



***National Vocational Certificate Level 2 in Mining Process Technology  
(Junior Technician)***



**National Vocational Certificate Level 2 in Mining Process Technology”  
(Junior Technician)**



**(Curriculum)**



# ***National Vocational Certificate Level 2 in Mining Process Technology (Junior Technician)***



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

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## ***National Vocational Certificate Level 2 in Mining Process Technology (Junior Technician)***



### **Introduction**

#### **Definition/Description of training program (Junior Technician)**

Mining sector is one of the booming industries of Pakistan. There is an increasing demand of the Junior Technician. Therefore, the skills are required to be inducted in the future generation. If an individual is planning to pursue a career in mining, this program will be helpful in targeting various commercial and non-commercial projects etc. If an individual is planning to take up Junior Technician 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 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 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 labors is demanded by Saudi Government especially for the construction sector. For this purpose, new qualifications have



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been developed by NAVTTTC 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 2 in Mining Process Technology (Junior Technician) are as follows:

- Improve the professional competence of mining process
- 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 for Mining Process technology 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. Follow Safety Rules at Site
2. Perform Basic Communication Skills
3. Demonstrate Basic Numeracy Skills
4. Draw Basic Technical Drawings



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5. Perform Basic Bench Work Operations
6. Interpret Topographic Map
7. Interpret Geological Map
8. Interpret Mineral Map
9. Perform Basic Electricity Applications
10. Perform Safe Handling of Explosive Material

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

### **Possible Career paths**

- Junior Technician
- Technician
- Operations Manager
- Mine Manager
- Process Manager
- Production manager
- Maintenance Manager
- Site Manager
- Superintendent



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### **Trainee entry level:**

The entry level for National Vocational Certificate Level 2 in Construction Sector (**Junior Technician**) is given below:

<b>Title</b>	<b>Entry requirements</b>
National Vocational Certificate Level 2 in Mining Process Technology ( <b>Junior Technician</b> )	The entry requirement for this qualification would be Middle or 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. B.Sc Engineering Technology (Civil) / B.E Civil /B.Sc 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:

<b>Total</b>	-	<b>600 hours</b>
<b>Theory</b>	-	<b>120hours (20%)</b>
<b>Practical</b>	-	<b>480 hours (80%)</b>

**Proposed Course Duration-6 Months**

### Sequence of modules:

<b>Module-1</b> Follow Safety Rules at Site	<b>Module-5</b> Perform Basic Bench Work Operations	<b>Module-8</b> Interpret Mineral Map
<b>Module-2</b> Perform Basic Communication Skills		<b>Module-9</b> Perform Basic Electricity Applications
<b>Module-3</b> Demonstrate Basic Numeracy Skills	<b>Module-6</b> Interpret Topographic Map	<b>Module-10</b> Perform Safe Handling of Explosive Material
<b>Module-4</b> Draw Basic Technical Drawings	<b>Module-7</b> Interpret Geological Maps	



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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	
<b>Level 2</b>									
1	724CO08	Follow Safety Rules at Site	<b>Junior Technician</b>	2	Generic	9	21	30	3
2	001100851	Perform Basic Communication Skills		2	Generic	9	21	30	3
3	724CO08	Demonstrate Basic Numeracy skills		2	Functional	18	42	60	6
4	724CO08	Perform Basic Technical Drawing		2	Functional	23	57	80	8
5	724MP012	Perform Basic Bench Work Operations		2	Technical	10	90	100	10
6	724MP012	Interpret Topographic Map		2	Technical	7	33	40	4



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7	724MP012	Interpret Geological Maps		2	Technical	6	24	30	3
8	724MP012	Interpret Mineral Map		2	Technical	6	24	30	3
9	724CO012	Perform Basic Electricity Applications		2	Technical	16	84	100	10
10	724MP012	Perform Safe Handling of Explosive Material		2	Technical	16	84	100	10
		<b>Total</b>				<b>120</b>	<b>480</b>	<b>600</b>	<b>60</b>
		<b>Percentage</b>				<b>20</b>	<b>80</b>		



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### Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<p><b>Module 1:</b> Follow Safety Rules at Site</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in Following of Safety Rules at Site</p>	<p><b>LU1:</b> Maintain occupational safety and health at workplace  <b>LU2:</b> USE Personal Protective and Safety Equipment (PPE)  <b>LU3:</b> Perform Communication Signals  <b>LU4:</b> Manual Handling of Loads</p>	9	21	30
<p><b>Module 2:</b> Perform Basic Communication Skills</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in performing basic communication skills</p>	<p><b>LU1:</b> Communicate in aTeam  <b>LU2:</b> Follow Supervisor's instructions as per Organizational SOPs</p>	9	21	30



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<p><b>Module 3:</b> Demonstrate Basic Numeracy Skills</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in demonstrating basic numeracy skills</p>	<p><b>LU1:</b> Apply Basic Numeracy Skills  <b>LU2:</b> Perform Basic Measurement  <b>LU3:</b> Calculate Area and Volume of Object</p>	18	42	60
<p><b>Module 4:</b> Perform Basic Technical Drawing</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in performing basic technical drawing</p>	<p><b>LU1:</b> Explore Lettering, Lines and symbols  <b>LU2:</b> Draw Different Geometrical Shapes  <b>LU3:</b> Explore Orthographic views of simple shapes  <b>LU4:</b> Dimension the drawing</p>	23	57	80



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<p><b>Module 5:</b> Perform Basic Bench Work operations</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in performing basic computer operations</p>	<p><b>LU1:</b> Carry out Drilling  <b>LU2:</b> Carry out Counter Sinking and Counter Boring  <b>LU3:</b> Carry out Reaming  <b>LU4 :</b> Perform General Housekeeping &amp; Maintenance</p>	10	90	100
<p><b>Module 6:</b> Interpret Topographic Map</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in interpreting Topographic Map</p>	<p><b>LU1:</b> Utilize Grid Reference and GPS  <b>LU2:</b> Illustrate Administrative Index  <b>LU3:</b> Locate The Specific/Required Area In Sheet  <b>LU4:</b> Setout Legends of Topographic Sheet</p>	7	33	40



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<p><b>Module 7:</b> Interpret Geological Maps</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in interpreting Geological Maps</p>	<p><b>LU1:</b> Illustrate Rock units  <b>LU2:</b> Recognize geological structure  <b>LU3:</b> Illustrate legends  <b>LU4:</b> Identify Geological map symbols</p>	6	24	30
<p><b>Module 8:</b> Interpret Mineral Map</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in interpreting Mineral Map</p>	<p><b>LU1</b> Identify mineral zones  <b>LU2:</b> Identify different minerals  <b>LU3:</b> Identify gem stone</p>	6	24	30



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<p><b>Module 9:</b> Perform Basic Electricity Applications</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in performing basic electricity applications</p>	<p><b>LU1:</b> Interpret Electrical layout  <b>LU2:</b> Perform Basic Electric Circuits  <b>LU3:</b> Perform Basic Electrical Measurements  <b>LU4:</b> Perform three phase connection</p>	16	84	100
<p><b>Module 10:</b> Perform Safe Handling of Explosive Material</p> <p><b>Aim:</b> After successful completion of this module, the trainee is competent in performing safe handling of explosive material</p>	<p><b>LU1:</b> Perform safe transportation of blasting material  <b>LU2:</b> Perform safe storage of Blasting Material</p>	16	84	100



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### Module 1: Follow Safety Rules at site

**Objective:** The aim of this module to get knowledge, skills and understanding to follow safety rules at site.

Duration: 30Hours

Theory: 9 Hours

Practice: 21 Hours

Credit Hours: 3

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Maintain occupational safety and health at workplace	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify the safety signs and symbols</li> <li>2. Erect barricades, hoardings, signage in the hazardous areas</li> <li>3. Maintain housekeeping</li> <li>4. Report unsafe condition to immediate supervisor (shift person)</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of different types of hazards</li> <li>• Explain unsafe working conditions</li> <li>• Understanding of health and safety signs and symbols</li> <li>• Explain housekeeping</li> <li>• Understanding of different methods of dealing with hazard</li> </ul> <p><b>Activity:</b></p>	<p><b>Total</b> 6hrs</p> <p><b>Theory:</b> 2 hrs</p> <p><b>Practical:</b> 4 hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White Board Marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> <li>• Simulated environment</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		Practice to identify the physical hazards in mock situation and apply control measures, safety sign and barricade.			
<b>LU2:</b> Use Personal Protective and Safety Equipment (PPE)	<p><b>The trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Identify risk associated with job to be done</li> <li>2. Select PPE according to job</li> <li>3. Wear PPE according to job</li> <li>4. Store PPE at Designated place after use</li> </ol>	<ul style="list-style-type: none"> <li>• Describe the types of Personal protective equipment (PPEs)</li> <li>• Describe the procedure to identify risk associated with job to be done</li> <li>• Importance of personal protective equipment</li> <li>• Describe the Maintenance and cleaning of PPEs</li> <li>• Describe the procedure to</li> </ul>	<p><b>Total:</b> 9 hrs</p> <p><b>Theory:</b> 3hrs</p> <p><b>Practical:</b> 6hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White Board Marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• PPEs (Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> <li>• Simulated environment</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		wear full body harness <u>Activity:</u> <ul style="list-style-type: none"> <li>• Demonstrate to select PPEs for specific job.</li> <li>• Practice to wear full body harness and anchorage</li> </ul>		glasses, Ear muffs/ear plugs, Protective Gloves, Cap, Safety shoes etc.)	
<b>LU3:</b> Perfrom communication signals	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify different types of communication hand signals.</li> <li>2. Use appropriate hand signals as per situation</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of different types of communication signals</li> <li>• Explain different types of hand signals</li> <li>• Explain the importance of hand signals</li> </ul> <u>Activity:</u> Demonstrate the hand signals for different activities	<b>Total</b> 6hrs <b>Theory:</b> 2 hrs <b>Practical:</b> 4 hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White Board Marker</li> </ul> <b>Non Consumable</b> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> <li>• Simulated environment</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				<ul style="list-style-type: none"> <li>Safety manuals</li> </ul>	
<b>LU4:</b> Manual handling of loads	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>Check the load's weight to be handles</li> <li>Check the availability of broad stable base</li> <li>Lift and place the load with proper posture</li> <li>Lift the load as per given standards</li> </ol>	<ul style="list-style-type: none"> <li>Explain the importance of safely lifting loads</li> <li>Describe types of loads</li> <li>Explain basic ergonomics principles</li> <li>State the load lifting procedures</li> </ul> <p><b>Activity:</b> Practice of shifting manually the load from ground to a designated location.</p>	<b>Total:</b> 9 hrs <b>Theory:</b> 2hrs <b>Practical:</b> 7hrs	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White Board Marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> </ul>	<ul style="list-style-type: none"> <li>Class Room</li> <li>Simulated environment</li> </ul>



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### Module 2: Perform Basic Communication Skills

**Objective of the module:** The aim of this module to get knowledge, skills and understanding to perform basic communication.

**Duration:** 30 Hours

**Theory:** 9 Hours

**Practice:** 21 Hours

**Credit Hours:** 3

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Demonstrate the basic communication skills	<p><b>The trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Demonstrate the listening skills</li> <li>2. Demonstrate the reading skills</li> <li>3. Demonstrate the writing skills</li> <li>4. Demonstrate the speaking skills</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of communication skills (7Cs of effective communication)</li> <li>• Describe verbal and non-verbal communication</li> <li>• Explain reporting techniques</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to listen to the audio and write down</li> <li>• Practice to note down the instructions given by the supervisor</li> </ul>	<p><b>Total:</b> 15 hrs</p> <p><b>Theory:</b> 5hrs</p> <p><b>Practical:</b> 10hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU2.</b> Follow Supervisor's instructions	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>Carry out the instructions of the supervisor</li> <li>Report to the supervisor as per organizational SOP's given standards</li> </ol>	<ul style="list-style-type: none"> <li>Explain the note taking procedure</li> <li>Understanding of the standard procedure to prepare the report</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Prepare different office reports</li> </ul>	<p><b>Total:</b> 15 hrs</p> <p><b>Theory:</b> 4hrs</p> <p><b>Practical:</b> 11hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White board marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>White board</li> </ul>	<ul style="list-style-type: none"> <li>Class Room</li> </ul>



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### Module 3: Demonstrate Basic Numeracy Skills

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to demonstrate basic numeracy skills

**Duration:** 60 Hours

**Theory:** 18 Hours

**Practice:** 42Hours

**Credit Hours:** 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1:Apply Basic Numeracy Skills	<p><b>The trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Perform basic mathematical calculations as per given task</li> <li>2. Perform DMAS rule as per given calculation.</li> <li>3. Calculate percentages of given task</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of basic principles of addition, subtraction, multiplication division of whole number and fraction</li> <li>• Explain how to calculate percentage</li> <li>• Knowledge of DMAS rule</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice of addition, subtraction, multiplication division of whole number and fraction</li> <li>• Practice to calculate percentage</li> </ul>	<p><b>Total:</b> 10hrs.</p> <p><b>Theory:</b> 2 hrs.</p> <p><b>Practical:</b> 8hrs.</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• Pen</li> <li>• White board marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		between referred number			
<b>LU2:Perform Basic Measurement</b>	<b>The trainee will be able to:</b> 1. Collect geometric tools for required measurements 2. Measure length of given object by using standard units 3. Perform inter conversion of Measuring units as per requirement	<ul style="list-style-type: none"> <li>• Understanding of basic measuring units.</li> <li>• Knowledge of measuring tools</li> <li>• Understanding of Imperial and metric system of measurements.</li> <li>• Explain the inter-conversion between measuring units.</li> </ul>	<b>Total:20hrs</b>  <b>Theory:4hrs</b>  <b>Practical:16hrs</b>	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> </ul> <b>Non Consumable</b>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Take the measurement of different geometrical figures with scale.</li> <li>Practice to measure the boundaries of specific land and calculate its area and perimeter.</li> <li>Take the measurements of different solids</li> <li>Practice of inter-conversion of units.</li> </ul>		<ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Printer</li> <li>Measuring tape</li> <li>Scale</li> </ul>	
<p><b>LU3:</b></p> <p>Calculate Area and Volume of object</p>	<p><b>The trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>Calculate Area and Volume of given object</li> <li>Calculate surface area of given object</li> </ol>	<ul style="list-style-type: none"> <li>Knowledge of geometrical figures and solids.</li> <li>Understanding the surface area and volume of solid figures.</li> <li>Explain the method of</li> </ul>	<p><b>Total:</b>30hrs</p> <p><b>Theory:</b> 4hrs.</p> <p><b>Practical:</b>26hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpener</li> <li>White board marker</li> </ul>	Class Room/workshop



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>3. Calculate volume of material in the given object</p> <p>4. Calculate quantities of materials (stone, aggregate, stacks/piles and sand) by incorporating time saving practices</p>	<p>calculating quantity of material in piles/stack.</p> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to calculate the surface area and volume of given geometrical figures and solids.</li> <li>• Practice to calculate quantity of material in piles/stack.</li> </ul>		<p>Non Consumable</p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Printer</li> <li>• Measuring tape</li> <li>• Scale</li> <li>• 3D model of geometrical solids</li> </ul>	



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### Module 4: Perform Basic Technical Drawing

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to draw basic technical drawing

**Duration: 80 Hours**

**Theory: 23Hours**

**Practice: 57 Hours**

**Credit Hours: 8**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Explore Lettering, Lines and symbols	<b>The trainee will be able to:</b> 1. Draw different types of lettering 2. Draw different types of lines 3. Draw different drawing symbols	<ul style="list-style-type: none"> <li>• Knowledge of different types of lines</li> <li>• Knowledge of different lettering style.</li> <li>• Understanding of symbols used in technical drawings.</li> <li>• Knowledge of different scales.</li> <li>• Understanding of different drawing pencils (Clutch pencil Mechanical pencils, etc.)</li> <li>• Understanding of different grades of lead pencils(H,HB,B)</li> <li>• Knowledge of different drawing sheets (scholar sheet, chart paper, Canson Sheet, etc.)</li> </ul>	<b>Total:</b> 20hrs  <b>Theory:</b> 5hrs  <b>Practical:</b> 15hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Drawing sheets</li> <li>• Drawing pen</li> <li>• Masking tape</li> <li>• Different</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to draw of title block</li> <li>• Practice to draw of different lines</li> <li>• Practice to draw of different types of lettering</li> </ul> <p>Practice of drawing symbols</p>		<ul style="list-style-type: none"> <li>• drawing pencils</li> <li>• Scale</li> <li>• <b>Non Consumable</b></li> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Drawing board</li> <li>• Drawing instruments</li> </ul>	
<p><b>LU2.</b>Explore Orthographic views of simple shapes</p>	<p><b>The trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Draw first angle projection</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of orthographic projection</li> <li>• Explain the rules of 1<sup>st</sup> and 3<sup>rd</sup> angle projection</li> </ul>	<p><b>Total:</b>45hrs</p> <p><b>Theory:</b>13hrs</p>	<ul style="list-style-type: none"> <li>• <b>Consumable</b></li> <li>• Notebooks</li> <li>• Erasers</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<ol style="list-style-type: none"> <li>2. Draw third angle projection</li> <li>3. Draw missing views</li> <li>4. Draw different section views</li> </ol>	<ul style="list-style-type: none"> <li>• Explain pictorial drawings</li> <li>• Understanding of sectional views</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to draw first angle projection of simple object blocks.</li> <li>• Practice to draw third angle projection of simple object blocks.</li> <li>• Practice to draw the missing view of different given orthographic projection.</li> <li>• Practice to draw the section view of different blocks.</li> </ul>	<p><b>Practical:32hrs</b></p>	<ul style="list-style-type: none"> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Drawing sheets</li> <li>• Drawing pen</li> <li>• Masking tape</li> <li>• Different drawing pencils</li> <li>• Scale</li> </ul> <p style="text-align: center;">Non</p>	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				<p>Consumable</p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Drawing board</li> <li>• Drawing instruments</li> </ul>	
<p><b>LU3.</b> Dimension the drawing</p>	<ol style="list-style-type: none"> <li>1. Draw different types of dimensions.</li> <li>2. Draw geometrical tolerance.</li> </ol>	<ul style="list-style-type: none"> <li>• Describe the different dimensioning principles</li> <li>• Explanation of geometrical tolerance</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to dimension the given orthographic projections with</li> </ul>	<p><b>Total:</b>15 hrs</p> <p><b>Theory:</b>5 hrs</p> <p><b>Practical:</b>10hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Drawing sheets</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		different dimensioning style.		<ul style="list-style-type: none"><li>• Drawing pen</li><li>• Masking tape</li><li>• Different drawing pencils</li><li>• Scale</li><li>• Non-Consumable</li><li>• White board</li><li>• Multimedia</li><li>• Internet</li><li>• Computer system</li><li>• Drawing board</li><li>• Drawing instruments</li></ul>	



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### Module 5- Perform Basic Bench Work Operations

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to perform basic bench work Operations.

**Duration:** 100 Hours

**Theory:** 10Hours

**Practice:** 90 Hours

**Credit Hours:** 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Carry out Drilling	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Select drilling bit according to the material</li> <li>2. Select marking tool and mark the job as per drawing</li> <li>3. Select clamping device and clamp the work piece</li> <li>4. Set the machine RPM according to the drill size and work piece material</li> <li>5. Mark centre with the help of centre punch</li> <li>6. Perform drilling as per standard procedures</li> <li>7. Perform post drilling operations</li> <li>8. Verify the final job with the given drawing</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of PPEs</li> <li>• Knowledge of drilling machine function</li> <li>• Understanding of drilling procedure</li> <li>• Define quality sampling</li> </ul> <p><b><u>Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to making holes using drilling machine</li> </ul>	<p><b>Total:</b> 24hrs</p> <p><b>Theory:</b>3 hrs</p> <p><b>Practical:</b>21hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> <li>• Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Drilling machine</li> <li>• Drill chuck</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room/ workshop</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				with Key Machine Vice <ul style="list-style-type: none"> <li>• Marking Tools</li> <li>• Measuring Tools</li> <li>• Drill Sleeve and Socket</li> <li>• PPEs</li> <li>• Counter drill</li> <li>• Cutting oil</li> <li>• Tri square</li> <li>• Measuring Tool</li> </ul>	
<b>LU2:</b> Carry out Counter Sinking and Counter Boring	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Select counter sinking tool according to the drawing</li> <li>2. Select marking tool and mark the job as per drawing</li> <li>3. Select clamping device and clamp the work</li> </ol>	<ul style="list-style-type: none"> <li>• Explain usage of measurement and marking tools</li> <li>• Knowledge of simple arithmetic calculation</li> <li>• Describe simple measurements using metric and imperial</li> </ul>	<b>Total:</b> 27hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 24hrs	<div style="background-color: #cccccc; padding: 2px; display: inline-block;">Consumable</div> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room/ workshop</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>piece</p> <ol style="list-style-type: none"> <li>4. Perform drilling operation as per drawing</li> <li>5. Set the machine RPM according to the counter sink size and work piece material</li> <li>6. Perform counter sinking as per standard procedures</li> <li>7. Verify the final job with the given drawing</li> </ol>	<p>systems</p> <ul style="list-style-type: none"> <li>• Knowledge of conversion of linear unit for measurement unit</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to interpret sketches of different types of bent up bars, stirrups and chairs, sort out its cut length and mark on straight rebars</li> </ul>		<ul style="list-style-type: none"> <li>• White board marker</li> <li>• Duster</li> <li>• Chalk</li> <li>• Non Consumable</li> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Drilling machine</li> <li>• Drill chuck with Key Machine Vice</li> <li>• Marking Tools</li> <li>• Measuring Tools</li> <li>• Drill Sleeve and Socket</li> </ul>	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				<ul style="list-style-type: none"> <li>PPEs</li> <li>Counter drill</li> <li>Cutting oil</li> <li>Tri square</li> <li>Measuring Tool</li> </ul>	
<b>LU3:</b> Carry out Reaming	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>Select appropriate reamer according to the job specification</li> <li>Select appropriate marking tool and mark the job as per drawing</li> <li>Select appropriate clamping device and clamp the work piece</li> <li>Perform drilling to produce hole according to the size of reamer</li> <li>Perform reaming as per job specification</li> <li>Verify the final job with given drawing</li> </ol>	<ul style="list-style-type: none"> <li>Describe cutting tools of rebars</li> <li>Explain fixing and cutting blade and other accessories in cutting and bending machine</li> <li>Explain capacity and required details of cutting machines, bending machine.</li> <li>Explain types of hand tool available for cutting and bending</li> <li>Describe BBS in order to carry out cutting and bending of reinforcement.</li> <li>Knowledge of storing of cut rebars and scrap material</li> </ul>	<b>Total:</b> 26hrs  <b>Theory:</b> 2hrs  <b>Practical:</b> 24hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White board marker</li> <li>Duster</li> <li>Chalk</li> </ul> <b>Non Consumable</b> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>Class Room/ workshop</li> </ul>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<ul style="list-style-type: none"> <li>• Understanding of tolerance limits for bending and cutting of rebars</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to cut rebars of different dia as per marked cut length.</li> </ul>		<ul style="list-style-type: none"> <li>• Internet</li> <li>• Computer system</li> <li>• Drilling machine</li> <li>• Drill chuck with Key Machine Vice</li> <li>• Marking Tools</li> <li>• Measuring Tools</li> <li>• Drill Sleeve and Socket</li> <li>• PPEs</li> <li>• Counter drill</li> <li>• Cutting oil</li> <li>• Tri square</li> <li>• Measuring Tool</li> </ul>	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU4:</b> Perform General Housekeeping & Maintenance	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>Clean and maintain all workplace tools &amp; machines as per housekeeping checklists or given instructions</li> <li>Prepare checklist for daily cleanliness of the workplace</li> <li>Place all tools &amp; material in proper place to ensure safe work</li> <li>Fill checklists to conduct maintenance and housekeeping of machines &amp; tools</li> </ol>	<ul style="list-style-type: none"> <li>Explain guidelines and checklists to conduct maintenance and housekeeping of tools &amp; equipment.</li> <li>Explain the Importance of daily cleanliness of workplace.</li> <li>Explain the Importance of storing tools and material in specific place.</li> <li>Knowledge of faulty/damaged/ worn out parts of tools &amp; equipment.</li> <li>Explain the Importance of Record keeping.</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Practice of sorting different types of tool, trace defects and perform maintenance.</li> </ul>	<b>Total:</b> 23hrs  <b>Theory:</b> 2hrs  <b>Practical:</b> 21hrs	<div style="background-color: #cccccc; padding: 2px;">Consumable</div> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>Whiteboard marker</li> <li>Chalk</li> </ul> <div style="background-color: #cccccc; padding: 2px;">Non Consumable</div> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Tool box</li> <li>Layout tools</li> <li>Cutting tools</li> <li>Measuring tools</li> <li>Precision tools</li> </ul>	<ul style="list-style-type: none"> <li>Class Room/ workshop</li> </ul>





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### Module 6- Interpret Topographic Map

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to interpret topographic map.

**Duration:** 40Hours

**Theory:** 07Hours

**Practice:** 33 Hours

**Credit Hours:** 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Grid Reference and GPS usage	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify the longitude and latitude of given location</li> <li>2. Use GPS (global positioning system) to locate given site</li> <li>3. Use Brunton compass to find direction</li> <li>4. Identify the number of topographic sheet</li> <li>5. Scale of topographic sheet as per requirements</li> <li>6. Identify the values</li> </ol>	<u><b>Knowledge based question</b></u> <ul style="list-style-type: none"> <li>• Define longitude and latitude of location</li> <li>• Define GPS</li> <li>• Define Brunton compass</li> <li>• Define topography</li> <li>• How to measure distance between two specific points of topographic region</li> </ul> <u><b>Activity:</b></u> <ul style="list-style-type: none"> <li>• Reading map as per GPS reference location</li> </ul>	<p style="text-align: center;"><b>Theory- 2Hrs</b></p> <p style="text-align: center;"><b>Practical- 9Hrs</b></p> <p style="text-align: center;"><b>Total- 11Hrs</b></p>	<div style="background-color: #d9ead3; padding: 2px;"><b>Consumable</b></div> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> </ul> <div style="background-color: #d9ead3; padding: 2px;"><b>Non Consumable</b></div> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Topographic sheet</li> <li>• GPS</li> <li>• Brunton compass</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>of longitude and latitude of given site</p> <p>7. Measure distance between two specific points on topographic sheet</p>	<ul style="list-style-type: none"> <li>Find direction by using Brunton compass</li> <li>Calculate longitude and latitude of given site</li> <li>Measure distance between two specific points on topographic sheet</li> </ul> <p><b>Activity</b></p> <ul style="list-style-type: none"> <li>Reading map as per GPS reference location</li> <li>Find direction by using Brunton compass</li> <li>Calculate longitude and latitude of given site</li> <li>Measure distance between two specific points on topographic sheet</li> </ul>		<ul style="list-style-type: none"> <li>Plain table</li> </ul>	
<p><b>LU2.</b></p> <p>Illustrate Administrative</p>	<p><b>Trainee will be able to:</b></p> <p>1. Identify geographical</p>	<ul style="list-style-type: none"> <li>Define geographical location of topographic sheet</li> </ul>	<p><b>Theory-2Hrs</b></p> <p><b>Practical-9Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
Index	<p>location of topographic sheet</p> <p>2. Identify number of adjacent topographic sheet</p>	<p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Identify manmade and natural features on topographic sheets</li> <li>Identify geographical boundaries of different administrative zones on topographic sheets</li> </ul>	<b>Total-11Hrs</b>	<ul style="list-style-type: none"> <li>Sharpeners</li> <li>White board marker</li> <li>Duster</li> <li>Non Consumable</li> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Topographic sheet</li> <li>GPS</li> <li>Brunton compass</li> <li>Plain table</li> </ul>	
<b>LU3.</b> Locate Specific/Required Area In Sheet	<p>1. Calculate area of ore body on topographic sheet</p> <p>2. Calculate mining area of required location</p>	<ul style="list-style-type: none"> <li>Describe method of calculate area of ore body</li> <li>Describe method of calculate mining area</li> </ul>	<p><b>Theory-1Hrs</b></p> <p><b>Practical-6Hrs</b></p> <p><b>Total-7Hrs</b></p>	<p>Consumable</p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White board marker</li> <li>Duster</li> <li>Non</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<p><b>Activity</b></p> <ul style="list-style-type: none"> <li>Practice to calculate area of ore body on topographic sheet</li> <li>Practice to calculate mining area of required location</li> <li>Practice to plan accessibility of far off mines using topographic sheets</li> </ul>		<p>Consumable</p> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Topographic sheet</li> <li>GPS</li> <li>Brunton compass</li> <li>Plain table</li> </ul>	
<p><b>LU4.</b> Legends of Topographic Sheet</p>	<ol style="list-style-type: none"> <li>Identify the natural and man-made features on topographic sheet</li> <li>Identify water bodies, vegetation cover, agricultural land, mountainous and plain area</li> <li>Identify man-</li> </ol>	<ul style="list-style-type: none"> <li>Knowledge of natural and manmade features on topographic sheet</li> <li>Understanding of water bodies</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Practice to identify landforms by reading contours</li> </ul>	<p><b>Theory-2Hrs</b></p> <p><b>Practical-9Hrs</b></p> <p><b>Total-11Hrs</b></p>	<p>Consumable</p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White board marker</li> <li>Duster</li> </ul> <p>Non Consumable</p> <ul style="list-style-type: none"> <li>White board</li> </ul>	<p>Class Room</p>



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	made structures (roads, railway lines, towns etc.) 4. Identify the landforms by reading contours	<ul style="list-style-type: none"><li>Practice to identify geomorphologic features on topographic sheets</li></ul>		<ul style="list-style-type: none"><li>Multimedia</li><li>Internet</li><li>Computer system</li><li>Topographic sheet</li><li>GPS</li><li>Brunton compass</li><li>Plain table</li></ul>	



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### Module7- Interpret Geological Maps

**Objective of the module:** The aim of this module to get knowledge, skills and understanding to interpret geological maps.

**Duration: 30 Hours**

**Theory: 06 Hours**

**Practice: 24Hours**

**Credit Hours: 3**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Illustrate Rock units	<b>Trainee will be able to:</b>  1. Find out geological formation of given rock  2. Recognize age of given rock  3. Understand dip and strike  4. Understand type of lithology (limestone,	<ul style="list-style-type: none"> <li>• Knowledge of geological formation of rock</li> <li>• Define the terms dip and strike</li> <li>• Describe lithology</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to find out geological formation of given rock</li> <li>• Practice to recognize age of given rock</li> <li>• Practice to understand dip and strike</li> </ul>	<p><b>Theory-2Hrs</b></p> <p><b>Practical-6Hrs</b></p> <p><b>Total-8Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> <li>• Rebars</li> <li>• Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>sandstone, shale etc.)</p> <p><b>5.</b> Understand boundaries of different rock units.</p>	<ul style="list-style-type: none"> <li>Practice to understand type of lithology</li> <li>Practice to understand boundaries of different rock units</li> </ul>		<ul style="list-style-type: none"> <li>system</li> <li>Geological map</li> <li>Plain table</li> </ul>	
<p><b>LU2.</b> Recognize geological structure</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>Illustrate Fold</li> <li>Identify faults (reverse, normal, strike-slip)</li> <li>Identify joints</li> <li>Identify foliation and lineation</li> <li>Understand anticline syncline</li> <li>Learn about unconformity</li> </ol>	<ul style="list-style-type: none"> <li>Knowledge of fold and fault symbol</li> <li>Knowledge of foliation and lineation</li> <li>Describe anticline and syncline</li> <li>Understanding of unconformity</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Practice to identify fold, faults and joints</li> <li>Practice to identify foliation and lineation</li> <li>Practice to identify anticline and</li> </ul>	<p><b>Theory-2Hrs</b></p> <p><b>Practical-6Hrs</b></p> <p><b>Total-8Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpener</li> <li>White board marker</li> <li>Duster</li> <li>Rebars</li> <li>Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		syncline		<ul style="list-style-type: none"> <li>Geological map</li> <li>Plain table</li> </ul>	
<b>LU3.</b>  Illustrate legends	<b>Trainee will be able to:</b>  1. Identify Formation legend  2. Identify structure legend  3. Understand lithology legend	<ul style="list-style-type: none"> <li>Understanding of formation legend</li> <li>Describe identification of structure legend</li> <li>Knowledge of lithology legend</li> </ul> <p><b>Activity</b></p> <ul style="list-style-type: none"> <li>Practice to identify Formation and structure legend</li> <li>Practice to identify lithology legend</li> </ul>	<b>Theory-1Hrs</b>  <b>Practical-6Hrs</b>  <b>Total-07Hrs</b>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpener</li> <li>White board marker</li> <li>Duster</li> <li>Rebars</li> <li>Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Geological map</li> </ul>	Class Room



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				<ul style="list-style-type: none"> <li>Plain table</li> </ul>	
<b>LU4.</b> Identify Geological map symbols	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>Learn dip and strike symbol</li> <li>Identify unconformity symbol</li> <li>Identify fold and fault symbols</li> </ol>	<ul style="list-style-type: none"> <li>Explain dip and strike symbol</li> <li>Knowledge of unconformity symbol</li> <li>Understanding of fold and fault symbol</li> </ul> <p><b>Activity</b></p> <ul style="list-style-type: none"> <li>Practice to calculate dip and strike symbol</li> <li>Practice to identify unconformity, fold and fault symbols</li> </ul>	<p><b>Theory-1Hrs</b></p> <p><b>Practical-06Hrs</b></p> <p><b>Total-07Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpener</li> <li>White board marker</li> <li>Duster</li> <li>Rebars</li> <li>Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Geological map</li> <li>Plain table</li> </ul>	Class Room



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### Module 8- Interpret Mineral Map

**Objective:** This competency standard covers the skills and knowledge required to interpret mineral map.

**Duration: 30Hours**

**Theory: 06Hours**

**Practice: 24Hours**

**Credit Hours: 3**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Identify mineral zones	<b>Trainee will be able to:</b>  1. Understand Sedimentary area 2. Recognize Igneous area 3. Recognize Metamorphic area	<ul style="list-style-type: none"> <li>• Knowledge of sedimentary and igneous rock</li> <li>• Understanding of metamorphic area</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to understand sedimentary, igneous and metamorphic area</li> <li>• Practice to identify hardness of different rocks using Moho's hardness scale</li> </ul>	<p><b>Theory-02Hrs</b></p> <p><b>Practical-08Hrs</b></p> <p><b>Total-10Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> <li>• Rebars</li> <li>• Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Mineral maps</li> </ul>	Class Room  /Lab/ Field Visit



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				<ul style="list-style-type: none"> <li>• Moho's hardness tester</li> <li>• XRF handheld gun</li> </ul>	
<b>LU2.</b> Identify different minerals	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify sulphide and oxide minerals according to rock form</li> <li>2. Recognize carbonates</li> <li>3. Recognize silicates</li> <li>4. Phosphates</li> <li>5. Highlight Native elements (gold, silver etc.)</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of sulphide and oxide minerals</li> <li>• Knowledge of carbonates, silicates and phosphate from rocks</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to identify sulphide, oxide, carbonates Silicates, phosphates and native elements</li> </ul>	<p><b>Theory-02Hrs</b></p> <p><b>Practical-08Hrs</b></p> <p><b>Total-10Hrs</b></p>	<p>Consumable</p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• Whiteboard marker</li> <li>• Duster</li> <li>• Chalk</li> <li>• Rebars</li> </ul> <p>Non Consumable</p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• PPEs</li> <li>• Computer</li> <li>• Mineral maps</li> <li>• Moho's hardness tester</li> <li>• XRF handheld gun</li> <li>• Plain table</li> </ul>	<p>Class Room</p> <p>Training Workshop</p> <p>Lab/ Field Visit</p>



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<p><b>LU3.</b></p> <p>Identify gem stone</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Recognize emerald, topaz, ruby, sapphire etc.</li> <li>2. Estimate the hardness of gem stone</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of emerald, topaz, ruby and sapphire</li> <li>• Describe the method of estimation the hardness of gem stone</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to identify emerald, topaz, ruby, sapphire etc.</li> <li>• Practice to estimate the hardness of gem stone</li> </ul>	<p><b>Theory-02Hrs</b></p> <p><b>Practical-08Hrs</b></p> <p><b>Total-10Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> <li>• Rebars</li> <li>• Chalk</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Mineral maps</li> <li>• Moh's hardness tester</li> <li>• XRF handheld gun</li> <li>• Plain table</li> </ul>	
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		<ul style="list-style-type: none"> <li>Explain layout of electrical components in circuit diagram</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>Practice to interpret electrical circuit diagram and layout of the job.</li> <li>Practice of connecting electrical components as per circuit diagram</li> </ul>		<ul style="list-style-type: none"> <li>White board</li> <li>PPES</li> <li>Multimedia</li> <li>Internet</li> <li>Computer system</li> <li>Electrical Circuit Board</li> <li>Multi meter</li> <li>Wire cutter</li> <li>Wire clipper</li> <li>Continuity tester</li> </ul>	
<p><b>LU2.</b></p> <p>Perform Basic Electric Circuits</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>Prepare series circuit on work bench</li> <li>Prepare parallel circuit on work bench</li> <li>Prepare Head and Tail Light</li> </ol>	<ul style="list-style-type: none"> <li>Describe electrical connection scheme of the job</li> <li>Elaborate handling techniques for placement</li> </ul>	<p><b>Theory-04-Hrs</b></p> <p><b>Practical-21-Hrs</b></p> <p><b>Total- 25 Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Insulation tape</li> <li>Electrical wire of different color code and</li> </ul>	<p>Class Room/workshop</p>



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	<p>Circuit on work bench</p> <p>4. Prepare indicator circuit on work bench</p>	<p>for electrical equipment</p> <ul style="list-style-type: none"><li>• Describe parallel and series circuit.</li></ul> <p><b><u>Activity:</u></b></p> <ul style="list-style-type: none"><li>• Practice of performing electrical measurement and prepare series and parallel electrical circuit according to diagram</li><li>• Practice to prepare head and tail light circuit on work bench</li><li>• Practice to prepare indicator circuit on work bench</li></ul>		<p>gauge</p> <ul style="list-style-type: none"><li>• White board marker</li><li>• Cable clips</li><li>• Spring push connectors</li></ul> <p>Non Consumable</p> <ul style="list-style-type: none"><li>• White board PPES</li><li>• Multimedia</li><li>• Internet</li><li>• Computer system</li><li>• Electrical Circuit Board</li><li>• Multi meter</li><li>• Wire cutter</li><li>• Wire clipper</li></ul>	
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<p><b>LU3.</b> Perform Basic Electrical Measurements</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Measure voltage</li> <li>2. Measure current</li> <li>3. Measure resistance</li> <li>4. Test continuity</li> </ol>	<ul style="list-style-type: none"> <li>• Describe Voltage, Current, Resistance and Continuity of current</li> <li>• Differentiate between earthing and testing procedures</li> <li>• Elaborate working principle of earth tester</li> <li>• Elaborate L.C.R meter</li> </ul> <p><b><u>Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to measure Voltage, Current, Resistance and Continuity in circuit</li> </ul>	<p><b>Theory-04-Hrs</b> <b>Practical-21-Hrs</b> <b>Total- 25 Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Insulation tape</li> <li>• Electrical wire of different color code and gauge</li> <li>• White board marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• PPES</li> <li>• Multimedia</li> <li>• Internet</li> <li>• Computer system</li> <li>• Electrical Circuit Board</li> </ul>	<p><b>Class</b> <b>Room/workshop</b></p>
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				<ul style="list-style-type: none"> <li>• Multi meter</li> <li>• Wire cutter</li> <li>• Wire clipper</li> <li>• Continuity tester</li> </ul>	
<b>LU4.</b> Perform three phase connection	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Select cable gauge</li> <li>2. Select cables colors</li> <li>3. Connect cables</li> <li>4. Insulate Joints</li> </ol>	<ul style="list-style-type: none"> <li>• Elaborate methods of installing the electrical appliances.</li> <li>• Describe different methods of cable testing</li> <li>• Describe different types of coding procedures (e.g. color coding / tagging / numbering)</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice of power supply connection to the three phase motor as per circuit diagram</li> </ul>	<p><b>Theory-04-Hrs</b></p> <p><b>Practical-24-Hrs</b></p> <p><b>Total- 28 Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• Whiteboard marker</li> <li>• Duster</li> <li>• Chalk</li> <li>• Spacers</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• PPEs</li> <li>• Computer</li> </ul>	Class Room/ Workshop



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### Module 10- Perform Safe Handling of Explosive Material

**Objective:** The aim of this module to get knowledge, skills and understanding to perform safe handling of explosive materil.

**Duration: 100Hours**

**Theory: 16Hours**

**Practice: 84 Hours**

**Credit Hours: 10**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Perform safe transportation of blasting material	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Keep detonator/primer and blasting material separately while transferring as per SOP</li> <li>2. Keep electrostatic charge to be dissipated</li> <li>3. Maintain appropriate distance between blasting and flammable material</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of detonator and blasting materials</li> <li>• Understanding of electrostatic charge</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to follow SOPs for keeping detonator/primer and blasting material separate while transferring</li> <li>• Prepare Head and Tail Light Circuit on workbench using</li> </ul>	<p><b>Theory-8Hrs</b></p> <p><b>Practical-42Hrs</b></p> <p><b>Total-50Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• Whiteboard marker</li> <li>• Duster</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Computer</li> <li>• PPEs</li> <li>• Transportation</li> </ul>	Class Room  Training Workshop  Lab/ Field Visit



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		<p>appropriate tools.</p> <ul style="list-style-type: none"> <li>• Prepare indicator circuit on workbench using appropriate tools</li> </ul>		<p>and storage machines</p> <ul style="list-style-type: none"> <li>• Blasting material</li> </ul>	
<p><b>LU2.</b> Perform safe storage of Blasting Material</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Store all blasting material away from populated area under surveillance</li> <li>2. Storage room should keep away from electric wires and metallic materials.</li> </ol>	<ul style="list-style-type: none"> <li>• Define blasting materials</li> </ul> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to safe storage of blasting material</li> <li>• Practice to perform safe blasting activity</li> </ul>	<p><b>Theory-8Hrs</b></p> <p><b>Practical-42Hrs</b></p> <p><b>Total-50Hrs</b></p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• Whiteboard marker</li> <li>• Duster</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• PPEs</li> <li>• Transportation and storage machines</li> <li>• Blasting material</li> </ul>	<p>Class Room/ Workshop</p>



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### List of Tool, Machinery, Equipment and Consumables:

SR#	Items/Tools /Equipment & Consumables
1.	<b>PPEs:</b> Safety Helmet Safety Shoes Earmuffs Gloves Goggles Face Shields. Surgical Face Masks
2.	Computer Systems
3.	Scanner
4.	Printer
5.	Drilling machine with accessories



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6.	Drilling tools (twist drill, center drill, counter boring tool , reamer, taps etc)
7.	Surface Grinding Machine with accessories and consumables
8.	Steel Rules
9.	Tri Square
10.	Vernier Caliper
11.	Thread gauges
12.	Screw pitch gauges
13.	Fillet gauges
14.	Feeler gauges
15.	Set of Adjustable Wrench
16.	Set of Spanners (Open end, Ring)
17.	Pipe wrench
18.	L-key sets



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19.	Nose pliers
20.	Grip pliers
21.	Straight peen Hammer
22.	Long nose Tong
23.	Short nose tong
24.	Flat Chisel
25.	Scraper of different shapes
26.	scriber
27.	Hand hacksaw
28.	Diamond hand file set
29.	Riffle hand file set
30.	Needle hand file set
31.	Round hand file



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32.	Half round hand file
33.	Triangular hand file
34.	Square hand file
35.	Flat hand file
36.	Drawing board
37.	Mineral maps
38.	Moh's hardness tester
39.	XRF handheld gun
40.	Plain table
41.	Stationary items
42.	Transportation and storage machines
43.	Multimeter
44.	Wires



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45.	Measuring tools
46.	Tester
47.	Topographic sheet
48.	Brunton compass
49.	GPS
50.	Graph and drawing sheet
51.	Geometry Box
52.	T-Square
53.	Set Square
54.	Templates
55.	Compass
56.	Divider
57.	Drawing pencils



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58.	Protractor
59.	Measuring tapes
60.	Calculator
61.	Materials of various Types
62.	First Aid Box
63.	Oxygen Cylinder
64.	Safety sign boards



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### Members of the Curriculum Development Committee

S#	Name	Designation
1.	Saima Asghar	DACUM Facilitator, Lahore
2.	Engr. M. Muneeb Ur Rehman Khan	Measurement Engineer, ACC pvt Ltd
3.	Dr. Muhammad Naeem Khan	AP, Govt Science College Wahdat Road, Lahore
4.	Dr. Farhat Yasmeen	Professor, UET Lahore
5.	Dr. Irfan Hafeez	Senior Scientific Officer, PCSIR Lahore
6.	Dr. Shahid Tufail Sheikh	Member Science(Retired), Ex-Head of MPRC Lahore
7.	Dr. Asma Sheikh	Scientific Officer, PCSIR Lahore
8.	Mohammad Shahbaz	Assistant Director, Mining Development Cell, Lahore
9.	Syed Zafar Ayab Hussain Shah	Project Coordinator, ZKB Construction ,Peshawar



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10.	Muhammad Irfan Zubair	Deputy Director GSP, Lahore
11.	Engr.Syed Zeeshan Arif	Data Engineer/Mudlogger Petro Service hyderabad
12.	Shahbaz Muhammad	Assistant geophysicist GSP, Lahore
13.	Muhammad Usman Alvi	Scientific Officer, PCSIR LABS, Lahore
14.	Engr.Taimoor Iftikhar	Site Supervisor, Hadi Construction Co Nowshera KPK
15.	Muhammad Shahzad	Director, NAVTTTC, Islamabad



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**Members of the Curriculum Validation Committee**

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4.	Dr. Farhat Yasmeen	Professor, UET Lahore
5.	Dr. Irfan Hafeez	Senior Scientific Officer, PCSIR Lahore
6.	Dr. Shahid Tufail Sheikh	Member Science(Retired), Ex-Head of MPRC Lahore
7.	Dr. Asma Sheikh	Scientific Officer, PCSIR Lahore
8.	Mohammad Shahbaz	Assistant Director, Mining Development Cell, Lahore
9.	Syed Zafar Ayab Hussain Shah	Project Coordinator, ZKB Construction ,Peshawar
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13.	Engr.Taimoor Iftikhar	Site Supervisor, Hadi Construction Co Nowshera KPK
14.	Muhammad Shahzad	Director, NAVTTC, Islamabad