



***National Vocational Certificate Level 5 in Mining Process Technology
(Supervisor)***



**National Vocational Certificate Level 5 in Mining Process Technology”
(Supervisor)**



(Curriculum)



National Vocational Certificate Level 5 in Mining Process Technology (Supervisor)



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

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Introduction

Definition/Description of training program (Supervisor)

Mining sector is one of the booming industries of Pakistan. There is an increasing demand of the Supervisor. 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 Supervisor 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 5 in Mining Process Technology (Supervisor) 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. Manage Safety at Mining Site
2. Carry out Dewatering Activities
3. Perform Soil Profiling
4. Interpret Geophysical Data Collection
5. Perform Evaluation of Minerals
6. Apply Arc GIS and Google Earth in Mining Technology



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7. Perform Quality Control of Aggregate, Concrete, Grout and Shotcrete
8. Evaluate Rock Mechanics and Ground Control
9. Perform Mine Ventilation Design and Process
10. Manage and Supervise the Job Activities
11. Plan a Project in Primavera P6
12. Develop Entrepreneurial Skills
13. Practice Professionalism

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

Possible Career paths

- Supervisor
- 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 5 in Mining Sector **(Supervisor)** is given below:

Title	Entry requirements
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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:

Total	-	1200 hours
Theory	-	480hours (40%)
Practical	-	720hours (60%)
Proposed Course Duration- 12 Months		

Sequence of modules:

Module-1 Manage Safety at Mining Site	Module-6 Apply Arc GIS and Google Earth in Mining Technology	Module-8 Install Ground Support
Module-2 Carry out Dewatering Activities	Module-9 Perform Mine Ventilation Design and Process	Module-4 Interpret Geophysical Data Collection
Module-3 Perform Soil Performing	Module-7 Perform Quality Control of Aggregate, Concrete, Grout and Shotcrete	Module-10 Manage and Supervise the Job Activities
Module-5 Perform Evaluation of Minerals		Module-8 Evaluate Rock Mechanics and Ground Control



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Module-11 Plan a Project in Primavera P6	Module-12 Develop Entrepreneurial Skills
Module-13 Practice Professionalism	



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Summary Template-Overview of the Curriculum:

Following is the structure of the course:

Sr. No	Code	Competency Standards	Occupation	NVQF Level	Category	Estimated Contact Hours			Cr Hr
						Th.	Pr	Total	
Level 5									
1.	724MP15-A	Manage Safety at Mining Site	Supervisor	5	Generic	24	36	60	6
2.	724MP15-B	Carry out Dewatering Activities		5	Technical	32	48	80	8
3.	724MP15-C	Perform Soil Performing		5	Technical	24	36	60	6
4.	724MP15-D	Interpret Geophysical Data Collection		5	Technical	15	45	60	6
5.	724MP15-E	Perform Evaluation of Minerals		5	Technical	40	60	100	10
6.	724MP15-F	Apply Arc GIS and Google Earth in Mining Technology		5	Technical	27	33	60	6



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7.	724MP15-G	Perform Quality Control of Aggregate, Concrete, Grout and Shotcrete		5	Technical	43	57	100	10
8.	724MP15-H	Evaluate Rock Mechanics and Ground Control		5	Technical	27	33	60	6
9.	724MP15-I	Perform Mine Ventilation Design and Process		5	Technical	20	30	50	5
10.	724CO11-J	Manage and Supervise the Job Activities		5	Generic	32	48	80	8
11.	724CO11-K	Plan a Project in Primavera P6		5	Functional	60	90	150	15
12.	041300860-L	Develop Entrepreneurial Skills		5	Generic	16	24	40	40
13.	724MP15-M	Practice Professionalism		5	Generic	120	180	300	30
		Total				480	720	1200	120
		Percentage				40	60		



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Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1: Manage Safety at Mining Site Aim: After successful completion of this module, the trainee is competent in managing safety at mining site	LU1: Implement safe working practices at site LU2: Maintain safe work environment LU3: Report and Investigate the accident at plant site LU4: Follow vehicle safety at workplace	24	36	60
Module 2: Carry out Dewatering Activities Aim: After successful completion of this module, the trainee is competent in carrying out dewatering activities	LU1: Organize Dewatering Activities LU2: Control Surface Water Run-off LU3: Lower Water Table LU4: Conduct Housekeeping Activities	32	48	80



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 3: Perform Soil Profiling Aim: After successful completion of this module, the trainee is competent in performing soil profiling	LU1: Organize area for soil profile construction LU2: Construct Soil Profile	24	36	60
Module 4: Interpret Geophysical Data Collection Aim: After successful completion of this module, the trainee is competent in interpreting geophysical data collection.	LU1: Select Geophysical Method LU2: Recognize Data Acquisition LU3: Comprehend Geophysical Interpreted Models	15	45	60



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 5: Perform Evaluation of Minerals Aim: After successful completion of this module, the trainee is competent in performing evaluation of minerals	LU1: Perform Physical Evaluation of Ore LU2: Perform Optical Evaluation of Ore LU3: Perform Petro graphic Studies	40	60	100
Module 6: Apply Arc GIS and Google Earth in Mining Technology Aim: After successful completion of this module, the trainee is competent in applying Arc GIS and Google earth in mining technology	LU1: Use of Google Earth LU2: Apply Geo referencing in Arc GIS LU3: Perform analysis In Arc GIS	27	33	60



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 7: Perform Quality Control of Aggregate, Concrete, Grout and Shotcrete Aim: After successful completion of this module, the trainee is competent in performing quality control of aggregate, concrete, grout and Shotcrete	LU1: Perform Crushing and Grinding of Ore LU2: Perform Impact Test LU3: Perform Soundness Test LU4: Perform Shape Test LU5: Perform Specific gravity test LU6: Perform Absorption test LU7: Perform slump test for concrete and Shotcrete LU8: Perform Compressive strength test of concrete and Grout	43	57	100
Module 8: Evaluate Rock Mechanics and Ground Control Aim: After successful completion of this module, the trainee is competent in evaluating rock mechanics and ground control	LU1: Evaluate The Mechanical Properties of Rock LU2: Perform geological services	27	33	60



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 9: Perform Mine Ventilation Design and Process Aim: After successful completion of this module, the trainee is competent in performing mine ventilation design and process	LU1: Perform Qualitative Survey LU2: Layout The Basic Mine Ventilation System LU3: Comprehend The Basic Rules for Ventilation System	20	30	50
Module 10: Manage and Supervise the Job Activities Aim: After successful completion of this module, the trainee is competent in managing and supervise the job activities	LU1: Plan for on-site operations LU2: Supervise work activities to achieve desired results LU3: Perform on- site inspection LU4: Prepare the inspection report.	32	48	80



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 11: Plan a Project in Primavera P6 Aim: After successful completion of this module, the trainee is competent in planning a project in Primavera P6	LU1: Perform Basic operation in Primavera P6 LU2: Perform Project Activities Scheduling in Primavera P6 LU3: Perform Project Resources Costing & Planning in Primavera P6 LU4: Manage Project in Primavera P6	60	90	150
Module 12: Develop Entrepreneurial Skills Aim: After successful completion of this module, the trainee is competent in developing entrepreneurial skills	LU1: Develop a business plan LU2: Collect information regarding funding sources LU3: Develop a marketing plan LU4: Develop basic business communication skills	16	24	40



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Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 13: Practice Professionalism Aim: After successful completion of this module, the trainee is competent in practicing professionalism	LU1: Develop Portfolio for industry LU2: Perform Internship	120	180	300



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Module 1: Manage Safety at Mining Site

Objective: This competency standard covers the skills and knowledge required to manage safe working practices at site. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Duration: 60Hours

Theory: 24 Hours

Practice: 36 Hours

Credit Hours: 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1 Implement safe working practices at site	The trainee will be able to: 1. Carry out tool box talks which require discussion on critical safety matters and hazardous site conditions pertaining to particular work etc. 2. Practice of Personal	<ul style="list-style-type: none"> • Explain unsafe act and unsafe conditions • Describe physical hazards at work site and its controlling measures • Describe standard procedure of handling, storing and stacking of hazardous materials • Explain Safe disposal of hazardous waste • Describe the OHS standards 	Total 15 hrs Theory: 6 hrs Practical: 9 hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • PPEs <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • PPEs 	<ul style="list-style-type: none"> • Class Room • Simulated environment



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>Protective Equipment (PPE)</p> <p>3. Implement health and safety practices and ensure it is followed by subordinates</p> <p>4. Implement safe handling and stacking methods at workplace / store</p> <p>5. Perform appropriate posting of safety signs and boards at designated places)</p> <p>6. Barricade all un-</p>	<ul style="list-style-type: none"> Describe the Importance of reporting near miss <p>Activity:</p> <ul style="list-style-type: none"> Conduct emergency response drill for enhancing importance of safety Perform risk assessment at the workplace 			



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>protected openings at the workplace</p> <p>7. Implement and check near miss reporting</p> <p>8. Provide safe access at work place for movement of workers & materials.</p> <p>9. Conduct emergency response drill for enhancing importance of safety among the workers as per the policy of organization</p>				



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 2 Maintain safe work environment	The trainee will be able to: <ol style="list-style-type: none"> 1. Use defined safe work practices and personal protective equipment to ensure personal safety at the workplace 2. Collect and/or dispose of all waste in accordance with environmental requirements and workplace procedures 3. Check condition and serviceability of 	<ul style="list-style-type: none"> • Explain Standard procedure of handling, storing and stacking of hazardous materials • knowledge about methods of safe disposal of hazardous waste • Describe standard procedure of serviceability and storing of equipment <p>Activity:</p> <ul style="list-style-type: none"> • Practice to collect, segregate and dispose of hazardous waste • Investigate work site accident and develop the incident report 	Total: 15 hrs Theory: 6 hrs Practical: 9 hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • PPEs • Labels • Barrication tape • Tags <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • PPEs 	<ul style="list-style-type: none"> • Class Room • Simulated environment



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	equipment before storage.	along with corrective measures to avoid future accident.		<ul style="list-style-type: none"> Disposal container 	
LU 3 Report and Investigate the accident at plant site	The trainee will be able to: <ol style="list-style-type: none"> Identify any injured employee and check severity of the injury Provide first aid treatment if required Interview injured person and other involved personnel 	<ul style="list-style-type: none"> Describe the ABC of first aid Describe the first aid procedure for severe wound Describe investigation procedure of accident <p>Activity: Investigate and report of</p>	Total 15 hrs Theory: 6 hrs Practical: 9 hrs	Consumable <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker PPEs Non Consumable <ul style="list-style-type: none"> White board 	<ul style="list-style-type: none"> Class Room Simulated environment



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>in the accident</p> <p>4. Collect all information related to the incident/accident at workplace</p> <p>5. Analyse the facts and figures by observing the accident scene</p> <p>6. Review your recording</p> <p>7. Perform risk assessment and hazard identification at the workplace</p> <p>8. Develop the incident report</p>	<p>mock accident at work place</p>		<ul style="list-style-type: none"> • Multimedia • PPEs 	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	along with corrective measures to avoid future accidents				
LU 4 Follow vehicle safety at workplace	The trainee will be able to: <ol style="list-style-type: none"> 1. Follow the speed limit as per the company policy while driving vehicle at site 2. Use high visibility safety vest 3. Keep flag man while driving/reversing vehicle in operational areas 	<ul style="list-style-type: none"> • Explain the Importance of vehicle safety at work place • Describe standard procedure related to vehicle safety at workplace. <p>Activity:</p> <ul style="list-style-type: none"> • Demonstrate vehicle driving safety as per policy of the organization 	Total 15 hrs Theory: 6 hrs Practical: 9 hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Barrication tape • PPEs <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Sign board 	<ul style="list-style-type: none"> • Class Room • Simulated environment



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	4. Follow standard procedure related to vehicle safety at workplace				

Module 2: Carry out Dewatering Activities

Objective of the module: The aim of this module to get knowledge, skills and understanding to carryout dewatering activities.

Duration: 80 Hours

Theory: 32Hours

Practice: 48 Hours

Credit Hours: 08



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Organize Dewatering Activities	The trainee will be able to: <ol style="list-style-type: none"> 1. Select equipment and attachments 2. Use PPEs 3. Conduct equipment pre-start checks 	<ul style="list-style-type: none"> • Define OHS • Define job specifications attachments <p>Activity:</p> <ul style="list-style-type: none"> • Practice to conduct work according to site procedures, regulations, OHS, other relevant legislation, manufacturer's specifications • Practice to select equipment and attachments according to job specifications • Practice to pre-start checks of equipments 	Total: 20hrs Theory: 8hrs Practical: 12hrs	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen • White board marker • Duster <p>Non-Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Dewatering equipment (Ancillary equipment, Fitting, Lines • Pads(Piping, • Pumps, 	<ul style="list-style-type: none"> • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				<ul style="list-style-type: none"> Submersible pumps) 	
LU2: Control Surface Water Run-off	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> Control surface runoff using watering mechanisms Direct runoff to storage areas to allow settling of sediments 	<ul style="list-style-type: none"> Describe control surface runoff Define settling of sediments <p>Activity:</p> <ul style="list-style-type: none"> Practice to control surface runoff using dewatering mechanisms according to environmental guidelines Practice to direct runoff to storage areas to allow settling of sediments 	<p>Total: 20hrs</p> <p>Theory: 8hrs</p> <p>Practical: 12hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners Pen White board marker Duster <p>Non-Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Dewatering equipment (Ancillary equipment, Fitting, Lines 	<ul style="list-style-type: none"> Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
				<ul style="list-style-type: none"> • Pads(Piping, • Pumps, • Submersible pumps) 	
LU3: Lower Water Table	The trainee will be able to: <ol style="list-style-type: none"> 1. Locate and mark high water table in the given area 2. Isolate dewatering area by erecting physical barricades and signage 3. Construct 	<ul style="list-style-type: none"> • Define water table • Knowledge of isolate dewatering areas • Define barricaded and signage • Define ancillary equipment • Define equipment to maximize dewatering • Explain pumping system <p>Activity:</p> <ul style="list-style-type: none"> • Practice to locate and mark high water table in the 	Total: 20hrs Theory: 8hrs Practical: 12hrs	Consumable <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen • White board marker • Duster Non-Consumable <ul style="list-style-type: none"> • White board • Multimedia • Internet 	<ul style="list-style-type: none"> • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>sumps to collect water at required location</p> <p>4. Erect pumps, lines, fittings and ancillary equipment as required</p> <p>5. Use equipment to maximize dewatering</p> <p>6. Monitor and adjust pumping system</p> <p>7. Manage water table at desired level</p>	<p>given area</p> <ul style="list-style-type: none"> Practice to Isolate dewatering area by erecting physical barricades and signage Practice to construct sumps to collect water at required location Practice to erect pumps, lines, fittings and ancillary equipment as required Practice to use equipment to maximize dewatering Practice to monitor and adjust pumping system to ensure dewatering as 		<ul style="list-style-type: none"> Computer system Dewatering equipment (Ancillary equipment, Fitting, Lines Pads(Piping, Pumps, Submersible pumps) 	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		required <ul style="list-style-type: none"> Practice to manage water table at required level 			
LU4: Conduct Housekeeping Activities	The trainee will be able to: <ol style="list-style-type: none"> Clean attachments and other ancillary equipment Complete all required documentation as per given format 	<ul style="list-style-type: none"> Define ancillary equipment <p>Activity:</p> <ul style="list-style-type: none"> Practice to clean attachments and other ancillary equipment Practice to complete all required documentation as per given format 	Total: 20hrs Theory: 8hrs Practical: 12hrs	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer System Vacuum Cleaner Mop 	<ul style="list-style-type: none"> Training Workshop Lab/ Field Visit



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Module 3: Perform Soil Profiling

Objective of the module: The aim of this module is to get knowledge, skills and understanding to perform soil profiling.

Duration: 60Hours

Theory: 24 Hours

Practice: 36Hours

Credit Hours: 06

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Organize Area for Soil Profile Construction	The trainee will be able to: <ol style="list-style-type: none"> 1. Select equipment and attachments 2. Select & wear PPEs 3. Conduct equipment pre-start checks 	<ul style="list-style-type: none"> • Define OHS • Define job specifications <p>Activity</p> <ul style="list-style-type: none"> • Practice to conduct work according to site procedures, regulations, OHS, other relevant legislation, manufacturer's specifications • Practice to select equipment and attachments according to job specifications 	<p>Total: 30hrs.</p> <p>Theory: 12 hrs.</p> <p>Practical: 18hrs.</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen • White board marker • Duster <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Computer system , • pH meter • Conductivity meter • Shovels 	<ul style="list-style-type: none"> • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<ul style="list-style-type: none"> Practice conduct equipment pre-start checks 		<ul style="list-style-type: none"> Electronic Weighing Balance 	
LU2: Construct Soil Profile	The trainee will be able to: <ol style="list-style-type: none"> Add materials to soil as per local vegetation requirements Stabilize soil profile Replicate the construction of soil profile horizons in the surrounding environment Check landform construction Place final soil layer Construct soil horizon following land contour Add nutrients to soil 	<ul style="list-style-type: none"> explain stabilize soil profile Define local vegetation Define soil profile Define rehabilitation plan Describe procedure to minimize soil damage Explain how to reduce water flow Define soil nutrients <p>Activity:</p> <ul style="list-style-type: none"> Practice to stabilize soil profile using required techniques Practice to add materials to soil as per local vegetation 	Total 30hrs Theory: 12hrs Practical: 18hrs	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker Duster <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system pH meter Conductivity meter Shovels Electronic 	<ul style="list-style-type: none"> Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<p>requirements</p> <ul style="list-style-type: none"> Practice to replicate construction of soil profile horizons in the surrounding environment or as detailed in rehabilitation plan Practice to check landform construction is complete, prior to placement of final soil layer Practice to place final soil layer in appropriate conditions to minimize damage to soil Practice to construct soil horizon following land contour to reduce water 		Weighing Balance	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<p>flow down slope and increase water storage capabilities</p> <ul style="list-style-type: none">• Practice to add nutrients to soil according to rehabilitation plan and environmental guidelines			



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Module 4: Interpret Geophysical Data Collection

Objective of the module: The aim of this module is to get knowledge, skills and understanding to interpret geophysical data collection.

Duration: 60 Hours

Theory: 15Hours

Practice: 45 Hours

Credit Hours: 06

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Select Geophysical Method	The trainee will be able to: <ol style="list-style-type: none"> 1. Identify geology, tectonic setting and geomorphology of the area 2. Identify targeted mineral zone 	<ul style="list-style-type: none"> • Describe method of calculation of absolute Weight Strength (AWS) , Absolute Bulk Strength (ABS) , velocity , density and detonate pressure • Knowledge of explosives properties • Define geomorphology of area • Define mineral zone <p><u>Activity:</u></p>	Total: 10hrs Theory: 4hrs Practical: 6hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Erasers • Sharpeners • White board marker • Duster <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<ul style="list-style-type: none"> Identify geology, tectonic setting and geomorphology of the area Identify targeted mineral zone 		system <ul style="list-style-type: none"> Geophysical equipment Seismograph Gravimeter Magnetometer Metal detector 	
LU2. Recognize Data Acquisition	The trainee will be able to: <ol style="list-style-type: none"> Prepare layout plan of geophysical profiles targeting the mine area Select on ground site for geophysical survey Identify depth of penetration of targeted zone 	<ul style="list-style-type: none"> Define geophysical profiles Explain method geophysical survey Explain depth of targeted zone <p>Activity:</p> <ul style="list-style-type: none"> Practice to prepare layout plan of geophysical pr files targeting the mine area Practice to identify depth 	Total: 23hrs Theory: 5hrs Practical: 18hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Erasers Sharpeners White board marker Duster <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Geophysical equipment Seismograph 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		of penetration of targeted zone		<ul style="list-style-type: none"> Gravimeter Magnetometer Metal detector 	
LU3. Comprehend Geophysical Interpreted Models	The trainee will be able to: <ol style="list-style-type: none"> Interpret 2D/3D and sub-surface of anomalous mineral zone as per given models Measure depth and area of anomalous zones Analyze electrical resistivity Analyze seismic velocity Recognize density contrast Analyze magnetic response 	<ul style="list-style-type: none"> Define anomalous zones Describe electrical resistivity of earth materials Knowledge of seismic velocity Explain magnetic response <p>Activity:</p> <ul style="list-style-type: none"> Practice to interpret 2D/3D and sub-surface of anomalous mineral zone as per given models Practice to measure depth and area of anomalous zones Practice to analyze electrical 	Total: 27hrs Theory: 6hrs Practical: 21hrs	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Erasers Sharpeners White board marker Duster <p>Non-Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Geophysical equipment 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<p>resistivity</p> <ul style="list-style-type: none">• Practice to analyze seismic velocity• Practice to recognize density contrast• Practice to analyze magnetic response		<ul style="list-style-type: none">• Seismograph• Gravimeter• Magnetometer• Metal detector	



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Module 5- Perform Evaluation of Minerals

Objective of the module: The aim of this module is to get knowledge, skills and understanding to perform evaluation of minerals.

Duration: 100Hours

Theory: 40 Hours

Practice: 60Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Perform Physical Evaluation of Ore	The trainee will be able to: <ol style="list-style-type: none"> 1. Observe lustre of ore as per standard parameters 2. Observe Colour of ore as per standard parameters 3. Measure Streak for ore as per given table 4. Measure (MOHS) Hardness of ore 5. Estimate specific gravity as per standard 	<ul style="list-style-type: none"> Define lustre of ore Explain how to observe color of ore Define MOHS <p>Activity:</p> <ul style="list-style-type: none"> Practice to observe lustre of ore as per standard parameters Practice to observe Colour of ore as per standard parameters Practice to measure Streak for ore as per given table 	Total: 36hrs Theory: 15hrs Practical: 21hrs	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker Duster <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		<ul style="list-style-type: none"> Practice to measure (MOHS) Hardness of ore Practice to estimate specific gravity as per standard 		<ul style="list-style-type: none"> PPEs Hardness tester Optical microscope Polarize microscope Electron microscope Thin section cutter, grinder and polisher Canada bolisom Rock cutting machine Glass slides Electronic balance UV-VIS Spectrophotometer 	



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU2: Perform Optical Evaluation of Ore	The trainee will be able to: <ol style="list-style-type: none"> 1. Carry out visual inspection for ore identification 2. Carry out Optical Microscopy of ore 3. Perform Polarized Microscopy (Pleochroism) 4. Carry out Birefringence 	<ul style="list-style-type: none"> • Explain method of visual inspection • Define optical microscopy • Define Pleochroism • Define Birefringence <p>Activity:</p> <ul style="list-style-type: none"> • Practice to carry out visual inspection for ore identification • Practice to carry out Optical Microscopy of ore • Practice to perform Polarized Microscopy (Pleochroism) • Practice to carry out 	Total: 33hrs Theory: 15hrs Practical: 18hrs	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • Duster <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Hardness tester • Optical microscope • Polarize microscope 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		Birefringence		<ul style="list-style-type: none"> Electron microscope Thin section cutter, grinder and polisher Canada bolisom Rock cutting machine Glass slides Electronic balance UV-VIS Spectrophotometer 	
LU3: Perform Petro graphic Studies	The trainee will be able to: <ol style="list-style-type: none"> Select sample for test Prepare the equipment for testing Mount sample on glass slide/acrylic button Perform grinding and polishing of the sample 	<ul style="list-style-type: none"> Knowledge of equipment for testing Explain sample texting procedure Define electro microscopic studies <p><u>Activity:</u></p> <ul style="list-style-type: none"> Practice to prepare the equipment for testing 	Total: 31hrs Theory: 10hrs Practical: 21hrs	<div style="background-color: #cccccc; padding: 2px; display: inline-block;">Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker Duster 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<p>5. Carry out microscopic studies</p> <p>6. Perform electro-microscopic studies</p>	<ul style="list-style-type: none"> Practice to mount sample on glass slide/acrylic button Practice to perform grinding and polishing of the sample Practice to carry out microscopic studies Practice to perform electro-microscopic studies 		<p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Hardness tester Optical microscope Polarize microscope Electron microscope Thin section cutter, grinder and polisher Canada bolisom Rock cutting machine Glass slides Electronic balance UV-VIS Spectrophotometer 	



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Module 6- Apply Arc GIS and Google Earth in Mining Technology

Objective of the module: The aim of this module is to get knowledge, skills and understanding to apply Arc GIS and Google earth in Mining Technology.

Duration: 60 Hours

Theory: 27 Hours

Practice: 33 Hours

Credit Hours: 06

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Use of Google Earth	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Setup Google earth as per job requirements 2. Access the location of the given area 3. Manipulate the coordinates as required 4. Calculate the area of the given site 5. Calculate the distance between different 	<ul style="list-style-type: none"> • Knowledge of equipment for testing • Explain sample texting procedure • Define electro microscopic studies <p>Activity:</p> <ul style="list-style-type: none"> • Practice to prepare equipment for testing • Practice mount sample on glass slide/acrylic button • Practice to perform grinding and polishing of the sample 	<p>Total: 18hrs</p> <p>Theory: 9hrs</p> <p>Practical: 9hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • Duster <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	points	<ul style="list-style-type: none"> Practice to carry out microscopic studies Practice to perform electro-microscopic studies 		<ul style="list-style-type: none"> Computer system Google Earth Application GIS software Hard copies of different map sheets 	
LU2: Apply Geo referencing in Arc GIS	The trainee will be able to: <ol style="list-style-type: none"> 1. Upload map sheet as required 2. Assign coordinate system to uploaded sheet 3. Apply different commands in GIS as per requirement 	<ul style="list-style-type: none"> Explain map sheet Define coordinate system Define GIS <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to upload map sheet as required Practice to assign coordinate system to 	Total: 15hrs Theory: 6hrs Practical: 9hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker Duster <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		uploaded sheet <ul style="list-style-type: none"> Practice to apply different commands in GIS as per requirement 		<ul style="list-style-type: none"> Computer system Google Earth Application GIS software Hard copies of different map sheets 	
LU3: Perform analysis In Arc GIS	The trainee will be able to: <ol style="list-style-type: none"> Select area for analysis Outline the position of selected area Identify mineral showings offshoots Differentiate metallic and non-metallic mineral zones Develop subsurface 	<ul style="list-style-type: none"> Describe metallic and non-metallic mineral zones Explain subsurface cross-section <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to outline the position of selected area Practice to identify 	Total: 27hrs Theory: 12hrs Practical: 15hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners Pen White board marker Duster <div>Non Consumable</div> <ul style="list-style-type: none"> White board 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	cross-section	<ul style="list-style-type: none"> mineral showings offshoots Practice to differentiate metallic and non-metallic mineral zones Practice to develop subsurface cross-section 		<ul style="list-style-type: none"> Multimedia Internet Computer system Google Earth Application GIS software Hard copies of different map sheets 	



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Module7- Perform Quality Control of Aggregate, Concrete, Grout and Shotcrete

Objective of the module: The aim of this module to get knowledge, skills and understanding to perform quality control of aggregate ,concrete, grout and Shotcrete.

Duration: 100 Hours

Theory: 43Hours

Practice: 57 Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Perform Crushing and Grinding of Ore	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform crushing and grinding of rock sample 2. Perform sieve analysis using required mesh sizes 3. Collect and calculate the different fractions 	<ul style="list-style-type: none"> • Explain crushing and grinding method for ore • Describe sieve analysis • Explain method of calculation for different fractions using weighing Activity • Practice to perform crushing and grinding of rock sample • Practice to perform sieve analysis • Practice to collect and calculate different fractions 	Total: 11hrs Theory: 5hrs Practical: 6hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White Board marker • Duster • USB • Result sheets templates <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	using weighing balance 4. Note down all values for given sample			system • Printer • Roll crusher • Ball mill • Rod Mill • Dry sieve Analyzer • Wet sieve Analyzer • SS Cylinder for Alkali silica • Universal testing machine • Slump cone, rod, scale • Digital balance • Glass ware • Specific Gravity bottle • Viscometer • pH Meter • PPEs	
LU2. Perform Impact Test	Trainee will be able to: 1. Place sample under the knob of impact	• Explain impact test. • Define the role of tester	Total: 11hrs Theory: 5hrs Practical: 6hrs	Consumable • Notebooks • Pencils • Erasers	• Class Room • Training Workshop



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	tester 2. Apply the weight and obtain the reading 3. Note down all values, displaying on screen	Activity: <ul style="list-style-type: none"> Practice to place sample under the knob of impact tester Practice to apply the weight and obtain the reading 		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPEs 	<ul style="list-style-type: none"> Lab/ Field Visit
LU3. Perform Soundness Test	1. Prepare the solution of different concentration of	<ul style="list-style-type: none"> Knowledge of alkalis Knowledge of sodium and potassium reactivity test 	Total: 14hrs Theory: 5hrs Practical: 9hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers 	<ul style="list-style-type: none"> Class Room Training Workshop



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	alkalies 2. Perform sodium and potassium reactivity test 3. Estimate the loss of material after standardized time period 4. Calculate the weight difference before and after treatment using weighing digital balance	<ul style="list-style-type: none"> Explain soundness test procedure. <p>Activity:</p> <ul style="list-style-type: none"> Practice to prepare the solution of different concentration of alkalis Practice to perform sodium and potassium reactivity test Practice to estimate the loss of material after standardized time period Practice to calculate the weight difference before and after treatment using weighing digital balance 		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPEs 	<ul style="list-style-type: none"> Lab/ Field Visit
LU4. Perform Shape Test	1. Select the rock sample for testing 2. Add rock sample in	<ul style="list-style-type: none"> Knowledge of wet sieve Explain shape test <p>Activity:</p>	Total: 11hrs Theory: 5hrs Practical: 6hrs	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils Erasers 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	flakiness gauge 3. Calculate flakiness index	<ul style="list-style-type: none"> Practice to select rock sample for testing Practice to add rock sample in ball/rod mill Practice to use sieve wet and dry shake 		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPES 	
LU5. Perform Specific gravity test	1. Weigh the given dried sample in Air 2. Weigh the dried	<ul style="list-style-type: none"> Define Archimedes law Explain gravity test procedure. 	Total: 11hrs Theory: 5hrs Practical: 6hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers 	<ul style="list-style-type: none"> Class Room Training Workshop Lab/ Field Visit



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	sample in water 3. Calculate specific gravity	Activity: <ul style="list-style-type: none"> Practice to weigh the given dried sample in Air Practice to weigh the dried sample in water Practice to calculate the values by using Archimedes' law 		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPES 	
LU6. Perform Absorption test	1. Weigh the dried sample in Air 2. Add the dried	<ul style="list-style-type: none"> Explain procedure of absorption test Activity:	Total: 11hrs Theory: 5hrs Practical: 6hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers 	<ul style="list-style-type: none"> Class Room Training Workshop



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	sample in water 3. Calculate the percentage of absorption	<ul style="list-style-type: none"> Practice to perform absorption test 		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPEs 	<ul style="list-style-type: none"> Lab/ Field Visit
LU7. Perform slump test for concrete and Shotcrete	1. Collect fresh concrete sample in slump cone at	<ul style="list-style-type: none"> Explain slump test procedure Activity: <ul style="list-style-type: none"> Practice to perform slump 	Total: 15hrs Theory: 6hrs Practical: 9hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers 	<ul style="list-style-type: none"> Class Room Training Workshop



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	given site 2. Place the concrete in cone 3. Perform Roding in the concrete with temping rod 4. Remove the slump cone and observe concrete flow 5. Measure the value with scale as per standard	test for concrete and Shotcrete		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPEs 	<ul style="list-style-type: none"> Lab/ Field Visit
LU8. Perform Compressive strength test of concrete and	1. Prepare cylinder/cubes of concrete for	<ul style="list-style-type: none"> Define Grout for compressive strength test Activity:	Total: 16hrs Theory: 7hrs Practical: 9hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers 	<ul style="list-style-type: none"> Class Room Training Workshop



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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
Grout	<p>compressive strength test</p> <p>2. Dip cylinder/cubes in water</p> <p>3. Crush the cylinder/cubes in compressive strength machine</p> <p>4. Note down the value as per given format</p>	<ul style="list-style-type: none"> Practice to perform compressive strength test 		<ul style="list-style-type: none"> Sharpeners White Board marker Duster USB Result sheets templates <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer Testing Equipment's Preservatives Brick Hammer Scrunch shovel PPEs 	<ul style="list-style-type: none"> Lab/ Field Visit



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Module 8- Evaluate Rock Mechanics and Ground Control

Objective: This competency standard covers the skills and knowledge required to evaluate rock mechanics and ground control.

Duration: 60Hours

Theory: 27Hours

Practice: 33Hours

Credit Hours: 06

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Evaluate The Mechanical Properties of Rock	Trainee will be able to: <ol style="list-style-type: none"> 1. Identify the mechanical properties of rock (brittle, ductile) 2. Carry out Tri-axial test (to bear load strength of rock material) 3. Calculate Unconfined compressive strength (UCS) (to find the compressive strength of rock material) 4. Carry out Ring shear test (gives shear strength of rock as a function of confining pressure) 	<ul style="list-style-type: none"> • Explain mechanical properties of rock • Define Tri-axial test • Define UCS • Define Ring shear test • Define Brazilian test • Explain method of beam bending test <p>Activity:</p> <ul style="list-style-type: none"> • Practice to identify the mechanical properties of 	Theory-12 hrs Practical-15 hrs Total-27hrs	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White Board marker • Duster • USB <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Printer • Universal testing machine (UTM) 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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	<p>5. Carry out Split tensile test (tensile strength of material e.g., Concrete and rock like material)</p> <p>6. Perform Beam bending test for flexure / flexure test (rock specimen is subjected to bending till failure occurs)</p>	<p>rock (brittle, ductile)</p> <ul style="list-style-type: none"> Practice to carry out Tri-axial test (to bear load strength of rock material) Practice to calculate Unconfined compressive strength (UCS) (to find the compressive strength of rock material) Practice to carry out Ring shear test (gives shear strength of rock as a function of confining pressure) Practice to carry out Split tensile test/Brazilian test (tensile strength of material e.g., Concrete and rock like material) Practice to perform Beam 		<ul style="list-style-type: none"> Test cell, hydraulic pump Straight circular cylinder Brazilian test apparatus Pressure jack and gauge Optical microscope Polarize microscope Chemicals PPES 	
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		bending test for flexure / flexure test (rock specimen is subjected to bending till failure occurs			
LU2. Perform geological services	Trainee will be able to: <ol style="list-style-type: none"> 1. Prepare rock sample for microscopy 2. Perform petrography of given sample 	<ul style="list-style-type: none"> • Define petrography Activity: <ul style="list-style-type: none"> • Practice to prepare rock sample for microscopy • Practice to perform petrography of given sample 	Theory- 15hrs Practical- 18hrs Total- 33 hrs	Consumable <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White Board marker • Duster • USB Non Consumable <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Printer • Optical microscope • Polarize microscope • PPEs 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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Module 9- Perform Mine Ventilation Design and Process

Objective: The aim of this module is to get knowledge, skills and understanding to perform mine ventilation design and process.

Duration: 50 Hours

Theory: 20Hours

Practice: 30 Hours

Credit Hours: 05

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Perform Qualitative Survey	Trainee will be able to: <ol style="list-style-type: none"> 1. Use portable gas detector 2. Detect gas hazard in mine 3. Use PPEs as required 	<ul style="list-style-type: none"> • Knowledge of gas detector • Define PPEs • Describe procedure of qualitative survey <p>Activity:</p> <ul style="list-style-type: none"> • Practice to perform qualitative survey 	Theory- 5hrs Practical- 9hrs Total- 14hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Erasers • Sharpeners • White board marker • Duster • PPEs <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Computer system 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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				<ul style="list-style-type: none"> • Multi Gas Detector • Tube Detector • Brattice cloth • Axial Flow Fan • Centrifugal Flow Fan 	
LU2. Layout The Basic Mine Ventilation System	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform survey for installation of ventilation system 2. Collect ventilation data base 3. Check optimization through simulator 4. Develop model for ventilation system 	<ul style="list-style-type: none"> • Define ventilation system • Define simulator <p>Activity:</p> <ul style="list-style-type: none"> • Practice to perform survey for installation of ventilation system • Practice to collect ventilation data base • Practice to check optimization through simulator • Practice to develop model 	Theory-5hrs Practical- 9hrs Total- 14hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Erasers • Sharpeners • White board marker • Duster • Material Log register <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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		for ventilation system		<ul style="list-style-type: none"> • Computer system • Anemometer • Multi Gas Detector • Tube Detector • Gas Mask • Brattice cloth • Axial Flow Fan • Centrifugal Flow Fan 	
LU3. Comprehend The Basic Rules for Ventilation System	Trainee will be able to: <ol style="list-style-type: none"> 1. Identify the air flow system of ventilation system 2. Make a layout of ventilation system on paper 3. Outline the layout of single and double split system 4. Calculate area, volume and velocity of air for specified mine location 	<ul style="list-style-type: none"> • Define air flow system of ventilation • Define single and double split system <p>Activity:</p> <ul style="list-style-type: none"> • Practice to identify the air flow system of ventilation system • Practice to make a layout 	Theory- 10 hr Practical- 12hrs Total- 22 hrs	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Erasers • Sharpeners • White board marker <p>Non Consumable</p> <ul style="list-style-type: none"> • White board 	<ul style="list-style-type: none"> • Class Room • Training Workshop • Lab/ Field Visit



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		<p>on paper of ventilation system</p> <ul style="list-style-type: none">• Practice to outline the layout of single and double split system• Practice to calculate area, volume and velocity of air for specified mine location		<ul style="list-style-type: none">• Multimedia• Computer system• Anemometer• Multi Gas Detector• Tube Detector• Gas Mask• Brattice cloth• Axial Flow Fan• Centrifugal Flow Fan• PPEs	
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Module 10- Manage and Supervise the Job Activities

Objective: The aim of this module is to get knowledge, skills and understanding to manage inventory of mine material.

Duration: 80 Hours

Theory: 32 Hours

Practice: 48 Hours

Credit Hours: 08

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Plan for on-site operations	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Consult with the client to obtain required information 2. Prepare SOP's in accordance with the identified requirements. 3. Prepare the process flow diagram in order to achieve Quality outcome. 4. Break down work of activities into small achievable components and efficient sequences 5. Recognize site hazards and the 	<ul style="list-style-type: none"> • Explain principles of planning and project management • Explain roles and responsibilities for different levels of site supervision. • Explain planning method for on-site operations • Knowledge about process flow diagram • Understanding of health and safety standards • Understanding of house 	<p>Total: 15hrs</p> <p>Theory: 6hrs</p> <p>Practical: 9 hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • White board marker • Duster <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer 	Class Room / Site



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	<p>personal protective equipment (PPE) and safety procedures specified for job</p> <p>6. Organize site induction for support personnel as required</p> <p>7. Plan housekeeping activities prior to and post completion of work</p>	<p>keeping</p> <p>Activity</p> <ul style="list-style-type: none"> Practice to prepare activities plan for a specific crushing job order including break down of activities, recognize site hazards, prepare the demand of required equipment's and man power. 		<p>system</p>	
<p>LU2: Supervise work activities to achieve desired results</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> List and arrange required resources prior to commencement of work Recognize the areas of work which could result in a delay of work, wastage of material or damage to tools. Allocate responsibility to required team members to avoid 	<ul style="list-style-type: none"> Understanding about causes of delay in work, wastage of material or damage to tools. Explain documentation and record system of the inspection body <p>Activity:</p> <p>Practice to manage task</p>	<p>Total: 15 hrs</p> <p>Theory: 6 hrs</p> <p>Practical: 9hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils White board marker Duster <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia 	<ul style="list-style-type: none"> Class Room/ Site



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	<p>conflicts</p> <p>4. Review work plan in response to new information, urgent requests, changed situations or instructions from concern personnel</p> <p>5. Cooperate with team members to achieve common goals</p>	<p>allocation to team member for the specific crushing job order, trace out the weak area of work and review the work plan.</p>		<ul style="list-style-type: none"> Internet Computer system 	
<p>LU3: Perform on-site inspection</p>	<p>The trainee will be able to:</p> <p>1. Conduct inspection of processes & materials according to inspection plan</p> <p>2. Identify defects and deficiencies in product & processes</p> <p>3. Record defects and deficiencies with evidence in product & processes (if required)</p> <p>4. Perform test as per standard procedure for determining the</p>	<ul style="list-style-type: none"> Describe the information relevant to inspection activities and document preparation for recoding inspection results. Differentiate various types of deficiencies in inspection activities Describe site problems and recommended corrective actions Describe the procedure to 	<p>Total: 25 hrs</p> <p>Theory: 10 hrs</p> <p>Practical: 15 hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils White board marker Duster <p>Non Consumable</p> <ul style="list-style-type: none"> White board Multimedia Internet Computer 	<ul style="list-style-type: none"> Class Room/ Site



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	<p>physical properties of materials and product.</p> <ol style="list-style-type: none"> 5. Collect the samples of materials & products for lab testing as per standards 6. Complete the sampling document as per requirement 7. Check the actions taken for rectification of snag list 8. Record the non-compliance and expected breaches of contract as per SOPs. 	<p>perform on- site inspection</p> <p><u>Activity:</u></p> <ul style="list-style-type: none"> • Conduct inspection of crushing plant with emphasizes on deficiencies and defects in process & production including collection of sample of material & product and collect pictorial evidence etc 		system	
<p>LU4: Prepare the inspection report.</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Collect and review the information relevant to inspection activities for recoding in section results 2. Verify the integrity of information supplied by other party as a part of 	<ul style="list-style-type: none"> • Explain the procedure to prepare the inspection report. • Understanding about third/other party inspection process • Explain reporting standards <p><u>Activity:</u></p>	<p>Total: 25 hrs</p> <p>Theory: 10 hrs</p> <p>Practical: 15 hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Whit board marker • Duster <p>Non Consumable</p>	<ul style="list-style-type: none"> • Class Room



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	<p>the inspection process</p> <p>3. Record inspection observations and findings</p> <p>4. Recommend the necessary corrective actions for tackling the identified problems</p>	<p>Prepare the inspection report with respect to standards</p>		<ul style="list-style-type: none">• White board• Multimedia• Internet• Computer system	
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Module 11- Plan a Project in Primavera 6

Objective: The aim of this module is to get knowledge, skills and understanding to manage inventory of mine material.

Duration: 150 Hours

Theory: 60 Hours

Practice: 90Hours

Credit Hours: 15

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Perform Basic operation in Primavera P6	The trainee will be able to: <ol style="list-style-type: none"> 1. Load & unload primavera P6 Software. 2. Prepare interface of software 3. Customize P6 Screen Layout 4. Work Breakdown Structure (WBS) 	<ul style="list-style-type: none"> • Explain the importance of Primavera P6 • Describe interface of software • Describe physical performance to customised screen layout. • Explain work breakdown structure (WBS) • Differentiate different types of values. • Describe the total float and free float <p>Activity:</p> <ul style="list-style-type: none"> • Load Primavera P6 Software and prepare 	Total: 32hrs Theory: 11hrs Practical: 21hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen • Duster <div>Non Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Printer 	Class room/Computer Lab



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		<p>interface according to the assigned task.</p> <ul style="list-style-type: none"> Practice to create dummy activity. Practice to identify different types of activities. 			
LU2: Perform Project Activities Scheduling in Primavera P6	The trainee will be able to: <ol style="list-style-type: none"> Add Project in Primavera Create WBS of project in Primavera. Create Activities of project in Primavera. Create Relationships between activities of project in Primavera. Create Schedule of activities of project in Primavera. Display Gantt Chart 	<ul style="list-style-type: none"> Explain Gantt Chart Explain types of activities Describe relationships between activities of project in Primavera Elaborate Activity Constraints Differentiate between Work calendar, work/non-work days and working hours Describe to calculate the activity time and job critical time. 	Total: 36hrs Theory: 15hrs Practical: 21hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners Pen Duster <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer 	Class room/Computer Lab



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		<ul style="list-style-type: none"> Describe procedure to prepare Gantt chart. <p>Activity:</p> <ul style="list-style-type: none"> Create WBS of assigned task in Primavera. Prepare a Gantt chart of assigned task in Primavera P6. Practice of creating activities and the relation between activities of project in Primavera P6. Practice of creating schedule of activities Primavera P6. Practice to prepare Gantt chart. 			
LU3: Perform Project Resources Costing &Planning in Primavera P6	The trainee will be able to: <ol style="list-style-type: none"> Add constraints of activities of project Create Calendar for activities of project 	<ul style="list-style-type: none"> Explain resources of activities of project Describe baseline process for project. 	Total: 45hrs Theory: 18hrs Practical: 27hrs	Consumable <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners 	Class room/Computer Lab



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	<p>3. Assign Calendars to activities of project</p> <p>4. Add Resources of activities of project</p> <p>5. Assign Resources of activities of project</p> <p>6. Add Cost of activities of project</p> <p>7. Analyze Resources of activities of project</p> <p>8. Perform Baseline process for Project.</p>	<ul style="list-style-type: none"> • Explain Critical Path Method (CPM) • Explain Program Evaluation and Review Technique (PERT) Analysis • Describe the procedure to draw the activity diagram for CPM. • Explain the stages of project execution <p><u>Activity:</u></p> <ul style="list-style-type: none"> • Practice of adding constraints, creating and assigning calendar to the activities in Primavera P6 • Practice of adding and assigning resources of activities in Primavera P6 • Practice of adding cost of activities in 		<ul style="list-style-type: none"> • Pen • Duster • Non Consumable • White board • Multimedia • Internet • Computer system • Printer 	
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		Primavera P6: 1. Practice of performing baseline process of project. 2. Draw CPM of assigned project in Primavera P6. 3. Draw PERT of assigned project in Primavera P6.			
LU4:Manage Project in Primavera P6	The trainee will be able to: 1. Status the Project 1. Prepare Mitigation plan of the project	<ul style="list-style-type: none"> • Explain impact analysis • Describe mitigation techniques • Explain crash program • Describe the project monitoring and control • State the status of the project. Activity: Practice to prepare them itigate chart.	Total: 37hrs Theory: 16hrs Practical: 21hrs	Consumable <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen • Duster Non Consumable <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Printer 	Class room/Computer Lab



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Module 12- Develop Entrepreneurial Skills

Objective: The aim of this module is to get knowledge, skills and understanding to manage inventory of mine material.

Duration: 40 Hours

Theory: 16Hours

Practice: 24 Hours

Credit Hours: 04

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1 Develop a business plan	The trainee will be able to: <ol style="list-style-type: none"> 1. Conduct market survey to collect information 2. Select the best option in terms of cost, service, quality, sales, profit margin, overall expenses 3. Compile the information collected through the market survey, in the business plan format 	<ul style="list-style-type: none"> • Describe market survey and types of information collected such as <ul style="list-style-type: none"> Customer /demand ✓ Tools, equipment, machinery and furniture with rates ✓ Raw material ✓ Supplier ✓ Credit / funding sources ✓ Marketing strategy ✓ Market trends ✓ Overall expenses ✓ Profit margin • ∴ • Explain market survey tools such as questionnaire, interview, observation etc • Explain elements of 	Total 15hrs Theory: 6 hrs Practical: 12 hrs	Consumable <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • Duster Non Consumable <ul style="list-style-type: none"> • White board • Multimedia 	<ul style="list-style-type: none"> • Class Room • Simulated environment



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		<p>business plan</p> <ul style="list-style-type: none"> State the procedure to fill the business plan format <p>Activity:</p> <ul style="list-style-type: none"> Conduct market survey and formulate business plan in terms of feasibility, investment potential, risk, and completeness. 		<ul style="list-style-type: none"> Computer system 	
<p>LU 2</p> <p>Collect information regarding funding sources</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate Choose the best available option according to investment requirement Prepare documents according to the loan agreement requirement Include the information of funding sources in the business plan 	<ul style="list-style-type: none"> Explain different funding sources Describe the documents required to get loan to start a new business <p>Activity:</p> <ul style="list-style-type: none"> Prepare the documents for financial feasibility for external investment / loan for the business plan. Prepare loan documents. 	<p>Total</p> <p>15 hrs</p> <p>Theory:</p> <p>4 hrs</p> <p>Practical:</p> <p>6 hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker Duster <p>Non Consumable</p> <ul style="list-style-type: none"> White board 	<ul style="list-style-type: none"> Class Room Simulated environment



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				<ul style="list-style-type: none"> Multimedia Computer system 	
LU 3 Develop a marketing plan	The trainee will be able to: 1. Collect information required to devise marketing plan Prepare marketing plan for new business	<ul style="list-style-type: none"> Prepare the product promotion strategy State elements of business plan Describe 7 Ps of marketing Prepare human resource strategy plan <p>Activity:</p> <ul style="list-style-type: none"> Devise marketing strategy for product promotion 	Total 5hrs Theory: 2 hrs Practical: 3 hrs	Consumable <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker Duster Non Consumable <ul style="list-style-type: none"> White board Multimedia Computer system 	<ul style="list-style-type: none"> Class Room Simulated environment



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<p>LU 4</p> <p>Develop basic business communication skills</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Communicate with internal customers and external customers : 2. Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading etc. 3. Use specific business terms used in the market 	<ul style="list-style-type: none"> • Describe 7Cs of business communication • Explain different modes of communication and their application in the industry • Describe business terms used in the industry • Describe organization's procedures and policy related to information and communication systems, protocol and procedures <p>Activity:</p> <ul style="list-style-type: none"> • Practice to prepare a report about shortage of labour • Practice to play a role to communicate with customer about the product. 	<p>Total</p> <p>5 hrs</p> <p>Theory:</p> <p>2 hrs</p> <p>Practical:</p> <p>3 hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • Duster <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Computer system 	<ul style="list-style-type: none"> • Class Room • Simulated environment
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Module 13- Practice Professionalism

Objective: The aim of this module is to get knowledge, skills and understanding to practice professionalism.

Duration: 300 Hours

Theory: 120 Hours

Practice: 180 Hours

Credit Hours: 30

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1 Develop Portfolio for industry	The trainee will be able to: <ol style="list-style-type: none"> 1. Select previous assignments for portfolio 2. Work on previous selected assignments for portfolio 3. Compile variety of assignments for portfolio 4. Make Professional Portfolio for industry 5. Develop Digital Portfolio for industry 	<ul style="list-style-type: none"> Describe different styles/format of portfolio Explain the importance of portfolio Activity: <ul style="list-style-type: none"> Compile important assignments Prepare folder for assignments manually Prepare portfolio digitally 	Total 50hrs Theory: 20 hrs Practical: 30hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Computer system 	<ul style="list-style-type: none"> Class Room Simulated environment
LU 2	The trainee will be able to:	<ul style="list-style-type: none"> Explain importance of 	Total	<div>Consumable</div>	<ul style="list-style-type: none"> Class Room



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Perform Internship	<ol style="list-style-type: none"> 1. Prepare for internship <ul style="list-style-type: none"> • Personal Presentation • Portfolio Presentation 2. Interview preparation 3. Demonstrate Ethics for Internship 4. Identify Industry for internship 5. Perform Internship in Industry <ul style="list-style-type: none"> • Fill the Performa of Internship 5. Report the performance of internship 	<p>personal grooming for professional life</p> <ul style="list-style-type: none"> • Describe the importance of internship • Explain ethics for work/internship <p>Activity:</p> <ul style="list-style-type: none"> • Practice of presentation • Prepare CV for internship • Prepare report on performance of internship • Perform internship 	<p>250hrs</p> <p>Theory:</p> <p>100hrs</p> <p>Practical:</p> <p>150 hrs</p>	<ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Computer system 	<ul style="list-style-type: none"> • Mining site
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List of Tool, Machinery, Equipment and Consumables:

SR#	Items/Tools /Equipment &Consumables
1.	PPEs: Safety Helmet Safety Shoes Earmuffs Gloves Goggles Face Shields. Surgical Face Masks Safety blanket Safety harness Safety Belts Safety Apron
2.	Safety net
3.	Shovels with handle



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4.	Computer Systems
5.	Scanner
6.	Printer
7.	Chain Hoist
8.	Sieve set
9.	Digital Balance
10.	Fire Buckets.
11.	Fire Extinguishers
12.	First aid Kit
13.	Hooks / Anchors
14.	Manufacturers Operation and Maintenance Manual & Video
15.	Measuring Tape
16.	Multimeter



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17.	Slings
18.	Jackhammer
19.	Cameras
20.	Stationary Items
21.	Log Books
22.	Application Software
23.	Internet router
24.	Spatula
25.	Various hand / power tools
26.	Stretcher
27.	Engine and stop engine lights (orange and red)
28.	Display instrumentation and gauges (indicators, gauges, laser levels), computer systems
29.	Fluid levels (windscreen washer tank, hydraulic oil, coolant, grease, water, engine oil, fuel)



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30.	Visual and audio warning devices and lights
31.	Viscometer
32.	Air filter restriction indicator
33.	Mechanical tool kit
34.	Drilling equipment and machine
35.	Blasting machine and tools
36.	Ancillary equipment (generators, pumps, lights, compressors, cleaning equipment, power tools, hand tools)
37.	pH meter
38.	Visual and audio warning devices and lights
39.	Calculator
40.	Conveyor belt and component
41.	Inventory register
42.	Screw driver set



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43.	Plier
44.	Slip joint plier
45.	Socket set
46.	Hand hacksaw
47.	Chisel
48.	Tong
49.	Claw hammer
50.	Ball peen Hammer
51.	Straight peen Hammer
52.	Grip pliers
53.	Nose pliers
54.	L-key sets
55.	Pipe wrench



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56.	Set of Spanners (Open end, Ring)
57.	Set of Adjustable Wrench
58.	Dial Bore Gauge
59.	Snap Gauge set
60.	Micrometer
61.	Feeler gauges
62.	Screw pitch gauges
63.	Thread gauges
64.	Vernier Caliper
65.	Tri Square
66.	Steel Rules
67.	Hoppers
68.	Conveyors



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69.	Anemometer
70.	Geophysical equipment
71.	Brattice cloth
72.	Axial Flow Fan
73.	Centrifugal Flow Fan
74.	Tube Detector
75.	Multi Gas Detector
76.	Seismograph
77.	Gravimeter
78.	Magnetometer
79.	Metal detector
80.	Electronic Weighing Balance
81.	Shovels



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82.	pH meter
83.	Conductivity meter
84.	Dewatering equipment (Ancillary equipment, Fitting, Lines)
85.	Pads(Piping, Pumps, Submersible pumps)



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