



## **National Competency Standards for “Level-2 Junior Technician for Mining Process Technology”**



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



## **ACKNOWLEDGEMENT**

National Vocational and Technical Training Commission (NAVTTTC) extends its gratitude and appreciation to representatives of business, industry, academia, government agencies, provincial TEVTAs, sector skill councils and trade associations who spared time and extended their expertise for the development of National Vocational Qualifications for the trade of **Mining Process Technology**. This work would not have been possible without the technical support of the above personnel.

NAVTTTC initiated development of CBT&A based qualifications for 200 traditional / hi-tech trades under the Prime **Minister’s Hunermand Pakistan Program**, focusing on Development & Standardization of 200 Technical & Vocational Education & Training (TVET) Qualifications. NAVTTTC efforts have received full support from the Ministry of Federal Education and Professional Training, which highly facilitated progress under this initiative.

It may not be out of place to mention here that all the experts of Industry, Academia, TVET TEVTAs, BTEs and PVTC work diligently for making this qualification worthy and error free for which all credit goes to them. However, NAVTTTC accepts the responsibility of all the errors and omissions still prevailing in the qualification document.

Development of Skill Standards is a dynamic and ongoing process, and the developed skill standards need periodic review and updating owing to the constant technological advancements, development in scientific knowledge, and growing experience of implementation at the grass root level as well as the demand of industry. NAVTTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

**Executive Director,  
NAVTTTC**



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## 1. Introduction

Mining technology is exploration of valuable mineral/ores like Manganese, Tantalum, Cassiterite, Copper, Tin, Nickel, Bauxite, Iron, Gold, Silver, gems stone and other geological materials on or underneath the surface of earth. Usually, these ore bodies are in the form of lode, vein, seam, reef, or placer deposit. In other words, it is industrial activity that removes rocks from the Earth and processes it to extract valuable minerals for further use. This technology in a wider sense also includes extraction of any non-renewable resource such as petroleum, natural gas, or even water.

Primarily, there are two types of mining methods being used for the extraction of minerals and ores; surface mining and underground mining. The choice of method is largely determined by factors such as depth, geology of the mineral deposit and the cost of equipment.

When evaluating mineral deposits, it is extremely important to keep profit in mind. The total quantity of mineral in a given deposit is referred to as the mineral inventory, but only that quantity which can be mined at a profit is termed ore reserves.

The overall sequence of activities in modern mining is often compared with the five stages in the life of a mine: prospecting, exploration, development, exploitation, and reclamation.

- Prospecting stage; geophysical, geochemical procedures, location of favourable loci (maps, literature, and old mines), air source/aerial photography, airborne geophysics, satellite, surface/ ground geophysics, geology and spot anomaly is evaluated.
- Exploration (Ore body); sample (drilling or excavation), assay, testing analysis, extent, estimation of tonnage and grade, Evaluate deposit: present value, feasibility study.
- Development (Prospect); acquire mining rights (purchase or lease), File environmental impact statement, technology, assessment, permit, Construct access roads, transport system, locate surface plant, construct facilities, excavate deposit (strip or sink shaft).
- Exploitation (Mine); Factors in choice of methods like geologic, geographic, economic, environmental, societal safety, Types of mining methods. Surface: open pit, open cast, etc. Underground: room and pillar, block caving, etc. Monitor costs and economic payback.
- Reclamation (Real estate); Removal of plant and buildings after closure of mining. Reclamation of waste and tailings dumps, Monitoring of discharges.

National Vocational & Technical Training Commission (NAVTTC) developed competency standards for Mining Process technology training under National Vocational Qualifications Framework (NVQF). These competency standards have been developed by a Qualification Development Committee (QDC) and validated by the Qualification Validation Committee (QVC) having representation from the leading experts from academia and industry in mining area of the country.



## **2. Purpose of the Qualification**

The competency based NVQ has been developed to train the unskilled men and women of Pakistan on the technical and entrepreneurial skills to be employed / self-employed and inevitably set sustainable impact on their lives by enhancing their livelihood income.

The purpose of these qualifications is to set professional standards for upcoming experts, who will serve as key elements enhancing quality of Pakistan’s manufacturing sector. The specific objectives of developing these qualifications are as under:

- Improve the professional competencies of individual in metallurgy and cast metal technology
- Capacitate the local community and trainers in modern CBT trainings, methodologies and processes as envisaged under NVQF
- Provide flexible pathways and progressions in metallurgy and cast metal technology
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training in Pakistan
- Enabling the youth with greater employment opportunities



### 3. Date of Validation

This national vocational qualification (NVQ) has been validated by the Qualifications Development Committee (QDC) in 4<sup>th</sup> Oct to 8<sup>th</sup> Oct 2021 and will remain in currency until 10<sup>th</sup> October 2031

### 4. Date of Review

The qualification shall be reviewed after 3 years.

### 5. Codes of Qualification

Qualification Title	Code
National Vocational Certificate Level 2 in Mining Process Technology “Junior Technician ”	<b>724MP12</b>



## 6. Members of Qualification Development Committee

The following members participated in the qualification development process at PITAC, Lahore.

**Date: 13 to 17 August 2021.**

S#	Name	Designation
1.	Dr. Shahid Tufail Sheikh	Member Science, Ex-Head of MPRC Lahore
2.	Dr. Farhat Yasmeen	Professor, UET Lahore
3.	Dr. Muhammad Naeem Khan	AP, Govt Science College Wahdat Road, Lahore
4.	Dr. Irfan Hafeez	Senior Scientific Officer, PCSIR Lahore
5.	Dr. Asma Sheikh	Scientific Officer, PCSIR Lahore
6.	Dr. Shafia Iftikhar	AP, University of Sahiwal
7.	Muhammad Irfan Zubair	Deputy Director GSP, Lahore
8.	Shahbaz Muhammad	Assistant geophysicist GSP, Lahore
9.	Hafiz Zeeshan Akram	Assistant Director GSP, Lahore
10.	Muhammad Shahzad	Director, NAVTTC, Islamabad
11.	Engr. Saba Sadiq	DACUM FACILITATOR, Islamabad





## 7. Members of Qualification Validation Committee

The following members participated in the qualification development process at PITAC, Lahore. **Date: Oct 4<sup>th</sup> 2021 to Oct 8<sup>th</sup> 2021**

S#	Name	Designation
1.	Aftab Hussain	DACUM Facilitator/ Principal P-TEVTA Rawalpindi
2.	Dr. ShahidTufail Sheikh	Member Science, Ex-Head of MPRC Lahore
3.	Dr. Farhat Yasmeen	Professor, UET Lahore
4.	Dr. Muhammad Naeem Khan	AP, Govt Science College Wahdat Road, Lahore
5.	Dr. Irfan Hafeez	Senior Scientific Officer, PCSIR Lahore
6.	Engr. Shafaat Ali	Lecturer (Mining) GCT KharBajaur
7.	Engr. M. MuneeburRehman Khan	Measurement Engineer, ACC PVT Ltd
8.	ZeeshanMusadiq	Data Engineer/Mudlogger (Geologist) Petro Services
9.	Tariq Mehmoob	Incharge Operational Wing PBTE, Lahore
10.	Mr. Tahir Shah	Assistant Secretary TTB Peshawar
11.	Syed Mansoor Ahmed	Assistant Manager IT, NVQF Registry Incharge, SBTE Sindh

## 8. ENTRY REQUIREMENTS

- For National Vocational Certificate Level-2 in Mining process Technology “Junior Assistant”, the entry requirement is Middle or Equivalent for admission in formal institute. The entry in informal sector is not prescribed.

## 9. Regulation of the Qualification and schedule of units

Not applicable





**National Competency Standards for “Junior Technician in Mining Process Technology”**



## 10. Summary of competency standards

Sr.N o	Competency Standards	NVQF Level	Category	Estimated Contact hr.			Credit hr.
				Th.	Pr.	Total	
Junior Technician in Mining Process Technology -Level 2							
1.	Follow Safety Rules at Site	2	Generic	9	21	30	3
2.	Perform Basic Communication Skills	2	Generic	9	21	30	3
3.	Demonstrate Basic Numeracy skills	2	Functional	18	42	60	6
4.	Perform Basic Technical Drawing	2	Functional	23	57	80	8
5.	Perform Basic Bench Work Operations	2	Technical	10	90	100	10
6.	Interpret Topographic Map	2	Technical	7	33	40	4
7.	Interpret Geological Maps	2	Technical	6	24	30	3
8.	Interpret Mineral Map	2	Technical	6	24	30	3
9.	Perform Basic Electricity Applications	2	Technical	16	84	100	10
10.	Perform Safe Handling of Explosive Material	2	Technical	16	84	100	10
Total				120	480	600	60



## 11. Details of competency standards

### Level 2 - Junior Technician in Mining Process

#### 724CO08A-Competency Standard: Follow Safety Rules at Site

**Overview:** This competency standard covers the skills and knowledge required to follow safety rules at working site. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
<b>CU1.</b> Maintain occupational safety and health at workplace	<b><i>You must be able to:</i></b> <b>P1.</b> Identify basic safety signs and symbols <b>P2.</b> Erect barricades, hoardings, signage in the hazardous areas <b>P3.</b> Maintain housekeeping <b>P4.</b> Report unsafe condition to immediate supervisor (shift position)
<b>CU2.</b> USE Personal Protective and Safety Equipment (PPE)	<b><i>You must be able to:</i></b> <b>P1.</b> Identify risk associated with job to be done <b>P2.</b> Select PPE according to job <b>P3.</b> Wear PPE according to job <b>P4.</b> Store PPE at Designated place after use
<b>CU3.</b> Perform Communication Signals	<b><i>You must be able to:</i></b> <b>P1.</b> Identify different types of communication hand signals. <b>P2.</b> Use appropriate hand signals as per situation.
<b>CU4.</b> Manual Handling of Loads	<b><i>You must be able to:</i></b> <b>P1.</b> Check the load's weight to be handled <b>P2.</b> Check the availability of broad stable base <b>P3.</b> Lift and place the load with proper posture <b>P4.</b> Lift the load as per given standards

### 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:

- Types of hazards
- Verbal and non-verbal (Hand Signals) communication



**National Competency Standards for “Junior Technician in Mining Process Technology”**



- Basic first aid treatment
- Safety signs and symbols
- Manual handling of loads
- Standard procedure of handling, storing and stacking material.
- Usage of Appropriate PPE for different situations

### **Critical Evidence(s) Required**

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

- Use of PPE according to hazard/job
- Keep the workplace clean and tidy
- Balance the load while handling manually
- Use of first aid kit

### **Tool & Equipment**

- Personal Protective Equipment
- First Aid kit
- Oxygen Cylinder



## 001100851B- Competency Standard: Perform Basic Communication Skills

**Overview:** This unit describes the skills and knowledge required to assist in the development of basic communication competence by providing information regarding different forms of communication and their appropriate use. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
<b>CU1.</b> Communicate in a team	<b>You must be able to:</b> <b>P1.</b> Treat team members with respect <b>P2.</b> Maintain positive relationships to achieve common organizational goals <b>P3.</b> Get work related information from team <b>P4.</b> Identify interrelated work activities to avoid confusion <b>P5.</b> Adopt communication skills, which are designed in a team. <b>P6.</b> Identify problems in communication with a team <b>P7.</b> Resolve Communication barrier through discussion and mutual agreement
<b>CU2.</b> Follow Supervisor's instructions as per organizational SOPs	<b>You must be able to:</b> <b>P1.</b> Receive the instructions from Supervisor <b>P2.</b> Carry out the instructions of the supervisor <b>P3.</b> Report to the supervisor as per organizational SOPs

### 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
- Application of Work ethics
- Good communication skills (7Cs of effective communication)
- Workplace dress code
- The role of team members and functionality of the teams
- Team dynamics
- Basic Reading Skills
- Basic Writing skills
- Basic Verbal communication skills
- Basic Problem solving skills
- Basic Self-Management Skills
- Basic Technology Skills
- Basic Interview Skills



## **Tool & Equipment**

- Note book
- Pen
- Pencil

## **Critical Evidence(s) Required**

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

- Maintain effective communication with colleagues and supervisors
- Prepare different office reports



## 724MP12C-Competency Standard: Demonstrate Basic Numeracy Skills

**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 object. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
<b>CU1.</b> Apply Basic Numeracy Skills	<b>You must be able to:</b> <b>P1.</b> Perform basic mathematical calculations as per given task <b>P2.</b> Perform DMAS rule as per given calculation. <b>P3.</b> Calculate percentages of given task
<b>CU2.</b> Perform Basic Measurement	<b>You must be able to:</b> <b>P1.</b> Collect geometric tools for required measurements <b>P2.</b> Measure length of given object by using standard units <b>P3.</b> Perform inter conversion of Measuring units as per requirement
<b>CU3.</b> Calculate Area and Volume of Object	<b>You must be able to:</b> <b>P1.</b> Calculate Area and Volume of given object <b>P2.</b> Calculate surface area of given object <b>P3.</b> Calculate volume of material in the given object <b>P4.</b> Calculate quantities of materials (stone, aggregate, stacks/piles and sand) by incorporating time saving practices

### Knowledge & Understanding

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

- K1.** Basic principles of addition, subtraction, multiplication and division
- K2.** measuring tools
- K3.** millimetre, centimetre and meter
- K4.** Basic measuring units and its interring conversion
- K5.** Calculate area and volume of cylinder and cube
- K6.** Time saving practices

### Tool & Equipment

- Geometry Box
- Measuring tapes
- Calculator
- Materials of various shapes

### Critical Evidence(s) Required



***National Competency Standards for “Junior Technician in Mining Process Technology”***



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

- Perform addition
- Perform subtraction
- Perform multiplication
- Perform division
- Inter conversion of measuring units.
- Calculate Area and Volume of geometrical figures
- Calculate volume of material stacks of various shapes





## 724CO08D-Competency Standard: Perform Basic Technical Drawing

**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
<b>CU.1</b> Explore Lettering, Lines and symbols	<b>You must be able to:</b> <b>P1.</b> Draw different types of lettering <b>P2.</b> Draw different types of lines <b>P3.</b> Draw different drawing symbols
<b>CU.2</b> Draw Different Geometrical Shapes	<b>You must be able to:</b> <b>P1.</b> Draw different geometrical figures <b>P2.</b> Draw simple curve <b>P3.</b> Create a pattern with simple shapes
<b>CU3.</b> Explore Orthographic views of simple shapes	<b>You must be able to:</b> <b>P1.</b> Draw first angle projection <b>P2.</b> Draw third angle projection <b>P3.</b> Draw missing views <b>P4.</b> Draw different section views
<b>CU.4</b> Dimension the drawing	<b>You must be able to:</b> <b>P1.</b> Draw different types of dimensions. <b>P2.</b> Draw geometrical tolerance

### Knowledge & Understanding

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

- Types of orthographic views
- Types of pictorial drawings
- Types of sectional views
- Types of lines
- Types of scales
- Types of dimensioning and drawing symbols
- Types of developmental drawings
- Types of geometrical solids and geometrical figures
- 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, Canson Sheet, etc.)

### **Critical Evidence(s) Required**

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

- Portfolio
- Draw different geometrical shapes
- Draw first and third angle projection with symbols
- Identify different installation and assembly plans and sections

### **Tool & Equipment**

- Graph and drawing sheet
- Drawing board/table
- T-Square
- Set Square
- Templates
- Compass
- Divider
- Drawing pencils
- Protractor



## 724MP12E-Competency Standard: Perform Basic Bench Work Operations

**Overview:** This competency standard covers the skills and knowledge required to produce holes using drilling machine, perform counter boring, counter sinking and perform machine reaming.

Competency Units	Performance Criteria
<b>CU1.</b> Carry out Drilling	<b>You must be able to:</b> <b>P1.</b> Select drilling bit according to the material <b>P2.</b> Select marking tool and mark the job as per drawing <b>P3.</b> Select clamping device and clamp the work piece <b>P4.</b> Set the machine RPM according to the drill size and work piece material <b>P5.</b> Mark centre with the help of centre punch <b>P6.</b> Perform drilling as per standard procedures <b>P7.</b> Perform post drilling operations <b>P8.</b> Verify the final job with the given drawing
<b>CU2.</b> Carry out Counter Sinking and Counter Boring	<b>You must be able to:</b> <b>P1.</b> Select counter sinking tool according to the drawing <b>P2.</b> Select marking tool and mark the job as per drawing <b>P3.</b> Select clamping device and clamp the work piece <b>P4.</b> Perform drilling operation as per drawing <b>P5.</b> Set the machine RPM according to the counter sink size and work piece material <b>P6.</b> Perform counter sinking as per standard procedures <b>P7.</b> Verify the final job with the given drawing
<b>CU3.</b> Carry out Reaming	<b>You must be able to:</b> <b>P1.</b> Select reamer according to the job specification <b>P2.</b> Select marking tool and mark the job as per drawing <b>P3.</b> Select clamping device and clamp the work piece <b>P4.</b> Perform drilling to produce hole according to the size of reamer <b>P5.</b> Perform reaming as per job specification <b>P6.</b> Verify the final job with given drawing
<b>CU4.</b> Perform General Housekeeping & Maintenance	<b>You must be able to:</b> <b>P1.</b> Clean and maintain all workplace tools & machines as per housekeeping checklists or given instructions <b>P2.</b> Prepare checklist for daily cleanliness of the workplace <b>P3.</b> Place all tools & material in proper place to ensure safe work <b>P4.</b> Fill checklists to conduct maintenance and housekeeping of machines & tools



### **Knowledge & Understanding**

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

- Basic engineering drawings
- Types & application of clamping devices
- Types and uses of basic measuring instruments required during different operations
- Types and uses of layout tools
- Different types of hacksaw blades and its use
- File types and their uses
- Types and application of reamers
- Types & properties of material
- Drilling and its uses.
- Types of drilling tools
- Types and uses of measuring instruments required during grinding operations
- Types of nut and bolts
- Guidelines and checklists to conduct maintenance and housekeeping of tools and equipments
- Importance of daily cleanliness of workplace
- Importance of storing tools and material in specific place
- Faulty/damaged/ worn out parts
- Importance of Record keeping
- Utilization of tools (measuring, marking & cutting) equipment and their working method

### **Critical Evidence(s) Required**

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

- Produce a component containing the following operations marking, counter sinking and counter boring
- Produce a component containing the following operations with drilling & reaming
- Clean and maintain all bench-work tools and machines as per instructions given
- Interpret guidelines and checklists of conducting housekeeping of machines and tools

### **Tool & Equipment**

- ❖ Drilling Machines
- ❖ Drill chuck with Key
- ❖ Machine Vice
- ❖ Marking Tools
- ❖ Measuring Tools
- ❖ Drill Sleeve and Socket
- ❖ Personal Protective Equipment
- ❖ Counter drill
- ❖ Cutting oil
- ❖ Tri square
- ❖ Measuring Tool



## 724MP12F-Competency Standard: Interpret Topographic Map

**Overview:** This competency standard covers the skills and knowledge required to use of grid reference and GPS, illustrate administrative index, locate the specific/required area in sheet and legends of topographic sheet.

Competency Units	Performance Criteria
<b>CU1.</b> Utilize Grid Reference and GPS	<b>You must be able to:</b>  <b>P1.</b> Identify the longitude and latitude of given location <b>P2.</b> Locate the given site by GPS (global positioning system). <b>P3.</b> Find direction by Brunton compass. <b>P4.</b> Identify the number of topographic sheet as required <b>P5.</b> Scale topographic sheet as per requirements <b>P6.</b> Identify the values of longitude and latitude of given site <b>P7.</b> Measure distance between two specific points on topographic sheet
<b>CU2.</b> Illustrate Administrative Index	<b>You must be able to:</b>  <b>P1.</b> Identify geographical location of topographic sheet <b>P2.</b> Identify number of adjacent topographic sheet
<b>CU3.</b> Locate The Specific/Required Area In Sheet	<b>You must be able to:</b>  <b>P1.</b> Calculate area of ore body <b>P2.</b> Calculate mining area of required location
<b>CU4.</b> Setout Legends of Topographic Sheet	<b>You must be able to:</b>  <b>P1.</b> Identify the natural and man-made features on topographic sheet <b>P2.</b> Identify water bodies, vegetation cover, agricultural land, mountainous and plain area <b>P3.</b> Identify man-made structures (roads, railway lines, towns etc.) <b>P4.</b> Identify the landforms by reading contours

### Knowledge & Understanding

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

- K1.** Basic geological concept
- K2.** Rock type, geomorphology/ landform, mineral,
- K3.** Importance of topographic sheet
- K4.** Describe topographic sheet
- K5.** Administrative index
- K6.** Usage of grid reference and GPS
- K7.** Legends of topographic sheet



### **Critical Evidence(s) Required**

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

- Identify and Interpret different topographical sheets/maps

### **Tool & Equipment**

- Topographic sheet
- GPS
- Brunton compass
- Plain table
- Stationary items



## 724MP12G-Competency Standard: Interpret Geological Maps

**Overview:** This competency standard covers the skills and knowledge required to illustrate Rock units, recognize geological structure and geological map symbols.

Competency Units	Performance Criteria
<b>CU1.</b> Illustrate Rock units	<b><i>You must be able to:</i></b>  <b>P1.</b> Find out geological formation of given rock <b>P2.</b> Recognize age of given rock <b>P3.</b> Understand dip and strike <b>P4.</b> Understand type of lithology (limestone, sandstone, shale etc.) <b>P5.</b> understand boundaries of different rock units
<b>CU2.</b> Recognize geological structure	<b><i>You must be able to:</i></b>  <b>P1.</b> Illustrate Fold <b>P2.</b> Identify faults (reverse, normal, strike-slip) <b>P3.</b> Identify joints <b>P4.</b> Identify foliation and lineation <b>P5.</b> Understand anticline syncline <b>P6.</b> Learn about unconformity
<b>CU3.</b> Illustrate legends	<b><i>You must be able to:</i></b>  <b>P1.</b> Identify Formation legend <b>P2.</b> Identify structure legend <b>P3.</b> Understand lithology legend
<b>CU4.</b> Identify Geological map symbols	<b><i>You must be able to:</i></b>  <b>P1.</b> Learn dip and strike symbol <b>P2.</b> Identify unconformity symbol <b>P3.</b> Identify fold and fault symbols

### 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:

- K1.**Importance of geological maps
- K2.**Illustrate Rock units





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**K3.**Recognize Geological Structure

**K4.**Describe legends

**K5.**Geological map symbols

### **Critical Evidence(s) Required**

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

- Identify and Interpret different geological maps

### **Tool & Equipment**

- Geological map
- Plain table
- Stationary items



## 724MP12H-Competency Standard: Interpret Mineral Map

**Overview:** This competency standard covers the skills and knowledge required to identify mineral zones, identify different minerals and gem stone.

Competency Units	Performance Criteria
<b>CU1.</b> Identify mineral zones	<p><b>You must be able to:</b></p> <p><b>P1.</b> Understand Sedimentary area</p> <p><b>P2.</b> Recognize Igneous area</p> <p><b>P3.</b> Recognize Metamorphic area</p>
<b>CU2.</b> Identify different minerals	<p><b>You must be able to:</b></p> <p><b>P1.</b> Identify sulphide and oxide minerals according to rock form</p> <p><b>P2.</b> Recognize carbonates</p> <p><b>P3.</b> Recognize silicates</p> <p><b>P4.</b> Phosphates</p> <p><b>P5.</b> Highlight Native elements (gold, silver etc.)</p>
<b>CU3.</b> Identify gem stone	<p><b>You must be able to:</b></p> <p><b>P1.</b> Recognize emerald, topaz, ruby, sapphire etc.</p> <p><b>P2.</b> Estimate the hardness of gem stone</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:

- K1.** Mineral zones
- K2.** Different minerals
- K3.** Gem stone

### Critical Evidence(s) Required

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

- Identify and Interpret different mineral maps

### Tool & Equipment

- Mineral maps
- Moh's hardness tester
- XRF handheld gun
- Plain table
- Stationary items



## 724MP12I-Competency Standard: Perform Basic Electricity

### Applications

**Overview:** This competency standard covers the skills and knowledge required to perform basic electrical applications. It covers basic electric circuits, three phase connection, and basic electrical measurements.

Competency Units	Performance Criteria
<b>CU1.</b> Interpret Electrical layout	<b><i>You must be able to:</i></b> <b>P1.</b> Interpret layout of the job for installations <b>P2.</b> Interpret electrical drawing for electrical wirings <b>P3.</b> Connect components of equipment according to drawing
<b>CU2.</b> Perform Basic Electric Circuits	<b><i>You must be able to:</i></b> <b>P1.</b> Prepare series circuit on work bench <b>P2.</b> Prepare parallel circuit on work bench <b>P3.</b> Prepare Head and Tail Light Circuit on work bench <b>P4.</b> Prepare indicator circuit on work bench
<b>CU3.</b> Perform Basic Electrical Measurements	<b><i>You must be able to:</i></b> <b>P1.</b> Measure voltage <b>P2.</b> Measure current <b>P3.</b> Measure resistance <b>P4.</b> Test continuity
<b>CU4.</b> Perform three phase connection	<b><i>You must be able to:</i></b> <b>P1.</b> Select cable gauge <b>P2.</b> Select cables colors <b>P3.</b> Connect cables <b>P4.</b> Insulate Joints

### Knowledge & Understanding

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

- Electrical symbols to be used in drawings
- AC and DC
- Ohm's Law
- Electrical connection scheme of the job
- Handling techniques for placement for electrical equipment
- Different methods of cable testing
- Methods of installing the electrical appliances



- Different types of coding procedures (e.g. color coding / tagging / numbering)
- Earthing and testing procedures
- Working principle of earth tester
- L.C.R meter

### **Tools and Equipment**

- Multimeter
- Wires
- Measuring tools
- Supply
- Tester

### **Critical Evidence(s) Required**

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

- Perform Basic Electric Circuits
- Perform three phase connection
- Perform Basic Electrical Measurement



## 724MP12J-Competency Standard: Perform Safe Handling of Explosive Material

**Overview:** This competency standard covers the skills and knowledge required to perform safe handling of explosive material.

Competency Units	Performance Criteria
<b>CU1.</b> Perform safe transportation of blasting material	<b>You must be able to:</b>  <b>P1.</b> Keep detonator/primer and blasting material separately while transferring as per SOP <b>P2.</b> Keep electrostatic charge to be dissipated <b>P3.</b> Maintain appropriate distance between blasting and flammable material
<b>CU2.</b> Perform safe storage of Blasting Material	<b>You must be able to:</b>  <b>P1.</b> Store all blasting material away from populated area under surveillance <b>P2.</b> Storage room should keep away from electric wires and metallic materials.

### 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:

**K1.** Transportation and storage technique

**K2.** Safety factors

### Tool & Equipment

- Transportation and storage machines
- Mock explosive material

### Critical Evidence(s) Required

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

- Perform safe transportation of blasting material
- Perform safe storage of blasting material



## LIST OF TOOLS AND EQUIPMENT

SR#	Tools & Equipment
1.	Computer Systems
2.	Scanner
3.	Printer
4.	Drilling machine with accessories
5.	Drilling tools (twist drill, center drill, counter boring tool , reamer, taps etc)
6.	Surface Grinding Machine with accessories and consumables
7.	Steel Rules
8.	Tri Square
9.	Vernier Caliper
10.	Thread gauges
11.	Screw pitch gauges
12.	Fillet gauges
13.	Feeler gauges
14.	Set of Adjustable Wrench
15.	Set of Spanners (Open end, Ring)
16.	Pipe wrench
17.	L-key sets
18.	Nose pliers
19.	Grip pliers
20.	Straight peen Hammer
21.	Long nose Tong
22.	Short nose tong
23.	Flat Chisel
24.	Scraper of different shapes
25.	scriber
26.	Hand hacksaw
27.	Diamond hand file set
28.	Riffle hand file set
29.	Needle hand file set
30.	Round hand file
31.	Half round hand file
32.	Triangular hand file
33.	Square hand file
34.	Flat hand file
35.	Drawing board
36.	Mineral maps
37.	Moh's hardness tester
38.	XRF handheld gun
39.	Plain table
40.	Stationary items
41.	Transportation and storage machines
42.	Multimeter



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43.	Wires
44.	Measuring tools
45.	Tester
46.	Topographic sheet
47.	Brunton compass
48.	GPS
49.	Measuring Tool
50.	Graph and drawing sheet
51.	Geometry Box
52.	T-Square
53.	Set Square
54.	Templates
55.	Compass
56.	Divider
57.	Drawing pencils
58.	Protractor
59.	Measuring tapes
60.	Calculator
61.	Materials of various Types
62.	First Aid Box
63.	Oxygen Cylinder
64.	Transportation and storage machines