

MECHANIC AGRICULTURE MACHINERY

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



कौशल भारत - कुशल भारत
SECTOR – Agriculture and Allied Services



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

MECHANIC AGRICULTURE MACHINERY

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)



NSQF LEVEL - 5

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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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Sl. No.	Topics	Page No.
1.	Background	1-2
2.	Training System	3-7
3.	Job Role	8
4.	NSQF Level Compliance	9
5.	General Information	10
6.	Learning Outcome	11-13
7.	Learning Outcome with Assessment Criteria	14-16
8.	Syllabus	17-25
9.	Syllabus - Core Skill	26-33
	9.1 Core Skill – Workshop Calculation & Science and Engineering Drawing	
	9.2 Core Skill – Employability Skill	
10.	Details of Competencies (On-Job Training)	34-35
11.	List of Trade Tools & Equipment Basic Training - Annexure I	36-43
12.	Format for Internal Assessment -Annexure II	44

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.



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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.

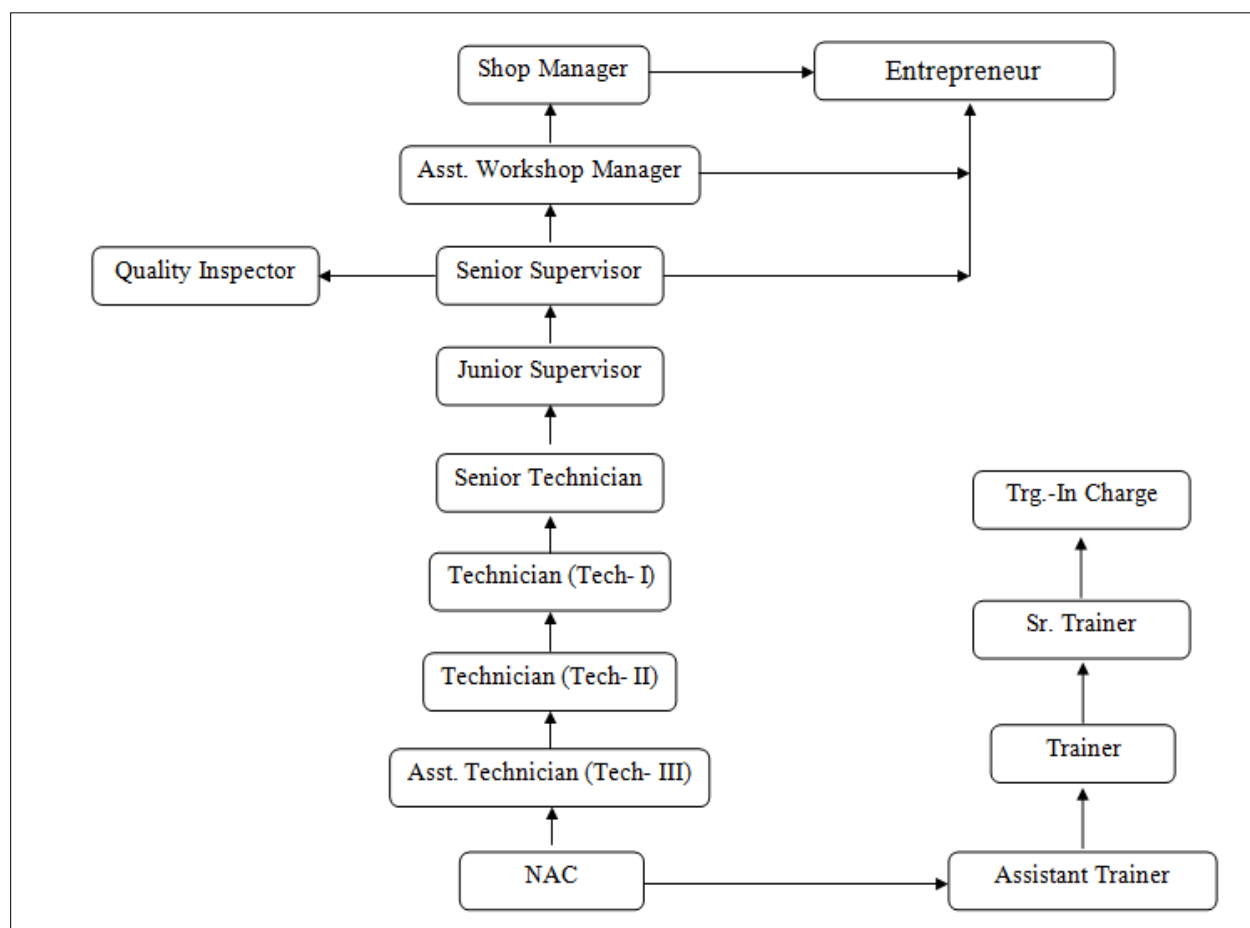
Mechanic Agriculture Machinery trade under ATS is one of the courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, 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.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- 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

Mechanic Agriculture Machinery

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 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 (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 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 above 75% - 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:

Mechanic Agriculture Machinery identifies and selects job requirements in installing, testing and maintaining machineries and vehicles commercially manufactured and made available in the market evolving over need and acceptance arises in Agricultural Industries/fields based on the daily needs of labour and skill requirements as well as process steps in the field; performs basic workshop skills such as filing, drilling, joining metal sheets, fixing nuts and bolts, sheet metal works, locking, lubricating, washing and cleaning etc; general servicing of machineries or vehicles like tractors such as inspecting, oiling, greasing, engine removing and refitting, replacing auxiliaries, checking normal operations, troubleshooting, and rectifying faults, customer orientation etc. May operate like spare part trader or salesman; may explore latest machineries in market time and again & identifies prospective customers for business that may include sales and service.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

On successful completion of the course the candidates can either get employed, or become a self-employed Entrepreneur in any one of the following fields.

a) Wage Employment

1. Astd. Mechanic in Farm machinery
2. Agricultural machinery/Tractor Service Mechanic
3. Dealers service mechanic
4. Spare Parts Sales Assistant

b) Self Employment

1. Agricultural Machinery Mechanic
2. Tractor Operator
3. Spare Parts Salesman

Reference NCO 2015: 7233.2800 - Agriculture Engineering Technician

4. NSQF LEVEL COMPLIANCE

NSQF level for Fitter (Steel Plant) 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 Fitter (Steel Plant) 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 Agriculture Machinery
NCO-2015	7231.10
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 10 th Class with Science and Mathematics 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 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	02 years
CTS trades eligible for Fitter (Steel Plant) Apprenticeship	Mechanic Agriculture Machinery

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 Fitter (Steel Plant) 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 -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Sectional views, Estimation of material, Electrical & electronic symbol]*
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. Familiarize general safety measures, identifying hand tools and practicing using tools
2. Learn measuring techniques using various measuring instruments
3. Identify different files and practicing filing operations
4. Mark out for drilling
5. Grind chisels
6. Identify various parts of lathe, learning the operation and practicing working on lathe

Mechanic Agriculture Machinery

7. Practice plain turning, step turning, taper turning, screw turning, boring and knurling
8. Identify hand tools for sheet metal worker, practicing simple exercises on forging, heat treatment, hardening, annealing etc
9. Identify gas and arc welding machines, learning their operations and practicing simple exercise on welding
10. Learn the methods of manufacturing ferrous and non ferrous materials
11. Identify common agricultural machinery – Tractor, learning its general features for attending common functional problems
12. Identify different types of fasteners, nuts, bolts, studs etc, learning types of threads, head and screw points
13. Identify and using carbon remover and anti rusting solution
14. Identify and practice shop power tools and equipments such as air compressor, hoist hydraulic / mechanical jack, jack stand, support, lift/cranes, hydraulic press etc
15. Practice driving tractor for running trials to inspect functioning and find defects
16. Identify components of tractor and handling
17. Inspect cooling systems, radiator, water pump, thermostat valve, pressure cap, engine lubrication, engine auxiliaries and fuel supply system
18. Overhaul, service, general maintenance of cooling system, engine and auxiliary systems of the tractor
19. Learn and practice hydraulic system for general operation and servicing
20. Identify, operation and general maintenance of power tiller

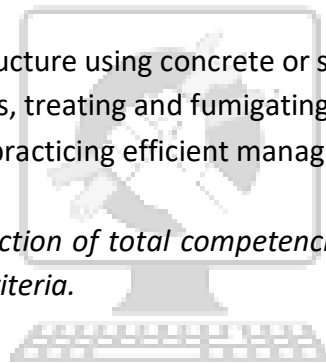
Block – II

21. Identify, handle and service electrical equipment and lighting arrangements in tractor
22. Identify, operate or handle, dismantle and service common agricultural machineries such as Cultivator, Soil forming equipment, leveller, scraper/ blade terracer, ditchers and bund formers
23. Identify, operate or handle, dismantle and service special agricultural machineries such as Lazar leveller, trencher & dozer/dumper and posthole digger, Prime mover, seed drills, seed cum fertilizer drill, Seed & fertilizer metering devices, furrow openers etc
24. Calibrate seed & fertilizer meter
25. Identify, operate or handle, dismantle and service different types of planter, paddy and vegetable trans-planters
26. Identify, operate or handle, dismantle and service cage-wheels and paddy puddles
27. Identify, operate or handle, dismantle and service fertilizer applicators, sprayers, fogging machine, common dusters and Aero blast sprayers
28. Identify, operate or handle, dismantle and service Reapers

Mechanic Agriculture Machinery

29. Identify, operate or handle, dismantle and service irrigation and drainage systems, pumps, sprinkler and fogger, pop-up and drippers, etc
30. Identify, install, test and maintain electric motors, starters, fuses etc used in farm.
31. Identify, install, operate, test and maintain power tiller and power weeder.
32. Identify, install, operate, test and maintain thresher, maize sheller, groundnut decorticator and combine harvester
33. Identify, install, operate, test and maintain mover, fodder harvester, power chaff/silage-cutter and rotary harvester
34. Identify, install, operate, test and maintain different types of root harvesting machine, winnower, cleaner/grader etc.
35. Identify, install, operate, test and maintain fans and blowers, grain auger, bucket elevator and grain drier,
36. Construct Grain storage structure using concrete or sheet metal bins.
37. Measure moisture contents, treating and fumigating seeds and grains.
38. Prepare farm shop layout, practicing efficient management and organization of a farm

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 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 including basic	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.

Mechanic Agriculture Machinery

electrical and apply in day to day work. <i>[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]</i>	2.2	Measure dimensions as per drawing
	2.3	Use scale/ tapes to measure for fitting to specification.
	2.4	Comply given tolerance.
	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.
	2.7	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-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Sectional views, Estimation of material, Electrical & electronic symbol]</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 micrometers, vernier calipers, dial gauge, bevel protector and height gauge (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

Mechanic Agriculture Machinery

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 resources 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	
<u>Block- I & II (Section:10)</u>	
<i>Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under block – I & 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	Professional Knowledge
1 & 2	Importance of safety and general precautions to be observed in the Section./ Fire-precautions for different types of fires-importance of the trade in the development of Industrial Economy of the Country-What is related instructions on the subject to be taught, achievement to be made. Elementary First Aid. Safety precautions, description of Fitter's hand tools, chisels, hammers, hacksaw, files, drill, taps, dies and surface plate etc. Care and maintenance of tools. Description, proper handling of scale, feeler gauge. Calipers and precision measuring instruments micrometer (inside/outside) vernier caliper, telescopic gauge. Dial test indicator & cylinder gauge.	Introduction to safety equipment's and their uses etc. Use of Fitter's hand tools, care and maintenance of tools, filing practice. Practice of precision instrument. Measuring diameter of piston, main journals, crankpin. Big and main bearing, cylinder bore with ordinary caliper and micrometer and vernier caliper, telescopic gauge.
3	Filing-classification of files. Different filing operations. Use of measuring instruments, vernier calipers etc. Marking out for drilling. Ratchet brace-its manipulation and use. Hand drill brief description, operation and use.	Filing-filing to line-marking off-use of center punch, dividers, calipers, steel rule etc. Filing true and square. Grinding of chisels, Simple drilling.
4	Safety precautions in the use of lathe-essential parts, their description and functions. Types of lathes, their constructional details and function of each part. Types of tools used on a lathe. Different operations i.e. plain, step, taper and offset turning, screw cutting, boring and knurling.	Practice of centre lathe setting up work between centers. Use of side cutting tools. Practice in simple turning, step turning, taper turning, , boring etc.
5	Sheet metal worker's common hand	Simple marking out of sheet metal. Joining

Mechanic Agriculture Machinery

	tools- their names and description. Safety precautions, simple forging process, simple heat treatment to case hardening, Annealing & hardening. Gas and arc welding	of metal by gas and electric welding. Simple sheet metal work cutting, bending and simple fold joints.
6	Description giving composition, manufacture of various common engineering ferrous, Non-Ferrous materials like cast iron, mild steel, High Speed steel brass, bronze, copper and aluminum-aluminum alloy. Study types and uses of temporary and permanent fasteners used in Tractor Agriculture Machinery. Description of types of threads, head and screw points of screws, Nuts & Bolts & studs and materials used types of nuts, locking devices key and splines. Description of chemical used as carbon remover, anti- rusting solution.	General cleaning, checking and tightening of nut & bolts, Practice of different types of nuts & bolts, locking devices of tractor. Such as lock nuts, cotter, split pins, keys, Circlip lock rings lock washers and locating where they are used. Removal of broken stud/bolt from blind hole.
7 & 8	General introduction and uses working safety of shop hand tools-type of screw drivers, spanners set, types of wrenches, plier punches and hammers, shop power tools & equipment function and maintenance, air compressor, Hoist Hydraulic/mechanical jack. Jack stand, support, lift (cranes) Hydraulic press arbor press, cleaning equipment,	Operation of General shop power tools & equipment such as pneumatic nut runner, riveting tools, Inflation to correct pressure according to field & road
9 & 10	Study of different major systems of tractor Precautions observed while starting, running and stopping the tractor.	Checking cooling system for overheating, cleaning, radiators, Dismantle, cleaning, assembling & testing water pumps, reverse flushing the system & adjusting the fan belt tension. Checking of thermostat valve, pressure cap. Experiment on lubrication oil flow in engine, overhauling oil filters, oil pump and setting the pressure release valve for correct oil pressure maintenance & repairs in the lubrication system in engine. Servicing of oil cooler. Checking engine auxiliaries, fuel supply system.

Mechanic Agriculture Machinery

		General servicing of Tractor.
11 & 12	Description and working principle of Hydraulic system pump and operating valves and Rams, hose pipe. Necessary servicing.	Checking, Layout of hydraulic system. Dismantle hydraulic system and Checking/Inspection of different parts of pumps, control valves, safety valves, remote cylinders etc. and necessary repair. Assembling the hydraulic system.
13	Description, working principle & use of power tiller (two wheel tractor) power unit. Method of power transmission to wheel from engine. Main clutch assembling working procedure steering Clutch/brakes mechanism method of power transmission to implement (Rotation), irrigation pump, thresher. Hitching of M.B. Plough, trailer disc harrow.	Overhauling power tiller transmission system includes main clutches, steering clutch/brakes mechanism-gear box and wheel hub testing for field operation without implements and with implements. Driving practice with trolley/trailer.
	Revision & Internal Assessment	

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	Professional Knowledge
1 & 2	Electrical equipment-lighting arrangement in tractors (As applicable) including storage battery, dynamo, regulator switch and spot-lights-both front and rear. Maintenance of battery. Types of harrows & their uses. working principles& Constructional details Setting and adjustments. Hitching and mode of operation. Difference between disc harrows & drag harrow. Difference between disc harrows & disc plough. Trouble shooting. Safety precautions. Care & maintenance	Servicing of storage batteries starter generator and regulator systems. Dismantle & assembling of disc harrows (Off set Type/Double action). Dismantle & assembling of disc harrows (Single action). Measuring gang angle. Dismantle & assembling of bar/power harrows. Servicing of spring/blade harrow. Hitching arrangements, Field operation & adjustment
3 & 4	Types of cultivator. Working Principles & their constructional details. Adjustments. Common types of shovels & seeps. Adjustments, mode of operation. Trouble shooting. Care & Maintenance. Soil forming equipment & their types. Constructional details of levelers, scrapers/ blade terracer, ditchers and bund formers. Constructional details of Lazar leveler, trencher & dozer/dumper and posthole digger. Prime mover & driving practice. Adjustments, mode of operation. Method of Field operation. Recommended speeds for operation. Daily and periodical maintenance Trouble shooting. Care & Maintenance. Types of seed drills & their uses.	Dismantle the cultivator (Spring /Rigid). Checking, repairing & replacing the Components. Assembling the cultivator Setting of cultivators with the help of floor diagram. Workshop adjustments. Field operation & adjustments. Dismantle and assembling of levelers, scrapers/ blade terracer, ditchers and bund formers/dozer/dumper. Servicing of Lazar leveler. Servicing of post hole digger. Dismantle, checking, repairing & replacing the components of Lazar leveler, trencher & post hole digger. Assembling of Lazar leveler, trencher & post hole digger Workshop adjustments. Setting and adjusting for field operation. Dismantle & assembling of seed drills.

Mechanic Agriculture Machinery

	Constructional details of seed cum fertilizer drill. Seed & fertilizer metering devices. Constructional details of special drills such as zero till, strip drill/roto drill & Happy seeder. Types of furrow openers, Methods of transmission of power. Calibration & workshop adjustments. Field calibration and mode of operation. Guide chart for mixing fertilizers. Recommended speeds for operation Trouble shooting. Care & maintenance.	Calibration of seed & fertilizer rates. Workshop adjustments of special drills such as zero till, strip drill & Happy seeder. Field operation & adjustments of special drills such as zero till strip drill & Happy seeder.
5 & 6	Types of planters. Constructional details of Maize, Cotton, G/ nut & potato planters. Constructional details of paddy transplanter, Sugarcane & paddy transplanter Common metering devices. Types of furrow openers. Power transmission. Function of row marker. Field operation of paddy transplanter. Field operation of veg. transplanter. Use of cage wheels and puddles. Types of fertilizer applicators. Constructional details of fertilizer applicators Types of furrow openers, Methods of transmission of power. Calibration & workshop adjustments. Field operation & adjustments of fertilizer applicators. Recommended speeds for operation Trouble shooting. Care & maintenance. Types of sprayers & dusters. Working principles. Calibrations of sprayers & dusters. Method of operation. Common prime movers. Workshop adjustments. Constructional details, working	Dismantle & assembling of planters. Calibration of seed & fertilizer rates. Workshop adjustments. Setting of planter with different seed plates & adjusts for planting. Repair of furrow openers. Servicing of veg. transplanter. Practice in the use of veg. transplanter and adjustments. Servicing of paddy transplanter. Raising type of MAT type nursery for paddy. Practice in the use of paddy transplanter, Raising bed and adjustments. Use of cage-wheels and paddy puddles. Dismantle and assembling of fertilizer applicators. Minor repairs of fertilizer applicator. Calibrations of fertilizer applicator Field operation & adjustments of fertilizer applicators. Dismantle and assembling common sprayers. Calibration of sprayers. Field adjustments & operation of sprayers. Dismantle and assembling common dusters. Servicing fogging machine. Calibration of common dusters. Field adjustments & operation of duster.

	principles & calibration of high clearance sprayers/ cotton & Aero blast sprayers. Methods of operation. Field operation. Care and maintenance of sprayers. Troubles and remedies. Precautions while handling insecticides and pesticides.	Servicing of high clearance/cotton sprayers. Servicing of Aero blast sprayers. Calibration & adjustments of high clearance/ cotton sprayers & Aero blast sprayers. Repairs and maintenance. Field operation & adjustments.
7	Reapers & their types Functions, working principles, constructional details. Field adjustments & operation Care and maintenance. Trouble shooting. Source of water. Study common irrigation and drainage systems. Types of irrigation systems. Types of pumps. Working principles & constructional details of centrifugal pumps. Types of centrifugal pumps Constructional details & principle of operation of a submersible pump. Description of tools and equipment required for boring a tube well. Use a compressor for revitalizing the tube well to improve its discharge. Pump selection, common prime movers, and coupling devices. Different types of irrigation pipes Working principles of valves and hydrants. Working principles of Popup/sprinkler & mister /fogger. Working principles of drippers. Methods of field operation & adjustment. Daily and periodical maintenance. Troubles shooting.	Dismantle and assembling a reaper. Workshop adjustments. Dismantle and assembling of reaper winder. Workshop adjustments. Dismantle and assembling of straw-reapers. Workshop adjustments. Hitching and fitting with prime mover. Field operation& adjustment of reapers. Field operation& adjustment of reaper winder. Field operation& adjustment straw-reapers. Visit to a tube well boring sites, Dismantle and assembling of a volute type centrifugal pump. Preparing foundations and installing a pumping set. Adjustments and operation of a pumping set Servicing of a submersible pump. Measuring of discharge of water. Installation of HDPE, QRC, PVC & dipper pipe line. Repairing and adjusting of irrigation valves and hydrants. Installing sprinkler and fogger. Installing pop-up and drippers. Installing drippers on level/ hilly ground. Field operation & adjustment (angular/ full circle).
8	Types of electrical motors used on the farm, their constructional details, selection, operation, care and	Dismantle and assembling AC motors and studies their parts. Reversing the directions. Study of motor starting devices.

	maintenance. Different types of starters. Fuses and their capacities. Installation of motors. Types of power tillers, their uses Constructional details. Method of power transmission for different field operation with different attachments. Common types of weeds and their control. Methods of weed control. Constructional detail of power weeder. Pre emergence and post emergence applications; Recommended weedicides for different crops. Daily and periodical maintenance; Faults and remedies. Care and maintenance	Periodical maintenance faults and remedies. Servicing of Power tiller/power weeder. Field operation with different attachments. Common adjustments. Dismantle and assembling of a cultivator. Repair and maintenance Adjusting the cultivator with the help of floor diagram. Setting of shovels and sweeps. Field operation of cultivator with shovels and sweeps.
9	Types of threshers, maize Sheller and ground nut decorticators. Working principles, constructional details. Adjustments and operations. Prime mover and driving systems. Transmission of power belts and pulleys. Safety precautions. Faults finding. Precautions for safe operation. Purpose of a combine harvester. Advantages and limitations. Types of combine harvester. Special purpose combine harvesters Working principles & constructional of different systems of combine harvester. Components of different systems of combine harvester. Flow path material of combine harvesters. Power transmission & drive systems. Workshop adjustments. Methods of field operation. Field adjustments according to crop & soil condition. Types of grain losses, their causes and remedies. Factors affecting the performance of a	Dismantle and assembling of thresher. Workshop adjustments. Fitting with prime mover. Adjusting and operating in field. Dismantle and assembling of Maize seller. Dismantle and assembling of Ground nut decorticator. Fitting with prime mover. Measuring important speeds affecting the performance. Driving practice of combine harvester. Dismantle cutter bar assembly. Dismantle feeder unit. Dismantle threshing unit. Dismantle separating unit. Checking, repairing and replacing the defective components. Assembling the Components of different systems of combine harvester. Workshop adjustments. Transporting practice of the combine. Operating the combine in the field and adjust according to the field and crop conditions. Servicing and maintenance Computing grain losses. Storage during off season. Field operation and adjustments of baler, paddy straw chopper cum spreader.

Mechanic Agriculture Machinery

	combine. Recommended speeds. Functions, working principles, constructional details of Super SMS, Paddy straw chopper cum spreader, balers	
10	Working principles, constructional details of mover. Functions, working principles, constructional details of folder harvester. Functions, working principles, constructional details power chaff/ silage-cutter. Workshop and field adjustments. Methods of field operation. Care and maintenance. Trouble shooting. Function and working of rotary harvester. Function and working of hay-bailer. Workshop adjustments. Method of field operation. Method of transportation. Common accidents and their prevention. Trouble shooting.	Practice in Dismantle and assembling mower. Practice in Dismantle and assembling fodder harvester. Practice in Dismantle and assembling of power chaff/ silage-cutter. Workshop adjustments. Hitching and fitting with prime-mover. Field operation and adjustments. Servicing and maintenance Practice in Dismantle and assembling rotary harvester. Practice in Dismantle and assembling of hay bailer. Workshop adjustments. Hitching and fitting with prime-mover. Field operation and adjustments. Servicing and maintenance
11	Need & importance of root harvesting machine. Types & working of diggers. Components of diggers. Prime mover attachments and driving system. Transporting the root harvesting machinery. Settings & Adjustments. Fault & remedies. Important of winnowing. Types of winnower and its parts. Importance of cleaning & grading. Types of cleaner/grader. Methods of cleaning/grading. Prime mover attachments and driving system. Settings and Adjustments. Importance of rice huller and polisher,	Dismantle groundnut digger. Dismantle potato / onion digger. Checking, repairing and replacing the defective components. Assembling of groundnut digger. Assembling of potato / onion digger Workshop adjustments. Attachment of diggers with prime- movers. Field operation and adjustments. Servicing and maintenance. Servicing and adjusting the winnower Servicing and adjusting the cleaner & graders. Fitting with prime mover attachment. Operation of winnower, cleaner and grader. Common troubles and its causes. Servicing and adjusting the rice huller Servicing and adjusting the polisher Servicing and adjusting the feed grinder-

Mechanic Agriculture Machinery

	feed grinder-cum-mixer, hammer mill, oil extractor and sugarcane crusher. Constructional details, materials used. Principles of operation. Common faults and remedies.	cum-mixer. Servicing and adjusting the hammer mill. Fitting with prime mover Operation of rice huller. Operation of the polisher. Operation of the hammer mill
12	Working of fans and blowers. Purpose of grain auger, bucket elevator etc. Constructional details and working of a grain drier. Grain storage structure i.e. concrete and sheet metal bins (silo structure). Methods and instruments used for measuring moisture contents of grains. Equipment and methods used for treating and fumigating seeds and grains.	Visit to a grain drying and storing plant Operation of grain handling seed treating and drying equipment. Preparation of Log books. Maintenance of necessary records i.e. Log books of tractors, combines etc. Preparation of service schedules. Off season storage of farm equipment.
13	Trouble shooting in tractor driving and testing the performance of a tractor-tractor driving with implements. Procedure and principle for efficient management and organization of a farm. Discussion on different farm shop layout.	Visit to a Government Farms and Co-operative Societies and study of farm records, accounts and log books. Service schedule of farm machinery. Off season storing of farm equipment. Preparing layout and list of equipment of a typical farm workshop. Quality concept Entrepreneurship REVISION & TEST
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.

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

BLOCK I

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
		30		20
1	Engineering Drawing: Introduction and its importance -Viewing of engineering drawing sheets. Method of Folding of printed Drawing Sheet as per BIS SP:46-2003 Drawing Instruments : their Standard and uses - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.		Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units.	
2	Lines : - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment		Fractions & Simplification: Fractions, Decimal fraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems Simplification using BODMAS.	
3	Drawing of Geometrical Figures: Definition, nomenclature and practice of - - Angle: Measurement and its types, method of bisecting. - Triangle -different types		Square Root : Square and Square Root, method of finding out square roots, Simple problem using calculator	

Mechanic Agriculture Machinery

	- Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.			
4	Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.		Ratio & Proportion: Simple calculation on related problems.	
5	Free Hand sketch: Hand tools and measuring instruments used in electronics mechanics Trades		Percentage: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	
6	Free hand drawing : - Lines, polygons, ellipse, etc. - Geometrical figures and blocks with dimension. - Transferring measurement from the given object to the free hand sketches.		Material Science : Properties -Physical & Mechanical, Types – Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	

B. Block- II

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
		30		20
1	Symbolic Representation (as per BIS SP:46-2003) of : - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings		Mass, Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals	
2	Construction of Scales and diagonal scale		Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	
3	LED, IRLED, photo diode, photo transistor, opto-coupler symbols symbol of Logic gates		Algebra: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	
4	Half adder, full adder, multiplexer and de-multiplexer		Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.	
5	UJT, FET, MOSFET, DIAC, TRIC, SCR, IGBT symbols and circuits of FET Amplifier, SCR using UJT triggering, snubber circuit, light dimmer circuit using TRIAC, UJT based free running			

	oscillator.		Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables. Finding height and distance by trigonometry.	
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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.
Computer Networking and	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),

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Internet	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

Mechanic Agriculture Machinery

	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.

Mechanic Agriculture Machinery

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 FITTER (STEEL PLANT) TRADE:

1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)
2. Record keeping and documentation
3. Fitting components using different metal fitting procedure and perform testing of the assembly.
4. Assembling of different components as per requirement and check functionality.
5. Carryout maintenance of different systems.

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

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

Block – I

1. Familiarize general safety measures, identifying hand tools and practicing using tools
2. Learn measuring techniques using various measuring instruments
3. Identify different files and practicing filing operations
4. Mark out for drilling
5. Grind chisels
6. Identify various parts of lathe, learning the operation and practicing working on lathe
7. Practice plain turning, step turning, taper turning, screw turning, boring and knurling
8. Identify hand tools for sheet metal worker, practicing simple exercises on forging, heat treatment, hardening, annealing etc
9. Identify gas and arc welding machines, learning their operations and practicing simple exercise on welding
10. Learn the methods of manufacturing ferrous and non ferrous materials
11. Identify common agricultural machinery – Tractor, learning its general features for attending common functional problems
12. Identify different types of fasteners, nuts, bolts, studs etc, learning types of threads, head and screw points
13. Identify and using carbon remover and anti rusting solution
14. Identify and practice shop power tools and equipments such as air compressor, hoist hydraulic / mechanical jack, jack stand, support, lift/cranes, hydraulic press etc
15. Practice driving tractor for running trials to inspect functioning and find defects
16. Identify components of tractor and handling
17. Inspect cooling systems, radiator, water pump, thermostat valve, pressure cap, engine lubrication, engine auxiliaries and fuel supply system
18. Overhaul, service, general maintenance of cooling system, engine and auxiliary systems of the tractor

Mechanic Agriculture Machinery

19. Learn and practice hydraulic system for general operation and servicing
20. Identify, operation and general maintenance of power tiller

Block – II

1. Identify, handle and service electrical equipment and lighting arrangements in tractor
2. Identify, operate or handle, dismantle and service common agricultural machineries such as Cultivator, Soil forming equipment, leveller, scraper/ blade terracer, ditchers and bund formers,
3. Identify, operate or handle, dismantle and service special agricultural machineries such as Lazar leveller, trencher & dozer/dumper and posthole digger, Prime mover, seed drills, seed cum fertilizer drill, Seed & fertilizer metering devices, furrow openers etc
4. Calibrate seed & fertilizer meter
5. Identify, operate or handle, dismantle and service different types of planter, paddy and vegetable trans-planters
6. Identify, operate or handle, dismantle and service cage-wheels and paddy puddles
7. Identify, operate or handle, dismantle and service fertilizer applicators, sprayers, fogging machine, common dusters and Aero blast sprayers
8. Identify, operate or handle, dismantle and service Reapers
9. Identify, operate or handle, dismantle and service irrigation and drainage systems, pumps, sprinkler and fogger, pop-up and drippers, etc
10. Identify, install, test and maintain electric motors, starters, fuses etc used in farm.
11. Identify, install, operate, test and maintain power tiller and power weeder.
12. Identify, install, operate, test and maintain thresher, maize sheller, groundnut decorticator and combine harvester
13. Identify, install, operate, test and maintain mover, fodder harvester, power chaff/ silage-cutter and rotary harvester
14. Identify, install, operate, test and maintain different types of root harvesting machine, winnower, cleaner/grader etc.
15. Identify, install, operate, test and maintain fans and blowers, grain auger, bucket elevator and grain drier,
16. Construct Grain storage structure using concrete or sheet metal bins.
17. Measure moisture contents, treating and fumigating seeds and grains.
18. Prepare farm shop layout, practice efficient management and organization of a farm

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

MECHANIC AGRICULTURE MACHINERY		
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)		
Sl. No.	Item	Quantity
1.	Caliper spring inside 15 cm.	6
2.	Caliper spring outside 15 cm.	6
3.	Centre punch 100 mm.	6
4.	Chisel cold flat 20 mm x 150 mm.	4
5.	Feeler Gauge 20 blades (metric)	2
6.	Hammer ball peen 0.75 kg.	4
7.	Hand file 20 cm second cut flat	6
8.	Hand file 20 cm second cut half-round	6
9.	Hand file 20 cm. smooth triangular	6
10.	Hand file 30 cm. Round	4
11.	Hand file 30 cm. Bastard	4
12.	Pliers Circlip flat nose 15 cm	2
13.	Pliers Circlip round nose 15 cm	2
14.	Pliers side cutting 15 c m	2
15.	Screw driver 100 mm x 8 mm.	6
16.	Screw driver 750 mm x 6 mm.	6
17.	Steel rule 15 cm.	6
18.	Steel tool box with lock and key (folding type) 400x200x150 mm	6
19.	Dividers spring 15 cm.	6
20.	Pipe wrench 350 mm	As required
21.	Cleaning Tray 45x30 cm	1
22.	Crow bar	As required
23.	Plier combination 15 cm.	2
24.	Scriber bit with 15 cm scribing block universal	2
25.	Spanner D.E. (set of 6 BSF)	4
26.	2-furrow disc plough with scrapers.	1
27.	9 tine: cultivator-spring loaded.	1
28.	Allen key set of 12 pieces (2 mm to 14 mm)	2
29.	Bearing puller screw powered/ hydraulic powered with attachments Max spread 80, 200 and 300 mm	As required
30.	Blow lamp.	2
31.	Brake drum spring balance belt etc for performance testing of engine.	As required
32.	Cage Wheel	As required
33.	Chain and pulley block 3000 kg. Capacity electric type	1

Mechanic Agriculture Machinery

34.	Chaser hard W/V 9 to 40 T.P.I. set of 11 external.	1
35.	Chaser hard W/V 9 to 40 T.P.I. set of 11 internal.	1
36.	Chisel cross cut 9 x 3 mm	4
37.	Chisel diamond point 9 mm.	4
38.	Chisel half round 9 mm.	4
39.	Chisel cross cut 200 mm x 6 mm	4
40.	Pliers Circlip long nose internal and external type 15 cm	4
41.	Pliers Circlip long nose internal and external type 20 cm	4
42.	Drill post.	4
43.	Drill twist metric 3 mm to 12 mm x 1 mm.	4
44.	Drill twist S.S. 1/8" to 1/2" x 1/64" set.	4
45.	Drilling machine bench 1 H.P. to drill up to 12 mm dia.	1
46.	Dynamo and voltage regulator	1
47.	Engineers square 15 cm blade.	2
48.	Engineers stethoscope	1
49.	Equipment puncture, in box.	1
50.	Ex-tractor stud (EZYOUT TYPE)	1
51.	Feeler gauge	2
52.	File flat 20 cm smooth.	4
53.	File flat 25 cm. second cut	4
54.	File flat 35 cm. bastard.	4
55.	File flat safe edge 25 cm smooth.	4
56.	File half round 40 cm. second cut	4
57.	File square 20 cm. second cut	4
58.	File square 30 cm rough.	4
59.	File triangular 15 cm. second cut	4
60.	Fire buckets with stand	1
61.	Fire extinguisher	1
62.	Ground wheel (complete wheel set of tractor)	1
63.	Groover – 3,4,6 mm.	1 Each
64.	Gun, grease pressure.	2
65.	Gun, paraffin set	2
66.	H.S.S. hand reamers 3.5 to 12.5 mm in steps of 1.5 mm set of 12.	2 sets
67.	H.S.S. Hand reamers adjustable 11 to 12, 12 to 13, 13 to 15, 15 to 16 mm.	2 sets
68.	H.S.S. Hand reamers, parallel 8 to 12 by 1.5 mm	2 sets
69.	H.S.S. machine reamers 3 to 19 mm in steps of 1.5 mm.	2 sets
70.	Hacksaw frame adjustable for 20.30 cm blades	10
71.	Hammer ball peen 0.25 kg.	4
72.	Hammer ball peen 0.5 kg.	4
73.	Hammer copper 1 kg. with handle.	4
74.	Hammer plastic 0.25 kgs with handle.	4

Mechanic Agriculture Machinery

75.	Hand Drill Pneumatic type / Electrical	4
76.	Hand reamers adjustable 10.5 to 11.25 mm, 11.25 to 12.75 mm, 12.75 to 14.25 mm, and 14.25 to 15.75 mm	2 sets
77.	Hand vice 37 mm	2
78.	Hand vice up to 3.75 cm.	2
79.	Hollow punch set of seven pieces 6 mm to 15 mm	2 sets each
80.	Hydraulic Pump, control valves (two types)	1
81.	Lifting jack screw type 3050 kg.	1 each
82.	Lockers with 8 drawers (standard size)	1
83.	Magnet spanner set.	1
84.	Mallet (Wooden/plastic)	1
85.	Marking out table 90 x 60 x 90 cm.	1
86.	Mechanical jack	1
87.	Metal rack 180 x 150 x 45 cm.	1
88.	Micrometer outside 0-25 mm 25-50, 50-75 75-100 mm with extension rod.	1 set
89.	Micrometer inside 0-150 mm with extension rod.	As required
90.	Nose pliers 15 cm (Round and Straight)	1
91.	Oil can 0.25 liter capacity	2
92.	Philips screw driver type set of 5 pieces (100 mm to 300 mm)	2 sets
93.	Portable electric drill 6mm	1
94.	Pressure grease gun	1
95.	Prick punch 15 cm	4
96.	Puller set for steering wheel universal	1
97.	Puller set universal for bearing and bushes	1
98.	Punch figure set 3 mm.	2 sets
99.	Punch hollow 6.7 and 9 mm set.	2 sets
100.	Punch Letters set 3 mm.	2 sets
101.	Ratchet brace	1
102.	Rule steel 30 cm to read inches and mm.	1
103.	Safety goggles (clear glass)	As required
104.	Scraper, bearing.	2
105.	Scraper, flat 25 cm handled.	2
106.	Scraper, half round 25 cm.	2
107.	Scraper, triangular 25 cm.	2
108.	Screw driver-Electrician type-15 cm size.	6
109.	Screw jack one tone, capacity double lift	6
110.	Screw pitch gauge	6
111.	Scriber 15 cm.	6
112.	Scribing block universal	6
113.	Set of Morse socket 0-1, 1-2 and 2-3.	2 sets
114.	Spanner Ring & DE 36-41	4

Mechanic Agriculture Machinery

115.	Spanner Ring & open ended 36 to 41 mm	2
116.	Spanner socket pneumatic / Power tool kit	2
117.	Spanner socket pneumatic/Power tool kit	2
118.	Spanner socket 6-32 mm.	2
119.	Spanner, double ended set of 12 metric sizes 8 to 32 mm.	2
120.	Spanner, double off-set double ended set of 7 M/W from 3 to 14 mm.	2
121.	Spanner, for sparking plug 10 mm to 22 mm.	2
122.	Spanner, ring set of 12 metric size up to 32 mm	2
123.	Spanner, T-flax for screwing up and screwing in accessible position.	2
124.	Spanners adjustable 15 cm.	2
125.	Stone, carbondrum 15 x 5 x 4 cm smooth and rough.	2
126.	Surface plate 60 x 60 cm.	2
127.	Tachometer (counting type)	1
128.	Toe-in, toe-out gauge	2
129.	Tools, measuring instruments general shop outfit:	2
130.	Torque wrench 12-68 Nm.	1 each
131.	Tray cleaning assorted sizes.	1 each
132.	Triple leg grip puller with bearings attachment screw/ hydraulic powered max. spread 80, 160, 250, 450 mm	As required
133.	Twist drills for ratchet brace 6 to 20 by 1.5 cm.	1
134.	Vernier caliper set 10" or 8" inside and outside, depth to read inches and mm.	1 each
135.	Vice grip pliers	2
136.	Tractor 60 HP power steering	1
137.	Reversible Mould Board Plough	As required
138.	Disc Plough 3 Bottom	1
139.	Disc Plough 2 Bottom reversible I	1
140.	Chisel Plough- 5/7 tone	1
141.	Rotavator – 5.5' cutting Width	1
142.	Sub solier 24 -30 inch.	As required
143.	Disc Harrow 8x8 trailed type	1
144.	Disc Harrow (14 Mounted type) off set	1
145.	Paddy harrow (14 Disc mounted type)	1
146.	Pulverizing Roller (Tractor Mounted) with spring loaded (11tyne) cultivator	1
147.	Bund maker (disc type)	1
148.	Leveler/spike Leveler 3 meter width	1
149.	Laser Leveler complete with transmitter, receiver, control box, survey equipment	1
150.	Tractor operator Angle blade Tracer	1
151.	Tractor operator scraper and bucket scraper	1

Mechanic Agriculture Machinery

152.	Tractor Operator ditcher	1
153.	Tractor Operator trencher 10" to 16" Width & 4 ft depth	1
154.	Tractor Operator post hole digger	1
155.	Tractor Operator Zero/ strip till Seed cum fertilizer drill 9/11 rows	1
156.	Tractor PTO operated multi - crop direct sowing happy seeder	1
157.	Tractor Operator Seed cum fertilizer drill cum planter	1
158.	Tractor operated two rows Semi /automatic potato planter	1
159.	Tractor operated bed farmer cum three rows planter	1
160.	Tractor operated two rows vegetable trans planter (semi automatic)	1
161.	Paddy transplanter	1
162.	Sugar cane transplanter	1
163.	Centrifugal Pump with electric motor	1
164.	Submersible Pump complete unit	1
165.	Sprinkler type and drip irrigation systems complete sets. Pipes(Different materiel & Sizes) Such as :- PVC, HDPE, QRC &Poly Tubing Dripper (Different materiel & Sizes) Jets, Foggers & Mister	As required
166.	Tractor PTO operated sprayer for cotton	1
167.	Knapsack /foot sprayer	1
168.	Power operated manure spreader	1
169.	Rotary duster	1
170.	Mechanical Power Weeder	1 each
171.	Multi crop thresher	1
172.	Groundnut decorticator	1
173.	Winnowers	1
174.	Self propelled riding type Reaper/Reaper winder	1
175.	Power operated soybean reaper	2
176.	Straw reaper	1
177.	Mower/Grass Cutter	1
178.	Power Tiller	1
179.	Self-propelled Combine Harvester axial flow/Track type combine Harvesterfitted with super SMS	1
180.	Header Assembly for maize and sun-flower	1
181.	Tractor Operated paddy straw chopper cum spreader,	1
182.	Tractor Operated Baler.	1
183.	Stubble shaver	1
184.	Chaff cutter and silage cutter	1each
185.	Field crops like wheat, Soya bean, paddy etc.	As required
186.	Fodder Harvester (Flail type)	1
187.	Tractor operated potato digger	1
188.	Tractor operated ground nut digger	1
189.	Power operated Grader (wheat, maize)	1

Mechanic Agriculture Machinery

190.	Power Operated Cleaner	1
191.	Weighing balance	2
192.	Measuring tape	1
193.	Laptop Computers with Trade Related Software	1
194.	Computers with Trade Related Software	1
195.	Air conditioner 1.5 ton	As required

The specifications of the items in the above list have been given in Metric Units. The items which are available in the market nearest of the specification as mentioned above, if not available as prescribed should be procured Measuring instruments such as steel rule which are graduated both English and Metric Units may be procured, if available.

General Machinery Installation

1. Drilling machine pillar sensitive 0-20 mm cap with chuck & key
2. Drilling machine pillar sensitive 0-12 mm cap motorized with chuck and key.
3. Grinding machine (general purpose) D.E. pedestal with 20 cm dia. wheels rough and smooth with twist drill grinding- attachment.

Sl. No.	Name of the items	Qty.
1.	Compressor capacity 12 c.ft. piston type with pressure gauge (for insulating of tubes etc.)	1 no.
2.	Electric Arc welding Set portable (inverter type)	1 set
3.	Electric pedestal grinder with two 18cm. Wheel	1 no.
4.	Grinder with two 18 cm wheels with twist drill grinding attachment	1 no.
5.	Mounted type three bottom mould Board 30 cm. size with coulter and jointer.	1 no.
6.	Disc harrow	1 no.
7.	Cultivator	1 no.
8.	Bund Former	1 no.
9.	Washing unit	1 no.
10.	Steel Almirah large	1 no.
11.	Locker 8 drawer	1 no.
12.	Work bench 295 x 120 x 80 cm with 4 vices 12.5 cm jaw.	4 nos.

**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING
DRAWING**

TRADE: Mechanic Agriculture 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		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

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													