



National Competency Standards for
“Digging Operation/Technology”
(Assistant Digger Operator)
Level-2



National Vocational and Technical Training Commission
(NAVTTTC) Government of Pakistan



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INTRODUCTION

Digging Operation/Excavation is one of the booming industries of Pakistan. There is an increasing demand of Assistant Digger Operator. 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 industries including mechanical, electrical, automobile, hydraulics, etc. If an individual is planning to take up Assistant Digger Operator, this course will help him/her weigh their choices better.

Keeping in view of the above the competency based national vocational qualifications have been developed by NAVTTTC 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 increase in 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 specialist equipment, working on computers doing research on the Internet or the library. As trainees learn at different pace they might well 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 QUALIFICATION

The purpose of the training is to provide skilled manpower to improve the existing construction industry. This will improve the quality in different industrial sectors by



Assistant Digger Operator and the availability of skilled professionals will bring socio-economic benefits to all stakeholders. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of Assistant Digger Operator
- Capacitate the local community and trainers in modern CBT training, methodologies and processes as envisaged under NVQF
- Provide flexible pathways and progressions in the mining sector.
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training Assistant Digger Operator in Pakistan

DATE OF VALIDATION

This national vocational qualification (NVQ) has been validated by the Qualifications Development Committee (QDC) in 08th to 12th November, 2021 and will remain in currency until 20th Jan 2023/2024.

*Shall be reviewed after 3 years



CODE OF QUALIFICATION

Qualification Title	Code
National Vocational Certificate Level 2, in (Digging Operation/Technology) "Assistant Digger Operator"	724DOT04

ENTRY REQUIREMENTS

- For National Vocational Certificate Level-2 in "Assistant Digger Operator" (Digging Operation/Technology), the entry requirement is Middle or Equivalent.



QUALIFICATIONS DEVELOPMENT COMMITTEE

The following members participated in the qualification development of these qualifications:

Sr. No.	Name	Designation	Organization
1.	Shahzad Ahmad	Director	SS&-C, NAVTTTC HQ
2.	Mehwish Aisha Ahsan	DACUM Facilitator	CBT Expert/Certified Assessor
3.	Muhammad Faraz Haider	Instructor, Mechanical	CTTI Islamabad
4.	Sikander Mehmood	Instructor, Mechanical	CTTI Islamabad
5.	Muhammad Rizwan Sarwar	Sr Instructor	GTTI Sheikhpura)
6.	Saif Ullah Khan	AD, Technical	PITAC, Lahore
7.	Sajid Mahmood	Site Incharge	National Construction Co, Lahore
8.	Engr. Abdul Basit Mansoor	AFM Civil	PITAC, Lahore
9.	Engr. Muhammad Ibrar	Manager Site,	DHA Bahawalpur
10.	Engr. Ameer Khusro	Site Supervisor,	Makson, Peshawar
11.	Engr. Rebab Maria Mehmood	Site Engineer	IMC Engineering & Consultants, Lahore
12.	Engr. Norheen Amina	Project Coordinator	Allied Engineering Services, Lahore
13.	Tahir Mahmood	GTTI Mughalpura	Lahore
14.	Dr Amjad Hussain	AP, Mechanical	UET, Lahore
15.	Dr Shahid Imran	HOD	Mechanical, UET, Lahore



QUALIFICATIONS REVIEW AND VALIDATION COMMITTEE

The following members participated in the qualification development of these qualifications:

Sr. No.	Name	Designation	Organization
1.	Shahzad Ahmad	Director	SS&-C, NAVTTTC HQ
2.	Mehwish Aisha Ahsan	DACUM Facilitator	CBT Expert/Certified Assessor
3.	Aqsa Saleem	CBT Assessor	GCU, Faisalabad
4.	Mr Shahzad Zafar	Master Trainer/Ex DD	PTEVTA, Lahore
5.	Muhammad Younas	Master Trainer/Ex DD	Staff training College Lahore
6.	Engr. Muhammad Ibrar	Manager Site	DHA Bahawalpur
7.	Engr. Jamal Akbar	Associate Professor, Mechanical Department	GCT Peshawar
8.	Engr. Tashiq Semab Amin	Dy Manager,	HIT Taxila
9.	Mr. Tahir Shah	Assistant Secretary	TTB Peshawar
10.	Engr. Usama Ahmed	Assistant Track Engineer	Orange Line, Lahore
11.	Engr. Nohman Ahmad	Great Drilling Co	Iraq
12.	Syeda Fatima Iqbal	System Analyst	PBTE
13.	Israr Ahmed	Secretary	BTE, KPK
14.	Syed Mansoor Ahmed	Assistant Manager IT, NVQF Registry Incharge	SBTE Sindh
15.	Humaira Kanwal	Assistant Professor	University of Lahore, Lahore



SUMMARY OF COMPETENCY STANDARDS

National Vocational Certificate Level 2, in (Digging Operation Supervisor) “Assistant Digger Operator” (6 Months)

Code	Competency Standards	Level	Theory		Practical		Total	
			C	Hr.	C	Hr.	C	Hr.
1.	A-Maintain Personal Health, hygiene and safety	2	2	20	1	10	3	30
2.	B-Perform basic communication skills	2	2	20	1	10	3	30
3.	C- Operate Computer Functions (General)	2	1	10	2	20	3	30
4.	D-Demonstrate Basic Numeracy skills	2	2	20	2	20	4	40
5.	E-Identify Electrical Circuits and Measurements	2	2	20	5	50	7	70
6.	F-Perform Battery Service of Vehicle	2	1	10	4	40	5	50
7.	G-Maintain Diesel Engine Systems	2	3	30	14	140	17	170
8.	H-Carryout General Maintenance	2	2	20	6	60	8	80
9.	I-Perform Basic Technical Drawing	2	3	30	7	70	10	100
Total			18	180	42	420	60	600



Competency Standard A: Maintain Personal Health, Hygiene and Safety - 101200829

Overview: This Competency Standard identifies the competencies required to protect/apply occupational Safety, Health and Environment at workplace according to the industry's approved guidelines, procedures and interpret environmental rules/regulations. Trainee will be expected to identify and use Personal Protective Equipment (PPE) according to the work place requirements. The underpinning knowledge regarding Observe Occupational Safety and Health (OSH) will be sufficient to provide the basis for the job at workplace.

Competency Units	Performance Criteria
CU1. Identify Hazards at Workplace	<p>You must be able to:</p> <p>P1. Interpret work processes and procedures correctly to identify risk to Health, hygiene and safety at workplace</p> <p>P2. Recognize processes, tools, equipment and consumable materials that have the potential to cause harm</p> <p>P3. Prepare Report of the identified risk to Health, hygiene and safety</p>
CU2. Apply Personal Protective and Safety Equipment (PPE)	<p>You must be able to:</p> <p>P1. Select personal protective equipment in terms of type and quantity according to work orders.</p> <p>P2. Wear, adjust, and maintain personal protective equipment to ensure correct fit and optimum protection in compliance with company procedures.</p> <p>P3. Ensure personal protective equipment is cleaned and stored in proper place.</p>
CU3. Observe Occupational Safety and Health (OSH)	<p>You must be able to:</p> <p>P1. Maintain cleanliness and hygiene as per organizational policy</p> <p>P2. Comply with Health, hygiene and safety precautions before starting work</p> <p>P3. Follow organizational Health, hygiene and safety guidelines during work</p>



	<p>P4. Deal with resolvable problems according to prescribed procedures</p> <p>P5. Place the tools equipment etc at their prescribed place after completion of work</p> <p>P6. Identify the safety signs and symbols</p> <p>P7. Erect barricades, hoardings, signage in the hazardous areas</p> <p>P8. Maintain cleanliness and hygiene as per organizational policy</p> <p>P9. Follow organizational Health, hygiene and safety guidelines during work</p> <p>P10. Report unsafe condition to immediate supervisor</p>
<p>CU4. Dispose of hazardous Waste/materials</p>	<p><i>You must be able to:</i></p> <p>P1. Identify hazardous waste/ drug materials which needs to be disposed off</p> <p>P2. Collect hazardous or non-hazardous waste carefully from the designated area as per approved procedure</p> <p>P3. Use proper disposal hazardous containers for dispose-off hazardous waste as per procedure</p> <p>P4. Take necessary precautions like putting masks and gloves while disposing hazardous waste/ materials as per standard operating procedure</p>
<p>CU5. Carry out First aid</p>	<p><i>You must be able to:</i></p> <p>P1. Identify items of first aid kit</p> <p>P2. Check expiry date of medicines</p> <p>P3. Identify potential dangers</p> <p>P4. Call for help</p> <p>P5. Check for a response</p> <p>P6. Check the casualty's airway</p> <p>P7. Check the casualty is breathing</p> <p>P8. Check the casualty's circulation</p> <p>P9. Perform first aid treatment for accidental bleeding</p>



Knowledge & Understanding

The student must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards. This includes the knowledge of:

- Safety rules and regulations of organization
- List of Personal protection and safety Equipment
- Meaning of Safety signs and symbols
- Safety related Standard Operating Procedure/guidelines
- Waste disposal SOP
- Best practices relating to clean work environment
- Best practices relating to safe work environment

Critical Evidence(s) Required

The candidate needs to produce following critical evidence (s) to be competent in this competency standard:

1. Explain Health, hygiene and safety procedures/precautions
2. Interpret Health, hygiene and safety signs and symbols
3. Describe Techniques and methods to identify the risks of hazards at workplace
4. Describe Techniques and methods to identify the risks of hazards at workplace
5. Safety reporting procedures and documentation
6. Use of Personal Protective Equipment
7. First Aid treatment methods
8. Identify possible hazards at workplace



Competency Standard B: Perform Basic Communication Skills - 073200592

Overview: This unit describes the skills and knowledge required to assist in the development of communication competence by providing information regarding different forms of communication and their appropriate use.

Competency Units	Performance Criteria
CU1. Work in Team	<p>You must be able to:</p> <p>P1. Treat team members with respect and maintain positive relationships to achieve common organizational goals</p> <p>P2. Listen to instructions carefully & comply with those instructions</p> <p>P3. Provide work related information to team members and identify interrelated work activities to avoid confusion</p> <p>P4. Adopt communication skills, appropriate to work activities and organizational/medical procedures</p> <p>P5. Identify problems and resolve them through discussion and mutual agreement</p>
CU2. Follow Supervisor's instructions	<p>You must be able to:</p> <p>P1. Carefully listen and note down the instructions of Supervisor</p> <p>P2. Carry out the instructions of the supervisor</p> <p>P3. Report to the supervisor as per organizational SOPs</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Reporting techniques
- importance and application of Work ethics



- Explain the importance of Good communication skills (7Cs of effective communication)
- Explain the importance of Basic computer skills
- Workplace dress code
- Describe the role of team members and functionality of the teams
- Describe team dynamics and stages of team development
- Describe Conflict resolution strategies
- Prepare relevant documents and reports

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

1. Effective communication with colleagues, clients and supervisors
2. Office reports
3. Computer literacy certificate



Competency Standard C: Operate Computer Functions (General) - 724DOT04A

Overview: The competency Standard describe skills and knowledge required to setup a computer system, organize files in folders, and shutdown a computer system.

Competency Units	Performance Criteria
CU1. Set up the computer for use	<p><i>You must be able to:</i></p> <p>P1. Identify physical components of computer</p> <p>P2. Identify peripheral devices of the computer</p> <p>P3. Connect all components of computer</p> <p>P4. Follow procedures to turn on the computer system</p>
CU2. Organize files in folder	<p><i>You must be able to:</i></p> <p>P1. Create folders/subfolders with suitable names</p> <p>P2. Save files in relevant folders.</p> <p>P3. Rename and move folders in different drives.</p> <p>P4. Move folders and files using drag and drop techniques</p> <p>P5. Save folders and files on different media</p> <p>P6. Search for folders/subfolders and files using appropriate tool bars</p> <p>P7. Delete Folder files</p> <p>P8. Restore deleted folder files</p>
CU3. Shut down computer system	<p><i>You must be able to:</i></p> <p>P1. Save any work to be retained</p> <p>P2. Close open application programs correctly</p> <p>P3. Shut down computer</p> <p>P4. Switch off any unused peripheral devices</p> <p>P5. Ensure computer safety</p>

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Basic parts of a computer
- Definition of computer



- Definition of Drives
- Enlist computer component

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

1. Switch on the computer
2. Attach Computer component
3. Switch on Peripheral devices
4. Make a folder in any partition(drive) in hard disk
5. Give name to the folder
6. Save file in the folder
7. delete the folder/File
8. Shut down computer
9. Prepare a formatted document using MS Word
10. Enter data into the respective columns and rows as per given instructions
11. Set page layouts and margins
12. Apply any slide transition on entire presentation.



Competency Standard D: Demonstrate Basic Numeracy Skills - 001100851B

Overview: This module covers the skills and knowledge required to apply basic Numeracy skills, Perform Measurement, Perform basic mathematical calculations and Calculate Area and Volume of aggregate. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Apply Basic Numeracy Skills	<p><i>You must be able to:</i></p> <p>P1. Perform addition</p> <p>P2. Perform subtraction</p> <p>P3. Perform multiplication</p> <p>P4. Perform division</p> <p>P5. Calculate percentage</p>
CU2. Perform Measurement	<p><i>You must be able to:</i></p> <p>P1. Collect appropriate measuring tools</p> <p>P2. Identify inch foot and yard</p> <p>P3. Identify millimetre, centimetre and meter</p> <p>P4. Perform inter conversion of Measuring units</p>
CU3. Calculate Area and Volume of Regular Shapes	<p><i>You must be able to:</i></p> <p>P1. Calculate Area and Volume of basic shapes</p> <p>P2. Calculate surface area</p> <p>P3. Calculate volume of materials</p> <p>P4. Calculate quantities of materials (aggregate stacks/pile, earth material and sand) by incorporating time saving practices</p>

Knowledge & Understanding

The trainee must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:



- Basic principles of addition, subtraction, multiplication and division
- Measuring tools
- Basic measuring units and its interring conversion
- Calculation of area and volume of basic shapes and materials
- Time saving practices

Critical Evidence(s) Required

The trainee needs to produce following critical evidence(s) in order to be competent in this competency standard:

1. Perform mathematical operations (addition, subtraction, multiplication and division)
2. Inter convert measuring units
3. Calculate Area and Volume of geometrical figures
4. Calculate volume of material stack



Competency Standard E: Identify Electrical Basic Circuits and Measurements - 724DOT04B

Overview: This competency standard deal with learning the competencies needed to Carryout identification of the Electrical Circuits and their application. That includes preparing circuits and performing Basic Electricity Measurements. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Prepare Basic Circuits	You must be able to: P1. Prepare series circuit on work bench using appropriate tools. P2. Prepare parallel circuit on work bench using appropriate tools. P3. Prepare combination circuit (series parallel circuit) on work bench using appropriate tools.
CU2. Perform Basic Electricity Measurements	You must be able to: P1. Measure/ record voltage by using appropriate equipment P2. Measure/ record current by using appropriate equipment Measure/ record resistance by using appropriate equipment P3. Measure/ record continuity by using appropriate equipment

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Types of current, circuits (open/close), etc.
- Switches, relay, fuses, circuit breaker, etc.
- Motors (DC/AC),



- Generator (DC/AC)
- Resistors/colour coding.



Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

1. Portfolio
2. Measure/ record continuity by using appropriate equipment.



Competency Standard F: Perform Battery Service of Vehicle - 724DOT04C

Overview: This competency standard deal with learning the competencies needed to Carryout General Maintenance. That includes diagnose the problem related to the battery and starting system and enable the learner to troubleshoot the system if not working. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Perform Service of battery	You must be able to: P1. Perform the battery test using appropriate tools according to the standards. P2. Perform cleaning of terminal holder according to the standard. P3. Perform replacement of terminal holder according to requirement. P4. Assess the battery performance using appropriate tool.
CU2. Perform Battery replacement	You must be able to: P1. Perform Safe removal of Battery from the vehicle. P2. Install Battery in the vehicle. P3. Test the battery performance according to the set procedure.

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Lead Acid battery and its internal components: Material, acid and water ratio, plates, cells, ampere hour rating, voltage drop, corroded/ lose terminals, maintenance free batteries.



- Chemical activities in Lead Acid Battery while charging and discharging.

Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

1. Portfolio
2. Measure/ record continuity by using Digital Multi Meter.



Competency Standard G: Maintain Diesel Engine Systems - 724DOT04D

Overview: This competency standard deal with learning the competencies needed to principles, construction, types, components and their relationship between different components to service and repair air- and water-cooled engine cooling systems and to diagnose fault/s and other maintenance issues by Auto Mechanic, in accordance with the manufacturer's Manual. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Identify basic components of diesel Engines	<p><i>You must be able to:</i></p> <p>P1. Identify the main components of Diesel Engine</p> <p>P2. Locate fuel injectors and its function</p> <p>P3. Identify high pressure fuel pump and its functions</p> <p>P4. Identify heater plug and its function</p> <p>P5. Identify the Common rail fuel system</p> <p>P6. Identify HEUI fuel system</p> <p>P7. Identify Cooling system in the vehicle</p>
CU2. Maintain Diesel Engine Cooling System	<p><i>You must be able to:</i></p> <p>P1. Identify the antifreeze and its compositions</p> <p>P2. Check coolant level</p> <p>P3. Identify the rust and corrosion in the engine and preventions</p> <p>P4. Perform Flushing of Cooling system</p>
CU3. Maintain Engine Lubrication System	<p><i>You must be able to:</i></p> <p>P1. Identify the main components of engine lubrication system.</p> <p>P2. Replace Oil filter</p> <p>P3. Check engine oil level</p> <p>P4. Change engine oil</p> <p>P5. Check engine oil leakage</p>



CU4. Maintain Engine fuel System	<i>You must be able to:</i> P1. Identify the main components of engine fuel system. P2. Replace fuel filter. P3. Drain water from water separator.
CU5. Maintain Engine Intake System	<i>You must be able to:</i> P1. Identify the main components of engine Intake system. P2. Check dust indicator P3. Clean the air filter P4. Replace the air filter

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Operating principles and terminologies of cooling system (Air cooled engine, liquid cooled engine, operating temperature, thermal efficiency, pressurized system, heat exchange method (conduction, radiation, and convection), corrosion, and inhibitors/antifreeze)
- Functions and purpose of engine cooling system components (Electrical motor operated fan with thermo switch, belt operated fan, temperature controlled/viscous coupling fan, pressure cap, water body/pump, drive belt, thermostat, radiator, core plug, hoses/clamps, and gasket/ seals (Petrol four stroke, diesel four stroke, and rotary/Wankel).
- The functions/operating principle and main components of engine lubrication system as following.
- Wet sump, dry sump, total loss, Oil pumps and its types, pressure relief valves, oil filter, oil cooler, ventilation/ PCV Valve, hoses, and oil level indicators.
- Lubricant (oils viscosity, oil classifications, Reduction of frictional forces, cooling effect, cleaning effect, corrosion resistance, and noise reduction).



- Explain flow of oil in Lubrication system diagram with EGR.
- Explain flow of oil in Lubrication system diagram without EGR.
- Define Micron rating of Oil Filters.
- Define Oil Grades and multi grade oil.

Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

1. Capable of diagnose, adjust and rectify the cooling system faults.
2. Portfolio



Competency Standard H: Carryout General Maintenance - 724DOT04E

Overview: This competency standard deal with learning the competencies needed to Carryout General Maintenance. That includes carryout General Maintenance, Preventive Maintenance and Maintenance of Tooling according to instructions. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Perform General Housekeeping & Maintenance	<p>You must be able to:</p> <p>P1. Apply appropriate methods and techniques for cleanliness and maintenance of machines & tools</p> <p>P2. Clean and maintain all workplace tools & machines as per housekeeping checklists or given instructions</p> <p>P3. Prepare checklist for daily cleanliness of the workplace</p> <p>P4. Respond appropriately to safety hazards on all bench-work tools and machines</p> <p>P5. Place all the tools & material in proper place to ensure safe work</p> <p>P6. Prepare specific guidelines and checklists to conduct maintenance and housekeeping of machines & tools</p>
CU2. Perform Preventive Maintenance	<p>You must be able to:</p> <p>P1. Read and interpret maintenance schedule carefully</p> <p>P2. Maintain oiling and greasing chart (daily, weekly as per requirement)</p> <p>P3. Maintain machine history record - date of installation, condition, oiling and maintenance</p> <p>P4. Inspect and assess the general condition of an assigned machine on regular basis</p> <p>P5. Observe problems and carry out maintenance as per given instructions</p> <p>P6. Identify faulty/damaged/ worn out parts and take appropriate steps to replace them</p>



	P7. Report faults and problems of the machines, if not controllable, to the person concerned
CU3. Perform Tools Maintenance	<p>You must be able to:</p> <p>P1. Prepare checklist for daily cleanliness of the workplace</p> <p>P2. Clean and maintain all bench-work tools and machines as per housekeeping checklists or instructions provided</p> <p>P3. Respond appropriately to safety hazards on all bench-work tools & machines</p> <p>P4. Arrange all the tools and material in proper place to ensure safe work</p> <p>P5. Adopt methods and techniques for cleanliness and maintenance of tools</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Guidelines and checklists to conduct maintenance and housekeeping of machines & tools
- Importance of daily cleanliness of workplace and lubrication of the machine as per given checklist of oiling
- Machine operations
- Importance of storing tools and material in specific place
- Oiling, greasing and function of machine
- Faulty/damaged/ worn out parts
- Importance of Record keeping
- Routine maintenance problems and their solution
- Report writing



Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Clean and maintain all bench-work tools and machines as per housekeeping checklists or instructions given
- Interpret guidelines and checklists of conducting maintenance and housekeeping of machines and tools



Competency Standard I: Perform Basic Technical Drawing - 724CO08D

Overview: This competency standard deal with learning the competencies needed to perform basic technical drawing. That includes lettering/lines, different geometrical shapes. It will also allow you to learn orthographic views, dimensioning and drawing symbols. Your underpinning knowledge will be sufficient to provide you the basis for your work

Competency Units	Performance Criteria
CU1. Explore the Lettering and Lines	<p>You must be able to:</p> <p>P1. Draw different types of lettering</p> <p>P2. Draw different types of lines</p> <p>P3. Draw upper and lower lines for lettering on distance of 3mm</p> <p>P4. Write Vertical Lettering with different style like Gothic, Roman and free hand lettering</p>
CU2. Create a Design using different Geometrical Shapes	<p>You must be able to:</p> <p>P1. Draw different shapes using lines including:</p> <ul style="list-style-type: none"> • Circle • Triangle • Square • Rectangle • Curves <p>P2. Use T-Square and Set Squares for drawing horizontal, vertical and inclined lines</p> <p>P3. Create a design using different shapes</p>
CU3. Explore Orthographic views of simple Shapes	<p>You must be able to:</p> <p>P1. Draw first angle projection</p> <p>P2. Draw third angle projection</p> <p>P3. Draw missing views</p> <p>P4. Draw different section views</p> <p>P5. Draw Plane geometry angles and triangles</p> <p>P6. Sketch Plane Geometry quadrilateral, square, rhombus</p>



	<p>and parallelogram</p> <p>P7. Draw Plane Geometry parallel-lines, perpendicular, bisect line and angle</p> <p>P8. Sketch Plane geometry equal division of line with the help of compass and set square</p>
<p>CU4. Explore types of Dimensioning and Drawing Symbols</p>	<p>You must be able to:</p> <p>P1. Draw different types of dimensions.</p> <p>P2. Draw different drawing symbols.</p> <p>P3. Draw geometrical tolerance</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Types of orthographic views
- Types of dimensioning and drawing symbols
- Types of fasteners
- Assembly drawings
- Types of development drawings
- Different types of drawing pencils (Clutch pencil Mechanical pencils, etc.)
- Different types of technical pens
- Different types of ruler
- Different drawing sheets (scholar sheet, chart paper, Canon Sheet, etc.)
- Language of engineering terminology.
- Define Triangles, Quadrilateral, and Polygons

Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

1. Portfolio
2. Create a design using different geometrical shapes.
3. Draw first and third angle projection with symbols
4. Draw different assembly drawings with dimensioning and drawing



symbols



COMPLETE LIST OF TOOLS AND EQUIPMENT

SR#	Tools & Equipment	Quantity
1.	Computer Systems	26
2.	Scanner	1
3.	Printer	1
4.	Hardness Testers	1
5.	Universal testing machine(UTM)	1
6.	Impact Testing Machines	1
7.	Steel Rulers	10
8.	Tri Square	10
9.	Inside Vernier Caliper	10
10.	Odd leg Vernier Caliper	10
11.	Trammel Vernier Caliper	10
12.	Outside Vernier Caliper	10
13.	Vernier Depth gauge	5
14.	Vernier Bevel protractor	5
15.	Thread gauges	5
16.	Screw pitch gauges	5
17.	Fillet gauges	5
18.	Feeler gauges	5
19.	Vernier Height gauge	5
20.	Dial indicators with magnetic stand	5



21.	Vernier Micrometer	5
22.	Inside Micrometer	5
23.	Outside Micrometer	10
24.	Depth Micrometer	5
25.	Snap Gauge set	2
26.	Dial Bore Gauge	5
27.	Set of Adjustable Wrench	5
28.	Set of Spanners (Open end, Ring)	5 each
29.	Pipe wrench	2
30.	L-key sets	5
31.	Nose pliers	5
32.	Grip pliers	5
33.	Crawler Excavator	5
34.	Wheel Excavator	5
35.	Wrenches	5
36.	Pliers	5
37.	Screw driver (Positive and negative)	5
38.	Hammer	5
39.	Vice grip	5
40.	Grease gun	5 each
41.	Paint brush	10
42.	Steel brush	25
43.	Crawler Excavator	10



44.	Measuring tape	10
45.	High pressure washer	5
46.	Air compressor	5
47.	Rigid and articulated dump truck (Off road)	5
48.	Dump truck (On road)	10 set
49.	Hopper	10
50.	Conveyor	10
51.	Vernier caliper (out, inside)	5
52.	Torque gauge	5
53.	Steel rule	5
54.	Multi-meter	5
55.	Thermometers	5
56.	Spanner set	10 packs
57.	Socket set	1
58.	ST(special service Tool)	1
59.	Drilling Machines	1
60.	Location Determining Devices	1
61.	Digging slant determining devices	1
62.	Communication Devices	10
63.	Sample Boxes	10
64.	Exploration and Scanning Devices	2
65.	Drawing board	25
PPEs		



66.	Helmet	25
67.	Safety shoes	25
68.	Safety belt	25
69.	Cotton hand gloves	25
70.	Goggles	25
71.	Reflective jackets	25
72.	Safety Signs & Message boards	25
73.	Full body Harness	25
74.	Lanyard	25
75.	Anchorage	25
76.	Barricade tape	25
77.	Metal barricades	25
78.	Plastic cones	25
79.	Safety nets.	25
MATERIALS/LUBRICANTS		
80.	Engine oil	
81.	Gear oil	
82.	Hydraulic oil	
83.	Coolant	
84.	Grease	
85.	Nitrogen gas	
86.	Marking cloth	
87.	Spare parts	



88.	Machine parts	
89.	Boulders	
90.	Soil	
91.	Sand	
92.	Limestone	
93.	Debris	
94.	Coal	
95.	Landfill	
96.	Ore	
97.	Silt	