

SHOT FIRER/ BLASTER (MINES)

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



SECTOR – MINING & MINERALS



GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

Short Firer/ Blaster (Mines)

SHOT FIRER/ BLASTER (MINES)

(Revised in 2018)

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NSQF LEVEL - 5

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Developed By

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Directorate General of Training
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The DGT sincerely expresses appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

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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.

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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.



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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.

Shot Firer/ Blaster (Mines) trade under ATS is one of the most popular courses delivered nationwide through Electricity Boards. 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.

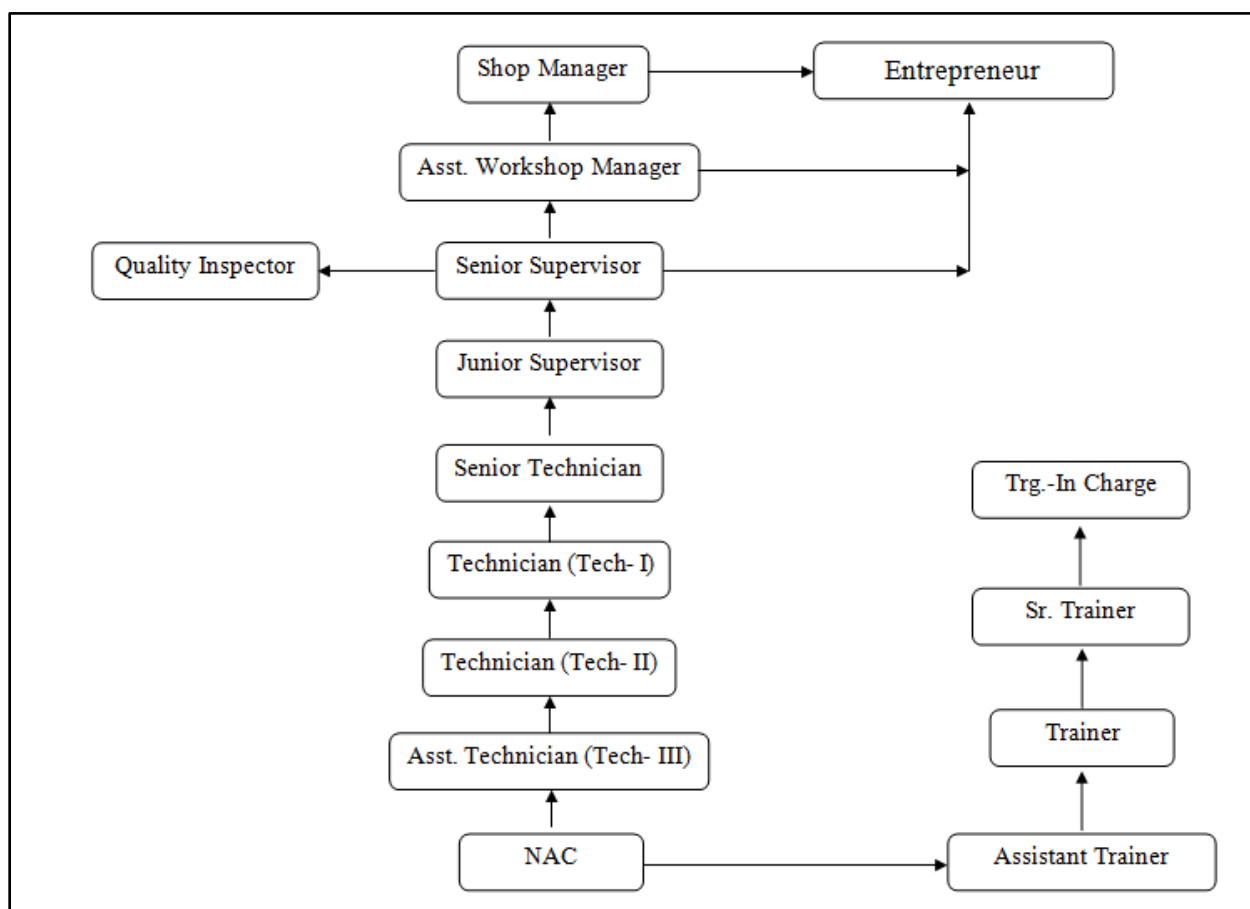
Broadly candidates need to demonstrate that they are able to:

- 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.

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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

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A. Basic Training

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

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

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 1styr. + 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

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institute have to maintain individual *trainee portfolio* as detailed in assessment guideline (section-2.4.2). 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 (section-2.4.2) 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 OSH 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:

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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.

Brief description of Job roles:

Shot Firer; Blaster; Dynamite Man conducts blasting operations in mines and quarries by charging drilled holes with requisite amount of explosives. Examines holes and areas to be blasted. Ensures that shot holes are properly drilled and cleaned before charging. Determines quantity and type of explosive to be used; loads shot hole with cartridges of explosive. Stems hole with clay, sand or other suitable stemming to prevent shot from blowing out. Signals Shot Firer Operative nearby to take safety measures. Couples fuse or cable to detonator lead. Splits end of fuses with knife or connects cable to electric exploder. Lights fuse or operates key of exploder to ignite explosive. Follows signal and restrains entry of workers at place of explosion before exploding and until atmosphere in area is free from dust, smoke or fumes. Directs Stone Duster to spread stone dust over roof floor and sides of roadways for suppressing coal dust explosives. Takes prescribed precautions in case of misfire. Maintains logbook for recording quantity of explosive used, number of shots fired and misfired, if any. May drill shot holes in quarries and mines using pneumatic or hand drills.

Reference NCO & NOS: 7542.0100

Notes: The apprentices are required to pass the following statutory examination conducted by Board of learning Examination under D.S.K.S.

- i) Gas testing certificate examination. (As applicable).
- ii) Shot firer/ Blaster Examination.
- iii) First Aid Examination.

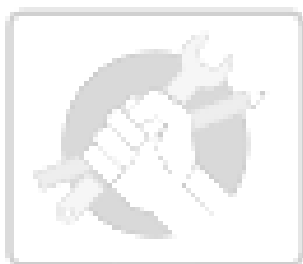
NSQF level for Shot Firer/ Blaster (Mines) trade under ATS: **Level 5**

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 Shot Firer/ Blaster (Mines) 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	SHOT FIRER/ BLASTER (MINES)
NCO-2015	7542.0100
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 in Matriculation Examination under 10+2 System of education or its equivalent.
Selection of Apprentices	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 ITIs
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 SHOT FIRER/ BLASTER (MINES) Apprenticeship	Shot Firer/ Blaster (Mines)

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.

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Shot Firer/ Blaster (Mines) 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 including basic electrical. *[Different mathematical calculation & science - Arithmetic, Algebra & Mensuration, Heat & Temperature, Levers & Simple machine, Centre of gravity, temperature scales and conversion]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing- Principles of sketching, Sketching work places, positions of holes in various work faces, Firing circuits, Different types of supports in work places.]*
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. Observe & practice in all mechanical & electrical works. Practice providing first aid.
2. Study of Miners outfits and those of shot firer. Identification of sample of different kinds of rocks.
3. Identification of different types of supports used in mines.
4. Examining work places and roof and sides of working including sites for election of supports in various situation.
5. Testing of mine gases using flame safety and other testing instruments in use.

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6. Arranging and coursing ventilation by use of brattices, sheets etc.
7. Use of self Rescuer.
8. Identification of different types of explosives.
9. Transporting explosives from magazine to work and Storing explosive temporarily underground.
10. Preparing charges with different kinds of explosives.
11. Study and assembly of drilling equipment various accessories e. g. Drills, rods, bits etc.
12. Drilling of shot holes for undercut / side cut or over cut faces / stope and development faces.
13. Drilling of deep holes for heavy blasting, (Burden and Spacing).
14. Placing of deep holes.
15. Cleaning, charging and stemming of deep holes with different kinds of explosives.
16. Drilling shot holes for secondary blasting and firing.
17. Practising muffle blasting/ shot firing.
18. Making different circuits and checking the circuits.
19. Use of holes directors and templates etc.

B. BLOCK – II

1. Drilling in sinking and stone drifts with pneumatic drills.
2. Drilling in coal heading dips and inclines in different situation.
3. Examining shot holes.
4. Placing of shot holes in different work faces and their examinations after they are drilled.
5. Selection of shot holes for charging and firing.
6. Use of shot firing tools e.g. crimpers, knife, pricker, crack detector, steaming rods, circuit tester.
7. Steaming and charging of shot holes.
8. Assist in firing of shot holes e.g. single shot, multiple shots, in rounds, multiple shots with delay detonators with fuses, cordte and detonators.
9. Identifications of different types of exploder their uses and care.
10. Assist in dealing with blown out shots, misfires.
11. Cautioning before and taking shelter.
12. Examining gases before and after firing and making the places safe after firing.
13. Firing shots in sinking, drifting and headings.
14. Charging of drill holes in open cast working with different kinds of explosives.
15. Assist in firing of shots in open cast benches, drill holes for heavy blasting.
16. Examining work places before and after shot firing/ blasting.

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17. Receiving instructions and execution.
18. Planning work for desired number of rounds of firing.
19. Handing over charge and writing report.
20. Work with responsibility as 'shot firer' 'Blaster' and develop skill.

Note: Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.



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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 Protective 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.

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2. Understand, explain different mathematical calculation & science in the field of study including basic electrical and	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
apply in day to day work. <i>[Different mathematical calculation & science - Arithmetic, Algebra & Mensuration, Heat & Temperature, Levers & Simple machine, Centre of gravity, temperature scales and conversion]</i>	2.2 Measure dimensions as per drawing
	2.3 Comply given tolerance.
	2.4 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.5 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing- Principles of sketching, Sketching work places, positions of holes in various work faces, Firing circuits, Different types of supports in work places.]</i>	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 such as per tool list.
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	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 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	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.

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available resources.	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	
<u>Block-I & II (Section:10 in the competency based curriculum)</u>	
<i>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.</i>	

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Study of Miners outfits and those of shot firer. Identification of sample of different kinds of rocks.	Requirement of first aid under mines rules and necessity thereof. Rules of first aid. In case of accidents what to do for first-aid. Duties of injured and other persons – including officials after receiving information of an injury to a person. Explain construction of body. Explain vital parts of the body and blood circulation. Bleeding and its first aid. Explain vital pressure points. Use of Truncates etc. Fracture and its first aid. Explain vital pressure of fractures and of splints for immobilising fractured parts. Explain respiratory system and respiratory blockade-reasons the roof. How to detect the same. How to give artificial respiration? Different methods of artificial respiration to be explained and practical to be done (2sessions). Explain different kinds of burns and their first aid. Heat stroke and its first aid.
2	Identification of different types of supports used in mines. Examining work places and roof and sides of working including sites for election of supports in various	Coal/Minerals and their formation. A General knowledge of associated strata (as applicable). Explain various geological disturbances

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	situation	such as faults, folios, dykes, sills, wash outs, cleavages, bedding planes, slips etc. Different modes of entry, Reasons thereof. Difference between underground and open cast. Pillars and Galleries in underground.
3	Testing of mine gases using flame safety and other testing instruments in use. Arranging and coursing ventilation by use of brattices, sheets etc.	Benches of slopes in open cast. Winning of coal: (Applicable to coal mines) Different methods at face: i) Pick mining, ii) Machine Cutting, iii) Solid blasting Types of explosives used in underground and open cast mines excluding heavy blasting. Mine Gases: Occurrence, danger and precautions (3 sessions).
4	Use of self Rescuer. Identification of different types of explosives	Ventilation- Standard of ventilation- Face, district and mine (2 sessions). Transport system for winning face to Surface (2 sessions). Travelling and Haulage road way- CMR requirements, etc. Coal dust, its hazards and precautions. (As applicable).
5	Transporting explosives from magazine to work.	Roof support-requirements, development/depillaring/ stopping. Lighting requirement- Individual and general Dangers due to water in underground and open cast mines. Duties of persons employed in mines. Use of safely boots, safely helmets and other protective equipment by the persons employed in mines.
6	Storing explosive temporarily underground.	Eligibility of persons to become shot firers, blasters, mining sirdars and over man.

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		Explain practical experience and examination required to pass in each case. To take practical training in the mine for A. Gas Testing. B. First Aid. C. Shot firing/ Blasting. D. Timbering. E. Depillaring/ stopping (2 session)
7	Preparing charges with different kinds of explosives	Various methods of entry to a coal ore body shaft, drift, incline and adit. Give specific example to explain the choice of methods of entry. Requirements of coal mine regulations MMR for number of outlets from a mine and from mine parts. Periodic examination of outlets, provisions of coal mines, regulations MMR in respect of open cast projects(s) depillaring and stopping. Various work cycles at the face. Dangers while mining a gallery in coal such as roof fall, presence of gases and coal dust and to counteract the same.
8	Study and assembly of drilling equipment various accessories e. g. Drills, roads, bits etc.	Explain presence of various mine gases, their properties, & physiological effects on human beings (3 sessions). Define and explain various mine gases, gassiness of mines, use of auxiliary fans in mines to be explained. Precautions against inflammable and noxious gases. Construction and maintenance of safety lamps, use of safety lamps, repair of safety lamps, precautions to be taken in safety lamp room. (2 sessions) Detection practice of fire damp by flame safety lamp. Limitations of flame safety lamp. Top feed safety lamp. (2 sessions)

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9	Drilling of shot holes for undercut / side cut or over cut faces / stope and development faces.	Various types of methanometers used in the mine for detection of fire damp. How to use them. Various methods of detection of carbon monoxide carbondiozide in the mines. Detection of nitrous fumes and stink damp in the mines. Precaution against eruption of gases. Layering of gas, accumulation of gas in cavities. Blowers and outbursts of gas, dealing with them. Emergency organization for: a) Fire, b) Inundation. Explain fire – lamp explosion, their cause and how to avoid the same.
10	Drilling of deep holes for heavy blasting, (Burden and Spacing). Placing of deep holes.	Coal dust explosion, their cause and measures to control the same. Dust suppression, S.O. Gassiness, sampling etc. After effect of explosion and precautions against this. Use of self – rescues to be explained.
11	Cleaning, charging and stemming of deep holes with different kinds of explosives Drilling shot holes for secondary blasting and firing.	Various causes of fires in the mines. Explain spontaneous heating of coal. Precautions against surface fires and underground fires.
12	Practising muffle blasting/ shot firing. Making different circuits and checking the circuits. Use of holes directors and templates etc.	Explain various hazards caused by coal dust (health hazards also). Precautions to be taken to control the hazards. Precautions against dust. Execution of dust control measures.
13	Internal 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.

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BASIC TRAINING (Block – II)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1.	Drilling in sinking and stone drifts with pneumatic drills. Drilling in coal heading dips and inclines in different situation.	Types of Explosives-low, high, permitted, non-permitted, use of explosive in the underground ground and cast mines. Solid blasting and out blasting in underground mines use of small dia explosives in open cast mines.
2	Examining shot holes. Placing of shot holes in different work faces and their examinations after they are drilled.	Requirement regarding storage of explosives cartridges, magazine, stores and premises to store explosives. Cases and containers for carrying explosives. Requirement regarding transport of explosives including bulk transport. Explosives reserves station in mines.
3	Selection of shot holes for charging and firing. Use of shot firing tools e.g. crimpers, knife, pricker, crack detector, steaming rods, circuit tester.	Requirement regarding appointment of shot-firers and their duties. Shotfirer's /blaster's tools. Requirement regarding drilling, charging, stemming, firing of shot holes, electric shot firing blasting.
4	Steaming and charging of shot holes. Assist in firing of shot holes e.g. single shot, multiple shots, in rounds, multiple shots with delay detonators with fuses, cordte and detonators.	Requirement regarding taking-shelters while firing shots/ blasting. Precaution against dry coal while. Firing shots in underground mines. Use of permitted explosives. Few examples of accidents for not taking proper shelter. Approved shot firing/ blasting apparatus, additional precautions in gawe/ mines while using explosives under CRM 1957 shot firing cable approved under circular issued by D. G. M. S.
5	Identifications of different types of exploder their uses and care.	Precautions after shot firing/ blasting misfires, special precautions in stone drifts. Duties of the shot firer/ blaster at the end of his shift. General precaution regarding explosives.
6	Assist in dealing with blown out shots, mis-fires.	Blasting at the coal face in underground. Mine boiled blasting and out blasting patterns, power factor of explosives and detonators and

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		additional precaution required to be taken in case of solid blasting and out blasting and out blasting (2 sessions).
7	Cautioning before and taking shelter.	Heavy blasting pattern o/c mine explain. Burden spacing, tee, calculation of requisite charge, blasting by liquid oxygen. (2 sessions).
8	Examining gases before and after firing and making the places safe after firing.	Small dia. Hole blasting in o/c mines, disadvantages, dangers from flying rock pieces. Dangers from flying rock pieces, dangers due to lighting while firing shots electrically. Controlled blasting in o/c mines, muffled-blasting.
9	Firing shots in sinking, drifting and headings.	Drilling by coal drill at a coal face and by stone drill in a stone drift. Compressed air drill in stone drift and o/c mines. Both in coal and stone. Various drilling patterns used in driving.
10	Charging of drill holes in open cast working with different kinds of explosives.	A stone drift. And necessity of controlling a drilling pattern. (2 sessions). Various drill patterns used in sinking shafts.
11	Assist in firing of shots in open cast benches, drill holes for heavy blasting. Examining work places before and after shot firing/ blasting.	Requirement of dressing after blasting, requirement of support after blasting (O.G.M.S. Circular) before men are engaged to remove broken materials.
12	Receiving instructions and execution. Planning work for desired number of rounds of firing.	Pilferage of explosives and its prevention. Transit slip system.
13.	Handing over charge and writing report. Work with responsibility as 'shot firer' 'Blaster' and develop skill.	<u>STATURORY REQUIREMENTS AND GENERAL.</u> Provision of CMR/ MMR relating to shot firing/ blasting. Handling over charge and writing of reports at the end of the shift by shot firer/ blaster.
Internal Assessment 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.

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration: - 30 hrs.)
1.	Simple Arithmetic principles & Calculations.	Types of lines.
2.	Simple mensuration and calculations.	Principles of sketching.
3.	Elementary algebra and practice.	Sketching a) work places:
4.	Units, measure, weights and volumes and calculations.	Sketching b) positions of holes in various work faces

Block – II		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration: - 30 hrs.)
1.	Simple mechanics principles, levers, pulleys, work, friction power energy etc.	Blue print reading.
2.	Concept of density, Specific gravity, velocity acceleration, retardation.	Sketching order of firing.
3.	Temperature and calorie, temperature scales and conversion.	Sketching c) Firing circuits
4.		Sketching d) Different types of supports in work places.

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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.

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Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of 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.	

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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.

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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-JOB TRAINING)

BROAD LEARNING TO BE COVERED IN INDUSTRY FOR SHOT FIRER/ BLASTER (MINES) TRADE: Block-I

1. Observe & practice in all mechanical & electrical works. Practice providing first aid.
2. Study of Miners outfits and those of shot firer.
3. Identification of sample of different kinds of rocks.
4. Identification of different types of supports used in mines.
5. Examining work places and roof and sides of working including sites for election of supports in various situation.
6. Testing of mine gases using flame safety and other testing instruments in use.
7. Arranging and coursing ventilation by use of brattices, sheets etc.
8. Use of self Rescuer.
9. Identification of different types of explosives.
10. Transporting explosives from magazine to work.
11. Storing explosive temporarily underground.
12. Preparing charges with different kinds of explosives.
13. Study and assembly of drilling equipment various accessories e. g. Drills, rods, bits etc.
14. Drilling of shot holes for undercut / side cut or over cut faces / stope and development faces.
15. Drilling of deep holes for heavy blasting, (Burden and Spacing).
16. Placing of deep holes.
17. Cleaning, charging and stemming of deep holes with different kinds of explosives.
18. Drilling shot holes for secondary blasting and firing.
19. Practising muffle blasting/ shot firing.
20. Making different circuits and checking the circuits.
21. Use of holes directors and templates etc.

Block – II

22. Drilling in sinking and stone drifts with pneumatic drills.
23. Drilling in coal heading dips and inclines in different situation.
24. Examining shot holes.
25. Placing of shot holes in different work faces and their examinations after they are drilled.
26. Selection of shot holes for charging and firing.

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27. Use of shot firing tools e.g. crimpers, knife, pricker, crack detector, steaming rods, circuit tester.
28. Steaming and charging of shot holes.
29. Assist in firing of shot holes e.g. single shot, multiple shots, in rounds, multiple shots with delay detonators with fuses, cordteand detonators.
30. Identifications of different types of exploder their uses and care.
31. Assist in dealing with blown out shots, mis-fires.
32. Cautioning before and taking shelter.
33. Examining gases before and after firing and making the places safe after firing.
34. Firing shots in sinking, drifting and headings.
35. Charging of drill holes in open cast working with different kinds of explosives.
36. Assist in firing of shots in open cast benches, drill holes for heavy blasting.
37. Examining work places before and after shot firing/ blasting.
38. Receiving instructions and execution.
39. Planning work for desired number of rounds of firing.
40. Handing over charge and writing report.
41. Work with responsibility as 'shot firer' 'Blaster' and develop skill.

Note: Actual training will depend on the existing facilities available in the establishments.

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.

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

SHOT FIRER/ BLASTER (MINES)		
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 with Specifications	Quantity
1.	Simple geological models- folds, faults etc.	
2.	Sample of rocks- different types (Specimen)	
3.	Sample of universals- different type.	
4.	Strike plate.	
5.	Lens.	
6.	Hammers (Geological)	
7.	Clinometers.	
8.	Hygrometer (Sterrowwhisting type).	
9.	Centigrade thermometers.	
10.	Anemometers/ Voltmeters.	
11.	Miners cut-fit and that of sirdar/mate, Blaster/ Shot firer.	
12.	Carpentry tools and equipment.	
13.	Measuring scales, tapes, plumb-bobs, spirit-level etc.	
14.	Prop-with drawer, buntions, sticks for testing.	
15.	Hammers, crowbar, chisel bar etc.	
16.	Chalk, strings, etc.	
17.	Spanners and tools necessary for rigid supports.	
18.	Self-Rescuer	
19.	Samples of explosives, detonators and fuses, etc.	
20.	Drilling apparatus and equipment including supply and control panels.	
21.	Hole directors, templates.	

Short Firer/ Blaster (Mines)

22.	Pneumatic drills and accessories.	
23.	Flame safety lamps, magnetic unluckier, Electric lamps, fittings and accessories.	
24.	Gas testing instruments and equipment.	
25.	Methanometers-different types.	
26.	Signalling and communicating systems.	
27.	Different types of pumps.	
28.	Different types of machines and equipment .	
29.	Co-detector/ multigas detectors, care with birds.	
30.	Pilot tube, prismatic compass, mining dial, drawing instruments, etc. Dumpy level, etc.	
B : INSTRUMENTS & GENERAL SHOP OUTFIT		
1.	Stemming rods.	
2.	Container for explosives and for detonators.	
3.	Blank cartridges.	
4.	Knife.	
5.	Crimper.	
6.	Crack detector cum	
7.	Models of a work faces showing pattern of holes, position of cut and order of blasting.	
8.	Blasting cable/ drill panel, drill machines and accessories.	
9.	Exploders, different types.	
10.	Haulage rope capels.	
11.	Haulage clips and attachments.	
12.	Different types of cable sample.	
13.	Different types of cable samples.	
14.	Drilling tools and machines and accessories (Electrical compressed air).	
15.	Siren etc. for cautioning, muffling arrangements, shelter, etc.	

Short Firer/ Blaster (Mines)

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: SHOT FIRER/ BLASTER (MINES)

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

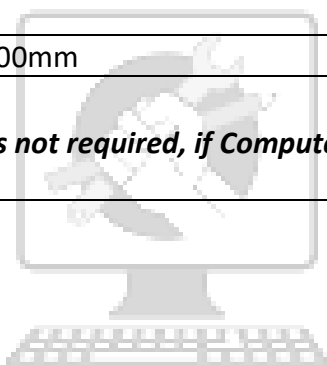
1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) **Infrastructure:**

A : TRAINEES TOOL KIT:-			
Sl. No.	Name of the items	Specification	Quantity
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid 45°	(250 X 1.5 mm)	20+1 set
3.	Set square celluloid 30°-60°	(250 X 1.5 mm)	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board IS: 1444	(700mm x500 mm)	20+1 set
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

Short Firer/ Blaster (Mines)

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.		



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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	Maximum Marks (Total 100 Marks)	15	5	10	5	10	10	5	10	15	15	Total internal assessment Marks	Result (Y/N)
	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	
1													
2													