CURRICULUM

FOR THE TRADE OF

MECHANIC (AGRICULTURE MACHINERY)

UNDER

APPRENTICESHIP TRAINING SCHEME

2017

सत्यमेव जयते
Government of India

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

CONTENTS

1. ACKNOWLEDGEMENT

The DGT sincerely express appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum.

Special acknowledgement is expended by DGT to the following expert members who had contributed immensely in this curriculum.

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
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4.	Sanjiv Kumar	ATI ,Ludhiana	Vocational Instructor (VI)

2. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

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

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

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

1.2 Changes in Industrial Scenario

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

1.3 Reformation

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

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.

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

3. RATIONALE

(Need for Apprenticeship in Mechanic Agriculture Machinery)

The revised Apprenticeship Training Scheme (ATS) shall make the students more adapt to industry requirement through latest theoretical & practical inputs as:

1. It offers a good synergy between BT (Theoretical Inputs) & PT (On the Job training) unlike earlier scheme where students need to complete two year's classroom training before undergoing PT (On the Job training).
2. It will enhance knowledge about scientific principles, familiarization with industrial culture, and basics of agriculture machinery and its need.
3. It will enhance the ability to work with help of hand tools, power tools and machines. At the same time it creates the base for achieving hard skills.
4. It will enhance knowledge about different types of agricultureimplements, Diagnosis techniques and tools used in industries.
5. It will enhance the ability to work on conventional as well as latest agriculture implementsand to service and trouble shoot agriculture implements.
6. It will enhance knowledge about industrial terminology, industrial practices and revitalize previous learning.

4. JOB ROLES: REFERENCE NCO

Brief description of Job roles:

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. Astt. 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: 7231.10

5. GENERAL INFORMATION

1. **Name of the Trade** **: MECHANIC AGRICULTURE MACHINERY**

2. **N.C.O. Code No.** : 7231.10

3. **Duration of Apprenticeship Training** (Basic Training + Practical Training**):** 2years

3.1 **For Fresher:-**

Duration of Basic Training: -

a) Block –I : 3 months

b) Block – II : 3 months

Total duration of Basic Training: 6 months

Duration of Practical Training (On -job Training): -

a) Block–I: 9 months

b) Block–II : 9 months

Total duration of Practical Training: 18 months

3.2 **For ITI Passed:-**

Duration of Basic Training: - NIL

Duration of Practical Training (On -job Training): 12 months

6. **Entry Qualification** : 10th Passed

7. **Selection of Apprentices:** The apprentices will be selected as per Apprentices Act amended time to time.

8. Rebate to ITI Passed out Trainees: one year for the trade of 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.

6. COURSE STRUCTURE

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

Duration of Training in Months

Components of Training	Duration of Training in Months →																							
↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Basic Training Block - I																								
Practical Training Block - I																								
Basic Training Block - II																								
Practical Training Block - II																								

7. SYLLABUS

7.1 BASIC TRAINING
(BLOCK – I &II)
DURATION: 06 MONTHS

GENERAL INFORMATION

1) **Name of the Trade** :**MECHANIC AGRICULTURE MACHINERY**
2) **Hours of Instruction** : 1000 Hrs. (500 hrs. in each block)
3) **Batch size** : 16 Nos.
4) **Power Norms** : 4.8 KW for Workshop
5) **Space Norms** : 210Sq.m. (including Parking area)
6) **Examination** : The internal assessment will be held on completion of each Block.
7) **Instructor Qualification** :

Degree in **Agricultural Engineering** from recognized university with one year experience in Agricultural industry. **OR** Diploma in **Agricultural Engineering** from recognized university with three year experience in Agricultural industry. **OR** NTC/NAC in the trade of Mechanic Agriculture Machinerywith three year post qualification experience in the relevant field. Preference will be given to a candidate with Craft Instructor Certificate (CIC)

8) **Tools, Equipment& Machinery required** : - As per Annexure – I

7.1.1 DETAILSYLLABUS OF CORE SKILL

A. Block– I
Basic Training

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
1	Free hand sketching of straight lines, rectangles, squares, circles, polygons etc.	**30**	Applied workshop problem s involving multiplication and division. Common fractions, addition, subtraction, multiplication and division-application of fractions to shop problems.	**20**
2	Free hand sketching with dimension and proportionate sketching. Views of simple hollow and solid bodies with dimensions use of different types of lines and symbols for drawing.		Properties and uses of cast iron, ferrous metal, gray cast iron, white cast iron, wrought iron, and plain carbon steel, high speed steel and alloy steel. Units, Derived and fundamental, types of system FPS, CGS, MKS and their conversion. Land measurement local units as Marla, Kanal, viswa, bigha, acre etc.	
3	Reading of simple Blue Print.		Applied workshop problems as in Week No.2. Properties and uses of copper, zinc, lead, tin, aluminum, brass, bronze, solder bearing metals, timber and rubber. Nylon, P.V.C., PP (poly prop line, polymer)	

4	Free hand sketching with dimension of simple solid such as cubes, rectangular blocks, cylinders etc. Free hand sketching of different types of threads and lathe tools.		Decimal-addition, subtraction, multiplication, conversion of decimals to common fractions-shop problems. Gear calculations for cutting threads. Calculations on speed, feed and taper. Metric system weight and measurement units conversion factors.	
5	Sketching of views of simple solid bodies as mentioned when viewed perpendicular to their surfaces and axis.		Brief description of manufacturing process of pig iron and cast iron, white cast iron. Reduction of common fractions to decimal fractions-shop problems.	
6	Free hand sketching of rivets and washers with dimensions from samples. Free hand sketching of nuts & bolts with dimensions from samples.		Brief description of manufacturing process of steel copper, aluminum and P.V.C. Effects of alloying elements on properties of cast iron & steel. Meaning of tenacity elasticity, malleability, brittleness, hardness, compressibility & ductility and their examples.	
7	Free hand sketching of key and screw threads with dimensions from samples. Free hand sketching of different major assemblies of tractors.		Shop's problem on metric system of weight and measurement.	
8	Sketching of different types of wheel rims. Views of simple hollow and solid bodies with dimensions. Use of different type of lines and symbols for drawings. Free hand sketching of tyres showing under over and proper inflation of tyres.		Effects of alloying elements on properties of cast iron steel. Shop,s problems on metric system of weight and measurements. Ratio and proportion shop problems. Percentage & its application.	

9	Explanation of simple Orthographic projection-list. Explanation of simple orthographic projection 3rd angle.		Square root of a perfect square. The square of a whole number and a decimal. Mass-unit of mass, force-absolute unit of force. The weight of a body-unit of weight shop problem.	
10	Views of simple hollow and solid bodies with dimensions. Use of different types of Tines and symbols for drawings. Views of simple hollow and solid bodies with dimensions. Use of different types of Tines and symbols for drawings. Free hand sketching of braking system of tractors (Mechanical brakes system).		C.G.S. and F.P.S. system of units of force, weight etc. their conversion problems. Percentage and its application-shop problems. Ratio and proportion shop problems. Work-unit of work energy-power-units of power applied problems. Simple problems on work, energy and power.	
11	Simple isometric drawings, isometric views of simple objects, such as square, rectangles, cubes , rectangular blocks etc. Free hand sketching of 4 stroke cycles & 2 stroke cycles of engine. Free hand sketch of piston assembly, valve assembly. Use of drawing instruments, T-square and drawing board. Free hand sketching of crank shaft showing all parts.		Meaning of friction examples, meaning of center of gravity-examples specific gravity examples. Mensuration-area of rectangles, squares, tri-angles, circles, regular polygons etc. calculation of areas. Simple problems straight and ball-cranked levers.	
12	Construction of simple figures and solids as mentioned above with dimensions & titles. Use of different types of scales in inches and millimeters. Construction of simple figures and solids as mentioned previous examples with dimensions & titles. Use of different types of scales in inches and millimeters.		Calculation of volume and weight of simple solid bodies such as cubes, square and hexagonal prism-shop problem. Heat and temperature thermometric scale Fahrenheit and centigrade scales & their conversion. Name & use of temperature measuring instruments normally used in workshop.	

13	Sketching valve timing diagram. Lettering number & alphabet. Free hand sketching of different cooling system showing all necessary parts. Lettering number & alphabets. Free hand sketching of lubrication system, filters and different types of oil pump, pressure release valve.		Heat and temperature thermometric scale. Fahrenheit & Centigrade scales & their conversion. Name use of temperature measuring instruments normally used in workshop.	

B. Block- II
Basic Training

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
1	Free hand isometric sketching of simple objects with dimensions. Free hand sketching of fuel feed system in diesel engines and fuel filters. Free hand sketching of different types of injectors. Free hand isometric sketching of simple objects with dimensions. Free hand sketching of fuel feed system in diesel engines and fuel filters. Free hand sketching of different types of injectors.	**30**	Geometry properties of lines, angles, triangles & circles. Factor of safety examples. Different types of stresses examples. Effect of forces on material in such application as extending, bending & shearing.	**20**

2	Free hand sketching of air cleaner used in tractors. Views of simple solid and hollow bodies cut by section plane. Reading of simple blue print. Free hand sketching of clutch assembly. Exercise on blue print reading. Free hand sketching showing different gear arrangement in gear box.		Technical advantage, velocity ratio and applied problems. Useful work of machine-mechanical efficiency of machine problems. Machines-basic principles, determination of velocity ratio, mechanical advantage and efficiency. Machines basic principle, determination of velocity ratio mechanical advantage and efficiency. Useful work of machine-mechanical efficiency of machine problems.	
3	Exercises on blue print reading. Free hand sketching of differential and reduction gearing system in rear axle. Exercises on blue print reading. Layout of hydraulic system in tractor for lift system.		Logarithm-use of logarithmic tables for multiplication & division. Determination of efficiency of simple machines like winch, pulley locks, wheel and compound axles. Further practice in the use of logarithm tables.	
4	Free hand sketching of simple objects related to the trade and preparation of simple working drawings and sketches. Free hand sketches of lighting system in tractor. Sketching harrows and their components.		Electricity and its use. Electric current, positive terminals. Use of switches and fuses-conductors and insulators. Ohm's law. Measuring current voltages-resistance in a circuit. Definition of work, energy, horse-power, efficiency, mechanical advantage, torque, speed, pressure and volume and their application of units..	

5	Sketching of cultivators and their components. Sketching of different shaping and forming equipment. Sketching of different seed drills and their components		Torque powers and their calculations. Instruments used for measurement of speed. HP calculation with respect to draft & speed of operation. How to calculate the drill size and speed. Determination least count of measuring instruments	
6	Sketching of fertilizer applicators Free hand sketching of common sprayers and dusters.		Simple calculations on fertilizer requirements. Calculation on discharge, application rate and field coverage.	
7	Free hand sketching different parts of reapers and mower. Sketching the layout of a tube well and a boring rig. Making layout of farms showing typical irrigation/drainage systems.		Calculations on work out put in reaper harvesting as compared to manual harvesting. Simple calculation on water requirements, discharge and shape size of open channel. Calculations on suction head and discharge of tube well.	
8	Free hand sketching the power wiring circuit of a 3-phase AC motor. Free hand sketching of power tiller and its parts.		Calculations on efficiency of electric motors. Using electric motors and I.C. Engines on the farm.	
9	Free hand sketching thresher Sheller decorticator. Free hand sketching of principle parts of a combine. Draw flow path material of combine harvester.		Calculating the speeds of threshing, sizes of pulleys and horse power requirements. Calculations on field capacity. Computing cost of operation of a combine. Common lubricant used in harvesting combine.	

10	Free hand sketching thresher Sheller decorticator. Free hand sketching of principle parts of a combine. Draw flow path material of combine harvester.		Calculating the speeds of threshing, sizes of pulleys and horse power requirements. Calculations on field capacity. Computing cost of operation of a combine. Common lubricant used in harvesting combine.	
11	Free hand sketching of different equipment used for potato, groundnut. Free hand sketching of common process in equipment as given in theory.		Calculating on field capacity. To calculate the working capacity and horse power (selection of suitable power source of machine to be required of machines given in the theory.	
12	Free hand sketching of common processing equipment as given in theory**.**		Simple calculations on grain moisture measurement relative humidity, wet and dry bulb temperatures.	
13	-do-		Factors to be considered in calculation the cost of operation of common farm machinery.	

7.1.2DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

A. Block –I Basic Training

Week no.	PROFESSIONAL SKILL (275 Hours)	PROFESSIONAL KNOWLEDGE (120 Hour)
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 ofcentre 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 tools- their names and description. Safety precautions, simple forging process, simple heat treatment to case hardening, Annealing & hardening. Gas and arc welding	Simple marking out of sheet metal. Joining 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-rustingsolution.	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, Precautions observed while starting, running and stopping the tractor.	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	Checking cooling system for overheating, cleaning, radiators, dismantling, 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, fuelsupply system. 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. Dismantling 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 & TEST

B. Block –II

Basic Training

Week No.	PROFESSIONAL SKILL (275 Hours)	PROFESSIONAL KNOWLEDGE (120 Hour)
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. Dismantling & assembling of disc harrows (Off set Type/Double action). Dismantling & assembling of disc harrows (Single action). Measuring gang angle. Dismantling & 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. 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.	Dismantling 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. Dismantling and assembling of levelers, scrapers/ blade terracer, ditchers and bund formers/dozer/dumper. Servicing of Lazar leveler. Servicing of post hole digger. Dismantling, 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. Dismantling & assembling of seed drills. 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 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.	Dismantling & 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. Dismantling and assembling of fertilizer applicators. Minor repairs of fertilizer applicator. Calibrations of fertilizer applicator Field operation & adjustments of fertilizer applicators. Dismantling and assembling common sprayers. Calibration of sprayers. Field adjustments & operation of sprayers. Dismantling and assembling common dusters. Servicing fogging machine. Calibration of common dusters. Field adjustments & operation of duster. 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.	Dismantling and assembling a reaper. Workshop adjustments. Dismantling and assembling of reaper winder. Workshop adjustments. Dismantling 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, Dismantling 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 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	Dismantling and assembling AC motors and studies their parts. Reversing the directions. Study of motor starting devices. Periodical maintenance faults and remedies. Servicing of Power tiller/power weeder. Field operation with different attachments. Common adjustments. Dismantling 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 combine. Recommended speeds. Functions, working principles, constructional details of Super SMS, Paddy straw chopper cum spreader, balers	Dismantling and assembling of thresher. Workshop adjustments. Fitting with prime mover. Adjusting and operating in field. Dismantling and assembling of Maize seller. Dismantling and assembling of Ground nut decorticator. Fitting with prime mover. Measuring important speeds affecting the performance. Driving practice of combine harvester. Dismantling of cutter bar assembly. Dismantling of feeder unit. Dismantling of threshing unit. Dismantling of 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.

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 dismantling and assembling mower. Practice in dismantling and assembling fodder harvester. Practice in dismantling and assembling of power chaff/ silage-cutter. Workshop adjustments. Hitching and fitting with prime-mover. Field operation and adjustments. Servicing and maintenance Practice in dismantling and assembling rotary harvester. Practice in dismantling 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, feed grinder-cum-mixer, hammer mill, oil extractor and sugarcane crusher. Constructional details, materials used. Principles of operation. Common faults and remedies.	Dismantling of groundnut digger. Dismantling of 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-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	Visit to a grain drying and storing plant Operation of grain handling seed treating and

	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.	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

7.1.3 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1)	**Name of the subject**	**:**	**EMPLOYABILITY SKILLS**
2)	**Applicability**	**:**	ATS- Mandatory for fresher only
3)	**Hours of Instruction**	**:**	**110 Hrs. (55 hrs. in each block)**
4)	**Examination**	**:**	The examination will be held at the end of two years Training by NCVT.
5)	**Instructor Qualification**	**:**	

i) MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12th /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGET Institute.

7.1.3.1 SYLLABUS OF EMPLOYABILITY SKILLS

A. Block – I
Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	
1	**Pronunciation :** Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)	**15**
2	**Functional Grammar** Transformation of sentences, Voice change, Change of tense, Spellings.	
3	**Reading** Reading and understanding simple sentences about self, work and environment	
4	**Writing** Construction of simple sentences Writing simple English	
5	**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.	
	I.T. Literacy	
1	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	**15**
2	**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.	
3	**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	

4	**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.	
Communication Skill		
1	**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. Case study/Exercise	**25**
2	**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.	
3	**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. Case study/Exercise	
4	**Facing Interviews** Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
5	**Behavioral Skills** Organizational Behavior Problem Solving Confidence Building Attitude Decision making Case study/Exercise	

B. Block–II
Basic Training

Topic No.	Topic	Duration (in hours)
	Entrepreneurship skill	**10**
1	**Concept of Entrepreneurship** **Entrepreneurship**- 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.	
2	**Project Preparation & Marketing analysis** Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of Product Life Cycle (PLC), Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.	
3	**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.	
4	**Investment Procurement** Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.	
	Productivity	**10**
1	**Productivity** Definition, Necessity, Meaning of GDP.	
2	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3	**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.	
4	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	**10**
1	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	

3	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4	**First Aid** Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
5	**Basic Provisions** Idea of basic provision legislation of India. of safety, health, welfare under legislation of India.	
6	**Ecosystem** Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.	
7	**Pollution** Pollution and pollutants including liquid, gaseous, solid and hazardous waste.	
8	**Energy Conservation** Conservation of Energy, re-use and recycle.	
9	**Global warming** Global warming, climate change and Ozone layer depletion.	
10	**Ground Water** Hydrological cycle, ground and surface water, Conservation and Harvesting of water	
11	**Environment** Right attitude towards environment, Maintenance of in -house environment	
	Labour Welfare Legislation	**5**
1	**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.	
	Quality Tools	**5**
1	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2	**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.	
3	**Quality Management System :** Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.	
4	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
5	**Quality Tools** Basic quality tools with a few examples	
	Leadership and Team Building skills.	**5**
1	Leadership Discipline and Morale Team Work Case Study/ Exercise	
2	**Meet the Mentor** **Role - play as a Supervisor**	**5**
	Organizing and Planning.	**5**

1	Time Management Group Dynamics Case Study/ Exercise	

7.2 PRACTICAL TRAINING (ON-JOB TRAINING)
(BLOCK – I&II)
DURATION: 18 MONTHS (9 months in each block)

GENERAL INFORMATION

1) **Name of the Trade** :**MECHANIC AGRICULTURE MACHINERY**
2) **Duration of On-Job Training** : As per Apprenticeship Act amended time to time.
3) **Batch size** : 16 Nos.
4) **Examination** : i) The internal assessment will be held on completion of each block
   ii) NCVT exam will be conducted at the end of 2nd year.
5) **Instructor Qualification** :

Degree in **Agricultural Engineering** from recognized university with one year experience in Agricultural industry. OR Diploma in **Agricultural Engineering** from recognized university with three year experience in Agricultural industry. **OR** NTC/NAC in the trade of Mechanic Agriculture Machinerywith three year post qualification experience in the relevant field. Preference will be given to a candidate with Craft Instructor Certificate (CIC)

6) **Tools, Equipments& Machinery required** : Nil-

7.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

A. BLOCK – I

SrNo.	Practical
1	Introduction to safety equipment's and their uses. Fire-precautions and different types of fire extinguishers. Use of Fitter's hand tools, care and maintenance of tools, filing practice. Practice of various types of precision measuring instruments. (Measuring diameter of piston, main journals, crankpin, big and main bearing, cylinder bore with ordinary caliper and micrometer and vernier caliper, telescopic gauge)
2	Filing-filing to line-marking off-use of centre punch, dividers, calipers, steel rule etc. Filing true and square. Operation and use of hand drill, chipping, grinding of chisels
3	Practice in simple turning, step turning, taper turning, screw cutting, boring etc.
4	Practices on joining of metals by gas and electric welding. Simple sheet metal work cutting, bending and simple fold joints.
5	Operation of different types of nuts & bolts, locking devices of tractor. (lock nuts, cotter, split pins, keys, Circlip lock rings lock washers and locating where they are used)
6	General servicing of Tractor, washing cleaning oil greasing and lubricating all moving parts of tractor and inspection of all the major components.
7	Checking engine auxiliaries, fuel, oil and cooling system. Practice in starting, running and stopping engine.
8	Checking cooling system for overheating, cleaning, radiators, dismantling, cleaning, assembling & testing water pumps, reverse flushing the system & adjusting the fan belt tension. Checking of thermostat valve, pressure cap etc
9	Overhauling of 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.

10	Checking, Layout of Hydraulic System. Checking/Inspection of Hydraulic System and necessary repair.
11	Servicing of hydraulic pump.
12	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.
13	Revision and Test

B. BLOCK – II

Sr. No.	Practical
1	Servicing of electrical system of tractor.
2.	Servicing of fuel supply system of tractor.
3	Overhauling of hydraulic system, pump, control valves and remote cylinder of a tractor.
4	Overhauling power transmission system of power tiller
5	Dismantling and assembling of disc harrow (Single action and double action). Measurement of gang angle.
6	Dismantling, checking, repairing, replacing and assembling of cultivator(Spring/Rigid) Dismantling and assembling of leveler. Dismantling and assembling of scraper
7	Dismantling and assembling of ditcher. Dismantling and assembling of bund former Servicing of laser leveler.
8	Servicing of post hole digger. Dismantling and assembling of seed cum fertilizer drill machine. Calibration of seed drill machine. Workshop adjustments of Zero till drill, strip drill, happy seeder. Calibration of planter and fertilizer applicator.
9	Dismantling and assembling of sprayers. Calibration of sprayers. Dismantling and assembling of duster.
10	Dismantling and assembling of reaper binder. Dismantling and assembling of straw reaper.
11	Dismantling and assembling of volute type centrifugal pump. Servicing of submersible pump.
12	Installation of HDPE, QRC, PVC & dripper pipe line. Repairing and adjusting of irrigation valve & hydrants. Installation of sprinkler, fogger, dripper and pop-up.
13	Servicing of power weeder. Dismantling and assembling of thresher.
14	Dismantling and assembling of maize Sheller. Dismantling and assembling of groundnut decorticator.
15	Dismantling and assembling of cutter bar assembly of combine harvester. Dismantling and assembling of baler, paddy straw chopper cum spreader, Super SMS
16	Dismantling and assembling of fodder harvester.
17	Dismantling and assembling of silage cutter.
18	Dismantling and assembling of rotary harvester.
19	Dismantling and assembling of hay bailer.
20	Dismantling and assembling of potato digger.
21	Servicing and adjusting of winnower.
22	Servicing and adjusting of cleaner & grader.

23	Servicing and adjusting of rice huller, polisher, and hammer mill.
24	Preparation of log books. Off season storage of farm equipment. Cost calculation of different farm machinery
25	Revision and Test

8. ASSESSMENT STANDARD

8.1 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 to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarp/wastage as per procedure, behavioral attitude and regularity in training.

The following marking pattern to be adopted while assessing:

a)Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For 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.

In this work there is evidence of:

- Good skill levels in the use of hand tools, machine tools and workshop equipment
- Many tolerances while undertaking different work are in line with those demanded by the component/job.
- 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 under following performance level:

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.

In this work there is evidence of:

- Good skill levels in the use of hand tools, machine tools and workshop equipment
- The majority of tolerances while undertaking different work are in line with those demanded by the component/job.
- A good level of neatness and consistency in the finish
- Little support in completing the project/job

c) Weight age in the range of above 90% to be allotted during assessment under following performance level:

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.

In this work there is evidence of:

- high skill levels in the use of hand tools, machine tools and workshop equipment
- Tolerances while undertaking different work being substantially in line with those demanded by the component/job.
- a high level of neatness and consistency in the finish.
- minimal or no support in completing the project

8.2 FINAL ASSESSMENT- ALL INDIA TRADE TEST (SUMMATIVE ASSESSMENT FOR TWO YEARS TRADE)

SUBJECTS	Marks	Internal assessment based on competency	Full Marks	Pass Marks	Duration of Exam.
Basic Training(Block-I)		**250**	**250**	**150**	
Professional Skill	250		250	150	**08 hrs.**
Professional Knowledge	100		100	40	3 hrs.
Workshop Cal. & Sc.	50		50	20	3 hrs.
Engineering Drawing	50		50	20	4 hrs.
Employability Skill	50		50	20	3 hrs.
Basic Training (Block-II)		**250**	**250**	**150**	
Grand Total	**500**	**500**	**1000**	**550**	

9. FURTHER LEARNING PATHWAYS

- On successful completion of the course trainees can opt for Diploma course (Lateral entry).
- On successful completion of the course trainees can opt for CITS course.

Employment opportunities:

On successful completion of this course, the candidates shall be gainfully employed in the following industries:

1. Production & Manufacturing industries.
2. Automobile and allied industries
3. Service Mechanic in agricultural machinery
4. Self employment
5. Tractor Industry
6. Agro service centres

ANNEXURE – I

TOOLS & EQUIPMENT FOR BASIC TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TRADE:MECHANICAGRICULTURE MACHINERY

LIST OF TOOLS & EQUIPMENTS FOR 16APPRENTICES

A : TRAINEES TOOL KIT:-

TRADE: MECHANIC AGRICULTURAL MACHINERY

LIST OF TOOLS & EQUIPMENT

A. TRAINEES TOOL KIT FOR 16 TRAINEES +1 INSTRUCTOR

Sl. No.	Name of the items	Qty.
1.	Caliper spring inside 15 cm.	6 nos.
2	Caliper spring outside 15 cm.	6 nos
3.	Centre punch 100 mm.	6 nos.
4.	Chisel cold flat 20 mm x 150 mm.	6 nos
5.	Feeler Gauge 20 blades (metric)	6 nos.
6.	Hammer ball peen 0.75 kg.	6 nos
7.	Hand file 20 cm second cut flat	6 nos.
8.	Hand file 20 cm second cut half-round	6 nos
9.	Hand file 20 cm. smooth triangular	6 nos.
10.	Hand file 30 cm. Round	6 nos
11.	Hand file 30 cm. Bastard	6 nos.
12.	Pliers Circlip flat nose 15 cm	6 nos
13.	Pliers Circlip round nose 15 cm	6 nos.
14.	Pliers side cutting 15 c m	6 nos
15.	Screw driver 100 mm x 8 mm.	6 nos.
16.	Screw driver 750 mm x 6 mm .	6 nos
17.	Steel rule 15 cm.	6 nos.
18.	Steel tool box with lock and key (folding type) 400x200x150 mm	6 nos
19.	Dividers spring 15 cm.	6 nos.
20.	Pipe wrench 350 mm	6 nos
21.	Cleaning Tray 45x30 cm	6 nos.
22.	Crow bar	6 nos
23.	Plier combination 15 cm.	6 nos.
24.	Scriber bit with 15 cm scribing block universal	6 nos
25.	Spanner D.E. (set of 6 BSF)	6 nos.

B. MEASURING INSTRUMENT SHOP OUTFIT

Sl. No.	Name of the items	Qty.
1.	2-furrow disc plough with scrapers.	1 no.
2.	9 tine: cultivator-spring loaded.	1 no.
3.	Allen key set of 12 pieces (2 mm to 14 mm)	4 set
4.	Bearing puller screw powered/ hydraulic powered with attachments Max spread 80, 200 and 300 mm	2 nos.
5.	Blow lamp.	2 nos.
6.	Brake drum spring balance belt etc for performance testing of engine.	1 set
7.	Cage Wheel	1 set
8.	Chain and pulley block 3000 kg. Capacity electric type	1 set
9.	Chaser hard W/V 9 to 40 T.P.I. set of 11 external.	1 set
10.	Chaser hard W/V 9 to 40 T.P.I. set of 11 internal.	1 set
11.	Chisel cross cut 9 x 3 mm	2 nos.
12.	Chisel diamond point 9 mm.	2 nos.
13.	Chisel half round 9 mm.	2 nos.
14.	Chisel cross cut 200 mm x 6 mm	2 nos.
15.	Pliers Circlip long nose internal and external type 15 cm	2 each
16.	Pliers Circlip long nose internal and external type 20 cm	2 each
17.	Drill post.	1 no.
18.	Drill twist metric 3 mm to 12 mm x 1 mm.	2 set
19.	Drill twist S.S. 1/8” to ½” x 1/64” set.	2 sets
20.	Drilling machine bench 1 H.P. to drill up to 12 mm dia.	1 no.
21.	Dynamo and voltage regulator	2 each
22.	Engineers square 15 cm blade.	4 nos.
23.	Engineers stethoscope	1 set
24.	Equipment puncture, in box.	1 no.
25.	Ex-tractor stud (EZYOUT TYPE)	1 no.
26.	Feeler gauge	2 nos.
27.	File flat 20 cm smooth.	2 nos.
28.	File flat 25 cm. second cut	2 nos.
29.	File flat 35 cm. bastard.	2 nos.
30.	File flat safe edge 25 cm smooth.	2 nos.
31.	File half round 40 cm. second cut	2 nos.
32.	File square 20 cm. second cut	2 nos.
33.	File square 30 cm rough.	2nos.
34.	File triangular 15 cm. second cut	2 nos.
35.	Fire buckets with stand	2 nos.
36.	Fire extinguisher	2 nos.

C. GENERAL INSTALLATION/MACHINERIES

Sl. No.	Name of the items	Qty.
1.	Ground wheel (complete wheel set of tractor)	1 set
2.	Groover – 3,4,6 mm.	1 each
3.	Gun, grease pressure.	1 no.
4.	Gun, paraffin set	1 no.
5.	H.S.S. hand reamers 3.5 to 12.5 mm in steps of 1.5 mm set of 12.	1 set
6.	H.S.S. Hand reamers adjustable 11 to 12, 12 to 13, 13 to 15, 15 to 16 mm.	1 set each
7.	H.S.S. Hand reamers, parallel 8 to 12 by 1.5 mm	2 sets
8.	H.S.S. machine reamers 3 to 19 mm in steps of 1.5 mm.	1 set
9.	Hacksaw frame adjustable for 20.30 cm blades	2 nos.
10.	Hammer ball peen 0.25 kg.	2 nos.
11.	Hammer ball peen 0.5 kg.	2 nos.
12.	Hammer copper 1 kg. with handle.	2 nos.
13.	Hammer plastic 0.25 kgs with handle.	2 nos.
14.	Hand Drill Pneumatic type / Electrical	One each
15.	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 Set
16.	Hand vice 37 mm	2 nos.
17.	Hand vice up to 3.75 cm.	2 nos.
18.	Hollow punch set of seven pieces 6 mm to 15 mm	1 set
19.	Hydraulic Pump, control valves (two types)	2 nos.
20.	Lifting jack screw type 3050 kg.	4 nos.
21.	Lockers with 8 drawers (standard size)	2 nos.
22.	Magnet spanner set.	1 set
23.	Mallet (Wooden/plastic)	2 each
24.	Marking out table 90 x 60 x 90 cm.	1 no.
25.	Mechanical jack	1 no.
26.	Metal rack 180 x 150 x 45 cm.	1 no.
27.	Micrometer outside 0-25 mm 25-50, 50-75 75-100 mm with extension rod.	1 each
28.	Micrometer inside 0-150 mm with extension rod.	1 each
29.	Nose pliers 15 cm (Round and Straight)	2 each
30.	Oil can 0.25 liter capacity	1 no.
31.	Philips screw driver type set of 5 pieces (100 mm to 300 mm)	4 set
32.	Portable electric drill 6mm	1 no.
33.	Pressure grease gun	1 no.
34.	Prick punch 15 cm	4 nos.
35.	Puller set for steering wheel universal	1 no.
36.	Puller set universal for bearing and bushes	1 set
37.	Punch figure set 3 mm.	1 set
38.	Punch hollow 6.7 and 9 mm set.	2 sets
39.	Punch Letters set 3 mm.	1 set
40.	Ratchet brace	1 no.
41.	Rule steel 30 cm to read inches and mm.	4 nos.

42.	Safety goggles (clear glass)	2 Pair
43.	Scrapper, bearing.	4 nos.
44.	Scrapper, flat 25 cm handled.	4 nos.
45.	Scrapper, half round 25 cm.	4 nos.
46.	Scrapper, triangular 25 cm.	4 nos.
47.	Screw driver-Electrician type-15 cm size.	4 nos.
48.	Screw jack one tone, capacity double lift	1 no.
49.	Screw pitch gauge	2 nos.
50.	Scriber 15 cm.	4 nos.
51.	Scribing block universal	2 nos.
52.	Set of Morse socket 0-1, 1-2 and 2-3.	2 set
53.	Spanner Ring & DE 36-41	2 set
54.	Spanner Ring & open ended 36 to 41 mm	1 set
55.	Spanner socket pneumatic / Power tool kit	1 set
56.	Spanner socket pneumatic/Power tool kit	1 set
57.	Spanner socket 6-32 mm.	2 set
58.	Spanner, double ended set of 12 metric sizes 8 to 32 mm.	2 set
59.	Spanner, double off-set double ended set of 7 M/W from 3 to 14 mm.	2 sets
60.	Spanner, for sparking plug 10 mm to 22 mm.	4 sets
61.	Spanner, ring set of 12 metric size up to 32 mm	2 set
62.	Spanner, T-flax for screwing up and screwing in accessible position.	1 no.
63.	Spanners adjustable 15 cm.	2 nos.
64.	Stone, carbondrum 15 x 5 x 4 cm smooth and rough.	1 each
65.	Surface plate 60 x 60 cm.	1 no.
66.	Tachometer (counting type)	1 no.
67.	Toe-in, toe-out gauge	2 nos.
68.	Tools, measuring instruments general shop outfit:	1 set
69.	Torque wrench 12-68 Nm.	1 no.
70.	Tray cleaning assorted sizes.	5 nos.
71.	Triple leg grip puller with bearings attachment screw/ hydraulic powered max. spread 80, 160, 250, 450 mm	1 no.
72.	Twist drills for ratchet brace 6 to 20 by 1.5 cm.	1 set
73.	Vernier caliper set 10” or 8” inside and outside, depth to read inches and mm.	1 no.
74.	Vice grip pliers	4 nos.

D. GENERAL MACHINERY

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	1 no.

	attachment	
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.

LIST OF TOOLS & EQUIPMENTS

Sl. No.	**Item/ Specification**	**Quantity**
1.	Tractor 60 HP power steering	1 no.
2	Reversible Mould Board Plough	1 no.
3	Disc Plough 3 Bottom	1 no.
4	Disc Plough 2 Bottom reversible l	1 no.
5	Chisel Plough- 5/7 tine	1 no.
6	Rotavator – 5.5’ cutting Width	1 no.
7	Sub solier 24 -30 inch.	1 no.
8	Disc Harrow 8x8 trailed type	1 no.
9	Disc Harrow (14 Mounted type) off set	1 no.
10	Paddy harrow (14 Disc mounted type)	1 no.
11	Pulverizing Roller (Tractor Mounted) with spring loaded (11tyne) cultivator	1 no.
12	Bund maker (disc type)	1 no.
13	Leveler/spike Leveler 3 meter width	1 no.
14	Laser Leveler complete with transmitter, receiver, control box, survey equipment	1 set
15	Tractor operator Angle blade Tracer	1 no.
17	Tractor operator scraper and bucket scraper	1 no.
18	Tractor Operator ditcher	1 no.
19	Tractor Operator trencher 10” to 16” Width & 4 ft depth	1 no.
20	Tractor Operator post hole digger	1 no.
21	Tractor Operator Zero/ strip till Seed cum fertilizer drill 9/11 rows	1 no.
22	Tractor PTO operated multi - crop direct sowing happy seeder	1 no.
23	Tractor Operator Seed cum fertilizer drill cum planter	1 no.
24	Tractor operated two rows Semi /automatic potato planter	1 no.
25	Tractor operated bed farmer cum three rows planter	1 no.
26	Tractor operated two rows vegetable trans planter (semi automatic)	1 no.
27	Paddy transplanter	1 no.
28	Sugar cane transplanter	1 no.
28A	Centrifugal Pump with electric motor	1 Unit
28B	Submersible Pump complete unit	1 no.
29	Sprinkler type and drip irrigation systems complete sets. Pipes(Different materiel & Sizes) Such as :- PVC, HDPE, QRC	One set each

	&Poly Tubing Dripper(Different materiel & Sizes) Jets, Foggers & Mister	
30	Tractor PTO operated sprayer for cotton	1 no.
34	Knapsack /foot sprayer	1 no.
35	Power operated manure spreader	1 no.
36	Rotary duster	1 no.
37	Mechanical Power Weeder	1 each
39	Multi crop thresher	1 no.
40	Groundnut decorticator	1 no.
41	Winnower	1 no.
42	Self propelled riding type Reaper/Reaper winder	1 no.
43	Power operated soybean reaper	2 nos.
44	Straw reaper	1 no.
45	Mower/Grass Cutter	1 no.
46	Power Tiller	1 no.
51	Self-propelled Combine Harvester axial flow/Track type combine Harvesterfitted with super SMS	1 no.
52	Header Assembly for maize and sun-flower	1 no.
53	Tractor Operated paddy straw chopper cum spreader,	1 no.
54	Tractor Operated Baler.	1 no.
55	Stubble shaver	1 no.
56	Chaff cutter and silage cutter	1each
57	Field crops like wheat, Soya bean, paddy etc.	As per practice
58	Fodder Harvester (Flail type)	1 no.
59	Tractor operated potato digger	1 no.
60	Tractor operated ground nut digger	1 no.
62	Power operated Grader (wheat, maize)	1 no.
64	Power Operated Cleaner	1 no.
72	Weighing balance	2 nos.
73	Measuring tape	4 nos.
78	Laptop Computers with Trade Related Software	1nos.
79	Computers with Trade Related Software	5nos.
80	Air conditioner 1.5 ton	1

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: MECHANIC AGRICULTURE MACHINERY

LIST OF TOOLS& EQUIPMENTS FOR 16 APPRENTICES

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

2) Infrastructure:

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Draughtsman drawing instrument box	16
2.	Set square celluloid 45^0 (250 X 1.5 mm)	16
3.	Set square celluloid 30^0-60^0 (250 X 1.5 mm)	16
4.	Mini drafter	16
5.	Drawing board (700mm x500 mm) IS: 1444	16

B : FURNITURE REQUIRED

Sl. No.	Name of the items	Quantity (indicative)
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

ANNEXURE-II

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1.Due care to be taken for proper & inclusive delivery among the batch. Some of the following some method of delivery may be adopted:

A) LECTURE
B) LESSON
C) DEMONSTRATION
D) PRACTICE
E) GROUP DISCUSSION
F) DISCUSSION WITH PEER GROUP
G) PROJECT WORK
H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.