MECHANIC MINING MACHINERY

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – Mining and Minerals

सत्यमेव जयते

GOVERNMENT OF INDIA

MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP

DIRECTORATE GENERAL OF TRAINING

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

MECHANIC MINING MACHINERY

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

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CONTENTS

1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

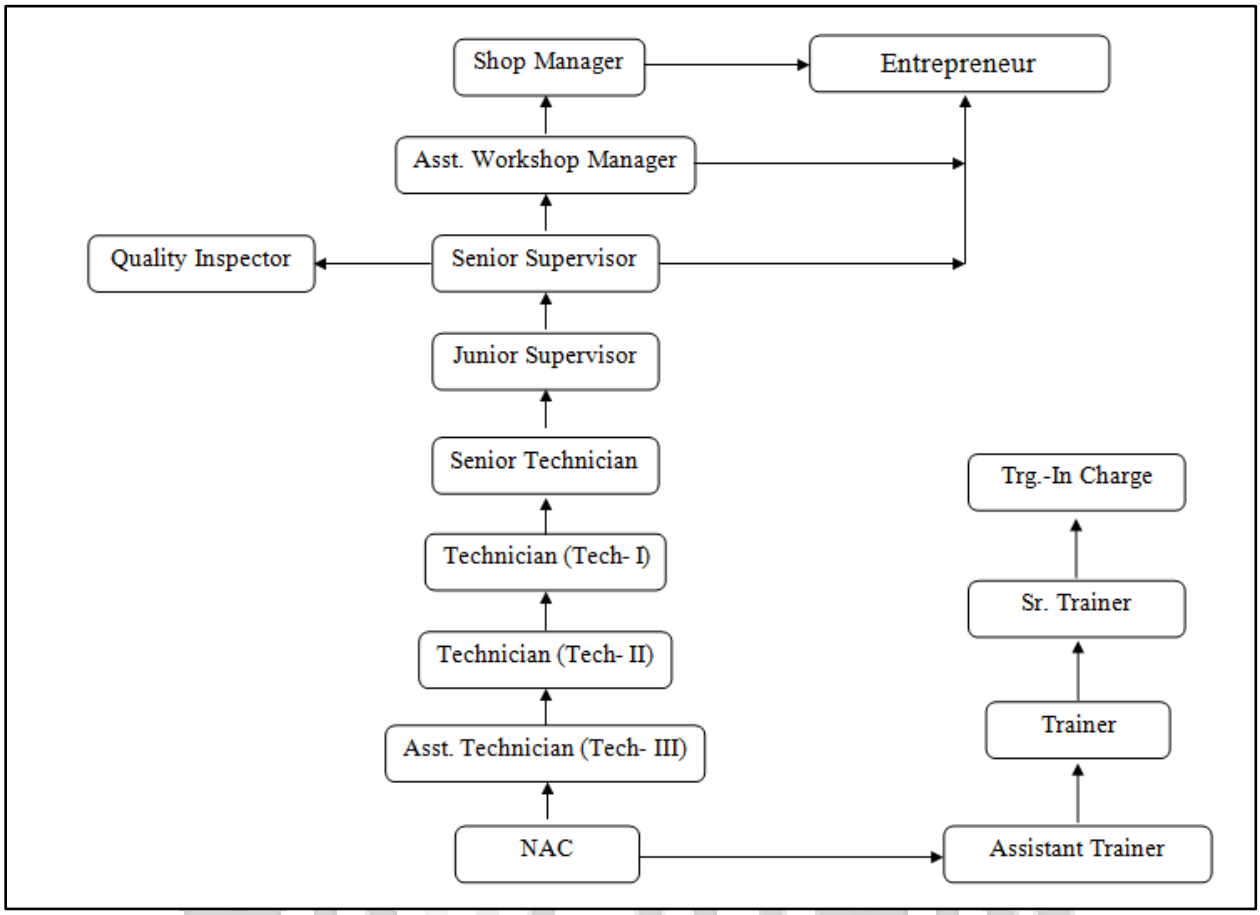
MECHANIC MINING MACHINERY trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*) : -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	**Block– I**	**-----**	**Block – II**	**------**
Practical Training (On - job training)	**----**	**Block – I**	**------**	**Block – II**

A. Basic Training

For 02 yrs. Course (Engg) :- (**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)

For 01 yr. course (Engg) :- (**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	**For 01 Yr. course**
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	**1000**	**500**

B. On-Job Training:-

For 02 yrs. Course (Engg) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg) :- (**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training

institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job role:

Mechanic, Mining Machinery repairs services and overhauls drilling, scraping, cutting, winding, hoisting and other mining machinery for correct performance. Get, defective machine or equipment removed from surface or underground working place to repair section, using slippers, roller, hoists etc. as necessary. Examines faulty equipment to ascertain nature and location of defects. Dismantles equipment partly or completely to remove damaged and worn out parts. Repairs parts by various mechanical processes such as remetalling, filing, chipping, scrapping, grinding etc. or obtains replacements. Assembles parts, doing supplementary tooling as necessary and ensures correct fit, movement, clearance, adjustments, functional operations etc. as specified. Tests reassembled equipment making necessary adjustments for optimum performance. Checks, adjusts and lubricates equipment periodically or gets it done and performs other tasks to keep equipment in good working order. May undertake minor repairs at working place. May weld, braze or solder parts.

Reference NCO 2015:7233.1500 - Mechanic Mining Machinery

4. NSQF LEVEL COMPLIANCE

NSQF level for MECHANIC MINING MACHINERY trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. professional knowledge,
c. professional skill,
d. core skill and
e. Responsibility.

The Broad Learning outcome of MECHANIC MINING MACHINERY trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	MECHANIC MINING MACHINERY
NCO - 2015	7233.1500 - Mechanic Mining Machinery
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	Passed 10th class examination under 10+2 system with Science (Physics and Chemistry) as subjects or its equivalent
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for Basic Training	As per related Trade of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for	Fitter

Note:

- *Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/Generic Learning Outcome after completion of the Mechanic Mining Machinery course of 02 years duration under ATS.

Block I & II

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study. *[Different mathematical calculation & science – Conversion of Units, Percentage, & Mensuration-Area & Volume of different surfaces and solids, and Properties of materials, Ferrous & non-ferrous metals, Mass, weight, Density, Specific Gravity etc.]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Lettering & Numbering, Freehand sketching of Hand tools used for Mechanic Mining Machinery , Orthographic drawing application of both the first angle and third angle methods]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Plan and organize the work to make job as per specification applying different types of basic fitting operation and Check for dimensional accuracy. *[Basic fitting operation – marking, Hack-sawing, Chiselling, Filing, Drilling, Taping and Grinding etc. Accuracy: ± 0.25mm].*
2. Manufacture simple sheet metal items as per drawing and join them by soldering, brazing and riveting.
3. Manufacture simple forge items as per drawing.

4. Set the different parameters to produce components involving basic operations on different machine observing standard procedure and check for accuracy. [Different machines – Shaper & Lathe, Different machining parameters – feed, speed & depth of cut.].
5. Plan & perform simple repair, overhauling of different pumps and compressors and check for functionality.
6. Dismantle & assemble Engine from vehicle along with other accessories.
7. Identify and explain basic functioning of different electrical equipment, sensors and apply such knowledge in industrial application including basic maintenance work.
8. Overhaul Engine and other parts and check functionality.
9. Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system.
10. Diagnose & rectify the defects in vehicle to ensure functionality of vehicle.
11. Carryout overhauling of Alternator and Starter Motor.

Block – II

12. Identify, dismantle, replace and assemble different pneumatics and hydraulics components. [Different components – Compressor, Pressure Gauge, Filter Regulator Lubricator, Valves and Actuators.]
13. Construct circuit of pneumatics and hydraulics observing standard operating procedure& safety aspect.
14. Conduct preventive maintenance, perform dismantling and assembly of different components machine and test for accuracy of rotor, crawler etc.
15. Dismantle Repair and Assemble of mechanical power transmission elements in machine tools and check for functionality.
16. Plan, Execute commissioning and evaluate performance of AC & DC machines.
17. Conduct preventive maintenance, perform dismantling & assembly of different components and test for accuracy to carryout advance lathe operation. [Different components- head stock apron, saddle, tool post tail stock; Different advance lathe operation – taper turning, thread cutting]
18. Plan, dismantle, repair and assemble different damaged mechanical components used for power transmission & check functionality.
19. Plan & perform basic day to day preventive maintenance, repairing and check functionality.
20. Troubleshoot & Overhaul of pumps, fans, blowers & compressors and perform preventive maintenance.
21. Identify fault, carryout maintenance work and break down of different machineries/ equipments viz., , drilling, loaders, dozers, shovels, dumper etc, in the shop floor, using appropriate tools &equipments to ensure its functionality.

22. Plan, execute testing, evaluate performance and carry out maintenance of cable system, measurement of insulation resistance.

Note:

1. *The above operations will be done taking all the Safety Precautions and safety practices, as applicable in the mines under Act.*
2. *Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.*

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution & contribute to avoidance of same.
	1.13 Take opportunities to use energy and materials in an environmentally friendly manner
	1.14 Avoid waste and dispose waste as per procedure
	1.15 Recognize different components of 5S and apply the same in the working environment.
2. Understand; explain different mathematical calculation & science in the field of study. apply	2.1 Explain concept of basic science related to the field such as Material science - Properties of materials, Ferrous & non-ferrous metals, etc.
	2.2 Mass, weight, Density, Specific Gravity etc.

in day to day work.*[Different mathematical calculation & science - Conversion of Units, Percentage, & Mensuration-Area & Volume of different surfaces and solids, and Properties of materials, Ferrous & non-ferrous metals, Mass, weight , Density, Specific Gravity etc.]*	2.3	Use scale/ tapes to measure as per specification.
	2.4	Calculate area / volume of the materials.
	2.5	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6	Ensure dimensional accuracy of assembly by using different instruments/gauges.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Lettering & Numbering, Freehand sketching of Hand tools used for Mechanic Mining Machinery , Orthographic drawing application of both the first angle and third angle methods].*	3.1	Read & interpret the information on drawings and apply in executing practical work.
	3.2	Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3.3	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1	Select appropriate measuring instruments as per tool list.
	4.2	Ascertain the functionality & correctness of the instrument.
	4.3	Measure dimension of the components & record data to analyse with the given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation	5.1	Explain the concept of productivity and quality tools and apply during execution of job.
	5.2	Understand the basic concept of labour welfare

and apply such in day to day work to improve productivity & quality.	legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7.1 Explain personnel finance and entrepreneurship.
	7.2 Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7.3 Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1 Use documents, drawings and recognize hazards in the work site.
	8.2 Plan workplace/ assembly location with due consideration to operational stipulation
	8.3 Communicate effectively with others and plan project tasks
	8.4 Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
Block-I& II (Section:10 in the competency based curriculum)	
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I & block – II** (section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and **Checking / Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*	

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	1. Instructions in safety precaution as applicable to the trade and in mines. 2. Implementation of various safety measures in the shop floor. Visit to different sections of the Institute. Demonstration of elementary first aid. Artificial Respiration. 3. Practice on use of fire extinguishers. 4. **Occupational Safety & Health.** 5. **Importance of housekeeping & good shop floor practices.** 6. Health, Safety and Environment guidelines, legislations & regulations as applicable. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Basic safety introduction, 7. Personal protective Equipment (PPE):- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. 8. Preventive measures for electrical accidents & steps to be taken in such accidents. 9. Use of Fire extinguishers.	Importance of safety and general precautions observed in the Institute and in the section. Importance of the trade in the development of Industrial, Economy of the country. What are related instructions – subjects to be taught – achievement to be made. Recreational, medical facilities and other extracurricular activities of the Institute. (All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training institute System including stores procedures etc.) **Occupational Safety & Health** Basic safety introduction, Personal protection:- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Use of Fire extinguishers. Visit & observation of sections. Various safety measures involved in the Industry. Elementary first Aid. Concept of Standard **Soft Skills**: its importance and Job area after completion of training. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept & its application. Response to emergencies e.g.; power failure, fire, and system failure.
2	10. Marking out from drawings in mm/inch.	Linear measurements and its units. Scribers – method of scribers with the help of rule. Dividers construction and

		use of hermaphrodite calipers construction and use. Centre punch and Dot punch – construction and use. Use of marking media. Harmers – types and uses Angle plates, parallel – block their uses. In marking out practice. Surface plate – construction use and care 'C' clamp and parallel clamp description, uses.
3-4	11. Filing practice, filing true to line.	Surface gauge, description, use and care. Vee-block – construction, use and care. files – types, grade, cut care and uses of various common files. Method of stocking a number of files in the tool kit. File card and its use Convexity of files, its reasons. Proper number of strokes per minute for steady and accurate filing. Right methods of fixing file handle, care of files. Marking off table – construction, use and care. Engineers square – description use and care.
5	12. Chipping practice and practice in grinding hardening and tempering of chisels. 13. Sawing practice. 14. Simple forgoing e.g. cold chisels etc.	Bench vice – constructional details. Function, types, use care and maintenance. Vice clamps and hacksaw - constructional details and types and uses frame. Hack-saw blades – Specification, construction and method of using hacksaw. Chisel – types and function, material for marking chisels correct length and cutting angle of chisel to suit the material. Method of chipping and grinding chisels. Safety precautions for chipping. Use of proper hammers. Metals – main difference between metals and non-metals. Physical and mechanical properties. Ferrous metals. Brief description to the manufacture of pig iron. Cast iron – Brief description of manufacturing process, Varieties grey. Nettled and white. Seasoning of cast iron, use. Steel – classification and uses. Alloy steels, kinds

		and uses. Non-ferrous metals. Instructions on important non-ferrous metal and their uses. Non-ferrous alloys and their uses.
6-7	15. Grinding practice. 16. Marking, Scraping and sharpening of scrapers. 17. Drilling practice in hand drilling & power drilling machine, counter-boring, counter- sinking and spot facing.	Grinding wheels and grinding. Grinding grades and grits Right method of pressing against the face of wheels. Motorised double ended units. Method of mounting grinding. Huntington and diamond dressers. How to dress grinding wheels, wheel dressing cutters, safety precautions for grinding. Marking out operations and procedure, marking lines parallel to the adjacent sides or edges. Parallel lines by turn over method. Marking for the datum lines. Marking out for tangents to the curves. Marking out for curves. Marking out the sector work based on angular distribution. Drills and drilling. Flat drills, construction cutting angles and lips. Grinding flat drill. Twist drill – straight fluted and special types, parallel and taper shanks, various parts and their function. Drill grinding common faults and their ill effects. Drill chuck, key, drill drift, sockets and sleeve, Introduction to drilling machines. Principle types of drilling machines. Bench and pillar of upright drilling machines. Method of drives. Sizes and specification and capacity of a drilling machine. Special features and care. Speed changing system and simple gear boxes. Feed for drilling, standard speed and feed for various metals. Holding job on drilling machine table. Precautions observed while drilling. Counter boring and bits. Spot facing in a drilling machine. Portable drilling machine. Tool grinding. The subject is to be dealt with in details. The art of tool grinding

		should be imparted in a very informal and intensive manners. Broken drills, old screw drivers chisels of various shapes and dot punches should form the range for tool grinding.
8-9	18. Practice in using taps and dies, threading hexagonal and square nuts etc. Cutting external threads on stud and on pipes and riveting practices. 19. Coolants used while reaming & taping. 20. Measuring Practice using with outside & inside micrometer. 21. Measuring Practice using with Vernier callipers. 22. Advanced measurement of bearings through vernier and micrometer.	Tap wrenches. Construction. Standard dimensions. Tapping blind holes. Determination of these sizes of drill, for tapping standard holes. Types commonly used Solid split. Design of stocks & handles. Method or threading with stock and die. Threading lubricants. Setting the threading die. Discuss interchangeability of parts for assembly. Give reasons and advantages. Screw threads standardisation of form threads. Types commonly used. More about threads – Terminology used in screw threads. Specification of the thread form used and data connected. Discuss fastenings – permanent, semi-permanent and temporary. Locking devices – castle nuts, slotted nuts secratted nuts. Washers, spring washers, fibre washers – tap washers etc. Advantages of each type – where generally used and why. Key and key ways – the pre-requisites of a key. Prevention of the circular and longitudinal motions of the mating parts. Kinds, uses and preparation of keys – key fitting. Procedure in removing keys. Reamers – types uses. Allowances for reading. Coolants used while reaming. Taps, sizes of taps, tapping, taping blind holes, lubricants for taping – causes of broken taps. Removing a broken tap from a hole. Micrometer, outside – principle, constructional features name of the parts. Graduations. Reading, use and care. Micrometer, inside – constructional features. Graduation, reading, use and

		care. Depth gauge construction and use. Micrometer construction system of graduations, use and care. Screw thread micrometer. Construction use and care. Vernier calipers - principle, construction. Graduation, reading, use, care & adjustment of venire caliper – vernier, height gauge construction, parts use and care.
10-11	23. Simple sheet metal work Cutting, bending and jointing. Jointing of metals by soft soldering. Making of simple sheet metal articles. 24. Practice in simple riveting. 25. Practice in brazing and welding operation like brazing copper pipe, welding mild steel ring etc.	Sheet metals and wire gauges. Equivalent inch and millimeter sizes of standard wire gauges – metals commonly rolled into sheets such as tin plate, galvanized iron sheet – copper and brass sheets, aluminium sheets. Brief accounts of physical properties of the above common tools used for sheet metal work such as tin – man mallets, stakes, swages, shears, strips, scribers, trammels. Dividers etc. Simple developments and the method of laying out. Types of joints. Such as folded joints. Grooved seams, wired edges, etc. Allowances for lap joints, grooves, beads etc. Rivets and riveting – the object of riveting, the relation between the sizes of rivets and the thickness of sheets. Pitch of the rivets. Rivets – Types, use. Method of riveting using snap and dolly Soldering and brazing – definitions with examples of soldering and brazing hard and soft solders percentage, compositions. Fluxes and spelters, their use. Soldering iron-types and use. Preparing the job for soldering, method of soldering.
12-13	26. Practice in Fitting & extraction of bearing 27. Practice in Fitting & extracting wheels, bushes. 28. Scrapping of bearings. And Scrapping and bed- in white metal or	Different types of bearings – their description, use, method of fitting, lubrication, etc. Friction – its effects methods of reducing friction. Care maintenance and inspection and reconditioning of bearings.

	brass bearings. 29. Use of different type of lubricants and greases for ropes, gears boxes, high speed metal bearings, ball and roller bearing etc	Use of wrenches – types box – spanner, socket – spanner, stubular hood spanner, T –socket wrench, monkey wrench. Ratchet wrench, pipe wrench etc. Generalized study of pulleys. Various types of keys and allowable clearances and tapers. Types and uses of pulley pullers. Revision on precision instruments such as vernier micrometers – Inside and outside, vernier – calipers, height gauges – vernier bevel protractors – depth gauge micrometer, depth gauge, radius gauge, feeler gauges, dial test indicators and comparators measurements of ovality in the cylinder bores.; Scrapers and their types, methods of scrapping. Combination set **:** i)Square head, ii)Protractor head. iii)Centre head and their uses in marking out, checking and setting the job. Vernier bevel protractor. Construction uses and care. Dial indicators – constructional features and various uses of checking the truth of flat and round surfaces.
	Assessment/Examination 03days	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

BASIC TRAINING (Block – II)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	30. Testing of mines gases – use of instruments and apparatus for detection of mine gases. Construction and assembly of flame safety lamp, detection of mine gases, fire – damp by flame safety lamp. Wherever applicable. 31. First Aid to the injured electric shocks, gassing, burn injuries etc. Use of self-rescuer.	Mines safety and Mine Legislation regarding winding engine, haulage, plant and machinery etc. Safety at work – code of conduct in mines. Mine gases – fire damp, after damp, carbon monoxide, carbon dioxide, etc. their physiological effects, means of detection and testing. Oxygen – effects of deficiency of Oxygen in mine atmosphere and care therein. Ignition, explosion of fire damp and coal dust – precautions. Elementary knowledge of working in mines including transport system of both underground and open-cast mines. Types of shafts and wheels – their fitting. Shaft drive, self-drive and reciprocating drive. Crank and ecentric drives, rigid and flexible shafts. Types of bushes and their fitting. Fits and tolerance in bushes. Mines safety and Mine Legislation regarding winding engine, haulage, plant and machinery etc. Safety at work – code of conduct in mines.
2-3	32. Practice in making Eye bolt, stay bolt 'U' clamps and 'J' clamps. 33. Practice in Hot and cold bending of solid bars and pipes 34. Practice in Heat treatment of simple bench tools	General idea about the main operations performed in a forge – such as upset tings, drawing down, twisting bonding, punching, drifting, welding etc. Hammers and sledges. Set hammers, flatters, hardies, fullers, swage and blocks. Hot and cold chisels. Convenient method of holding chisels, fullers and swages etc. Hot and shearing-cold and hot, precaution necessary. The extent and scope of hand forging. The forge, its constructional features and types. Arrangement of blast and its control. Necessary implements. Such as shovel, scoop, poker etc. Building up and renewal of fire prevention of clinker and slag formation. Anvils – names of various parts & their used tongs – their chief

		varieties, types of hammers – their chief varieties types and their use. Hot and cold bending of solid bars and pipes, twisting cold and hot metal. Precautions necessary for forging carbon steel tool. The right heat for forging steel. The reason and remedies of unsound forgings. Instructions on forging chisels, screw drivers, centre punches. Heat treatment of simple bench tools. Such as chisels. Centre punches, screw drivers, small coiled springs. Annealing of hardened steel components. Case hardening hammer heads and vice jaws. Hardening of scriber points, the legs of dividers and calipers etc.
4	35. Installation and maintenance of different types of hauling system, rope haulages safety devices, winding engine, cage and shaft fittings etc.	Haulages – their types, description and application, parts of rope haulages including safety devices on haulage tracks. Types, sizes and function of pulleys and rollers, lubrication. Wire ropes – their types, specification, factors for selection e.g. load, flexibility construction, wearing quality, factor of safety etc. Capping, recapping, changing of wire rope procedure head gear pulley, winding drums, cage, skips, shaft fittings. Suspension gears, tub, tripplers, etc. their function, types and maintenance. Inspection techniques for wire ropes. Determination of ropes. Preventive maintenance – main object and function P.M. section, inspection – Visual and detailed lubrication survey – system of symbol and colour cooling. Testing of machines, tools and equipment P.M. schedules chart. Revision. Simple estimation of materials. Use of head book and reference table.
5-6	36. Installation, operation, alignment and extension of all types of conveyors, locomotives and road haulers used in mines. 37. Special operation such as rope changing, roping slicing, rope capping, change of winding rope, change of guide rope, change of head gear pulley.	Conveyors – scraper chain, armoured chain shaker, plate and belt – types their description and use. Advantage and disadvantages. System of speed variation of conveyors, determination of length and size of belt. Replacement and repair of belts – vertical, horizontal, angular open and cross. Servicing and maintenance of belt conveyors. Types of chains and sprockets, their advantages and disadvantages, method of

		fixing. Installation and maintenance of chain conveyors including safety procedures adopted. Handling heavy equipment. Clutches – friction, plate and dog types their description and use adjustment and repair of clutches, brake and brake lining. Precautions to be taken with clutches and brakes. Types of keys, viz. Flat keys. Tapered keys, wood-ruff keys their materials, methods of fitting, specification and clearances. Mechanical, hydraulic and pneumatic drive – Basic Principles. Types of belts, and belt drives – specification, use, tension and speed. Belt fasteners. Method of aligning shaft and pulleys.
7-8	38. Assembly of different types of drills, their maintenance and overhauling. 39. Inspection and maintenance of boilers used in mines & their fittings. 40. Pipe fitting and laying of pipes in mines including shaft and incline	Drills as applicable to the industry – their types, constructional features and functions of components, types of bits e.g. single chisel, double chisel, cross and Z bit, their materials sizes, sharpening and hardening, air leg. Lubrication, maintenance, common faults and remedies. Loaders – their types of e.g. gathering Arm, Shovel etc. Construction features. Coal crushers their construction and types of screens used. Air compressors – their working principles, sizes, construction etc. Detection of common faults and their repair, lubrication and overhauling of Air compressors.
9	41. Study of simple hydraulic pneumatic and off time electrical equipment. 42. Maintenance of gears and gears boxes. 43. Maintaining stuffing boxes. Overhauling and maintaining hydraulic and pneumatic mining equipment e.g compressors, drills etc.	Study of simple hydraulic pneumatic and off time electrical equipment. Detailed study of Hydraulic circuits
10-11	44. Installation, assembly and maintenance of turbine, centrifugal and mono pumps and submersible pumps. 45. Alignment of pumps with	Pumps – centrifugal, gear, vane, turbine, etc. their constructions and principles of operation. Selection of pumps – head, inlet and output pressure, delivery, speed etc. Alignment, priming etc. Lubrication, types of

	motors and starting and stopping of pumps. Adjustment of thrust in multi-stage pump with balance valve. 46. Installation and maintenance of ventilation equipment. 47. Track laying including fitting of safety devices	maintenance, overhauling, etc. and precaution their of, balancing and testing. Types of vales and coupling, leakage, packing materials and their use. Spares and their stock. Pipes and pipe fittings – their specifications, couplings. Sockets, tees, flanges, glands and seals, sealing compound and their use. Layout, assembly maintenance, repair and testing of pipelines. Ventilation fans centrifugal and axial types, components. Their installation and maintenance. Water gauge.
12-13	49. Assembly of cutting and transporting machines, other face equipment including their maintenance and overhauling, study and maintenance of flame proof enclosures and protections and flame proof fittings. 50. Trouble shooting and preventive maintenance for all the equipments and machinery using in mines.	Cutting, machines and transporting machines applicable to the industry – constructional features, function of individual units. Types and sizes. Pick boxes – their sizes, types, methods of tempering. Running maintenance and safe overhaul procedure of coal cutting machines.
	Assessment/Examination 03 days	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	NUMBER AND FUNDAMENTAL ARITHEMETICAL OPERATION Addition, subtraction, multiplication, division of whole numbers, fraction and decimals, conversion of fraction to decimal and vice-versa. Simplification. Application of above operation to shop problems.	Engg. Drawing – type and their importance. Types of lines, their meaning and application as per IS – 696. Simple conventional symbols for materials and parts as IS-696. Use and application of Drawing Instruments in the geometrical construction – angles, triangles.
2.	UNITS AND MEASUREMENTS System of units, metric and S. I. units, different units of length, area, volume, capacity, weight time, angle, temperature, force, work, power, energy, problems related to trade.	Geometrical construction – rectangles, square, circles tangents. Geometrical construction – polygons, ellipse. Geometrical construction – in volute, oval, helix Geometrical constriction – parabola and hyperbola.
3.	POWER & ROOTS : Factor, power, base, exponent, multiplication and division of power, root of a Number, square root by arithmetics and problems related to trade.	Free hand sketching of straight lines oblique lines, rectangles, circles, squares, polygons, ellipse. Free hand sketching of simple geometrical solids- cube, cone, prism, cylinder, sphere, pyramids. Standard printing style for letters and numbers as per IS: 696. Free hand practice of printing style for standard letters and numbers.
4.	PERCENTAGE : Percentage, changing percent to decimal and fraction and vice-versa, problems related to trade.	Scales construction of plain scale, R.F. Construction of diagonal scale. Simple dimensioning technique size and location dimension parts, holes, angles, taper, screws etc. as per IS: 696.
5.	RATIO AND PROPORTION : Ratio, finding terms and ratio, proportions direct and indirect proportions, application of ratio and proportion to shop problems, mixed direct and indirect proportion.	Transferring measurements for linear, angular, circular, dimensions from the given objects to the related free hand sketches using different measuring instruments. Pictorial drawings – Isometric drawings of simple metrical solids.
6.	ALEGEBRAIC SYMBOLS AND FUNDAMENTAL ALGEBRAIC OPERATION : Signs and symbols used in algebra, co-	Oblique projection of simple geometrical solids. Isometric drawing of simple machined and casting blocks. Free hand

	efficient, terms, like and unlike terms, algebraic addition, subtraction, multiplication and division, power and exponent, law of exponents, simplification, problems.	sketches of trade related hand tools, cutting tools, measuring tools.
7.	FACTORS AND EQUATION : Algebraic formula, factors, and different types of factorization, equations – simple simultaneous; quadratic, application, construction and solution of problems by equations.	Orthographic drawing application of both the first angle and third angle methods in representing the drawings for simple and complex machine blocks given for exercises with dimensions.
8.	LOGARITHMS AND USE OF LOGARITHM TABLES : Logarithm, logarithm and exponent; use of logarithm & anti-logarithm tables,arithmetical operations involving logarithm in the computation, problems related to trade.	Standard methods of sectioning as per IS: 696. Exercises for different sectional views on the given orthographic drawings of machine parts, castings etc.
9.	GEOMETRY : Fundamental geometrical definitions, angles, and properties of angles, triangles, and properties of angles; Pythagoras theorem; properties of similar triangles; rectangle, square, rhombus, parallelograms etc. and their properties regular polygons, application of geometry to shop problems.	Inter-conversions of isometric, oblique drawings to orthographic drawings and vice-versa- related problems- as vee-blocks, simple stepped blocks, blocks oriented by various machining operations etc.
10.	MENSURATION : Plain figures – triangles, square, rectangle parallelogram, trapezium, regular polygons, circle, hollow circle, sector and segment of circle, ellipse and fillets. Solid figures – prism, pyramids, cylinder, cone, frustum of a cone, sphere. Porus and spherical segment, material weight and cost, problems related to trade.	Surface development of solids of simple geometrical solids like cube, rectangular blocks, cone pyramid, cylinder, prisms etc.
11.	TRIGONOMETRY : Trigonometrical ratios; use of trigonometrical tables, area of triangles, finding height and distance by trigonometry, applications of trignonometry to shop problems.	Interpenetration of solids and conventional application of intersectional curves on drawings.
12.	GRAPHS :	Solution of NCVT test paper (Preliminary).

	Abscissa and ordinate, Graphs of straight lines related to two sets of varying quantities.	
13.	Practice on simple pocket calculator.	Revision.
14.	Solution of NCVT test papers.	Test (preliminary).

Block – II		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	Properties and uses of C .I. . W .I. plain carbon steel, alloy steel.	Screw threads – their standard forms as per I.S.I. external and internal thread conventions on the features for drawings as per I.S.I.
2.	Properties and uses of copper, zinc, lead, tin, aluminum, brass, bronze, solder, hearing metal, timber, rubber.	Sketches for bolts, nuts, screws and other screwed members.
3.	Rest and motion, velocity, acceleration - Newton's Laws of Motions – problems.	Standard rivet forms as per I.S.I.
4.	Mass, force, weight; their unit, shop problems.	Riveted joints – lap.
5.	Work, power and energy – their units – applied problems.	Riveted joints – Butt.
6.	Heat and temperature, thermometric scales, their conversions, temperature measuring instruments, quality of heat, sp. heat of solids, liquids, gases, heat loss and heat gain – problems.	Sketches of keys, cotter and pin joints.
7.	Meaning of stress, strain, modulus of elasticity and ultimate strength, different types of stress of safety example.	Sketches for simple pipe unions with a simple pipe line drawing.
8.	Machines – basic principles, velocity ratio, mechanical advantage, efficiency.	Concept of preparation of assembly drawings and detailing – simple assemblies and their details of trade related jobs/ tools/ exercises with the dimensions – from the given simples or models. Tool post for the lathe with washer and screw.
9.	Simple machines like winch, pulley and compound axle etc.	Details and assembly up Vee- blocks with clamps.
10.	Atmospheric pressure, pressure gauge- gauge pressure and absolute pressure.	Details and assembly of shaft and pulley.
11.	Density of solids and liquids – specific gravity principle of Archimedes – relation between sp. gravity and density – simple experimental determination.	Details and assembly of Bush Bearing.
12.	Triangle of forces and parallelogram of forces – composition and resolution forces.	Details and assembly of a simple coupling.
13.	Representation of forces by vectors – simple problems on lifting tackles like jib crane. Wall	Details and assembly of a simple hand vice.

	cranes etc. and solution of the problems with the aid of vector- finding out the stress on ropes on erricks by graphical method.	
14.	Moment of forces – couples – principle of levers types of levers – simple problems on straight and bell cranked levers.	Blue Print Reading – simple exercises, related to missing lines.
15.	Centre of gravity – simple experimental determination stable, unstable and neutral equilibrium of bodies - simple explanation.	Blue Print Reading – simple exercises related to missing views.
16.	Friction – co- efficient of friction, simple problems.	Simple exercises related to missing symbols.
17.	Magnetic substances – natural and artificial magnets - methods of magnetization – uses of magnets.	Simple exercises related to missing sections.
18.	Electricity and its uses – electric current- positive and negative terminals – uses of fuses and switches – conductors and insulators – simple electric circuits, Ohm's law – simple calculation – electrical insulating materials.	Simple exercises related to missing dimensions.
19.	Meaning of tenacity, elasticity, malleability, brittleness, hardness, and ductility examples.	Simple exercises related to identification of faces.
20.	Heat – reatment – hardening, annealing, tempering, normalizing, case hardening, standard and measurements.	Advanced Blue Print Reading.
21.	Transmission of power by belt pulley and gear drive.	Free hand sketching of details from assembly drawings.
22.	Meaning of tenacity, elasticity, malleability, brittleness, hardness, compressibility and ductility.	Code of practice for General Engineering Drawing according to IS: 696 – 1960.
23.	Meaning of stress, strain, modulous of elasticity, ultimate tensile strength, factor of safety and different types of stresses.	Further free hand sketches and drawings of typical mechanical components, drives, etc. related to the equipments mentioned above in addition to the contents of Fitter trade under the Apprentices Act, 1961.
24.	Gear and belt drivers. Determination of horse power, speed and size of pulleys and gears.	Solution of NCVT test papers
25.	Difference between pressure and force.	Revision.
26.	Velocity, acceleration and retardation.	Institute test.
27.	Descriptive explanation of expansion of solids, liquids and gases due; to heat co-efficient of expansion. Brief description of transference of heat – conduction, conversation and radiation.	

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I **(Duration – 55 hrs.)**	
1. English Literacy	Duration : 20 Hrs. Marks : 09
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy	Duration : 20 Hrs. Marks : 09
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking	Basic of computer Networks (using real life examples), Definitions of

and Internet	Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	Duration : 15 Hrs. Marks : 07
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
Block – II **Duration – 55 hrs.**	
4. Entrepreneurship Skills	Duration : 15 Hrs. Marks : 06

Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity	Duration : 10 Hrs. Marks : 05
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education	Duration : 15 Hrs. Marks : 06
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety

	measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in -house environment.
7. Labour Welfare Legislation	Duration : 05 Hrs. Marks : 03
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools	Duration : 10 Hrs. Marks : 05
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block – I

1. Plan and organize the work to make job as per specification applying different types of basic fitting operation and Check for dimensional accuracy. *[Basic fitting operation – marking, Hack-sawing, Chiselling, Filing, Drilling, Taping and Grinding etc. Accuracy: ± 0.25mm].*
2. Manufacture simple sheet metal items as per drawing and join them by soldering, brazing and riveting.
3. Manufacture simple forge items as per drawing.
4. Set the different parameters to produce components involving basic operations on different machine observing standard procedure and check for accuracy. [Different machines – Shaper & Lathe, Different machining parameters – feed, speed & depth of cut.].
5. Plan & perform simple repair, overhauling of different pumps and compressors and check for functionality.
6. Dismantle & assemble Engine from vehicle along with other accessories.
7. Identify and explain basic functioning of different electrical equipment, sensors and apply such knowledge in industrial application including basic maintenance work.
8. Overhaul Engine and other parts and check functionality.
9. Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system.
10. Diagnose & rectify the defects in vehicle to ensure functionality of vehicle.
11. Carryout overhauling of Alternator and Starter Motor.

Block – II

12. Identify, dismantle, replace and assemble different pneumatics and hydraulics components. [Different components – Compressor, Pressure Gauge, Filter Regulator Lubricator, Valves and Actuators.]
13. Construct circuit of pneumatics and hydraulics observing standard operating procedure& safety aspect.
14. Conduct preventive maintenance, perform dismantling and assembly of different components machine and test for accuracy of rotor, crawler etc.
15. Dismantle, Repair and Assemble of mechanical power transmission elements in machine tools and check for functionality.
16. Plan, Execute commissioning and evaluate performance of AC & DC machines.

17. Conduct preventive maintenance, perform dismantling & assembly of different components and test for accuracy to carryout advance lathe operation. [Different components- head stock apron, saddle, tool post tail stock; Different advance lathe operation – taper turning, thread cutting]
18. Plan, dismantle, repair and assemble different damaged mechanical components used for power transmission & check functionality.
19. Plan & perform basic day to day preventive maintenance, repairing and check functionality.
20. Troubleshoot & Overhaul of pumps, fans, blowers & compressors and perform preventive maintenance.
21. Identify fault, carryout maintenance work and break down of different machineries/ equipments viz., drilling, loaders, dozers, shovels, dumper etc, in the shop floor, using appropriate tools &equipments to ensure its functionality.
22. Plan, execute testing, evaluate performance and carry out maintenance of cable system, measurement of insulation resistance.

Note:

1. *Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.*
2. *In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.*

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

MECHANIC MINING MACHINERY			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Rule steel	15 cm with metric graduations also.	20
2.	Square try	10 cm blade.	20
3.	Caliper outside	15 cm spring.	20
4.	Caliper in side	15 cm spring.	20
5.	Caliper	15 cm Hermaphrodite	20
6.	Divider	15 cm spring.	20
7.	Scriber	15 cm.	20
8.	Punch centre	10 cm.	20
9.	Screw driver	15 cm.	20
10.	Chisel cold	19mm.	20
11.	Hammer ball peen	0.45 Kg. with handle.	20
12.	Hammer ball peen	0.32 Kg. with handle.	20
13.	File flat	25 cm second cut.	20
14.	File flat	25 cm smooth.	20
15.	File half round	second cut 15 cm.	20
16.	Hacksaw frame adjustable	20-30cm.	20
17.	Safety goggles (Pistol grip tubular)		20
18.	Dot slot punch		20
B : INSTRUMENTS & GENERAL SHOP OUTFIT			
19.	Rule steel	30 cm to read metric.	5
20.	Rule steel	60 cm.	5
21.	Straight edge steel.	45 cm	2
22.	Plate surface	145 cm x 45 cm	2
23.	Height table	01 x 91 x 122 cm	2
24.	Universal scribing block	22 cm.	2
25.	Block-vee pair.	7 cm and 15 cm with clamps	2
26.	Square adjustable	15 cm blade.	2
27.	Angel plate	10 x 20 cm.	2
28.	Level spirit metal.	15 cm	1
29.	Punch letter	3mm set.	1
30.	Punch figure set	8 mm.	1

31.	Punch hollow	6 mm to 19 mm set of 5.	2
32.	Punch round	3mm x 4 mm set of 2.	2
33.	Portable hand drill (Electric)	0 to 6 mm.	2
34.	Drill brace hand	0 to 12 mm.	2
35.	Drill twist S/S	1.5 mm to 12 mm by 0.4 mm.	1set
36.	Drill twist S/S	3 mm by ½mm.	1set
37.	Brace ratchet with pillar.		1
38.	Tape & dies complete set in box B.A.		1
39.	Taps & dies complete set in box B.S.F		1
40.	Taps & dies complete in box white—worth.		1
41.	Taps dies complete set in box American.		1
42.	Taps & dies complete set box (Metric).		1
43.	File warding	15 cm smooth.	4
44.	File knife edge	15 cm smooth.	4
45.	File cant saw	15 cm smooth.	4
46.	File feather edge	15 cm smooth	4
47.	File triangular	15 cm smooth.	2
48.	File round	20 cm second cut.	8
49.	File square	15 cm second cut.	4
50.	File square	25 cm second cut.	4
51.	Feeler gauge.		1Set
52.	File triangular	20 cm second cut.	8
53.	File flat	30 cm second cut.	8
54.	File flat	20 cm bastard.	8
55.	File flat	30 cm bastard.	8
56.	File Swiss type needle set 12.		2
57.	File half round	25 cm second cut.	8
58.	File half round	25 cm bastard.	8
59.	File round	30 cm bastard.	4
60.	File hand	15 cm second.	8
61.	Card file.		8
62.	Stone oil	15 cm x 5 cm x 2.5 cm.	4
63.	Stone carborundum	15 cm x 5 cm x 4 cm.	2
64.	Can, oil	0.25 litre.	4
65.	Plier combination.	15 cm	2
66.	Iron soldering	350gm.	2
67.	Lamp, blow	0.55 litres.	2
68.	Spanner adjustable	15 cm.	2

69.	Spanner white worth D.E.	6mm to 25mm set of 8	4
70.	Inter-changeable ratchet set with a 12 mm. Driver-socket range-	4mm to 14 mm set of 7.	1set
71.	"APOLLO" bor spanner set in mm-	6x4, 6x9,9x11, 12x14, 15x9, 22x25, set of 6 with a tommy bar.	1set
72.	Glass magnifying	7cm	2
73.	Clamp tool maker	5 cm and 7.5 cm set of 2.	2
74.	Clamp 'C'	5 cm.	2
75.	Clamp 'C'	10 cm.	2
76.	Reamer adjustable	max. 9 mm, 12mm, 19mm set of 3.	1
77.	Reamer taper	4 mm to 9 mm set of 4.	1
78.	Reamer parallel	6 mm to 12 mm set of 5.	1
79.	Scraper flat	15 cm.	8
80.	Scraper 3 corner	15 cm.	8
81.	Scraper half round	15 cm.	8
82.	Chisel cold cross cut &diamond.	9 mm	8each
83.	Chisel cold flat.	19 mm	8
84.	Chisel cold round nose.	9 mm	8
85.	Extractor stud EZY out.		2
86.	Set combination	30 cm.	2
87.	Micro meter outside.	0-2.5 cm	8
88.	Micro meter outside.	0-25 mm	4
89.	Micro meter outside.	25-50 mm	3
90.	Micro meter out side	50-75 mm	2
91.	Micro meter inside with extension rods	5 cm to 20 cm	1
92.	Vernier caliper	20 cm.	1
93.	Vernier height gauge	30 cm.	1
94.	Vernier bevel protractor.		1
95.	Screw pitch gauge		1
96.	Wire gauge, metric standard.		1
97.	Drill twist T/S	6 mm x25 mm x 1.5 mm.	1
98.	Drill chuck	12 mm.	1
99.	Pipe wrench	40 cm.	1
100.	Pipe wrench	30 cm.	1
101.	Pipe vice	No. 4.	2
102.	Adjustable pipe die	0-205 cm cap.	1
103.	Wheel dresser (One for 4 units)		1
104.	Machine vice	10 cm.	1
105.	Machine Vice	15 cm.	1
106.	Sleeve drill Morse	0-0, 0-1, 1-2, 2-3.	1set
107.	Vice bench	12 cm jaw.	16

108.	Vice leg	10 cm jaw.	2
109.	Bench working	240 cm x120 cmx 60 cm.	4
110.	Almirah	180 x 90 cm x 30 cm.	2
111.	Lockers with 8 drawers (Standard).		2
112.	Metal rack	182 cm x 182 cm x 4.5 cm.	1
113.	Desk.		1
114.	Stool.		1
115.	Black Board with Easel.		1
116.	Fire extinguisher (for 4 units).		2
117.	Fire buckets		2
118.	Machine Vice		2
119.	Wing hammer	25.4 cm or 30 cm.	2
120.	Hand hammer with handle	1 kg	2
121.	Hammer smith with handle.	2 Kg.	2
122.	Tongs round		2
123.	Tong flat.		2
124.	Smith's square	45 cm x 30 cm.	1
125.	Cold set rodded.		2
126.	Hot set rodded.		1
127.	Swage top& bottom (Pair).	12 mm, 19 mm, 25 mm	1 each
128.	Swage block	35 cm x 35 cm x 12 cm	1
129.	Flatter (rodded) square.	55 mm,	2
130.	Fuller top and bottom (Pair)	6 mm 9 mm	2
131.	Anvil	50 Kg.	2
132.	Anvil stand.		2
133.	Shovel		2
134.	Rake		2
135.	Trammel		1
136.	Quenching tank		1 (To be made in the Instt,)
137.	Pocker		2
138.	Hardie		2
139.	Leather apron.		2
140.	Prick punch.		2
141.	Mallet		2
142.	Snips straight	25.4	2
143.	Setting hammer with handle.		2
144.	Planishing hammer.		2
145.	Snip bent 25 cm.		2
146.	Stake hatchet		2

147.	Stake grooving		2
148.	Gauge imperial sheet.		1
149.	Gauge Slip as Johnson metric sets		1set
150.	Gauge snap go and no go	25 to 50 mm by 5 mm	1set
151.	Gauge plug single ended	5 to 25 mm by 1 mm.	1set
152.	Gauge telescopic.		1set
153.	Dial test indicator to read .000',''on stand.		1
154.	Dial test indicator to read .01 mm on stand		1
155.	Sine bar	125 mm.	1
156.	Sine bar	250 mm.	1
157.	Lathe tools H.S.S. tipped set.		2
158.	Lathe tools bit	6 mmx 75 mm.	12
159.	Lathe tools bit	7 mmx 75 mm.	12
160.	Lathe tools bit	9 mm x 85 mm.	12
161.	Arm stong type tool bit holder R.H.		2
162.	Arm stong type tool bit holder L.H.		2
163.	Arm stong type tool bit holder straight.		2
164.	Stilson wrenches	20 mm.	2
165.	Spanner monkey up to	5 cm	2
166.	Pipe cutter wheel type.	6 mm to 50 mm	2
167.	Pipe vice to grip pipe	up to 50 mm.	2
168.	Pipe stocks and dies complete with stocks bursting, bushing holders taps and tap wrenches, sizes covered 19 mm, 25 mm, 32 mm, 6 mm, 9 mm, 12 mm, 19 mm, 25 mm, 32 mm, 38 mm, 50 mm		1set
169.	Pipe bender sools type stand manually operated.		1
170.	Adjustable spanner	38 cm long.	1
171.	Adjustable pipe chain tongs 22 cm. long to take pipes from 3 cm to 63 mm.		1
C : GENERAL MACHINERY INSTALLATIONS			
172.	Anvil 50 Kg. stand.		1
173.	Drilling machine pillar sensitive 0-20 mm rap. With swivel table motorised with chuck and key.		1
174.	Drilling machine bench sensitive 0-12 mm cap. motorised with chuck		2

	and key		
175.	Forge portable hand blower	38 cm to 45 cm.	1
176.	Grinding machine (General purpose) D.E. pedestal with 17 mm dia. wheels rough and smooth with twist drill grinding attachment.		1
GENERAL MACHINERY INSTALLATION			
177.	Furnace electric wire porch 15 cm x 15 cm x 30 cm x deep temperature of stand 3, 000º c with temperature reading scale.		
178.	Lathe all geared head stock S.S. and S.C. height of centre over bed 15 cm. Gap head complete with accessories e.g. pump, all fittings and splash guard, driving plate with drives, face plate, 3 jaw and 4 jaw chucks, fixed and trave lings steady compound turret tool post, taper turning attachment, fixed and running centres, driving dogs, straight and bent tails.		

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: MECHANIC MINING MACHINERY

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		21
2.	Set square celluloid 45^o)	(250 X 1.5 mm	21
3.	Set square celluloid 30^o-60^o	(250 X 1.5 mm)	21
4.	Mini drafter		21
5.	Drawing board IS: 1444	(700mm x500 mm)	21
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board		20
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board	(size: 8ft. x 4ft.)	01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS &EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools &Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														