SYLLABUS OF SEMESTER SYSTEM
FOR THE TRADE OF

Mechanic Agricultural Machinery

Under

Craftsmen Training Scheme (CTS)
(Two years/Four Semesters)

Redesigned in
2014

By
Government of India
Ministry of Labour & Employment (DGE&T)

GENERAL INFORMATION

1.	Name of the Trade	:	Mechanic Agricultural Machinery
2.	N.C.O. Code No.	:	**7231.30, 7233.80**
3.	Duration of Craftsmen Training	:	2 Year (Four Semester having duration of six months each)
4.	Power Norms	:	10 kw
5.	Space Norms	:	225 Sq. mtr. (Inclusive of parking area)
6.	Entry Qualification	:	Passed 10^{th} class examination with Maths and Science
7.	Unit strength	:	16 + 30% super Numeric
8.	Instructors Qualification	:	a) Degree in **Agriculture Engineering** from recognized university with one year experience in Agricultural Machinery industry and should possess valid LMV driving license. OR Diploma in **Agriculture Engineering** from a recognized board of Technical education with two year in Agricultural Machinery industry and should possess valid LMV driving license. OR 10^{th} Passed + NTC/NAC in the Trade of **" Mechanic Agricultural Machinery"** with 3 years post qualification experience in the relevant field and should possess valid LMV driving license **and** **and** b) With "**National Crafts Instructor Certificate".**

* **Note**:

1) At least one Instructor must have Degree/Diploma in **Agriculture Engineering** when applied for 02 units.
2) Instructor Qualification for WCS & E.D, as per the Training Manual

9. For Employability Skills One Contract/Part Time/Guest Faculty for Generic Module .

i) MBA/ BBA with two years experience **OR** Graduate in Sociology / Social Welfare / Economics with Two years experience **OR** Graduate / Diploma with Two years experience and trained in Employability Skills from DGET institutes

AND

Must have studied English / Communication Skills and Basic Computer at 12^{th} / Diploma level and above

OR

Existing Social Study Instructors duly trained in Employability Skills from DGET institutes

Distribution of training on Hourly basis:

Total hours /week	Trade practical	Trade theory	Work shop Cal. &Sc.	Engg. Drawing	Employability skills	Extra curricular activity
42 Hours	27 Hours	5 Hours	3 Hours	3 Hours	2 Hours	2 Hours

COURSE INFORMATION (MECHANIC AGRICULTURAL MACHINERY)

1.Introduction :

- An intensive industrial survey was made to ascertain the requirements of skill-gap in the automobile sector, a scientifically designed survey covering labour-market survey web-survey was conducted. Based on the data obtained the skills are identified and accordingly the syllabus has been drafted. Subsequently the Trade expert committed reviewed.

2. Terminal Competencies/Deliverables :

After successful completion of the above course, the trainee shall be able to perform the following skills with proper sequence.

- Maintains, services, repairs or overhauls different farm equipment such as Tractors, Power tillers, Sprayers, Drillers, etc.
- Examines and drives vehicle on road or runs engine in stationary position to diagnose troubles and defects.
- Dismantles part or complete engine or unit according to nature of defects.
- Repairs or replaces defective parts, reassembles them with prescribed settings, clearances, timings and adjustments by further tooling as necessary and ensures accuracy of fit.
- Installs assembled or repaired engine securely in position on vehicle controls and other accessories. Starts engine and observes performance for any unusual noise and knocks.

- Adjusts carburettor, fuel pump (Carburettor for petrol engine and fuel pump for diesel engine), sets clearance between tappets and valves, tunes engine, adjusts brakes, makes electrical connections and performs other tasks to ensure stipulated performance.

- May repair and overhaul electric motors, fuel pump, carburettor etc. of engine.

- May weld, braze or solder parts.

- May repair other agricultural machinery for ploughing, leveling, harvesting etc. and be designated as **MECHANIC, ARGRICULTLURAL MACHINES.**

3. Employment opportunities:

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. Agricultural Machinery Mechanic
2. Tractor Service Mechanic
3. Auto Fitter in Tractor Manufacturing Concern in Assembly Shop or Test Shop
4. Mechanic in Agricultural machinery Manufacturers
5. Dealers service mechanic
6. Driver/Tractor Operator
7. Spare Parts Sales Assistant / Manufacturers' Representative
8. Laboratory Assistant

Self Employment

1. Agricultural Machinery Mechanic
2.. Tractor Service Mechanic
3. Tractor Operator
4. Spare Parts Salesman
5. Spare Parts Dealer

4. Further learning pathways:

- On successful completion of the course trainee can get themselves enrolled in Apprenticeship training in reputed Industrial organisation.
- The qualified candidates have scope for lateral entry into the Diploma courses offered by some of the State Governments
- The qualified candidates can also get themselves upgraded by taking up the Second Semester at his own convenience in the CTS scheme , since the first semester is common to the following trades.

Craftsman Training Scheme

1. Mechanic Motor Vehicle - 2 Years (4 Sem)
2. Mechanic Diesel – 1 Year (2 Sem)
3. Mechanic Motor Cycle - 1 Year (2 Sem)
4. Mechanic Auto Electrical and Electronics - 1 Year (2 Sem)
5. Mechanic Agricultural Machinery - 2 Years (4 Sem)
6. Mechanic Tractor - 1 Year (2 Sem)
7. Pump Operator cum Mechanic - 1 Year (2 Sem)

Syllabus for the trade of Mechanic Agricultural Machinery
First Semester (Semester code No.)
Duration: Six Months.

Syllabus for Trade practical and Trade Theory

Week No.	Trade Practical (27 Hrs/week)	Trade Theory (5 Hrs/week)
1	Familiarisation with institute, Job opportunities in the automobile sector, Machinery used in Trade. Types of work done by the students in the shop floor.	**Admission & introduction to the trade:** Introduction to the Course duration, course content, study of the syllabus. General rule pertaining to the Institute, facilities available– Hostel, Recreation, Medical and Library working hours and time table
2	Practical related to Safety and Health, Importance of maintenance and cleanliness of Workshop. Interaction with health centre and fire service station to provide demo on First aid and Fire safety, Use of fire extinguishers. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of Used engine oil. Energy saving Tips of ITI electricity Usage	**Occupational Safety & Health** Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & personal safety message. Safe handling of Fuel Spillage, Fire extinguishers used for different types of fire. Safe disposal of toxic dust, safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles. **Energy conservation**-Definition, Energy Conservation Opportunities (ECOs)-Minor ECos and Medium ECOs, Major ECOs), Safety disposal of Used engine oil, Electrical safety tips**.**
3-5	Practice using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc., Layout a work piece- for line, circle, arcs and circles. Practice to measure a wheel base of a vehicle with measuring tape. Practice to measure valve spring tension using spring tension tester Practice to remove wheel lug nuts with use of an air impact wrench Practice on General workshop tools & power tools.	**Hand & Power Tools:-** Marking scheme, **Marking material-**chalk, Prussian blue. Cleaning tools- Scraper, wire brush, Emery paper**,** Description, care and use of Surface plates, steel rule, measuring tape, try square. Calipers-inside and outside. Dividers, surface gauges, scriber, punches-**prick punch,** center punch, pin punch, hollow punch, number and letter punch. Chisel-flat, cross-cut. Hammer- ball pein, lump, mallet. Screw drivers-blade screwdriver, **Phillips** screw driver, Ratchet screwdriver. Allen key, bench vice & C-clamps, Spanners- ring spanner, open end spanner & the combination spanner, universal adjustable open end spanner. Sockets & accessories, Pliers - **Combination pliers, multi grip, long nose, flat-nose, Nippers** or pincer pliers, **Side cutters, Tin snips, Circlip pliers, external circlips pliers.** Air impact wrench, air ratchet, wrenches- Torque wrenches, pipe

		wrenches, car jet washers Pipe flaring & cutting tool, pullers-Gear and bearing.
6&7	Measuring practice on Cam height, Camshaft Journal dia, crankshaft journal dia, Valve stem dia, piston diameter, and piston pin dia with outside Micrometers. Measuring practice on the height of the rotor of an oil pump from the surface of the housing or any other auto component measurement with depth micrometer. Measuring practice on valve spring free length. Measuring practice on cylinder bore, Connecting rod bore, inside diameter (ID) of a camshaft bearing with Telescope gauges. Measuring practice on cylinder bore for taper and out-of-round with Dial bore gauges. Measuring practice to measure wear on crankshaft end play, crankshaft run out, and valve guide with dial indicator. Measuring practice to check the flatness of the cylinder head is warped or twisted with straightedge is used with a feeler gauge. Measuring practice to check the end gap of a piston ring, piston-to-cylinder wall clearance with feeler gauge. Practice to check engine manifold vacuum with vacuum gauge. Practice to check the air pressure inside the vehicle tires is maintained at the recommended setting.	**Systems of measurement**, Description, care & use of - Micrometers- Outside and depth mirometer, Micrometer adjustments, Vernier calipers, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.
8 & 9	Practice on General cleaning, checking and use of nut, bolts, & studs etc., Removal of stud/bolt from blind hole. Practice on cutting tools like Hacksaw, file, chisel, Sharpening of	**Fasteners**- Study of different types of screws, nuts, studs & bolts, locking devices, Such as lock nuts, cotter, split pins, keys, circlips, lock rings, lock washers and locating where they are used. Washers & chemical compounds can be used to help secure these fasteners. Function of **Gaskets,** Selection of materials for gaskets and packing, **oil seals.**

	Chisels, center punch, safety precautions while grinding. Practice on Hacksawing and filing to given dimensions.	**Cutting tools** :- Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and uses., OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding. **Limits, Fits & Tolerances**:-Definition of limits, fits & tolerances with examples used in auto components
10 & 11	Practice on Marking and Drilling clear and Blind Holes, Sharpening of Twist Drills Safety precautions to be observed while using a drilling machine. Practice on Tapping a Clear and Blind Hole, Selection of tape drill Size, use of Lubrication, Use of stud extractor. Cutting Threads on a Bolt/ Stud. Adjustment of two piece Die, Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface.	**Drilling machine** - Description and study of Bench type Drilling machine, Portable electrical Drilling machine, drill holding devices, Work Holding devices, Drill bits. **Taps and Dies:** Hand Taps and wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and Die stock. Screw extractors. **Hand Reamers** – Different Type of hand reamers, Drill size for reaming, Lapping, Lapping abrasives, type of Laps.
12	Practice on making Rectangular Tray. Pipe bending, Fitting nipples unions in pipes. Soldering and Brazing of Pipes.	**Sheet metal** - State the various common metal Sheets used in Sheet Metal shop Sheet metal operations - Shearing, bending, Drawing, Squeezing Sheet metal joints - Hem & Seam Joints Fastening Methods - Riveting, soldering, Brazing. fluxes used on common joints. Sheet and wire-gauges. The blow lamp- its uses and pipe fittings.
13	Practice in joining wires using soldering Iron, Construction of simple electrical circuits, Measuring of current, voltage and resistance using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.	**Basic electricity**, Electricity principles, Ground connections, Ohm's law, Voltage, Current, Resistance, Power, Energy. Voltmeter, ammeter, Ohmmeter Mulitmeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor ratings
14	Diagnose series, parallel, series-parallel circuits using Ohm’s law, Check electrical circuit with a test lamp, perform voltage drop test in circuits using multimeter, measure current flow using multimeter	Fuses & circuit breakers, Ballast resistor, Stripping wire insulation, cable colour codes and sizes, Resistors in Series circuits , Parallel circuits and Series-parallel circuits, Electrostatic effects, Capacitors and its applications, Capacitors in series and parallel.

	/ammeter, use of service manual wiring diagram for troubleshooting.	
15	Cleaning and topping up of a lead acid battery, Testing battery with hydrometer, Connecting battery to a charger for battery charging, Ins**pecting & testing a battery after charging,** Measure and Diagnose the cause(s) of excessive Key-off battery drain (parasitic draw) and do corrective action. Testing of relay and solenoids and its circuit.	Description of Chemical effects, Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF) batteries, Magnetic effects, Heating effects, Thermo-electric energy, Thermisters, Thermo couples, Electrochemical energy, Photo-voltaic energy, Piezo-electric energy, Electromagnetic induction, Relays, Solenoids, Primary & Secondary windings, Transformers, stator and rotor coils.
16	Identify and test power and signal connectors for continuity, Identify and test different type of Diodes, NPN & PNP Transistors for its functionality**,** Construct and test simple logic circuits OR, AND & NOT and Logic gates using switches.	**Basic electronics**: Description of Semi conductors, Solid state devices- Diodes, Transistors, Thyristors, Uni Junction Transistors (UJT), Metal Oxide Field Effect Transistors (MOSFETs), Logic gates-OR, AND & NOT and Logic gates using switches.
17& 18	Practice to make straight beads and Butt, Lap & T joints Manual Metal Arc Welding. Setting of Gas welding flames, practice to make a straight beads and joints Oxy – Acetylene welding Film on Heat treatment process	**Introduction to welding and Heat Treatment** **Welding processes** – Principles of Arc welding, brief description, classification and applications. Manual Metal Arc welding -principles, power sources, electrodes, welding parameters, edge preparation & fit up and welding techniques; Oxy – Acetylene welding - principles, equipment, welding parameters, edge preparation & fit up and welding techniques;. Heat Treatment Process– Introduction, Definition of heat treatment, Definition of Annealing, Normalizing, Hardening and tempering. Case hardening, Nitriding, Induction hardening and Flame Hardening process used in auto components with examples.
19 & 20	Practice on Liquid penetrant testing method and Magnetic particle testing method. Identification of Hydraulic and pneumatic components used in vehicle. Tracing of hydraulic circuit on	**Non-destructive Testing Methods- Importance of Non-Destructive Testing In Automotive Industry, Definition of NDT,** Liquid penetrant and Magnetic particle testing method – Portable Yoke method **Introduction to Hydraulics & Pneumatics: -** Definition of Pascal law, pressure, Force,

	hydraulic jack, hydraulic power steering, and Brake circuit. Identification of components in Air brake systems.	viscosity. Description, symbols and application in automobile of Gear pump-Internal & External, single acting, double acting & Double ended cylinder; Directional control valves-2/2, 3/2, 4/2, 4/3 way valve, Pressure relief valve, Non return valve, Flow control valve used in automobile. Pneumatic Symbols, Description and function of air Reciprocating Compressor. Function of Air service unit (FRL-Filter, Regulator & Lubricator).
21	Identification of different type of Vehicle. Demonstration of vehicle specification data; Identification of vehicle information Number (VIN). Demonstration of Garage, Service station equipments.- Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.	Auto Industry - History, leading manufacturers, development in automobile industry, trends, new product. Brief about Ministry of Road transport & Highways, The Automotive Research Association of India (ARAI), National Automotive Testing and R&D Infrastructure Project (NATRIP), & Automobile Association. Definition: - Classification of vehicles on the basis of load as per central motor vehicle rule, wheels, final drive, and fuel used, axles, position of engine and steering transmission, body and load. Brief description and uses of Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.
22-23	In-plant Training	
24-25	Revision and Test	
26	NCVT Exam	

1st Semester

Workshop Calculation and Science

Syllabus for the trade of

1. Mechanic Agricultural Machinery

Week No.	Workshop calculation and Science (3 Hrs/week) 1st Semester
1	Units, Derived and fundamental, types of system FPS, CGS, MKS and their conversion. Metric weights and measurements, units conversion factors
2	Fractions- Addition and subtraction, Fractions and whole numbers, Combined addition and subtraction, Multiplication and division of fractions. Operations in problems involving fractions.
3	Order of performing (BODMAS) Mathematical operators , Integers – Rules for dealing with integers, Addition, subtraction, Multiplication and division.
4 & 5	Ratio and proportion. Percentages, Examples of ratios in Automotive technology
6	profit and loss, Discount .
7	simple interest and compound interest
8	depreciation calculation
9-10	Time and work problem , Time and distance, clocks and calendar,
11	Brief description of manufacturing process of steel, and aluminum
12	Meaning of elasticity, malleability, brittleness, hardness, compressibility & ductility and their examples , 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.
13	Properties and uses in automobile industries- copper, zinc, lead, tin, aluminum, brass, bronze, solder bearing metals, timber and rubber. Nylon, P.V.C., PP (poly prop line, polymer).
14-15	**Materials – Stress, strain,-** Definition of Stress, Types of stress- Tensile, compressive, shear , Examples of the three basic stresses in automotive components , calculation of stress and strain in automotive application, Stress raisers, Strain-, Tensile, compressive, Shear strain, Tensile strength, Factor of safety, Torsional stress, Strain energy.
16	Definition of cold working and Hot working and its properties on sheet metal. Advantage of Deep drawing material. Importance of Iron- carbon diagram in heat treatment process.
17	Different Type of cutting fluids and their properties. Calculation of cutting speed, feed and drilling time.
18-19	**Forces** – Definition of Force, Types of force -examples,– Direct forces, Attractive forces, Explosive forces, Describing forces, Graphical representation of a force, Addition of forces, Parallelogram of forces ,Triangle of forces, Resolution of forces, Mass, Equilibrium, Pressure, Pressure in hydraulic systems, Hooke's law, Practical applications.
20-21	**Work energy, power–** Definition and calculation of Work, Power and Work done by a torque, Definition and calculation of Energy -Potential energy, Chemical energy, Conservation of energy, Energy equation, Kinetic energy, Energy of a falling body, Kinetic energy of rotation.

Automobile Group – 2 years Trade

1st Semester

Engineering Drawing

Syllabus for the trade of Mechanic Agricultral Machinery

Week No.	**Engineering Drawing (3 Hrs/week)** **1st Semester**
1	Importance of engineering drawing as a communication medium, different types of drawing - Machine Drawing, Production Drawing, Part Drawing, Assembly Drawing, Drawing instruments, equipment and materials and their uses
2&3	Scales - Recommended scales, reduced & enlarged Drawing Sheet sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheet, sizes of title block and its contents. Using drawing instruments to draw straight lines, rectangles, squares, circles, polygons.
4&5	Lettering and Dimensioning - Types of Lettering, Guide Lines for lettering, Recommended sizes of letters and numbers, Single stroke letters, Dimensioning - rules and systems of dimensioning – dimensioning a given drawing.
6&7	Identify the alphabet of lines- Read and Interpret the meaning of various line types with examples- Object Lines, Hidden Lines, Center Lines, Phantom Lines, Dimension Lines, Extension Lines, Leaders, Break Lines -Long-break Line, Round, Solid, Hollow Cross Section, Section Lines – Common Manufacturing Materials, Cutting Plane Lines
8-11	Geometric Construction - Bisecting a line - perpendiculars - parallel lines - division of a line; Angles - bisection, trisection, Tangent lines touching circles internally and externally Polygons - Regular polygons - circumscribed and inscribed in circles. Conic sections - Definitions of focus, directrix, eccentricity, Construction of Ellipse by Concentric circles method, Construction of parabola by rectangular method.
12&13	Orthographic Projection - Definition - Planes of Projection - Four quadrants – Reference Line, First angle projection - Third angle projection.
14-17	Isometric Projection - Definition - Isometric axes, lines and planes, Isometric Scale - Isometric view. Drawing of isometric views of plane figures, Drawing of isometric views of prisms and pyramids, Drawing of isometric view of cylinders and cones
18-21	Development of Surfaces - Need for preparing development of surface, Concept of true length - Principal methods of development, Development of simple solids like cubes, prisms, cylinders, pyramids, cones.

SYLLABUS FOR EMPLOYABILITY SKILLS

SEMESTER-I

(Pl refer to www.dget.nic.in)

Syllabus for the trade of Mechanic Agricultural Machinery
Second Semester (Semester code No.)
Duration: Six Months.

Syllabus for Trade practical and Trade Theory

Week NO.	Trade Practical (27 Hrs/week)	Trade Theory (5 Hrs/week)
1	Demonstration of tractor specification data; Identification of different major assemblies of tractor and Cleaning of tractors, oil greasing and lubricating all moving parts of tractor. Practice on starting and stopping of tractor engine.	Tractor Industry in India - leading manufacturers, development in Tractor industry, trends, new product. Study of tractors, dozers & their major assemblies, and different make (indigenous). Constructional differences between tractor and dozers and their merits. Different type of Tractor starting method and stopping.
2	Dismantling of tractor engine as per procedure & Inspection of components for dimension and wear.	**Engine Basics:** Classification of engines, Principle & working of 2&4-stroke diesel engine (Compression ignition Engine (C.I)), Principle of Spark Ignition Engine(SI), differentiate between 2-stroke and 4 stroke, C.I engine and S.I Engine, Direct injection and Indirect injection,. Brief on common rail diesel injection engine. Engine output, compression pressure, Compression ratio.
3.	Remove cylinder head from engine. Overhauling of cylinder head assembly with use of service manual for clearance and other parameters:- Practice on removing rocker arm assembly manifolds, fitting of valve guide.	**Engine Components –** working principle & construction of cylinder heads, types of combustion chambers. Function of Engine Valves, different types, materials, Type of valve operating mechanism. Importance of Valve seats & inserts, importance of Valve movement, Valve stem, oil seals, Valve-timing diagram and concept of Variable valve timing.
4.	Cylinder block overhaul. Measurement of cylinder liner & crankshaft for ovality and taperness. Overhauling piston and connecting rod assembly with use of service manual for clearance and other parameters:- Practice on removing oil sump and oil pump – clean the sump.	**Description of Cylinder block**, **Cylinder block construction**, types of cylinder blocks & cylinder liners. Description & functions of different types of pistons, piston rings and piston pins and materials. Used recommended clearances for the rings and its necessity precautions while fitting rings, common troubles and remedy.
5.	Practice on removing the big end bearing, connecting rod with the piston. Practice on removing the piston rings, Dismantle the piston and connecting rod. Check the side clearance of piston rings	Description & function of connecting rod, importance of big-end split obliquely, Materials used for connecting rods big end & main bearings. Shells piston pins and locking methods of piston pins. Recommended clearances for the cylinder liners & rings. Bearing failure & its causes-care &

	in the piston groove & lands for wear. Check piston skirt and crown for damage and scuffing, clean oil holes. Measure -the piston ring close gap in the cylinder, clearance between the piston and the liner, clearance between crank pin and the connecting rod big end bearing.	maintenance.
6.	Check connecting rod for bend and twist. Setting of Connecting rod big end & main bearing. Assembling crank shaft, main bearings, connecting rods and piston assembly in the engine, fitting cylinder head. Setting valve timing.	Description of crankshaft & Camshafts. Types of their drives. Description of Overhead camshaft**,** importance of Cam lobes. Crankcase ventilation (PCV). Camshaft, Crank-shaft balancing, Firing order of the engine. Description and function of the fly wheel and vibration damper. Timing mark.
7.	Checking cooling system for overheating / under-cooling. Dismantling, cleaning, assembling & testing of water pumps, reverse flushing the system. Checking of thermostat valve, pressure cap. Adjusting the fan belt tension.	**Cooling systems**:- Purpose, types, Heat transfer method**,** effect of boiling point & pressure, coolant properties, preparation and recommended change of interval, use of antifreezer. **Cooling system components,** water pump, function of thermostat**,** pressure cap**,** Recovery system & Thermo-switch. Function & types of Radiator.
8.	Identification of lubrication oil flow circuit in an engine. Overhauling oil pump, servicing of oil cooler & centrifugal oil filter. Testing oil pressure.	**Lubrication system**: - purposes & characteristics of oil, type of lubricants, grade as per SAE, & their application, oil additives, type of lubrication system. Lubrication system components- different type of Oil pump, Oil filters & oil cooler. Probable reasons for low / high oil pressure, high oil consumption and their remedies.
9.	Servicing of air cleaner (Oil bath) Checking & changing an air filter, Dismantling & assembling of turbocharger, check for axial clearance as per service manual. Checking of Exhaust Gas Recirculation. Check Exhaust system for rubber mounting for damage, deterioration and out of position; for leakage, loose connection, dent and damage; Practice on Exhaust manifold removal and installation. Practice on Catalytic converter removal and installation.	**Intake & exhaust systems** – Description of Diesel induction & Exhaust systems. Description & function of air compressor, exhauster, Super charger, Intercoolers, turbo charger, variable turbo charger mechanism. **Intake system components**- Description and function of Air cleaners, Different type air cleaner, Description **of** Intake manifolds and material**.** **Exhaust system components**- Description and function of Exhaust manifold**,** Exhaust pipe**,** Mufflers- Reactive, absorptive, Combination**,** Electronic mufflers**,** Catalytic converters**,** Back-pressure, Diesel particulate filter**,** Exhaust Gas Recirculation(EGR).

10 & 11.	Repair to a tractor carburetors – adjusting float level and slow speed adjustments – studying the fuel flow circuit in carburetor. Practice in engine tune up in a vehicle – testing vacuum and compression of engine, adjusting tappets setting ignition timing and adjusting carburetor For slow speeds. Tracing of different parts of fuel system. Repairing fuel leaks in pipe line and unions, Servicing and testing of fuel feed pump. Servicing of fuel filters. Servicing of fuel Injection Pump. . Servicing of pressure pump of (C.R.D.I.). Regulator's and Elect/Electronic injectors, checking operation of C.R.D.I. system. Overhauling & Testing of injectors. Setting injection timing. Bleeding fuel lines for Air locks. Testing cylinder compression**,** Checking idle speed, Obtaining & interpreting scan tool data**.** Fault finding & remedy, care & maintenance.	**Carburetor operation-**Carburation**,** Carburetor system components**,** Carburetor systems**,** Metering jets**,** Accelerating**,** Carburetor barrels **Diesel Fuel Systems-** Diesel fuel characteristics, concept of Quiet diesel technology & Clean diesel technology, Fuel feed system used in Tractor's description and layout. Diesel fuel system components, Description and function of Diesel fuel injection system, types of fuel injection pumps, type of drive, injectors-types and function. Governor and their types. Distributor-type injection pump**,** Glow plugs**,** Cummins & Detroit Diesel injection Diesel electronic control- Diesel electronic control systems (DEC)**,** Common rail diesel injection system**.** Method of bleeding fuel supply system
12.	Dismantle clutch assembly. Inspect the parts of clutch. Relining of clutch plate & assemble. Coupling the clutch with flywheel & join the engine with gear box. Adjust clutch pedal free play. Dismantle gear box of a tractor & inspect the parts. Assemble the gear box. Overhauling Transfer case and auxiliary gear box.	**Clutch:-**types, construction and function. Components of clutch -driver & driven plates, torsion spring, cushion springs, operating fingers, clutch shaft, Slave cylinder & oil seal. Clutch release bearing & linkages. **Manual transmissions-** Function, description, types and their application. Gearbox layout. Components of tractor gear box. Principle of epicyclical gear box. Necessity of torque convertor, need of 4 x 4 wheel drive / Front wheel drive, Low & high gear ratio, universal joint and propeller shaft.
13.	Overhauling of differential. Servicing of reduction gear, rear axle wheel hub. Servicing of PTO (Power Take Off). Measure rpm of PTO shaft & speed of belt pulley.	**Final Drive & Drive Shafts** Differential carriers double reduction gearing, differential lock, crown wheel and pinion adjustments, function and types of power take off (PTO) mechanism. Types of front & rear axles. Common trouble and their remedies, care and maintenance.

14 & 15	Checking, Layout of Mechanical steering system. Checking/ Inspection of Steering linkage and necessary repair. Remove steering wheel. Overhauling of steering gear box of tractor. Remove front axle and spindle hub and steering linkage. Reassembling steering assembly and Test for correct function. Checking, inspect layout of different parts of Hydraulic steering system Practice on visual Inspection of chassis frame for crack, bent and twists. Overhauling and Inspection of shackle, front & rear suspension. **Lubricating a suspension system.**	**Steering & Suspension Systems-** Function and types of steering system. Description, construction and function of mechanical steering system steering wheel, steering gear box, tie-rod, arms link, ball and socket joints etc. their movement and adjustment. Description and mechanism of foot steerage pedal as incorporated in tractors. Description, working and principle of hydraulic steering system. Different parts such as pump, distributor valves, pipe line and hoses etc Development of mechanical framing. Use of Power tiller, Tractor & Bulldozer, Chassis frame of tractor.
16.	Remove wheels from tractor. Dismantle wheel for checking rims, tyres for wear and tubes for leaks. Repairing, derusting, painting. Fitting of tyres and tubes on rim & inflate to correct pressure. Balancing of Tractor wheels. Practice of tyre rotation. Fitting wheels on tractors. Tightening of wheel in correct sequence. Checking & adjusting tire pressure by use of air or by Nitorgen	**Wheels & Tyres-** Description, construction and function of Wheel**.** Rim sizes. Types & sizes of tyres. Solid, pneumatic & Radial. Ply rating. Tyre materials**,** Hysteresis & designations**,** Tyre information**,** Tyre tread designs**,** Tyre ratings for temperature & traction**.** Importance of in-Flatting tyres to correct pressure. Repair and maintenance of tyres and tubes. Storage of tyres. Descriptions Tirewear Patterns and causes Nitrogen vs atmospheric air in tyres
17 &18	Overhauling brakes including cleaning and inspection of all components, relining shoes, setting and actuating shoe clearance. Inspection spring of both shoe and lever. Inspecting and setting parking brakes. Inspecting and setting hydraulic main brake including replacement of washer and oil seals. Overhauling serve mechanism (as applicable) inspecting piston and valves. Bleeding and adjustment of brakes. Fault tracing and remedy. Skimming of brake drum and disc plate.	**Braking Systems** - Braking fundamentals Principles of braking, Drum & disc brakes, Lever/mechanical advantage, Hydraulic pressure & force, Brake fade. **Braking systems** - Brake type used on tractor - principles**,** Air brakes**,** **Braking system components**-Park brake system**,** Brake pedal**,** Brake lines**,** Brake fluid**,** Bleeding**,** Master cylinder**,** Divided systems**,** Tandem master cylinder**,** Power booster or brake unit**,** Hydraulic brake booster**,** Applying brakes**,** Brake force**,** Brake light switch **Drum brakes & components** -Drum brake system**,** Drum brake operation**,** Brake linings & shoes**,** Backing plate**,** Wheel cylinders **Disc brakes & components** -Disc brake system**,** Disc brake operation**,** Disc brake rotors**,** Disc brake pads**,** Disc brake calipers**,** Proportioning valves**,** Proportioning valve operation**,** Brake friction materials**.**

19	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.	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.
20	Checking implements such as ploughs, harrows, cultivators, seed drills, tractor trailer, & P.T.O. units etc. for serviceability before use. Lubricate them as required. Hitching practice (single & three point). Exercise in driving a tractor with different implements. Adjusting agriculture implements for correct functioning during field operation.	**Tractor equipment**:- Description, function of harrows, cultivators, seed drills & tractor trailer. Hitching of equipment. Danger in overloading & incorrect field operation. Average life of Agriculture implements. Description and function of tractor accessories such as Draw bar, top link & Belly Pulley. Setting of draw bar to correct height. Use of Hydraulic lift. Maintenance of tractor accessories.
21	Practice on removing alternator from vehicle dismantling, cleaning checking for defects, assembling and testing for motoring action of alternator & fitting to vehicles. Practice on removing starter motor vehicle and overhauling the starter motor, testing of starter motor. Servicing storage batteries, Tracing lighting circuit fault rectification.	**Tractor Electrical Maintenance:** Lighting arrangement in tractors (As applicable). Description of charging circuit. Operation of alternator, regulator unit ignition warning lamp troubles and remedy in charging system. Fault finding in electrical system. Description of **starter motor circuit**, common troubles and remedy in starter circuit. Description of lighting circuit. Charging & discharging of lead acid battery.
22-23	In plant Training	
24-25	Revision and Test	
26	NCVT Exam	

Automobile Group – 2 years Trade

2nd Semester

Workshop Calculation and Science

Syllabus for the trade of

1. Mechanic Agricultural Machinery

Week No.	Workshop calculation and Science (3 Hrs/week) 2nd Semester
1 & 2	**Factorisation and quadratics**: multiply expressions in brackets by a number, symbol or by another expression in a bracket; by extraction of a common factor eg ax + ay, a(x + 2) + b(x + 2) ; by grouping eg ax − ay + bx − by ; quadratic expressions eg a^2 + 2ab + b^2 ; roots of an equation eg quadratic equations with real roots by factorisation, and by the use of formula
3	**Geometry–** Use of scientific calculator,/logarithmic table Angles -Angular measurement, Angles and rotation, Examples of angles in automotive work, Adding and subtracting angles. Types of angle- Adjacent angles, Opposite angles, Corresponding angles, Alternate angle
4-6	**Trigonometry-** Types of triangle - Acute angled triangle, Obtuse angled triangle, Equilateral triangle, Isosceles triangle, Scalene triangle, Right angled triangle, Labelling sides and angles of a triangle, Sum of the three angles of a triangle. Pythagoras' theorem, Circles, Ratio of diameter and circumference, Length of arc, Timing marks, Wheel revolutions and distance travelled, Valve opening area. Trigonometry- Using sines, cosines and tangents to solve vehicle problems.
7 -10	Formulae for Perimeter and Area of Plane figure - Rectangle, Square, Parallelogram, Triangle, Hexagon, any regular polygon, Trapezium, Circle, sector, Fillet, Ellipse, segment of a circle; Formulae for Volume and surface area of solids- Rectangular solid, Prism, cylinder, pyramids and cones, Frustum of pyramid and cones, sphere, Hollow sphere, segment of sphere, circular ring, spherical sector, Calculation of volume and weight of simple solid bodies such as cubes, square and hexagonal prism-shop problem.
11-13	Statistics – Collecting and sorting raw data, Definition of Discrete variable, continuous variable with Shop examples. Constructing pictographs-pie chart, Bar chart. Frequency and tally Charts. Importance of the shape of a frequency distribution- histogram, frequency polygon, Cumulative frequency plot. Interpreting statistics- sampling, arithmetic mean, median, mode, Range. Graphs- variables, scales, coordinates, straight line graphs.
14 & 15	**Heat and temperature –**Temperature-Thermodynamic temperature scale (Kelvin), Cooling system temperature; Standard temperature and pressure (STP); Thermal expansion with calculation; Heat- Sensible heat, Latent heat, Specific latent heat, Specific heat capacity, Quantity of heat with calculation; Heat transfer – Conduction, Convection,
16 & 17	**Heating, expansion and compression of gases** - Absolute pressure, Absolute temperature; Laws relating to the compression and expansion of gases -Heating a gas at constant volume, Heating a gas at constant pressure, Charles' law. Expansion or compression at constant temperature – isothermal

18-20	**Internal combustion engines-** Engine power-Brake power, Horsepower, PS – the DIN, Indicated power, Mean effective pressure, Calculation of indicated power, Cylinder pressure vs. crank angle, Mechanical efficiency of an engine, Volumetric efficiency, Torque vs. engine speed, Specific fuel consumption vs. engine speed, Brake power, torque and sfc(Specific fuel consumption) compared, Brake mean effective pressure, Thermal efficiency, Indicated thermal efficiency, Brake thermal efficiency petrol vs. Diesel.
21	**Fuels and combustion-** Calorific value, Combustion-Products of combustion, Relevant combustion equations. Air–fuel ratio-Petrol engine combustion, Detonation, Pre-ignition, Octane rating, Diesel fuel, Flash point , Pour point, Cloud point, Biofuels, Liquefied petroleum gas (LPG) ,Hydrogen, Zero emissions vehicles (ZEVs)

Automobile Group – 2 years Trade

Engineering Drawing

2nd Semester Syllabus for the trade of

1. Mechanic Agricultural Machinery

Week Nos.	**Engineering Drawing (3 Hrs/week)** **2nd Semester**
1-4	Read and interpret drawings- Determine information from the title block, Read and interpret industrial prints, Read and interpret detailed and assembly drawings, Identify casting drawings and machining drawings, Read and interpret diagrams, Distinguish between a monodetail and a multidetail drawing.
5-8	Identify different drawing projections - Interpret pictorial and multi-view drawings. Interpret auxiliary and section views, Determine views in a drawing and the significance of the view being shown. Identify missing lines and missing views.
9-12	Free hand sketching of key and screw threads. Read and interpret three Types of screw thread representation: pictorial, schematic and simplified presentation. Terms used in describing a threaded Part, Designation of Thread Specifications, Left-Hand Thread Notations, read and interpret the different type of Finish Symbols, Fillets and Rounds and Machine Slots.
13	Drawing of I .C engine – Diesel and their parts.
14	Sketching of otto cycle, Diesel cycle, valves and valve timing diagram.
15	Free hand sketch of piston assembly, Free hand sketching of piston gudgeon pins rings and connecting rod .
16	Free hand sketching of crank shaft and cam shaft showing all parts.
17	Free hand sketching of cylinder block and cylinder head, cylinder liners .
18	Free hand sketching of different cooling system -showing all necessary parts such as water pump, thermostatic valve, Radiator etc.
19	Free hand sketching of lubrication system, showing all necessary parts such as filters, oil pump, pressure release valve etc.
20	Free hand sketching of power take off (PTO) system. Freehand sketching of staring system.
21	Freehand sketching of charging system and solenoid switch circuit.

SYLLABUS FOR EMPLOYABILITY SKILLS

SEMESTER-II

(Pl ref to www.dget.nic.in)

Syllabus for the trade of <u>Mechanic Agricultural Machinery</u>
Third Semester (Semester code No.)
Duration: Six Months.

Syllabus for Trade practical and Trade Theory

Week No.	Trade Practical (27 Hrs/week)	Trade Theory (5 Hrs/week)
1	Importance of safety precaution to be observed in the section. Range of machinery used in the trade & their features. Precautions to be observed in handling farm machinery	Introduction to the trade curriculum. Importance of the trade in the advancement of Agriculture technology in the country.
2	Dismantling of Mould Board plough. Checking, repairing & replacing the Component. Assembling of MB plough. Measuring Horizontal & Vertical suction. Dismantling of disc plough. Checking, repairing & replacing the Component. Assembling of disc plough. Measuring disc & tilt angle of disc plough. Workshop adjustments. Hitching of ploughs. Field operation & adjustments. Faults and remedies. Care and maintenance.	Types of **tillage** & their uses. Working principles of **ploughs**. Constructional details. Workshop adjustments. Method of hitching. Importance of weight transfer. Considerations while using mounted and semi mounted implements. Method of ploughing. Methods of field operation. Recommended speeds for operation under different field conditions. Daily and periodical maintenance
3	Servicing of sub soiler. Dismantling of chisel plough. Checking, repairing & replacing the Component. Assembling of chisel plough. Hitching of sub soiler/ chisel plough. Dismantling of Rotavator. Checking, repairing & replacing the Component. Assembling of Rotavator. Workshop adjustments. Field operations & adjustments. Faults and remedies. Care and maintenance.	Function & working of sub soiler/ chisel plough. Constructional details. Function & working of **Rotavator.** Workshop adjustments. Method of hitching. Importance of weight transfer. Method of ploughing. Method of Field operation. Recommended speeds for operation of rotavators. Daily and periodical maintenance
4 & 5	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 & adjustments Faults and Remedies. Care and maintenance.	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.
6	Dismantling the cultivator (Spring /Rigid). Checking, repairing & replacing the Components. Assembling the cultivator	**Types of cultivator**. Working Principles & their constructional details, adjustments. Common types of shovels & seeps.

	Setting of cultivators with the help of floor diagram. Workshop adjustments. Field operation & adjustments. Faults and Remedies. Care and maintenance.	Adjustments, mode of operation. Trouble shooting. Care & Maintenance.
7-9	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. Trouble shooting.	**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 post hole digger. Prime mover & driving practice. Adjustments, mode of operation. Method of Field operation. Recommended speeds for operation. Daily and periodical maintenance, Care & Maintenance.
10 & 11	Dismantling & assembling of seed drills. Calibration of seed & fertilizer rates. Workshop adjustments of special drills such as zero till, strip drill/rotto drill & Happy seeder. Field operation & adjustments of special drills such as zero till, strip drill/rotto drill & Happy seeder. Faults and remedies.	**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/rotto 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. Care & maintenance.
12-14	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.	**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.
15& 16	Dismantling and assembling of fertilizer applicators. Minor repairs of fertilizer applicator. Calibrations of fertilizer applicator, Field operation & adjustments of fertilizer applicators. Trouble shooting. Precautions to be observed in handling fertilizer	**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 Care & maintenance.

17	Visit to a tube well boring sites, study of boring and its operation. Dismantling and assembling of a volute type centrifugal pump. Preparing foundations and installing a pumping set. Adjustments and operation of a pumping set	Source of water. Study common irrigation and drainage systems. **Types of irrigation** systems. Types of pumps. Working principles & constructional details of centrifugal pumps.
18	Servicing of a submersible pump. Measuring of discharge of water. Installation of HDPE, QRC, PVC & dipper pipe line.	**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.
19	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). Faults and remedies. Troubles and remedies	**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. Precautions to be observed. Care & Maintenance.
20-21	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. Faults and remedies. Care and maintenance	**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. Premergence and post emergence applications. Recommended weedicides for different crops. Equipments used for their applications. Trouble shooting and remedies. Daily and periodical maintenance. Precautions in handling weedicides.
22-23	In Plant Training	
24-25	Revision & test	
26	NCVT Exam	

Automobile Group – 2 years Trade

3rd Semester

Workshop Calculation and Science

Syllabus for the trade of

1. Mechanic Agricultural Machinery

Week No.	Workshop calculation and Science (3 Hrs/week) 3rd Semester
1& 2	Data interpretation
3 & 4	Allegations or Mixture
5 &6	**Levers and moments, torque and gears -** definition of Levers, Principles of leverage- The principle of moments. The bell crank lever, A practical application of the bell crank lever in vehicle. Axle loadings, A steering mechanism as a machine
7-9	**Friction** – Definition of friction, Coefficient of friction, Static friction, Sliding friction; Making use of friction – Clutch- Torque & power transmitted by a plate clutch and Example calculation, Belt drive- Torque & power transmitted by a belt drive and Example calculation, speed ratio of belt drive.
10-12	**Velocity and acceleration, speed -** Definition of Speed and velocity, Acceleration, Velocity–time graph- Uniform velocity, Uniform acceleration, Equations of motion and their application to vehicle technology. Problems on speed and velocity.
13-15	**Force, mass and acceleration**-Newton's laws of motion, Relation between mass and weight. Inertia, Motion under gravity, Angular (circular) motion, Equations of angular motion Relation between angular and linear velocity, Centripetal acceleration, Accelerating torque
16-18	**Vehicle dynamics -**Load transfer under acceleration, Static reactions, Vehicle under acceleration, , Definition of tractive effort, Tractive resistance-Rolling resistance, air resistance, gradiant resistance, Inertia. Power required to propel vehicle, Forces on a vehicle on a gradient – gradient resistance, Gradeability, Vehicle power on a gradient, Vehicle on a curved track, Overturning speed, Skidding speed
19-21	**Balancing and vibrations –** Balance of rotating masses acting in the same plane (coplanar). Engine balance, Simple harmonic motion (SHM), Applications of SHM- Vibration of a helical coil spring, Torsional vibration, Free vibrations, Example of free vibrations, Forced vibrations- Resonance, Driveline vibrations, Damping, Vibration dampers, Dual mass flywheel, Cams.

Automobile Group – 2 years Trade

3rd Semester

Engineering Drawing

Syllabus for the trade of Mechanic Agricultral Machinery

Week Nos.	**Engineering Drawing (3 Hrs/week)** **3rd Semester**
1&2	Free hand sketching of different tillage and their parts.
3&4	Free hand Sketching of ploughs and their components.
5-7	Free hand Sketching Rotavator, harrows and their components.
8&9	Free hand Sketching of cultivators and their components.
10&11	Free hand Sketching of different shaping and forming equipment.
12&13	Free hand Sketching of different seed drills and their components
14&15	Free hand Sketching of different planters and their components
16	Free hand Sketching of fertilizer applicators
17&18	Sketching the layout of a tube well and a boring rig.
19	Making layout of farms showing typical irrigation/drainage systems
20 & 21	Free hand sketching of power tiller and its parts.

Syllabus for the trade of <u>Mechanic Agricultural Machinery</u>
Fourth Semester (Semester code No.)
Duration: Six Months.

Syllabus for Trade practical and Trade Theory

Week No.	Trade Practical (27 Hrs/week)	Trade Theory (5 Hrs/week)
1	Introduction to the trade curriculum. Importance of the trade in the advancement of Electrical technology in the country.	Introduction to the trade curriculum. Importance of safety precaution to be observed in the section. Range of machinery used in the trade & their features. Precautions to be observed in handling farm machinery.
2 & 3	Dismantling and assembling AC motors and study their parts. Reversing the directions. Study of motor starting devices. Periodical maintenance faults and remedies. 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. Troubles and remedies. Precautions while handling insecticides and pesticides.	**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. Safety precautions **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. Common accidents and their prevention. Care and maintenance.
4	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. Faults finding.	**Reapers & their types** Functions, working principles, constructional details. Field adjustments & operation Care and maintenance. Trouble shooting. Precautions in working & transporting.
5	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.	**Types of threshers**, maize Sheller and ground nut decorticators. Working principles, constructional details. Adjustments and operations. Prime mover and driving systems. Trouble shooting and remedies. Transmission of power belts and

	Measuring important speeds affecting the performance. Faults finding. Precautions for safe operation.	pulleys. Safety precautions.
6 -8	Practice on different components systems of combine harvester. Study of drive mechanism and controls of combine harvester. 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. Care and maintenance.	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. Considerations while selecting a combine. Custom hiring of combine. Calculating of combine operation of combine harvesting. Safety precautions.
9 & 10	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 Faults finding.	**Need of green harvesting equipment.** 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. Precautions in working & transporting.
11	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. Safety precautions, Servicing and maintenance. Faults finding & remedies.	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. Care and maintenance.
12 & 13	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. Faults and remedies.	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. Troubles & Maintenance. Safety precautions.

	Safety precautions.	
14&15	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.	**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. Troubles & maintenance. Safety precautions.
16 & 17	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 Common troubles and its causes.	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. Care & maintenance. Safety precautions.
18 & 19	Visit to a grain drying and storing plant, Studying different aspects of the construction, adjustments, controls. Operation of grain handling seed treating and drying equipment. Study of silo structure.	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 (sylo structure). Methods and instruments used for measuring moisture contents of grains. Equipment and methods used for treating and fumigating seeds and grains.
20	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.	Operation of transporting and handling equipment i.e. Tractor, tractor trailer, power tiller & combine harvester.
21	Visit to a Government Farms, Haryallee 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.	Procedure and principle for efficient management and organization of a farm. Discussion on different farm shop layout.
22-23	Project work	
24-25.	Revision & Test	
26	NCVT Exam	

Automobile Group – 2 years Trade

4th Semester

Workshop Calculation and Science

Syllabus for the trade of Mechanic Agricultural Machinery

Week No.	Workshop calculation and Science (3 Hrs/week) 4th Semester
1 & 2	The binary system- Most significant bit (MSB), Hexadecimal, Converting base 10 numbers to binary 10, Uses of binary numbers in vehicle
3 & 4	**Electrical principles-** Electric current, Atoms and electrons, Conductors and insulators, - Conductors, Semiconductors, Insulators, Electromotive force, Electrical power sources – producing electricity- Chemical power source, Magnetic power source, Thermal power source, Effects of electric current – using electricity,
5-7	Electrical circuits- Circuit principles, A simple circuit, Direction of current flow, Electrical units- Volt, Ampere, Ohm, Watt; Ohm's law, Resistors in series, Resistors in parallel, Alternative method of finding total current in a circuit, containing resistors in parallel, Measuring current and voltage, Ohmmeter, Open circuit, Short circuit.
8 &9	Temperature coefficient of resistance- Negative temperature coefficient; Electricity and magnetism- Permanent magnets, The magnetic effect of an electric current, Direction of the magnetic field due to an electric current in a straight conductor, Magnetic field caused by a coil of wire;
10 & 11	Solenoid and relay, Electromagnetic induction, The electric motor effect, Fleming's rule, Alternating current- Cycle, Period, Frequency; Applications of alternating current, Transformer,
12 & 13	Capacitors- Capacitance, Capacitors in circuits-Contact breaker ignition circuit, Capacitive discharge ignition system, Capacitors in parallel and series, Impedance.
14 &15	**Electronic principles-**Introduction, Semiconductors- Effect of dopants, Electrons and holes, The p–n junction, Bias, Behaviour of a p–n junction diode, Diode protection resistor, Negative temperature coefficient of resistance – semiconductor, The Zener diode.
16 &17	Light emitting diode (LED) - Voltage and current in an LED, Photodiode, Bipolar transistors-Basic operation of transistor, Current gain in transistor, Current flow in transistors; Transistor circuit used in automotive applications- Voltage amplifier, Darlington pair, Heat sink;
18 & 19	Filter circuits, Voltage divider, Integrated circuits, Sensors and actuators, Control unit (computer) inputs and outputs, Logic gates-The RTL NOR gate, Truth tables, Bits, bytes and baud.
20 & 21	Properties of refrigerants, refrigerant oil, Fluorinated refrigerants, Refrigeration process – pressure/enthalpy diagram

Automobile Group – 2 years Trade

4th Semester

Engineering Drawing

Syllabus for the trade of Mechanic Agricultral Machinery

Week Nos.	**Engineering Drawing (3 Hrs/week)** **4th Semester**
1&2	Introduction to AutoCAD, Starting AutoCAD, Exercises Using Draw commands as- Line, Polygon, Rectangle, Circle, Ellipse.
3-5	Exercises on using Edit Commands as Erase, Copy Mirror, Offset, Extend, Array, Move, Rotate, Scale, Trim Chamfer, Fillet
6&7	Exercises on using X,Y,Z, coordinate entry system for Angular measurement, Absolute Coordinate, Relative coordinate, Polar coordinate.
8	Exercises on using **Drawing Aids** -grid and snap, ortho and polar tracking, PolarSnap, running object snaps, the From snap, and object snap tracking.
9	Exercises on using Osnap commands as Endpoint, Intersection, Nearest, Midpoint, Tangent, Center.
10	Exercises on using Layers as Create new layer, Assign layer color, Assign layer linetype.
11	Exercises on using dimensions - Styling Dimensions, Adding Dimensions, Using Inquiry Commands, Adding Dimension Objects, Adding and Styling Multileaders, Editing Dimensions
12	Exercises on using Creating and Editing Text- Creating Text Styles, Writing Lines of Text, Creating Text to Fit, Justifying Text, Transforming and Creating Text, Editing Text.
13	Exercises on using Zoom Commands- Zoom realtime, Zoom window, Zoom previous, Zoom all, Pan realtime
14&15	Exercises on using Hatching and Gradients- Specifying Hatch Areas, Picking Points to Determine Boundaries, Selecting Objects to Define Boundaries, Associating Hatches with Boundaries , Hatching with Patterns, Specifying Properties, Separating Hatch Areas, Hatching with Gradients
16	Exercises on using Printing and Plotting - Configuring Output Devices, Setting Up a System Printer, Setting Up an AutoCAD Plotter, Plotting in Modelspace, Plotting Layouts in Paperspace, Exporting to an Electronic Format
17-19	Introduction to Modeling – type of modeling – 2D wire frame, 3D wire frame, surface modeling, solid modeling. Exercises on using 3D primitives, Extrude, Revolve command, subtract, union 3D drawing by using User co-ordinate systems
20-21	Working drawing of Combine Harvester Using CAD.

TRADE: Mechanic Agricultural Machinery

LIST OF TOOLS & EQUIPMNT

A. TRAINEES TOOL KIT per 4 Trainees FOR 20 TRAINEES +1 ISTRUCTOR

Sl.No.	Item with specification	Qty (Nos.)
1.	Allen Key set of 12 pieces (2mm to 14mm)	(5+1)
2.	Caliper inside 15 cm Spring	6
3.	Calipers outside 15 cm spring	6
4.	Center Punch 10 mm. Dia. x 100 mm.	6
5.	Dividers 15 cm Spring	6
6.	Electrician Screw Driver 250mm	6
7.	Hammer ball peen 0.5 kg with handle	6
8.	Hands file 20 cm. Second cut flat	6
9.	Philips Screw Driver set of 5 pieces (100 mm to 300 mm)	6
10.	Pliers combination 20 cm.	6
11.	Screw driver 20cm.X 9mm. Blade	6
12.	Screw driver 30 cm. X 9 mm. Blade	6
13.	Scriber 15 cm	6
14.	Spanner D.E. set of 12 pieces (6mm to 32mm)	6
15.	Spanner, ring set of 12 metric sizes 6 to 32 mm.	6
16.	Spanners socket with speed handle, T-bar, ratchet and universal upto 32 mm set of 28 pieces with box	6
17.	Steel rule 30 cm inch and metric	6
18.	Steel tool box with lock and key (folding type) 400x200x150 mm	6
19.	Wire cutter and stripper	6

B. Tools Instruments and General Shop outfits

Sl.No.	Item with specification	Qty. (Nos)
1.	AC alternator slip ring puller	1
2.	Adjustable spanner (pipe wrench 350 mm)	2
3.	Air blow gun with standard accessories	1
4.	Air impact wrench with standard accessories	4
5.	Air ratchet with standard accessories	4
6.	Allen Key set of 12 pieces (2mm to 14mm)	2
7.	Alternator for tractor – different type	2
8.	Ammeter 300A/ 60A DC with external shunt	4
9.	Angle plate adjustable 250x150x175	1
10.	Angle plate size 200x100x200mm	2
11.	Anvil 50 Kgs with Stand	1
12.	Arbor press hand operated 2 ton capacity	1
13.	Auto Electrical test bench	1
14.	Battery –charger	2
15.	Belt Tensioner gauge	1

16.	Blow Lamp 1 litre	2
17.	Caliper inside 15 cm Spring	4
18.	Calipers outside 15 cm spring	4
19.	Car Jet washer with standard accessories	1
20.	Carburetor repair tool kit	1
21.	Chain Pulley Block-3 ton capacity with tripod stand	1
22.	Chaser hard W/V 9 to 40 T.P.I. set of 11 external.	1 set
23.	Chaser, hand W/W 9 to 40 T.P.I. set of 11 internal.	1 set
24.	Chisel 10 cm flat	4
25.	Chisels cross cut 200 mm X 6mm	4
26.	Circlip pliers Expanding and contracting type 15cm and 20cm each	4
27.	Clamps C 100mm	2
28.	Clamps C 150mm	2
29.	Clamps C 200mm	2
30.	Cleaning tray 45x30 cm.	4
31.	Clutches, different types such as cone type, disc type	1 each
32.	Compression testing gauge suitable for diesel Engine	2
33.	Connecting rod alignment fixture	1
34.	Copper bit soldering iron 0.25 Kg	4
35.	Cut section model of fuel filter	1
36.	Cylinder bore gauge capacity 20 to 160 mm	4
37.	Cylinder liner- Dry & wet liner, press fit & slidefit liner	1 each
38.	DC Ohmmeter 0 to 300 Ohms, mid scales at 20 Ohms	2
39.	Depth micrometer 0-25mm	4
40.	Dial gauge type 1 Gr. A (complete with clamping devices and stand)	4
41.	Different type of Engine Bearing model	1 set
42.	Different type of piston model	1each
43.	Dividers 15 cm Spring	4
44.	Drift Punch Copper 15 Cm	4
45.	Drift, copper 10 x 15 1/2 mm	2
46.	Drill point angle gauge	1
47.	Drill twist 1.5 mm to 15 mm (various sizes) by 0.5 mm	4
48.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts	2 each
49.	Electric testing screw driver	2
50.	Engineer's square 15 cm. Blade	2
51.	Engineers stethoscope	1
52.	Equipment puncture, in box,	1
53.	Feeler gauge 20 blades (metric)	2
54.	File flat 20 cm bastard	4
55.	File, half round 20 cm second cut	4
56.	File, Square 20 cm second cut	4
57.	File, Square 30 cm round	4
58.	File, triangular 15 cm second cut	4
59.	Files assorted sizes and types including safe edge file (20 Nos)	2 set
60.	Flat File 25 cm second cut	4
61.	Flat File 35 cm bastard	4
62.	Fuel feed pump for diesel	2
63.	Fuel injection pump (Diesel) inline	1

64.	Glow plug tester	2
65.	Granite surface plate 1600 x 1000 with stand and cover	1
66.	Grease Gun	2
67.	Grover – 3, 4, 6mm.	1 Each
68.	Growler	2
69.	Hacksaw frame adjustable 20-30 cm	10
70.	Hammer Ball Peen 0.75 Kg	4
71.	Hammer Chipping 0.25 Kg	4
72.	Hammer copper 1 Kg with handle	4
73.	Hammer Mallet	4
74.	Hammer Plastic	4
75.	Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm	2
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	2sets
77.	Hand Shear Universal 250mm	2
78.	Hand vice – 37 mm	2
79.	High rate discharge tester (cell tester)	1
80.	Hollow Punch set of seven pieces 6mm to 15mm	2 sets each
81.	Hydraulic jack HI-LIFT type -3 ton capacity,	1
82.	Injector – Multi hole type, Pintle type	4 each
83.	Injector cleaning unit	1
84.	Injector testing set (Hand tester)	1
85.	Insulated Screw driver 20 cm x 9mm blade	4
86.	Insulated Screw driver 30 cm x 9mm blade	4
87.	Left cut snips 250mm	4
88.	Lifting jack screw type 3 ton, 5ton	1 each
89.	Magneto spanner set with 8 spanners	1 set
90.	Magnifying glass 75mm	2
91.	Marking out table 90X60X90 cm.	1
92.	Multi Scan Tool	1
93.	Multimeter digital	5
94.	Oil can 0.5/0.25 liter capacity	2
95.	Oil pump for dismantling and assembling.	2
96.	Oil Stone 15 cm x 5 cm x 2.5 cm	1
97.	Oscilloscope 20MHz	1
98.	Outside micrometer 0 to 25 mm	4
99.	Outside micrometer 25 to 50 mm	4
100.	Outside micrometer 50 to 75 mm	1
101.	Outside micrometer 75 to 100 mm	1
102.	Pat melting	2
103.	Philips Screw Driver set of 5 pieces (100 mm to 300 mm)	2 sets
104.	Pipe cutting tool	2
105.	Pipe flaring tool	2
106.	Piston ring compressor	2
107.	Piston Ring expander and remover.	2
108.	Piston Ring groove cleaner.	1

109.	Pliers combination 20 cm.	2
110.	Pliers flat nose 15 cm	2
111.	Pliers round nose 15 cm	2
112.	Pliers side cutting 15 cm	2
113.	Poker	2
114.	Portable electric drill Machine	1
115.	Portable oil monitoring Indicator	1
116.	Power Supply 0-12 v, lamp	1
117.	Prick Punch 15 cm	4
118.	Punch Letter 4mm	2 set
119.	Radiator cut section-cross flow	1
120.	Radiator cut section-down flow	1
121.	Radiator pressure cap	2
122.	Rake	1
123.	Rear axle assembly-gear box steering box assembly of the diesel engine	2 set
124.	Ridger.	2
125.	Right cut snips 250mm	4
126.	Rivet sets snap and Dolly combined 3mm, 4mm, 6mm	4
127.	Scraper flat 25 cm	2
128.	Scraper half round 25 cm	2
129.	Scraper Triangular 25 cm	2
130.	Scriber 15 cm	2
131.	Scriber with scribing black universal	2
132.	Set of stock and dies - Metric	2 sets
133.	Shear Tin Man's 450 mm x 600mm	4
134.	Sheet Metal Gauge	2
135.	Sher Tinmans 300mm	4
136.	Shovel	2
137.	Soldering Copper Hatchet type 500gms	4
138.	Solid Parallels in pairs (Different size) in Metric	2
139.	Spanner Clyburn 15 cm	1
140.	Spanner D.E. set of 12 pieces (6mm to 32mm)	4
141.	Spanner T. flocks for screwing up and up-screwing inaccessible positions	2
142.	Spanner, adjustable 15cm.	2
143.	Spanner, ring set of 12 metric sizes 6 to 32 mm.	2
144.	Spanners socket with speed handle, T-bar, ratchet and universal upto 32 mm set of 28 pieces with box	2
145.	Spark lighter	2
146.	Spark plug spanner 14mm x 18mm x Size	2
147.	Spirit level 2V 250, 05 metre	2
148.	Spring tension tester	1
149	Stake grooving.	2
150	Stake, hatchet.	2
151	Starter motor for tractor –different type	2
152	Steel measuring tape 10 meter in a case	4
153	Steel rule 15 cm inch and metric	4
154	Steel rule 30 cm inch and metric	4

155	Steel wire Brush 50mmx150mm	5
156	Stone, carborandum 15 x 5 x 4 cm smooth and rough.	1each
157	Straight edge gauge 2 ft.	2
158	Straight edge gauge 4 ft.	2
159	Stud extractor set of 3	2 sets
160	Stud remover with socket handle	1
161	Surface gauge with dial test indicator plunger type i.e. 0.01 mm	2
162	Tachometer (Counting type)	1
163	Taps and Dies complete sets (5 types)	1 set
164	Taps and wrenches -Metric	2 sets
165	Telescope gauge	4
166	Temperature gauge 0-100 deg c	2
167	Thermostat	2
168	Thread pitch gauge metric, BSW	1
169	Timing lighter	1
170	Torque wrenches 5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
171	Trammel 30 cm	2
172	Turbocharger cut sectional view	1
173	Tyre pressure gauge with holding nipple	2
174	Universal puller for removing pulleys, bearings	1
175	V' Block 75 x 38 mm pair with Clamps	2
176	Vacuum gauge to read 0 to 760 mm of Hg.	2
177	Valve Lifter	1
178	Valve spring compressor universal.	1
179	vernier caliper 0-300 mm with least count 0.02mm	4
180	Vice grip pliers	2
181	Voltmeter 50V/DC	4
182	Water pump for dismantling and assembling	2
183	Wing compass 25 cm	2
184	Wire Gauge (metric)	4
185	Work bench 250 x 120 x 60 cm with 4 vices 12cm Jaw	4

C. General Installation/ Machineries

Sl.No.	Item with specification	Qty (Nos.)
1.	3 furrow disc plough with scrapersyk	1
2.	9 tine cultivator-spring loaded mounted type	1
3.	Air conditioner 1.5 ton &2 ton	1 each
4.	Arbor press hand operated 2 ton capacity	1
5.	Automotive exhaust 5 gas analyzer (petrol & Diesel) or Diesel Smoke meter	1
6.	Axle flow vegetable thresher	1
7.	Bench lever shears 250mm Blade x 3mm Capacity	1
8.	Bund maker (disc type)	1
9.	Centrifugal Pump with electric motor	1
10.	Chaff cutter and silage cutter	1each

11.	Chisel Plough- 5/7 tone	1
12.	Dal Mill	1
13.	Diesel GEN SET-25/50 KVA with AMF facility	1
14.	Disc Harrow (14 Mounted type) off set	1
15.	Disc Harrow 8x8 trailed type	1
16.	Disc Plough 2 Bottom reversible l	1
17.	Disc Plough 3 Bottom	1
18.	Discrete Component Trainer / Basic Electronics Trainer	1
19.	Drier (Solar/Heater)	1
20.	Drilling machine bench to drill up to 12mm dia along with accessories	1
21.	Dual Magnetization Yoke : AC / HWDC, 230 VAC, 50Hz	1 set
22.	Electric motor 3 Phase 10 H.P.	1
23.	Electric motor 3 Phase 7.5 H.P.	1
24.	Engine - for walking and riding type reapers	2.
25.	Floor Mill	1
26.	Fodder Harvester/ Chopper Flale type	1
27.	Fodder kit for self Propelled reaper	1
28.	Gas Welding Table 1220mm x760mm	2
29.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth	1
30.	Groundnut decorticator	1
31.	Header Assembly for maize and sun-flower	1
32.	High capacity multi crop thresher	1
33.	Kino/ Orange grader	1 each
34.	Knapsack /foot sprayer	1
35.	Laser Leveler complete with transmitter, receiver, control box, survey	1
36.	Leveler/spike Leveler 3 meter width	1
37.	Liquid penetrant Inspection kit	1 set
38.	Maize crop thresher	1
39.	Mechanical Power Weeder	1 each
40.	Mould Board Plough-Augur type	1
41.	Mower/Grass Cutter	1
42.	Multi crop thresher	1
43.	Multi Scan Tool	1
44.	P.T.O. operated rotary lawn mower	1
~~45.~~	Paddy harrow (14 Disc mounted type)	1
46.	Paddy transplanter	1
47.	Picking platform	1
48.	Pipe Bending Machine (Hydraulic type) 12mm to 30mm	1
49.	Pneumatic rivet gun	2
50.	Power Operated Cleaner	1
51.	Power operated fogging machine	1
52.	Power operated Grader (wheat, maize)	1

53.	Power operated manure spreader	1
54.	Power operated potato Grader	1
55.	Power operated soybean reaper	2.
56.	Power Tiller	1.
57.	Prime movers (Engine Stationery type)	2.
58.	Pulverizing Roller (Tractor Mounted) with spring loaded (11tyne) cultivator	1
59.	Rice Mill/Paddy dehauskar	1
60.	Rice Polisher	1
61.	Rotary duster	1
62.	Rotary Harvester	1
63.	Rotavator – 5.5' cutting Width	1
64.	Self propelled Combine Harvester axial flow/Track type combine Harvester	1
65.	Self propelled high clearance sprayer with 20 hp diesel engine	1
66.	Self propelled riding type Reaper/Reaper winder	1
67.	Semi-axial flow multi crop thresher	1
68.	Sewing Machine/Bag stitcher	1
69.	Solar street light	1
70.	Spring tension tester	1
71.	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 • Sprinkler(Mini, Micro, angular and circular type) • Lawn sprinkler and garden pop-ups • Accessories and fitting for spray pop-ups • Low volume & High volume rain gun range15 to 30 meter die • Accessories and fitting for rain gun • Compression Fittings (Elbow, Elbow Treaded, Joiner, Tee, End Cap, adopter Male.) • HDPE fittings (Elbow, Elbow Treaded, Joiner, Tee, End Cap, adopter Male.) • PVC Fittings (Elbow, Elbow Treaded, Joiner, Tee, End Cap, adopter Male.) • PVC Control valve different sizes • Air Release Valve different sizes • Butterfly / G.M. Gate Valves different sizes • Fertigation Tank 30 to 160 Litres • Fertigation Equipment Pump 30 to 160 Litres • Filters (Primary filter) Sand, Hydro cyclone, Screen, Plastic/metal & Disc and Drip line • Poly joiner , reducer, Tee, Elbow ,End stop different sizes • Grommet hole plug different sizes • Pressure gauge • Three way cock for gauge • PVC valve box different sizes	As desired
72.	Straw reaper	1
73	Sub solier 24 -30 inch.	1
74	Submersible Pump complete unit	1
75.	Sugar cane transplanter	1

76.	Thresher rasp bar type	1
77.	Tin smiths bench folder 600 x 1.6mm	1
78.	Tractor PTO operated aero blast spray	1
79.	Tractor PTO operated sprayer for cotton	1
80.	Tractor 60 HP power steering	1
81.	Tractor 75 HP 4WD	1
82.	Tractor Diesel Engine 4 stroke for Dismantling and assembling with swiveling stand	2
83.	Tractor operated bed farmer cum three rows planter	1
84.	Tractor Operated Combine Harvester multi- crops	1
85.	Tractor operated ground nut digger	1
86.	Tractor operated hay bailer	1
87.	Tractor operated implement loading beam	1
88.	Tractor operated onion digger	1
89.	Tractor operated potato digger	1
90.	Tractor operated two rows Semi /automatic potato planter	1
91.	Tractor operated two rows vegetable trans planter (semi automatic)	1
92.	Tractor operator Angle blade Tracer	1
93.	Tractor Operator ditcher	1
94.	Tractor operator Front mounted dozer with Hydraulic single cylinder	1
95.	Tractor Operator post hole digger	1
96.	Tractor operator scraper and bucket scraper	1
97.	Tractor Operator Seed cum fertilizer drill cum planter	1
98.	Tractor Operator trencher 10” to 16” Width & 4 ft depth	1
99.	Tractor Operator Zero/ strip till Seed cum fertilizer drill 9/11 rows	1
100.	Tractor PTO operated multi - crop direct sowing happy seeder	1
101.	Tractor trailer with hydraulic system	1
102.	Trolley type portable air compressor single cylinder with 45 liters capacity Air tank, along with accessories & with working pressure 6.5 kg/sq cm	1
103.	Vaccine Machine	1
104.	Weighing balance	2.
105.	Welding plant Oxy-Acetylene complete (high pressure)	1
106.	Welding Transformer (150-300 Amps)	1
107.	Wheel type tractor fitted with diesel engine with standard accessories and special tools (30 to 40 draw-bar H.P).	2
108.	Wind mill	1
109.	Winnower	1

D. List of consumable:

Sl.	Description	Quantity
1.	Automatic Transmission oils	As required
2.	Battery- SMF	As required
3.	Brake fluids	As required
4.	Chalk, Prussian blue.	As required
5.	Chemical compound for fasteners	As required
6.	Diesel	As required
7.	Different type gasket material	As required
8.	Different type of oil seal	As required
9.	Drill Twist (assorted)	As required
10.	Emery paper - 36–60 grit , 80–120	As required
11.	Engine coolant	As required
12.	Engine oil	As required
13.	Gear oils	As required
14.	Hacksaw blade (consumable)	As required
15.	Hand rubber gloves tested for 5000 V	5 pair
16.	Holders, lamp teakwood boards, plug sockets, solders, flux wires and cables batteries round consumable blocks and other consumables as required	As required
17.	Hydrometer	8
18.	Lapping abrasives	As required
19.	Leather Apron	5
20.	Petrol	As required
21.	Power steering oil	As required
22.	Radiator Coolants	As required
23.	Safety glasses	As required
24	Steel wire Brush 50mmx150mm	5
25	Engine Spare Parts	As per req.
26	Field crops like wheat, Soya bean, paddy etc.	As desired
27	Gloves for Welding (Leather and Asbestos)	5 sets

E. Workshop Furniture

Sl. No.	Description	Quantity
1.	Book shelf (glass panel) 6½ ‘ x 3’ x 1½’	As required
2.	Computer Chair	1+1
3.	Computer Table	1+1
4.	Desktop computer and related MS office software	1+1
5.	Discussion Table 8’ x 4’ x 2½ ‘	2
6.	Fire Extinguishers, first- aid box	As required
7.	Instructional Material – NIMI Books/Ref.books	As required
8.	Internet connection with all accessories	As required
9.	Laser printer	1
10.	LCD projector/ LED /LCD TV (42”)	1
11.	Multimedia DVD for Automotive application/subjects	As required
12.	Online UPS 2KVA	1
13.	Stools	21
14.	Storage Rack 6½ ‘ x 3’ x 1½’	As required
15.	Storage shelf 6½ ‘ x 3’ x 1½’	As required.
16.	Suitable class room furniture	As required
17.	Suitable Work Tables with vices	As required
18.	Tool Cabinet - 6½ ‘ x 3’ x 1½’	2
19.	Trainees locker 6½ ‘ x 3’ x 1½’	2 Nos. to accommodate 20 Lockers

List of tools & Equipment for the Trade of
Mechanic Agricultural Machinery - Engineering Drawing
(Note : Facilities available in Draughtsman trade can be utilized)

TRAINEE’S TOOLS KIT

Sl. No.	Name of the items	Quantity
1.	Draughtsman drawing instrument box	20+1 set
2.	Set square celluloid 45^0 (250 X 1.5 mm)	20+1 set
3.	Set square celluloid 30^0-60^0 (250 X 1.5 mm)	20+1 set
4.	Mini drafter	20+1 set
5.	Drawing board (700mm x500 mm) IS: 1444	20+1 set

GENERAL MACHINERY SHOP OUTFIT

Sl. No.	Name & Description of Machine	Quantity
1.	Draughtsman table	20 Nos.
2.	Draughtsman stool	20Nos.
3.	Computer Latest version compatible for running Auto CAD software, preloaded with windows and 20” colour Monitor.	10Nos
4.	Plotter (Max. A3 size) (Max. A0 size)	1 No.
5.	Laser Jet printer latest model	1 No.
6.	UPS - 5 KVA	2 Nos.
7.	Computer table	10 Nos.
8.	Computer chairs	10 Nos.