make the bundle of prepared rebars and mark the bar code using tag for reference. 3. Bind/assembled wing wall rebars and abutment rebars with dowel on pile cap as per bar bending schedule. 4. Fix concrete spacer in sides, of wing wall and abutment.	• Understanding of structural drawings • Define wing wall, abutment of a bridge • Understanding of bar bending schedule • Define tagging and bar codes • Explain fixing steel reinforcement in abutment and wing wall of bridge. • Explain concrete spacers and its fixing	**Theory-3**Hrs **Practical-24**Hrs **Total-27**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	

		Practical Activity: • Practice to prepare reinforcement for wing wall of bridge • Practice to prepare reinforcement for abutment of bridge • Practice to fix spacers in sides of wing wall		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU4. Prepare the reinforcement for pier	**Trainee will be able to:** **1.** Identify sizes and diameter of pier and its location. **2.** Determine length and dia of main vertical rebar, diameter of spiral ties. **3.** Prepare spiral ties of required dia. **4.** Cut the vertical main rebars for piers as per bar bending schedule. **5.** Make the bundle of prepared rebars and mark the bar code using tag for reference. **6.** Bind the pier reinforcement with spiral ties, having round concrete spacers, with dowels	• Understanding of structural drawings. • Describe pier and its type • Explain fixing of steel reinforcement for piers • Explain reinforcement details of piers **<u>Practical Activity:</u>** • Practice to prepare main rebars and spiral ties as per drawing • Practice to bind the pier reinforcement with spiral ties as per	**Theory-4**Hrs **Practical-21**Hrs **Total-25**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	Class Room Training Workshop Lab/ Field Visit

	bars on pile cap.	specified job		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU5. Prepare the reinforcement for box culverts	**Trainee will be able to:** 1. Identify length, width and depth of box culvert 2. Mark and cut rebars of required length 3. Bend the distribution bars as per drawing 4. Make the bundle of prepared distribution and main rebars and mark the bar code by using tag for reference. 5. Bind the main and distribution rebars all around 6. Fix concrete spacer	• Describe culvert and its types • Explain reinforcement details of box culvert • Explain fixing of steel reinforcement in box culvert • Explain fixing/erecting of steel reinforcement in box culvert • Explain fixing of concrete spacers as per requirements **<u>Practical Activity:</u>** • Practice to identify length, width	**Theory-4**Hrs **Practical-15**Hrs **Total-19**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	Class Room Training Workshop Lab/ Field Visit

		and depth of box culvert • Practice to bend the main and distribution rebars as per drawing		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU6. Prepare the reinforcement for transom/pier cap	**Trainee will be able to:** 1. Mark and cut the required length on rebars as per bar bending schedule 2. Bend the end hooks of rebars as per bending dimension 3. Make the bundle of prepared rebars and tag rebars 4. Place the bundle of prepared rebars of structural members to the required central place 5. Separate the rebars of different sizes of beams 6. Put all stirrups in bottom and top rebars of the transom/pier cap	• Define transom/pier cap • Explain reinforcement details of transom/pier cap • Explain fixing of steel reinforcement in transom/pier cap • Explain binding, fixing/erecting of steel reinforcement , extra bars and stirrups in transom/pier cap • Explain fixing of concrete spacers as per requirements	**Theory-4**Hrs **Practical-21**Hrs **Total-25**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	Class Room Training Workshop Lab/ Field Visit

	7. Put extra rebars at the top of the transom/pier cap 8. Bind the stirrups with bottom and top rebars 9. Bind curtailed rebars with in the top and bottom rebars 10. Spread the rebars for transom/pier cap 11. Bind rebars with one another with binding wire 12. Add spacer according to bar bending schedule	**Practical Activity:** • Practice to separate rebar of different sizes of beams for transom/pier cap as per drawing • Practice to prepare stirrups and bind them in transom/pier cap as specified • Practice to fix the concrete spacer as per requirements		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU7. Prepare the reinforcement for deck slab over post-tensioned girder	**Trainee will be able to:** **1.** Mark and cut the required length on rebars as per bar bending schedule **2.** Bend the end hooks of rebars as per bending dimension **3.** Make the bundle of prepared rebars and tag rebars **4.** Place the bundle of prepared rebars of structural members to the required central place **5.** Separate the rebars of different sizes of beams/slabs **6.** Spread the main and distribution rebars for slab in two direction	• Define deck slab and post tensioned girder • Define Bearing pads • Explain fixing of steel reinforcement in deck slab over post-tensioned girder • Explain bending hooks of rebars and fixing/erecting steel reinforcement of deck slab as per bar bending schedule • Reinforcement details of deck slab of bridge.	**Theory-5**Hrs **Practical-24**Hrs **Total-29**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	Class Room Training Workshop Lab/ Field Visit

	7. Bind rebars with one another with binding wire **8.** Add spacer according to bar bending schedule **9.** Assemble the components of bridge according to the drawing **10.** Add bearing pads under the deck slab as shock absorbers	• Explain fixing of concrete spacers as per requirements **Practical Activity:** • Practice to bind main and curtailed rebars in deck slab as per drawing • Practice to add bearing pads under the deck slab as per requirements • Practice to prepare deck slab as per drawing		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	

Module 4.2: Perform Basic Green Skills for Steel Fixing

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to perform basic green skills for steel fixing.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours: 6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Manage sustainability of rebar fixing materials	**Trainee will be able to:** **1.** Select sustainable materials as per requirement	• Environmental degradation • Describe Importance of green skills • Basic knowledge of green energy	**Theory-**6 Hrs **Practical-** 24	Consumable • Notebooks • Pen • White board	Classroom/ working site

	2. Follow standard procedure to manage systems (waste, energy) **3.** Perform impact quantification of used material in steel fixing	resources (solar, biogas, natural light, rainwater, wind energy etc.) • Types of raw materials at crush plant **Activity:** • Mock exercise of identification of environmental friendly material at site.	Hrs **Total-**30 Hrs	marker • Duster Non Consumable • White board • PPES • Multimedia • Internet • Computer system	
LU2. Manage Steel fixing waste	**Trainee will be able to:** **1.** Identify various types of steel fixing waste. **2.** Sort and categorize reusable waste. **3.** Dispose unusable waste as per set standards. **4.** Place reusable material at designated storage area **5.** Transport waste material to	• Define types of waste • Differentiate between reusable and recyclable materials • Describe waste reduction techniques • Explain the concept of 6 R approach (Reduce, Reuse, Recycle, Repair, Renew, and Rethink) • Methods for disposal of unusable	**Theory-**6 Hrs **Practical-** 24 Hrs **Total-**30 Hrs	Consumable • Notebooks • Pen Non Consumable • White board PPES • Multimedia • Internet • Computer	Classroom/ working site

	designated place	materials **Activity:** • Perform mock exercise of collecting waste material at site, sort reusable and recyclable waste material and store/dispose of waste material		system	

Module 4.3: Perform Computer Applications

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to perform computer applications

Duration: 100 Hours **Theory: 25 Hours** **Practice: 75Hours** **Credit Hours: 10**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare Spreadsheet using MS Excel	**Trainee will be able to:** 1. Develop a worksheet as per given data. 2. Format the worksheet according to given criteria. 3. Apply Formulas according to the	• Explain different types of formulas in MS Excel • Knowledge about short of MS Excel **Activity:** • Develop a practice to	**Total:60**hrs **Theory:15**hrs **Practical:45**hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners	Computer Lab

	requirement. 4. Generate Charts/Graphs according to the given data. 5. Print Worksheet according to requirements	develop a work sheet as per given data • Format and apply a formula to a work sheet according to the requirement. • Practice to generate chart/graph according to given data.		• Pen • White board marker Non Consumable • White board • Multimedia • Internet • Computer system • MS Office Software	
LU2. Prepare a presentation using MS Power Point	**Trainee will be able to:** 1. Insert Slides with different Layouts according to requirements of presentation. 2. Insert text, tables, images, etc. according to the requirement. 3. Apply a set of effects to animate the slide according to requirement. 4. Apply Slide Transitions on Slides according to requirement. 5. Apply Sound Effects on	• Explain types of presentation format • Knowledge about short Keys of MS power point **<u>Activity:</u>** • Practice of inserting slides different layout according to the requirement of	**Total:40**hrs **Theory:10**hrs **Practical:30**hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Pen • White board marker	Computer Lab

	Objects/text/images according to requirement. **6.** Present a presentation according to 7Cs of communication	presentation. • Practice of inserting text, tables, images into the slides. • Practice of applying effects, slide transition and sound effects according to requirement.		Non Consumable • White board • Multimedia • Internet • Computer system • MS Office Software	

0732CM-23: Execute Steel Work in Confined Spaces

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to perform steel work in confined spaces

Duration: 110Hours **Theory: 20Hours** **Practice: 90 Hours** **Credit Hours: 11**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place

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LU1. Follow procedure of confined space entry	**Trainee will be able to:** 1. Fill the safety check list for confined spaces 2. Select and wear PPEs 3. Select approperiate tools and equipments 4. Interpret bar bending schedule 5. Interpret structure drawings	• Describe types of confined space • Describe confined space entry and exit procedures • Describe risks associated with confined spaces • Explain air contaminants and toxic gases • Understanding of materials safety data sheets **Practical Activity:** • Demonstrate the mock exercise to follow the confined space entry procedure in different situations	**Theory-5**Hrs **Practical-21**Hrs **Total-26**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Check list • Confined space entry permit Non Consumable • White board • Multimedia • PPEs • Computer • Lifeline Breathing apparatus • Fire extinguisher	Class Room Training Workshop Lab/ Field Visit

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LU2 Perform cutting and bending of rebars for confined spaces	**Trainee will be able to:** 1. Straighten the rebars. 2. Measure and mark the required cut length on rebars 3. Cut the rebars 4. Make the bundle of prepared rebars and mark the bar code using tag for pre stressed girder for reference.	• Knowledge of different Measurement systems • Describe cutting tools • Explain the manual cutting procedure **Activity:** • Practice to straighten, and cut rebars with power cutter • Practice to bend rebars with bending machine	**Theory-5**Hrs **Practical-21**Hrs **Total-26**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Chalk • Duster • Rebars • Erecting cable • Binding wire Non Consumable • White board • Multimedia • Computer PPEs • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t	Class Room Training Workshop Lab/ Field Visit

				• Cutting base • Clipers • Measuring tape(100') • Measuring tape 18'	
LU3. Perform fabrication of rebars in confined space	**Trainee will be able to:** **1.** Mark spacing of rebars on prepared bed **2.** Place rebars according to drawing **3.** Bind rebars **4.** Place spacers as per requirement	• Explain positive & negative steel, torsion bar and splices • Explain the spacing of stirrups **<u>Activity:</u>** • Practice to fabricate cut rebars in confined spaces	**Theory-5**Hrs **Practical-24**Hrs **Total-29**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Erecting cable • Binding wire Non Consumable • White board • Multimedia • Computer	

				• PPEs • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100') • Measuring tape 18'	
LU4. Perform final inspection	**Trainee will be able to:** 1. Recover tools, equipment and materials from the confined space 2. Clear work area and dispose of or recycle materials 3. Remove, clean and store barriers and signs	• Describe the procedure to empty the confined spaces after work **Activity:** • Practice to inspect the confined space before starting the job • Practice to inspect the confined space after completion of the job	**Theory-5**Hrs **Practical-24**Hrs **Total-29**Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Erecting cable • Binding wire	Class Room Training Workshop Lab/ Field Visit

				Non Consumable • White board • Multimedia • Computer • PPEs • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100') • Measuring tape 18'	

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0732CM-24: Fabricate Steel Reinforcement for Pre Stressed Structure Member

Objective: This competency standard covers the skills and knowledge required to execute steel work for pre stressed girders in civil structure..

Duration: 160 Hours **Theory: 28 Hours** **Practice: 132 Hours** **Credit Hours: 16**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare steel for the pre stressed girders	**Trainee will be able to:** 1. Interpret bar bending schedule 2. Interpret structural drawings 3. Barricade the area 4. Select and wear PPE's 5. Straighten rebars. 6. Measure and mark required cut length on rebars 7. Cut the rebars 8. Make the bundle of prepared rebars and mark the bar code	• Knowledge of Structural drawings. • Describe pre stressing and its types • Explain different tools and materials used in pre stressing • Describe different systems of pre stressing • Describe importance of barricading • Explain operating procedure of various bar cutting tools. **Practical Activity:** • Prepare bar bending Schedule as per requirement • Make bundle of pre-cut rebars as per order	**Theory-9**Hrs **Practical-**33Hrs **Total-**42Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape Non Consumable	Class Room Training Workshop Lab/ Field Visit

				• White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100') • Measuring tape 18'	

				• Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU2. Prepare mould	**Trainee will be able to:** 1. Fix the steel sheets of required size 2. Place the flexible conduits in the mould	• Explain mould for pre-stressed beams • Explain requirement of flexible conduits • Describe procedure of making mould as per drawing. **Practical Activity:** • Prepare required material for prepration of mould • Practice of placing conduits at proper place.	**Theory-5**Hrs **Practical-**33Hrs **Total-**38Hrs	• Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape Non	Class Room Training Workshop Lab/ Field Visit

				Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring tape(100')	

				• Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU3 Place steel in mould and conduits	1. Place top and bottom steel 2. Fix the shear reinforcement with top and bottom steel 3. Place steel/strands in conduits	• Explain shear reinforcement in pre-stressed beam • Describe strand in pre-stressing. • Explain material of conduits • Describe importance of codes and tagging of rebars **Practical Activity:** • Practice of placing top and bottom steel in pre-stressed beam • Practice of placing strands in conduits	**Theory-5**Hrs **Practical-30**Hrs **Total-35** Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	

				Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.)t • Cutting base • Clipers • Measuring	

				tape(100') • Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	
LU4 Perform Pre stressing of structure member	1. Provide tension by pulling tendons from the anchorage points 2. Provide dead end anchors 3. Fill flexible conduits with cement mortar	• Knowledge of Structural members in pre-stressing. • Explain operating procedure of placing strands as per requirement • Describe pre stressing of concrete members (types, techniques etc) • Describe Injection methods **Practical Activity:** • Practice of provision of tension steel • Practice of placing flexible	**Theory-9**Hrs **Practical-**36Hrs **Total-**45Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape	

		conduits in mould and filling it with cement mortar by injection method		Non Consumable • White board • Multimedia • Computer • PPEs • Barriers • Guardrail • Bar bending key • Bar bending table with pins • Straightening base • Chisels(for cutting rebars) • Differnt types of hammer(sledge hammer,light hammer etc.) • Cutting base • Clipers • Measuring	

				tape(100') • Measuring tape 18' • Bar straightening ring • Power cutter • Plier • Bench wise Bar straightening ring • Power cutter	

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0732CM-25: Execute Splicing and Anchoring using Mechanical Methods

Objective: This competency standard covers the skills and knowledge required to mechanically splice and anchor for reinforcement in concrete. It includes planning and preparation for the work, splicing and anchoring

Duration: 130 Hours **Theory: 25 Hours** **Practice: 105 Hours** **Credit Hours: 13**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Carry out mechanical splicing and anchoring	**Trainee will be able to:** 1. Interpret drawing and specification. 2. Prepare material as per requirement 3. Thread reinforcement rebars as detailed in job specifications 4. Fit and secure splicing couplers to rebars in accordance with job specifications 5. Free coupler connections and rebars from mill scaling and residual debris 6. Locate and anchor reinforcement as prescribed in job specifications	• Understanding of structural drawing • Define mechanical splicing and anchoring • Explain compressive and tensile strength • Explain process of splicing couplers to rebar • Explain anchoring location as per job • Describe mechanical anchoring systems, materials and techniques **Practical Activity:** • Practice of splicing of rebars as per job • Practice to locate anchoring as per specification	**Theory-**15Hrs **Practical-**70Hrs **Total-**85Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard marker • Duster • Chalk • Rebars • Binding wire • Safety tape Non Consumable	Class Room Training Workshop Lab/ Field Visit

				• White board • Multimedia • Computer • PPEs • Bolt Cutters • Couplers • Mechanical cutting equipment • End cutting nippers • Tool belts • Measuring tapes • Electric cold cut-off saw • Oxy-acetylene equipment	
LU2. Carryout reinforcement checks	**Trainee will be able to:** 1. Fix ties to reinforcement 2. Check depth of coverage, clearance, spacing and overlap of reinforcement material according to drawing 3. Clean, maintain and store plant tools & equipment	• Describe interpretation of drawings and specifications • Define Quality requirements • Explain calculation of material requirements • Understand handling, storage and environmentally friendly waste management • Knowledge of Material	**Theory- 10**Hrs **Practical-35**Hrs **Total-**45Hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • Whiteboard	Class Room Training Workshop Lab/ Field Visit

		safety data sheets (MSDS) • Knowledge of Materials storage and environmentally friendly waste management **Practical Activity:** • Practice of fixing ties to reinforcement • Practice of checking depth of coverage, clearance, spacing and overlapping of reinforcement material according to drawing		marker • Duster • Chalk • Rebars • Binding wire • Safety tape Non Consumable • White board • Multimedia • Computer • PPEs • Bolt Cutters • Couplers • Mechanical cutting equipment • End cutting nippers • Tool belts • Measuring tapes • Electric cold cut-off saw • Oxy-acetylene	

				equipment	

Module 4.4: Practice Entrepreneurial Skills

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required for entrepreneurship

Duration: 60 **Theory: 12 Hours** **Practice: 48Hours** **Credit Hours: 6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1 Develop a business plan	**The trainee will be able to:** 1. Conduct market survey to collect information 2. Select the best option in terms of cost, service, quality, sales, profit margin, overall expenses 3. Compile the information collected through the market survey, in the business plan format	• Describe market survey and types of information collected such as ○ Customer /demand ○ Tools, equipment, machinery and furniture with rates ○ Raw material ○ Supplier ○ Credit / funding sources ○ Marketing strategy	**Total** 19hrs **Theory:** 4hrs **Practical:** 15 hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker Non	• Class Room • Simulated environment

		○ Market trends ○ Overall expenses ○ Profit margin • Explain market survey tools such as questionnaire, interview, observation etc • Explain elements of business plan • State the procedure to fill the business plan format Activity: Conduct market survey and formulate business plan in terms of feasibility, investment potential, risk, and completeness.		Consumable • White board • Multimedia	

LU 2 Collect information regarding funding sources	**The trainee will be able to:** **1.** Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate **2.** Choose the best available option according to investment requirement **3.** Prepare documents according to the loan agreement requirement **4.** Include the information of funding sources in the business plan	• Explain different funding sources • Describe the documents required to get loan to start a new business Activity: • Prepare the documents for financial feasibility for external investment / loan for the business plan. • Prepare loan documents.	**Total** 19 hrs **Theory:** 4 hrs **Practical:** 15 hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker Non Consumable • White board • Multimedia	• Class Room • Simulated environment
LU 3 Develop a marketing plan	**The trainee will be able to:** **1.** Collect information required to devise marketing plan Prepare marketing plan for new business	• Prepare the product promotion strategy • State elements of business plan • Describe 7 Ps of marketing • Prepare human resource strategy plan.	**Total** 08hrs **Theory:** 2 hrs **Practical:**	Consumable • Notebooks • Pencils • Erasers • Sharpeners	• Class Room • Simulated environment

		Activity: • Devise marketing strategy for product promotion	06 hrs	• White board marker Non Consumable • White board • Multimedia	
LU 4 Develop basic business communication skills	**The trainee will be able to:** **1.** Communicate with internal customers and external customers : **2.** Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading	• Describe 7Cs of business communication • Explain different modes of communication and their application in the industry • Describe business terms used in the industry • Describe organization's procedures and policy related to information and communication systems, protocol and procedures Activity:	**Total** 14 hrs **Theory:** 2 hrs **Practical:** 12 hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker Non Consumable • White board	• Class Room • Simulated environment

	etc. **3.** Use specific business terms used in the market	• Practice to prepare a report about shortage of labour • Practice to play a role to communicate with customer about the product.		• Multimedia	

List of Tools, Machinery and Equipment

SR#	Items/Tools & Equipment	Quantity
1.	**PPEs:** Hard Hats Safety Shoes Earmuffs Gloves Eye Protection Face Shields.	 30 30 30 30 Pans 05 05
2.	Desktop computer	26
3.	Printer	01
4.	Multimedia	01
5.	Application software.	As per required
6.	Barricades	05

7.	Sound level meter	05
8.	Oxygen monitor	05
9.	Hygrometer	05
10.	Board of Safety instructions.	05
11.	First aid Box	01
12.	Stretcher	01
13.	Fall arrest system	02
14.	Chain Hoist	02
15.	Hooks / Anchors	10
16.	Slings	05
17.	Lux meter	02
18.	Chisels(for cutting rebars)	10
19.	Hammer(Light)	10
20.	Hammer(sledge)	05
21.	Cutting base	05
22.	Calipers	10
23.	Measuring tape(100')	10
24.	Measuring tape 18'	10
25.	Pliers	10
26.	Bar bending table	02
27.	Disc cutter	02
28.	Lifting device	02

29.	Different cutting tools	2 kit
30.	Bolt cutters	10
31.	couplers	10
32.	Nippers	10
33.	Tool belts	05
34.	Bending rod	10

List of Consumable Supplies

SR#	Consumable Supplies	Quantity
1.	PPEs Surgical Face Masks	30
2.	Barricading tape	05
3.	Stationary	As per required
4.	Rebar(1/2” dia)	600kg
5.	Rebar(3/2” dia)	450kg
6.	Rebar(1/4” dia)	350kg
7.	Bending wire	50kg
8.	Printer paper	As per required
9.	Lubricants	2L

10.	Fasterners	As per required
11.	Waste disposal containers	As per required

Members of the Curriculum Development Committee

S#	Name	Designation
1	Mr. Tariq Saeed	Sr. Instructor, GTTI Mughalpura Lahore
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3	Mr. Muhammad Asim	Lab Technologist UOL, Lahore
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8	Mr. Tahir Mehmood	Sr. Instructor, GTTI Mughalpura Lahore
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10	Engr. Danish Khan	DACUM Facilitator
11	Mr. Muhammad Yasir	Deputy Director/ Coordinator –(Skills Standards and Curricula) NAVTTC HQ

National Vocational Certificate Level 4 in Construction Sector
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Members of the Curriculum Validation Committee

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9.	Mr. Muhammad Abid	Instructor, GCT Railway Road Lahore
10.	Mr. Tahir Mehmood	Sr. Instructor, GTTI Mughalpura Lahore
11.	Mr. Shoukat Ali Rana	Deputy Controller Examination, PBTE, Lahore
12.	Engr. Muhammad Waris	Instructor, GCT Raiwind Road Lahore

13.	Mr. Sikandar Hayat	Jr. Instructor, GCT Raiwind Road Lahore
14.	Engr. Danish Khan	DACUM Facilitator
15.	Mr. Muhammad Yasir	DD, VT (NAVTTC)