



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

COMPETENCY BASED CURRICULUM

MECHANIC AGRICULTURAL MACHINERY

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 5



SECTOR - AUTOMOTIVE



Directorate General of Training

MECHANIC AGRICULTURAL MACHINERY

(Engineering Trade)

(Revised in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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CONTENTS

SNo.	Topics	Page No.
1.	Course Information	1
2.	Training System	3
3.	Job Role	7
4.	General Information	9
5.	Learning Outcomes	12
6.	Assessment Criteria	14
7.	Trade Syllabus	26
	Annexure I (List of Trade Tools & Equipment)	53
	Annexure II (List of Trade experts)	65

1. COURSE INFORMATION

During the two-year duration of Mechanic Agricultural Machinery trade, a candidate is trained on subjects- Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Science & Calculation and Employability Skills related to job role. In addition to this, a candidate is entrusted to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task.

The content broadly covers fitting of different components by operating different hand tools conventional machines and maintenance of machineries used in agriculture field. The broad components covered under Professional Skill subject are as below:

First Year: – In this year, the contents covered are from safety aspect related to the trade, the learner learns to apply safe working practices complying environment regulations and housekeeping in an automotive workshop; plan and perform precision measurements on the components and compare parameters with specifications used in automotive workshop practices, carryout marking and perform basic fitting operations used in the work shop practices along with inspection of dimensions; produce sheet metal components using bending process & other various sheet metal operations; construct electrical circuits and perform testing of basic electrical parameters by using electrical measuring instruments, construct basic electronic circuits and testing, manufacture components with different types of welding processes in the given job, identify and select the hydraulic and pneumatic components in a vehicle and inspect the auto component using Non-destructive testing methods. The learner learns to overhaul diesel engine of Tractor; service, cooling and lubrication system of Tractor in a workshop; service Exhaust System and Fuel Feed System of Tractor in a workshop; overhaul Clutch, Gearbox, Steering system, differential and PTO unit of Tractor in a workshop; carryout Repair of Wheels and Tyres of Tractor in the Workshop; overhaul Brake system of Tractor in the workshop; overhaul Major Assemblies of Power Tiller and carryout Field Operation; overhaul and troubleshoot for correct functioning of Implements of Tractor; perform battery testing, charging operations and overhaul charging and Starting System of Tractor.

Second Year: – In this year, test and rectify faults in functionality of major components and assemblies of Mould Board Plough, Disc Plough and troubleshoot of tillage and its implements; check, test and troubleshoot faults in functionality of major components and assemblies of Chisel Plough and Rotavator; troubleshoot & test the functionality of major components and assemblies of disc harrows (Off set Type/Double action. and single action) and Power harrows; check and service proper functionality of major components and assemblies of cultivators and soil forming equipments; identify and check functionality of major components and assemblies of Lazar leveler, trencher & post hole digger; dismantle, assemble and troubleshoot seed drills; test and verify functions of major components and assemblies of planters and fertilizer applicators; identify and check functionality of major components and assemblies of volute

type centrifugal pump and submersible pump; service irrigation valves and hydrants; service and trouble shoot power tillers/power weeder; identify and check functionality of grain handling seed treating and drying and troubleshoot major components and assemblies of AC motors; identify and trouble shoot faults in major components and assemblies of sprayers & dusters; detect and troubleshoot major components and assemblies of reaper, reaper winder, straw- reapers; troubleshoot the faults in functionality of major components and assemblies of Thresher, Maize seller, Groundnut decorticator; identify and check functionality of major components and assemblies of combine harvester- cutter bar assembly, feeder unit, threshing unit, separating unit; test and troubleshoot functionality of major components and assemblies of mower, folder harvester, power chaff/silage cutter; detect and rectify functionality of major components and assemblies of rotary harvester, hay bailer; find and troubleshoot major components and assemblies of groundnut digger, potato / onion digger; service and troubleshoot winnower, cleaner & grader; maintain and service rice huller, polisher, feed grinder-cum-mixer, hammer mill; detect and rectify functionality of grain handling seed treating and drying equipment.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with **variants** and Apprenticeship Training Scheme (ATS) are two pioneer schemes of DGT for strengthening vocational training.

Mechanic Agricultural Machinery trade under CTS is delivered nationwide through a network of ITIs. The course is of two years duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while Core area (Workshop Calculation & science, Engineering Drawing and Employability Skills) imparts requisite core skill, knowledge and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job and machining work.
- Check the job/components as per drawing for functioning identify and rectify errors in job/components.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Can join industry as Technician and will progress further as Senior Technician, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can take admission in diploma course in notified branches of Engineering by lateral entry.
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs.

- Can join Advanced Diploma (Vocational) courses as applicable conducted by DGT.

2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years:

S No.	Course Element	Notional Training Hours	
		1 st Year	2 nd Year
1	Professional Skill (Trade Practical)	1000	1000
2	Professional Knowledge (Trade Theory)	280	360
3	Workshop Calculation & Science	80	80
4	Engineering Drawing	80	80
5	Employability Skills	160	80
	Total	1600	1600

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by the DGT from time to time.

a) The Continuous Assessment (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the Formative assessment template provided on www.bharatskills.gov.in

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

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

2.4.2 ASSESSMENT GUIDELINE

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

Assessment will be evidence based, comprising the following:

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

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

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices.	<ul style="list-style-type: none"> • Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while undertaking different work 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 75%-90% to be allotted during assessment	
For this grade, a candidate should produce	<ul style="list-style-type: none"> • Good skill levels in the use of hand tools,

<p>work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices.</p>	<p>machine tools and workshop equipment.</p> <ul style="list-style-type: none"> • 70-80% accuracy achieved while undertaking different work with those demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
<p>© Weightage in the range of above 90% to be allotted during assessment</p>	
<p>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.</p>	<ul style="list-style-type: none"> • High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% accuracy achieved while undertaking different work 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.

Brief description of job roles:

Tractor Mechanic;repairs and overhauls tractors by various mechanical processes for agriculture, constructional and other heavy duties. 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 chassis and connects oil and fuel lines, controls and other accessories. Starts engine and observes performance for any unusual noise and knocks. Adjusts carburetor, fuel pump (Carburetor 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 etc. of engine. May weld, braze or solder parts. May repair other agricultural machinery for ploughing, harvesting etc. and be designated as mechanic, agricultural machines.

Tractor Operator, Farm;Tractor Driver, Farm operates and services farm tractor having different attachments for ploughing, harrowing, harvesting and other agricultural operations. Checks different parts of tractor to ensure that it is in proper working order. Collects, attaches and adjusts special equipment, required for different operations of tractor. Feeds tractor with fuel and demarcates land for ploughing. Starts tractor and drives it through fields at regulated speed depending on nature of soil and work. Controls operation of different attachments including turning of wheels by operating levers and pedals as required. Tows trailers laden with crops and other materials when required. Cleans and oils machine. Maintains tractor and other implements in good working order and keeps record of fuel consumption. May supervise work of Helpers. May detect mechanical defects and undertake minor repairs.

Tractor Driver, Construction; operates petrol or diesel powered tractor to haul vehicles or implements such as trailers, graders, etc. for pushing, pulling or moving goods and material or dumping earth. Checks engine oil, radiator water, diesel or petrol supply and other important greasing points of vehicles. Checks that brakes and pedals of vehicle are in good condition. Fastens attachments, such as graders, trailers, ploughs, and rollers to tractor with hitch pins; releases brakes, shifts gears, and depresses, accelerator or moves throttle to control forward and backward movement of machine; steers tractor by turning steering wheel and depressing brake pedals. May couple and uncouple loads to and from tractor. May lubricate and repair tractor and attachments. May be designated according to type of power utilized as diesel tractor operator or gasoline-tractor operator.

Reference NCO-2015:

- a) 7233.1500–Tractor Mechanic
- b) 8341.0101 – Tractor Operator, Farm
- c) 8341.0300 –Tractor Driver, Construction

4. GENERAL INFORMATION

Name of the Trade	Mechanic Agricultural Machinery
Trade Code	DGT/1064
NCO – 2015	7233.1500, 8341.0101,8341.0300
NSQF Level	Level – 5
Duration of Craftsmen Training	Two years (3200 Hours)
Entry Qualification	Passed 10 th class examination with Science and mathematics
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, LC, DW, AA, LV, DEAF
Unit Strength (No. Of Students)	24 (There is no separate provision of supernumerary seats)
Space Norms	225 Sq. m
Power Norms	10 KW
Instructors Qualification for	
1. Mechanic Agricultural Machinery Trade	<p>B.Voc/Degree in Agriculture Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Agriculture Engineering from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/NAC passed in the trade of “Mechanic Agricultural Machinery” with three years' experience in the relevant field.</p> <p>Essential Qualification: Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT.</p> <p>NOTE: - Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them</p>

	must possess NCIC in any of its variants.
2. Workshop Calculation & Science	<p>B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Engineering from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the engineering trades with three years' experience.</p> <p><u>Essential Qualification:</u> National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>NCIC in RoDA or any of its variants under DGT</p>
3. Engineering Drawing	<p>B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Engineering from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the Mechanical groups (Gr-I) trades categorized under Engg. Drawing'/ D'man Mechanical / D'man Civil' with three years' experience.</p> <p><u>Essential Qualification:</u> National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT.</p>
4. Employability Skill	<p>MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes. (Must have studied English/ Communication Skills and</p>

		Basic Computer at 12th / Diploma level and above)				
		OR				
		Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT institutes.				
5. Minimum Age for Instructor		21 Years				
List of Tools and Equipment		As per Annexure – I				
Distribution of training on Hourly basis: (Indicative only)						
Year	Total Hours/Week	Trade Practical	Trade Theory	Work shop Cal. & Sc.	Engg. Drawing	Employability Skills
1 st	40 Hours	25 Hours	7 Hours	2 Hours	2 Hours	4 Hours
2 nd	40 Hours	25 Hours	9 Hours	2 Hours	2 Hours	2 Hours

5. LEARNING OUTCOMES

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

5.1 LEARNING OUTCOMES (TRADE SPECIFIC)

First Year

1. Apply safe working practices complying environment regulations and housekeeping in an automotive work shop following safety precautions.
2. Plan and Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.
3. Carryout marking and perform basic fitting operations used in the work shop practices along with inspection of dimensions.
4. Produce sheet metal components using bending process & other various sheet metal operations.
5. Construct electrical circuits and perform testing of basic electrical parameters by using electrical measuring instruments.
6. Construct basic electronic circuits and testing.
7. Manufacture components with different types of welding processes in the given job.
8. Identify and select the hydraulic and pneumatic components in a vehicle and inspect the auto component using Non-destructive testing methods.
9. Overhaul Diesel Engine of Tractor.
10. Service, Cooling and Lubrication system of Tractor in a workshop.
11. Service Exhaust System and Fuel Feed System of Tractor in a workshop.
12. Overhaul Clutch, Gearbox, Steering system, differential and PTO unit of Tractor in a workshop.
13. Carryout Repair of Wheels and Tyres of Tractor in the Workshop.
14. Overhaul Brake system of Tractor in the workshop.
15. Overhaul Major Assemblies of Power Tiller and carryout Field Operation.
16. Overhaul and troubleshoot for correct functioning of Implements of Tractor.
17. Perform battery testing, charging operations and overhaul charging and Starting System of Tractor.

Second Year

18. Test and rectify faults in functionality of major components and assemblies of Mould Board Plough, Disc Plough and troubleshoot of tillage and its implements.

19. Check, test and troubleshoot faults in functionality of major components and assemblies of Chisel Plough and Rotavator.
20. Troubleshoot & Test the functionality of major components and assemblies of disc harrows (Off set Type/Double action and single action) and Power harrows.
21. Check and service proper functionality of major components and assemblies of cultivators and soil forming equipments.
22. Identify and check functionality of major components and assemblies of Lazar leveller, trencher & post hole digger.
23. Dismantle, assemble and troubleshoot seed drills.
24. Test and verify functions of major components and assemblies of planters and fertilizer applicators.
25. Identify and check functionality of major components and assemblies of volute type centrifugal pump and submersible pump.
26. Service irrigation valves and hydrants.
27. Service and Trouble shoot power tillers/power weeder.
28. Identify and check functionality of grain handling seed treating and drying and troubleshoot major components and assemblies of AC motors.
29. Identify and trouble shoot faults in major components and assemblies of sprayers & dusters.
30. Detect and troubleshoot major components and assemblies of reaper, reaper winder, straw- reapers.
31. Troubleshoot the faults in functionality of major components and assemblies of Thresher, Maize seller, Groundnut decorticator.
32. Identify and check functionality of major components and assemblies of combine harvester- cutter bar assembly, feeder unit, threshing unit, separating unit.
33. Test and troubleshoot functionality of major components and assemblies of mower, folder harvester, power chaff/silage cutter.
34. Detect and rectify functionality of major components and assemblies of rotary harvester, hay bailer.
35. Find and troubleshoot major components and assemblies of groundnut digger, potato / onion digger.
36. Service and troubleshoot winnower, cleaner & grader.
37. Maintain and service rice huller, polisher, feed grinder-cum-mixer, hammer mill.
38. Detect and rectify functionality of grain handling seed treating and drying equipment.

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
First Year	
1. Apply safe working practices complying environment regulations and housekeeping in an automotive workshop following safety precautions.	Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	Recognize and report all unsafe situations according to site policy.
	Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	Identify, handle and store/dispose off dangerous goods and substances according to site policy and procedures following safety regulations and requirements.
	Identify and observe site policies and procedures in regard to illness or accident.
	Report supervisor/competent of authority in the event of accidents or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	Identify personal protective equipment (PPE) and use the same as per related working environment.
	Identify environmental pollution and contribute to the avoidance of instances of environmental pollution.
	Carry out maintenance and cleaning of work shop and lifting equipment.
	Avoid waste and dispose waste as per procedure.
	Recognize different components of 5S and apply the same in the working environment.
2. Plan and Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.	Measure all dimensions in accordance with standard specifications and tolerances by using precision measuring instruments.
	Measure and record the parameters related with the vehicle components for its effective operation by matching with manufacturers' specification using different gauges.
3. Carry out marking and perform basic fitting operations used in the work shop practices along with	Mark as per drawing by using marking tools on flat surfaces.
	Hack saw and file the job using different methods and perform in accordance with the standard specifications and tolerances.
	Drill and ream on flat surfaces.
	Identify and use hand tools for internal and external threading with taps and dies.

inspection of dimensions.	Measure all dimensions in accordance with standard specification and tolerances.
4. Produce sheet metal components using bending process & other various sheet metal operations.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan and organize the work for different types of sheet metal operations.
	Mark according to drawing by using marking tools on flat surfaces.
	Produce components as per the drawing.
	Plan and organize the work for pipe bending operations.
	Perform bending, soldering and brazing operations in accordance with standard operating procedure using appropriate tools.
	Check accuracy/correctness of the job using appropriate measuring instruments.
5. Construct electrical circuits and perform testing of basic electrical parameters by using electrical measuring instruments.	Plan and organize the work for basic electrical operations.
	Select the tools, instruments and materials required to do the job.
	Comply with safety rules when performing the basic electrical operations.
	Perform electrical wire joints, form electrical circuits and test basic electrical parameters as per the circuit drawings and operating procedures.
6. Construct basic electronic circuits and testing.	Plan and select different types of basic electronic components and measuring instruments.
	Construct and test the basic electronic gate circuits and its components as per the standard procedure.
7. Manufacture components with different types of welding processes in the given job.	Plan and select appropriate method to produce components with welding process.
	Comply with safety rules when performing the above operations.
	Mark according to the drawing using marking tools on the job.
	Select appropriate tools and equipment to perform the above operations.
	Set up and produce component as per standard operating procedure.
8. Identify and select the hydraulic and pneumatic components in a vehicle and inspect the auto component using Non-destructive	Comply with safety rules when performing the following operations.
	Locate and identify the hydraulic/pneumatic components in a vehicle.
	Classify different vehicle components by its manufacturing processes.
	Ascertain and select tools and equipment to do NDT test the

testing methods.	given job.
	Plan and organize the work for non-destructive testing.
	Perform different types of non-destructive tests using appropriate testing equipment.
9. Overhaul Diesel Engine of Tractor.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms.
	Demonstrate possible solutions and agree tasks within the team.
	Drain coolant and lubricants from the engine and Remove Accessories of Engine.
	Service cylinder head assembly.
	Service Oil Sump and Oil Pump.
	Service Piston and connecting Rod Assembly.
	Service Flywheel, Crank shaft, camshaft and its Bearings and gear.
	Service cylinder block.
	Check and adjust valve clearances as per procedure and recommended Specification.
	Refit all the accessories.
	Refill all the required coolant and lubricants as per standard specification.
	Start the engine and observe reading of dashboard gauges and record Engine Performance.
10. Service, Cooling and Lubrication system of Tractor in a workshop.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms.
	Demonstrate possible solutions and agree tasks within the team.
	Drain coolant and lubricants from the engine and Remove Accessories of Engine.
	Service cylinder head assembly.
	Service Oil Sump and Oil Pump.
	Service Piston and connecting Rod Assembly.
	Service Flywheel, Crank shaft, camshaft and its Bearings and gear.
	Service cylinder block.
	Check and adjust valve clearances as per procedure and recommended Specification.
	Refit all the accessories.
	Refill all the required coolant and lubricants as per standard specification.
	Start the engine and observe reading of dashboard gauges and record Engine Performance.
Ascertain and select tools and materials for the job and make this available for use in a timely manner.	
Check & Replace Engine Oil/Oil Filter/Oil Pump.	

	Service Oil Cooler and pressure relief valve
11. Service Exhaust System and Fuel Feed System of Tractor in a workshop.	Service/Replace Air Cleaner.
	Overhaul Air Compressor/ Exhauster Assembly.
	Service Turbocharger/Supercharger as per manufacturer specification.
	Check Exhaust Leakages and Rubber Mounting of Exhaust System.
	Service Intercooler /Exhaust manifold.
	Check and Replace Catalytic Converter/ Resonator/Muffler.
	Tune up Petrol Engine Tractor as per manufacturer specification.
	Check leakages in Diesel/Petrol fuel line.
	Service Fuel Tank/fuel filter/ Fuel Feed Pump/Petrol Fuel Pump.
	Set Diesel Fuel Injection Pump Timing as per manufacturer specification.
	Bleed the Fuel System to vent out any air trapped.
Start the Engine and check for proper functioning as per standard guidelines specified by manufacturer.	
12. Overhaul Clutch, Gearbox, Steering system, differential and PTO unit of Tractor in a workshop.	Ascertain and select tools and equipment for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms.
	Adjust clutch pedal free play and check its performance.
	Monitor performance of Clutch and Gearbox by operating vehicle.
	Service Clutch, Gearbox and Driveline of tractor.
	Refit Clutch, Gearbox and Auxiliary Gearbox to the Tractor and check performance as per standard guidelines.
	Plan work in compliance with standard safety norms.
	Service Differential / PTO unit of the tractor
	Inspect steering linkages for excessive play.
	Service Steering Gear Box of the Tractor.
	Remove front Axle assembly from the Tractor.
	Repair Front Axle Assembly as per guidelines laid down by manufacturer.
	Refit Front Axle Assembly and check for proper functioning as per manufacturer's guidelines.
	Check front and rear suspension for proper functioning and abnormal noise.
	Service front and rear suspension system.
Refit the front and rear suspension to the tractor and check for proper functioning as per manufacturer's specification.	
13. Carryout Repair of Wheels and Tyres of Tractor in the Workshop.	Check and service rim, tyres and tube and repair/replace if necessary.
	Inflate tyres as per manufacturer recommended inflation pressure.

14. Overhaul Brake system of Tractor in the workshop.	Test the brake of tractor for effectiveness.
	Service Brake.
	Remove and service Hydraulic Brake cylinder.
	Bleed the brake system.
15. Overhaul Major Assemblies of Power Tiller and carryout Field Operation.	Remove major assemblies of Power tiller.
	Dismantle Transmission, clutch and brake.
	Clean and Replace/Repair components of Transmission, clutch and brake.
	Assemble Transmission, clutch and brake components.
	Refit the Transmission, clutch and brake to the Power Tiller.
Carryout field operation of Power tiller without implements	
16. Overhaul and troubleshoot for correct functioning of Implements of Tractor.	Check Plough, Harrows, cultivator, seed drill and tractor trailer for properfunctioning.
	Carryout Service of Plough, Harrows, cultivator, seed drill and tractor trailer.
	Perform hitching practice (Single & Three Point)
	Adjust agricultural implements for correct functioning during fieldoperations.
17. Perform battery testing, charging operations and overhaul charging and Starting System of Tractor.	Plan and select different methods for charging the battery.
	Perform battery testing as per the operating procedure.
	Check Charging system for proper functioning as per manufacturerGuidelines.
	Service alternator/ Starter.
	Refit Alternator to the tractor and check for functioning.
	Check starting system for proper functioning as per manufacturer guidelines.
Refit starter to the tractor and check for functioning.	
Second Year	
18. Test and rectify faults in functionality of major components and assemblies of Mould Board Plough, Disc Plough and troubleshoot of tillage and its implements.	Select, care and use of PPE while dismantling and assembling of Mould Board plough.
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble Mould Boardplough.
	Dismantle and assemble Mould Board/disc plough by reviewing technical data of removal and replacement procedures as per.
	Measure and adjust Horizontal & Vertical suction.
	Select and use safety measures while dismantling and assembling of disc plough.
	Measure and adjust disc and tilt angle.
	Identity the common fault and take corrective action for tillage system as per technical manual.
	Use testing methods that comply with the manufacturer's requirements.
Adjust the unit's components correctly where necessary to	

	ensure that they operate to meet the specified operating requirements.
	Ensure replaced components and assemblies conform to the specified operating specification.
19. Check, test and troubleshoot faults in functionality of major components and assemblies of Chisel Plough and Rotavator.	Select and use PPE while dismantling and assembling chisel plough.
	Select tools and materials for the job and make this available for use in a timely manner.
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble chisel plough.
	Dismantle and assemble chisel plough. by reviewing: Technical data removal and replacement procedures.
	Carry out hitching of sub soiler/ chisel plough.
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble rotavator.
	Dismantle and assemble rotavator by reviewing: Technical data for removal and replacement procedures complying.
	Carry out workshop adjustments of rotavator
	Identify the common fault and take corrective action for rotavator system as per technical manual
Adjust the unit's components correctly where necessary to ensure that they operate to meet the specified operating requirements.	
20. Troubleshoot & Test the functionality of major components and assemblies of disc harrows (Off set Type/ Double action and single action) and Power harrows.	Use PPE, tools and equipment as per manufacturer's specified way while dismantling and assembling of disc harrows.
	Dismantle and assemble disc harrows.
	Measure and adjust gang angle.
	Perform Depth adjustment and side deflector.
	Identify the common fault and take corrective action for harrows system as per technical manual.
	Adjust the units components correctly where necessary to ensure that they operate to meet the specified operating requirements.
	Ensure replaced components and assemblies conform to the specified operating specification.
21. Check and service proper functionality of major components and assemblies of cultivators and soil forming equipments.	Select and use PPE while dismantling and assembling of cultivators.
	Select tools and materials for the job and make this available for use in a timely manner.
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble cultivators.

	Dismantle and assemble cultivator by reviewing: Technical data for removal and replacement procedures.
	Carryout setting of cultivator as per flow diagram.
	Identify the common fault and take corrective action for cultivator system as per technical manual
	Ensure replaced components and assemblies conform to the specified operating specification.
	Dismantle and assemble levelers, scrapers/ blade terracer, ditchers and bund formers/dozer/dumper by reviewing technical data removal and replacement procedures.
	Carryout servicing of post hole digger as per technical manual.
22. Identify and check functionality of major components and assemblies of Lazar leveller, trencher & post hole digger.	Use PPE while dismantling and assembling of Lazar leveler, trencher & post hole digger.
	Select tools and materials for the job and make this available for use in a timely manner
	Use the tools and equipment in the way specified by manufacturers to Dismantle and assembles of Lazar leveler,trencher & post hole digger.
	Dismantle and assemble Lazar leveler, trencher & post hole digger by reviewing technical data removal and replacement procedures.
23. Dismantle, assemble and troubleshoot seed drills.	Use the tools and equipment in the way specified by manufacturers to Dismantle and assembles of seed drills
	Carryout their Dismantling and assembling of seed drills by reviewing technical data removal and replacement procedures.
	Carryout Calibration of seed & fertilizer rates.
	Carryout Workshop adjustments of special drills such as zero till, strip drill/rotto drill & Happy seeder.
	Identify the common fault and take corrective action for seeddrills as per technical manual.
24. Test and verify functions of major components and assemblies of planters and fertilizer applicators.	Select and use PPE while dismantling and assembling of planters.
	Select tools and materials for the job and make this availablefor use in a timely manner
	Use the tools and equipment in the way specified bymanufacturers to dismantle and assembles of planters
	Carryout dismantling and assembling of planters by reviewing technical data for removal and replacement procedures.
	Set planter with different seed plates &adjust for planting.
	Carryout vegetable transplanter adjustments.
	Carryout raising bed and adjustments of paddy transplanter.
	Dismantle and assemble fertilizer applicators by reviewing

	given technical data parameters.
	Carryout calibration of fertilizer applicators.
25. Identify and check functionality of major components and assemblies of volute type centrifugal pump and submersible pump.	Use PPE while dismantling and assembling of volute type centrifugal pump.
	Select tools and materials for the job and make this available for use in a timely manner
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble volute type centrifugal pump.
	Dismantle and assemble volute type centrifugal pump by reviewing technical data for removal and replacement procedures.
	Carryout adjustments process of centrifugal pump.
	Measure discharge of water.
26. Service irrigation valves and hydrants.	Use PPE while servicing of irrigation valves and hydrants.
	Select tools and materials for the job and make this available for use in a timely manner
	Use the tools and equipment in the way specified by manufacturers' servicing of irrigation valves and hydrants.
	Carryout installation of sprinkler, fogger, pop-up and dippers by reviewing technical data removal and replacement procedures.
	Carryout Field operation & adjustment (angular/ full circle).
27. Service and Trouble shoot power tillers/power weeder.	Use PPE while servicing of Power tiller/powerweeder.
	Use the tools and equipment in the way specified by manufacturers to Servicing of Power tiller/power weeder.
	Carryout Field operation with different attachments. and adjustments by reviewing technical data for removal and replacement procedures.
	Identify the common fault and take corrective action for power tillers/power weeder as per technical manual.
28. Identify and check functionality of grain handling seed treating and drying and troubleshoot major components and assemblies of AC motors.	Use PPE while dismantling and assembling of cultivator.
	Select tools and materials for the job and make this available for use in a timely manner.
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble of cultivator.
	Carryout their Dismantling and assembling of cultivator by reviewing technical data for removal and replacement procedures.
	Carryout Adjustment of the cultivator with the help of flow diagrams.
	To carryout Setting of shovels and sweeps.

29. Identify and trouble shoot faults in major components and assemblies of sprayers & dusters.	Select and use PPE while dismantling and assembling of Sprayers & dusters.
	Select tools and materials for the job and make this available for use in a timely manner
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble sprayers & dusters.
	Carry out their Dismantling and assembling sprayers & dusters. by reviewing technical data removal and replacement procedures.
	Carry out Calibration of sprayers and dusters
	Carry out Field adjustment and operation of sprayers and dusters
	Identify the common fault and take corrective action for sprayers & dusters as per technical manual.
	Follow the safety procedure while handling insecticides and pesticides
	Conduct appropriate and target oriented discussions with higher authority and within the team, where a replacement is uneconomical or unsatisfactory to perform
	Use testing methods that comply with the manufacturer's requirements.
	Adjust the units components correctly where necessary to ensure that they operate to meet the specified operating requirements.
30. Detect and troubleshoot major components and assemblies of reaper, reaper winder, straw-reapers.	Use PPE while dismantling and assembling of reaper, reaper winder, straw-reapers
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble of reaper, reaper winder, straw-reapers as per given technical data.
	Carry out Field adjustment and operation of reaper, reaper winder, straw-reapers
	Identify the common fault and take corrective action for reaper, reaper winder, straw-reapers as per technical manual.
	Conduct appropriate and target oriented discussions with higher authority and within the team, where replacement is uneconomical or unsatisfactory to perform.
	Use testing methods that comply with the manufacturer's requirements.
	Adjust the unit's components correctly where necessary to ensure that they operate to meet the specified operating requirements.
	31. Troubleshoot the faults in

functionality of major components and assemblies of Thresher, Maize seller, Groundnut decorticator.	Select tools and materials for the job and make this available for use in a timely manner
	Dismantle and assemble Thresher, Maize seller, Ground nut decorticator by reviewing the technical data as per removal and replacement procedures complying.
	Carryout Field adjustment and operation of Thresher, Maize seller, Ground nut decorticator
	Identify the common fault and take corrective action for Thresher, Maize seller, Ground nut decorticator as per technical manual.
32. Identify and check functionality of major components and assemblies of combine harvester- cutter bar assembly, feeder unit, threshing unit, separating unit.	Demonstrate care and use of PPE while dismantling and assembling of combine harvester- cutter bar assembly, feeder unit, threshing unit, separating unit.
	Select tools and materials for the job and make this available for use in a timely manner
	Use the tools and equipment in the way specified by manufacturers to dismantle and assemble of combine harvester- cutter bar assembly, feeder unit, threshing unit.
	Carryout dismantling and assembling of combine harvester- cutter bar assembly, feeder unit, threshing unit, separating unit as per given technical data.
	Carryout workshop adjustment for combine harvester.
	Compute grain losses.
33. Test and troubleshoot functionality of major components and assemblies of mower, folder harvester, power chaff/silage cutter.	Use PPE while dismantling and assembling of mower, folder harvester, power chaff/silage cutter.
	Use the tools and equipment in the way specified by manufacturers to Dismantle and assemble of power, folder harvester, power chaff/silage cutter.
	Carryout dismantling and assembling of mower, folder harvester, power chaff/silage cutter by reviewing the technical data.
	Carryout Field operation and workshop adjustment for mower, folder harvester, power chaff/silage cutter
	Identify the common fault and take corrective action for mower, folder harvester, power chaff/silage cutter.
	Adjust the units components correctly where necessary to ensure that they operate to meet the specified operating requirements.
	Identify the common fault and take corrective action for rotary harvester, hay bailer as per technical manual.
34. Detect and rectify functionality of major	Select and use PPE dismantling and assembling of rotary harvester, hay bailer.
	Select tools and materials for the job and make this available

components and assemblies of rotary harvester, hay bailer.	foruse in a timely manner.
	Use the tools and equipment in the way specified by manufacturers to Dismantle and assembles rotary harvester, haybailer.
	Dismantle and assemble rotary harvester, haybailer as per the technical data for removal and replacement procedures.
	Carryout Field operation and workshop adjustment forrotary harvester, hay bailer.
35. Find and troubleshoot major components and assemblies of groundnut digger, potato / onion digger.	Demonstrate care and use of PPE while dismantling and assembling of groundnut digger, hay bailer, potato /onion digger.
	Select tools and materials for the job and make this available foruse in a timely manner
	Use the tools and equipment in the way specified by manufacturers to dismantle and assembles groundnut digger, haybailer, potato / onion digger
	Carryout dismantling and assembling of groundnut digger, hay bailer, potato /onion digger by reviewing technical data ofremoval and replacement procedures.
	Carryout Field operation and workshop adjustment forgroundnut digger, hay bailer, potato / onion digger.
	Identity the common fault and take corrective action for groundnut digger, hay bailer, potato / onion digger as per technical manual.
36. Service and troubleshoot winnower, cleaner & grader.	Demonstrate care and use of PPE while servicing of winnower, cleaner & grader.
	Use the tools and equipment in the way specified bymanufacturers to service winnower, cleaner & grader.
	Carryout their adjustments of winnower, cleaner & grader by reviewing technical data for removal and replacement procedures.
	Carryout Field operation and workshop adjustment forwinnower, cleaner & grader.
	Identity the common fault and take corrective action forwinnower, cleaner & grader as per technical manual.
37. Maintain and service rice huller, polisher, feed grinder-cum-mixer, hammer mill.	Select and use PPE while servicing of rice huller, polisher, feed grinder-cum-mixer, hammer mill.
	Select tools and materials for the job and make this available foruse in a timely manner
	Carryout their adjustments of rice huller, polisher, feed grinder- cum-mixer, hammer mill by reviewing technical data removal and replacement procedures.

	Carryout operation of rice huller, polisher, feed grinder-cum-mixer, hammer mill.
38. Detect and rectify functionality of grain handling seed treating and drying equipment.	Identify the common fault and take corrective action for rice huller, polisher, feed grinder-cum-mixer, hammer mill as per technical manual.
	Adjust the unit's components correctly where necessary to ensure that they operate to meet the specified operating requirements.

SYLLABUS – MECHANIC AGRICULTURAL MACHINERY			
FIRST YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Apply safe working practices complying environment regulations and housekeeping in an automotive workshop following safety precautions.	<ol style="list-style-type: none"> 1. Identify workshop & machineries used in trade. (8 hrs.) 2. Familiarization with institute, Job opportunities in the automobile sector. (7 hrs.) 3. Perform different types of work done by the students in the shop floor. (10 hrs.) 	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 (07 Hrs)
		<ol style="list-style-type: none"> 4. Demonstrate Safety precautions and First aid. (2 hrs.) 5. Identify the hazards and take personal safety precautions. (3 hrs.) 6. Demonstrate Importance of maintenance and cleanliness of Workshop. (5 hrs.) 7. Demonstrate safe handling, safe disposal of used Indian oil and perform periodic testing of lifting equipment. (8 hrs.) 8. Apply energy saving Tips of ITI electricity Usage. (7 hrs.) 	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. (07 Hrs)

<p>Professional Skill 100 Hrs; Professional Knowledge 28 Hrs</p>	<p>Plan and Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.</p>	<p>9. Use all marking aids, like steel rule with spring calipers, dividers, scribe, punches, Chisel etc. (08 hrs.)</p> <p>10. Layout a work piece- for line, circle, arcs and circles. (08 hrs.)</p> <p>11. Measure a wheel base of a vehicle with measuring tape. (08 hrs.)</p> <p>12. Measure valve spring tension using spring tension tester. (08 hrs.)</p> <p>13. Remove wheel lug nuts with use of an air impact wrench. (09 hrs.)</p> <p>14. Use General workshop tools & power tools. (09 hrs.)</p>	<p>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, scribe, punches-prick punch, center punch, pin punch, hollow punch, number and letter punch. Chisel-flat, cross-cut. Hammer- ball peen, 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. (14 Hrs)</p>
		<p>15. Apply Measuring systems on Cam height, Camshaft Journal dia, crankshaft journal dia, Valve stem dia, piston diameter, and piston pin dia with outside Micrometers. (8 hrs.)</p> <p>16. Measure and record the height of the rotor of an</p>	<p>Systems of measurement, Description, care & use of - Micrometers- Outside and depth micrometer, Micrometer adjustments, Vernier calipers, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum</p>

		<p>oil pump from the surface of the housing or any other auto component measurement with depth micrometer. (6 hrs.)</p> <p>17. Measure valve spring free length, cylinder bore. (3 hrs.)</p> <p>18. Connecting rod bore, inside diameter (ID) of a camshaft bearing with Telescope gauges. (4 hrs.)</p> <p>19. Measure cylinder bore for taper and out-of-round with Dial bore gauges. (5 hrs.)</p> <p>20. Measure wear on crankshaft end play, crankshaft run out, and valve guide with dial indicator. (6 hrs.)</p> <p>21. Measure the standard parameters to check the flatness of the cylinder head is warped or twisted with straightedge is used with a feeler gauge. (5 hrs.)</p> <p>22. Measure to check the end gap of a piston ring, piston-to-cylinder wall clearance with feeler gauge. (6 hrs.)</p> <p>23. Check engine manifold vacuum with vacuum gauge. (4 hrs.)</p> <p>24. Test the air pressure inside the vehicle tires is maintained at the recommended setting. (3 hrs.)</p>	<p>gauge, tire pressure gauge. (16 Hrs)</p>
<p>Professional Skill 50 Hrs; Professional</p>	<p>Carry out marking and perform basic fitting operations used in the work</p>	<p>25. Perform general cleaning, checking and use of nut, bolts, & studs etc. (05 hrs.)</p>	<p>Fasteners- Study of different types of screws, nuts, studs & bolts, locking devices, Such as lock nuts, cotter, split pins,</p>

Knowledge 14 Hrs	shop practices along with inspection of dimensions.	<p>26. Remove stud/bolt from blind hole. (05 hrs.)</p> <p>27. Use cutting tools like Hacksaw, file, chisel, Sharpening of Chisels, center punch, safety precautions while grinding. (08 hrs.)</p> <p>28. Use Hacksaw and perform filing to given dimensions. (07 hrs.)</p>	<p>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. 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 autocomponents. (07 Hrs)</p>
		<p>29. Mark and Drill clear and Blind Holes, Sharp Twist Drills observing Safety precautions while using a drilling machine. (09 hrs.)</p> <p>30. Tap a Clear and Blind Hole, Select tap drill Size, use Lubrication, stud extractor. (07 hrs.)</p> <p>31. Cut Threads on a Bolt/ Stud. Adjust two piece Die, ream a hole/ Bush to suit the given pin/ shaft and scrap a given machined surface. (09 hrs.)</p>	<p>Drilling machine - Description and study of Bench type Drilling machine, Portable electrical Drilling machine, drill holding devices, Work Holding devices, Drill bits.</p> <p>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. (07 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Produce sheet metal components using bending process & other various sheet metal operations.</p>	<p>32. Make Rectangular Tray using Pipe bending process and fit nipples unions in pipes. (15 hrs.)</p> <p>33. Perform Soldering and Brazing of Pipes. (10 hrs.)</p>	<p>Sheet metal - State the various common metal Sheets used in Sheet Metal shop</p> <p>Sheet metal operations - Shearing, bending, Drawing, Squeezing</p> <p>Sheet metal joints - Hem & Seam Joints Fastening</p>

			Methods - Riveting, soldering, Brazing. fluxes used on common joints. Sheet and wire-gauges. The blow lamp- its uses and pipe fittings. (07 Hrs)
Professional Skill 75 Hrs; Professional Knowledge 21 Hrs	Construct electrical circuits and perform testing of basic electrical parameters by using electrical measuring instruments.	34. Join wires using soldering Iron; construct simple electrical circuits, measure current, voltage and resistance using digital multimeter. (12 hrs.) 35. Perform continuity test for fuses, jumper wires, fusiblelinks, and circuit breakers. (13 hrs.)	Basic electricity, Electricity principles, Ground connections, Ohm's law, Voltage, Current, Resistance, Power, Energy. Voltmeter, ammeter, Ohmmeter Multimeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor ratings. (07 Hrs)
		36. Diagnose series, parallel, series- parallel circuits using Ohm's law. (20 hrs.) 37. Check electrical circuit with a test lamp, perform voltage drop test in circuits using multimeter and measure current flow using multimeter/ammeter. (10 hrs.) 38. Use service manual Wiring diagram for troubleshooting. (20 hrs.)	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. (14 Hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Construct basic electronic circuits and testing.	39. Identify and test power and signal connectors for continuity. (7 hrs.) 40. Identify and test different type of Diodes, NPN & PNP Transistors for its functionality. (8 hrs.) 41. Construct and test simple logic circuits OR, AND & NOT and Logic gates using switches. (10 hrs.)	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. (07 Hrs)
Professional Skill 50 Hrs;	Manufacture components with different types of	42. Make straight beads and Butt, Lap & T joints Manual Metal Arc	Introduction to welding and Heat Treatment Welding processes – Principles of Arc

<p>Professional Knowledge 14 Hrs</p>	<p>welding processes in the given job.</p>	<p>Welding. (25 hrs.) 43. Set Gas welding flames and practice to make a straight beads and joints Oxy – Acetylene welding, film on Heat treatment process. (25 hrs.)</p>	<p>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 autocomponents with examples. (14 Hrs)</p>
<p>Professional Skill 75 Hrs; Professional Knowledge 21 Hrs</p>	<p>Identify and select the hydraulic and pneumatic components in a vehicle and inspect the auto component using Non-destructive testing methods.</p>	<p>44. Perform Liquid penetrant testing method and Magnetic particle testing method. (12 hrs.) 45. Identify hydraulic and pneumatic components used in vehicle. (18 hrs.) 46. Trace hydraulic circuit on hydraulic jack, hydraulic power steering, and Brake circuit. (20 hrs.) 47. Identify components in Air brake systems. (10 hrs.)</p>	<p>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, 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,</p>

			Description and function of air Reciprocating Compressor. Function of Air serviceunit (FRL-Filter, Regulator &Lubricator). (14 Hrs)
		48. Recognize different type of Vehicle and demonstrate vehicle specification data. (7 hrs.) 49. Find and select vehicle information Number (VIN), Garage, Service station equipments. (8 hrs.) 50. Identify vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands. (10 hrs.)	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. (07 Hrs)
Professional Skill 150 Hrs; Professional Knowledge 42 Hrs	Overhaul Diesel Engine of Tractor.	51. Demonstrate tractor specification data. (5 hrs.) 52. Identify and demonstrate different major assemblies of tractor and cleaning of tractors, oil greasing and lubricating all moving parts of tractor. (18 hrs.) 53. Start and stop tractor engine. (2 hrs.)	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. (07 Hrs)
		54. Dismantle tractor engine as per procedure & Inspection of components	Engine Basics: Classification of engines, Principle & working of 2&4-

		for dimension and wear. (25 hrs.)	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. (07 Hrs)
		55. Remove cylinder head from engine and Overhaul cylinder head assembly with use of service manual for clearance and other parameters. (13 hrs.) 56. Remove rocker arm assembly manifolds and demonstrate fitting of valve guide. (12 hrs.)	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, oils seals, Valve-timing diagram and concept of Variable valve timing.(07 Hrs)
		57. Overhaul Cylinder block. Measure and record required parameters of cylinder liner & crankshaft for ovality and taperness. (10 hrs.) 58. Overhaul piston and connect rod assembly with use of service manual for clearance and other parameters. (10 hrs.) 59. Removing oil sump and oil pump and clean the sump. (5 hrs.)	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. (07 Hrs)
		60. Remove the big end bearing and connect rod with the piston. (4 hrs.) 61. Remove the piston rings,	Description & function of connecting rod, importance of big-end split obliquely, Materials used for connecting rods big end & main bearings.

		<p>dismantle the piston and connecting rod. (4 hrs.)</p> <p>62. Check the side clearance of piston rings in the piston groove & lands for wear. (3 hrs.)</p> <p>63. Check piston skirt and crown for damage and scuffing, clean oil holes. (4 hrs.)</p> <p>64. 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. (10 hrs.)</p>	<p>Shells piston pins and locking methods of piston pins. Recommended clearances for the cylinder liners & rings. Bearing failure & its causes-care & maintenance. (07 Hrs)</p>
		<p>65. Check connecting rod for bend and twist and set connecting rod big end & main bearing. (7 hrs.)</p> <p>66. Assemble crank shaft, main bearings, and connecting rods and demonstrate piston assembly in the engine, fitting cylinder head and set valve timing. (18 hrs.)</p>	<p>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.</p> <p>Description and function of the fly wheel and vibration damper. Timing mark. (07 Hrs)</p>
<p>Professional Skill 50 Hrs;</p> <p>Professional Knowledge 14 Hrs</p>	<p>Service Cooling and Lubrication system of Tractor in a workshop</p>	<p>67. Check cooling system for overheating/ under-cooling. (6 hrs.)</p> <p>68. Dismantle, clean, assemble& test water pumps, reverse flushing system. (13 hrs.)</p> <p>69. Check thermostat valve, pressure cap and adjust the fan belt tension. (6 hrs.)</p>	<p>Cooling systems:-Purpose, types, Heat transfer method, effect of boiling point & pressure, coolant properties, preparation and recommended change of interval, use of antifreezer.</p> <p>Cooling system components, water pump, function of thermostat, pressure cap, Recoverysystem& Thermo-switch. Function & types of Radiator. (07 Hrs)</p>
		<p>70. Identify and select lubrication oil flow circuit</p>	<p>Lubrication system: - purposes & characteristics of oil, type of</p>

		<p>inan engine. (10 hrs.)</p> <p>71. Overhaul oil pump, serviceoil cooler & centrifugal oil filter and test oil pressure. (15 hrs.)</p>	<p>lubricants, grade as per SAE, & their application, oil additives, type of lubrication system.</p> <p>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. (07 Hrs)</p>
<p>Professional Skill 75 Hrs;</p> <p>Professional Knowledge 21 Hrs</p>	<p>Service Exhaust System and Fuel Feed System of Tractor in a workshop.</p>	<p>72. Service air cleaner (Oil bath). (2 hrs.)</p> <p>73. Check & change air filter, Dismantle & assemble turbocharger, check for axial clearance as per service manual. (5 hrs.)</p> <p>74. Check Exhaust Gas Recirculation. (1 hr.)</p> <p>75. Check Exhaust system for rubber mounting for damage, deterioration and out of position; for leakage, loose connection, dent and damage. (5 hrs.)</p> <p>76. Perform Exhaust. (2 hrs.)</p> <p>77. Manifold removal and installation. (5 hrs.)</p> <p>78. Perform Catalytic converter removal and installation. (5 hrs.)</p>	<p>Intake & exhaust systems - Description of Diesel induction & Exhaust systems. Description & function of air compressor, exhauster, Super charger, Intercoolers, turbo charger, variable turbo charger mechanism.</p> <p>Intake system components- Description and function of Air cleaners, Different type air cleaner, Description of Intake manifolds and material.</p> <p>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). (07 Hrs)</p>
		<p>79. Repair a tractor carburetors - adjusting float level and slow speed adjustments - studying the fuel flow circuit in carburetor. (7 hrs.)</p> <p>80. Perform engine tune up in a vehicle - testing vacuum and compression of engine, adjusting tappets setting ignition timing and adjusting carburetor for slow speeds. (8 hrs.)</p>	<p>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.</p> <p>Diesel fuel system</p>

		<p>81. Trace different parts of fuel system, repair fuel leaks in pipe line and unions. (5 hrs.)</p> <p>82. Service and test fuel feed pump, fuel filters, fuel Injection Pump. (7 hrs.)</p> <p>83. Service pressure pump of (C.R.D.I.). Regulator's and Elect/Electronic injectors, checking operation of C.R.D.I.system. (7 hrs.)</p> <p>84. Overhaul & Test of injectors. Set injection timing; Bleeding fuel lines for Air locks. (8 hrs.)</p> <p>85. Test cylinder compression, Checking idle speed, Obtaining & interpreting scan tool data. Fault finding & remedy, care & Maintenance. (8 hrs.)</p>	<p>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.</p> <p>Distributor-type injection pump, Glow plugs, Cummins & Detroit Diesel injection, Diesel electronic control- Diesel electronic control systems (DEC), Common rail diesel injection system.</p> <p>Method of bleeding fuel supply system. (14 Hrs)</p>
<p>Professional Skill 100 Hrs;</p> <p>Professional Knowledge 28 Hrs</p>	<p>Overhaul Clutch, Gearbox, Steering system, differential and PTO unit of Tractor in a workshop.</p>	<p>86. Dismantle and assemble clutch assembly and inspect the parts of clutch, relining of clutch plate & assemble. (6 hrs.)</p> <p>87. Couple the clutch with flywheel & join the engine with gear box. (6 hrs.)</p> <p>88. Adjust clutch pedal free play. (3 hrs.)</p> <p>89. Dismantle gear box of a tractor & inspect the parts. (4 hrs.)</p> <p>90. Assemble the gear box. Overhaul Transfer case and auxiliary gear box. (6 hrs.)</p>	<p>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.</p> <p>Manual transmissions- Function, description, types and their application. Gearbox layout.</p> <p>Components of tractor gear box.</p> <p>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. (07 Hrs)</p>
		<p>91. Overhaul differential; service reduction gear,</p>	<p>Final Drive & Drive Shafts Differential carriers double</p>

		<p>rear axle wheel hub. (10 hrs.)</p> <p>92. Service PTO (Power Take Off) and measure rpm of PTO shaft & speed of belt pulley. (15 hrs.)</p>	<p>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. (07 Hrs)</p>
		<p>93. Check Layout of Mechanical steering system. (5 hrs.)</p> <p>94. Inspect Steering linkage and necessary repair. (4 hrs.)</p> <p>95. Remove steering wheel and overhaul steering gear box of tractor. (7 hrs.)</p> <p>96. Remove front axle and spindle hub and steering linkage. (7 hrs.)</p> <p>97. Reassembling steering assembly and test for correct function. (6 hrs.)</p> <p>98. Check and test layout of different parts of Hydraulic steering system. (7 hrs.)</p> <p>99. Conduct visual Inspection of chassis frame for crack, bent and twists. (5 hrs.)</p> <p>100. Overhaul and Inspect shackle, front & rear suspension. (9 hrs.)</p>	<p>Steering & Suspension Systems-</p> <p>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 steering 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. (14 Hrs)</p>
<p>Professional Skill 50 Hrs;</p> <p>Professional Knowledge 14 Hrs</p>	<p>Carryout Repair of Wheels and Tyres of Tractor in the Workshop.</p>	<p>101. Remove wheels from tractor. (10 hrs.)</p> <p>102. Dismantle wheel to check rims, tyres for wear and tubes for leaks. (09 hrs.)</p> <p>103. Repair, derust, paint, fit tyres and tubes on rim & inflate to correct pressure. (10 hrs.)</p> <p>104. Balance Tractor wheels and perform tyre</p>	<p>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</p>

		<p>rotation. (8 hrs.)</p> <p>105. Fit wheels on tractors and tighten wheel in correct sequence. (09 hrs.)</p> <p>106. Check & adjust tire pressure by use of airtor by Nitrogen. (5 hrs.)</p>	<p>maintenance of tyres and tubes. Storage of tyres. Descriptions Tirewear Patterns and causes Nitrogen vs atmospheric air in tyres (14 Hrs)</p>
<p>Professional Skill 50 Hrs;</p> <p>Professional Knowledge 14 Hrs</p>	<p>Overhaul Brake system of Tractor in the workshop.</p>	<p>107. Overhaul brakes including cleaning and inspection of all components, relining shoes, setting and actuating shoe clearance. (10 hrs.)</p> <p>108. Inspect spring of both shoe and lever. (5 hrs.)</p> <p>109. Inspect and set parking brakes. Inspect and set hydraulic main brake including replacement of washer and oil seals. (10 hrs.)</p> <p>110. Overhaul serve mechanism (as applicable) inspecting piston and valves; bleeding and adjustment of brakes. (12 hrs.)</p> <p>111. Trace faults and apply remedies. (5 hrs.)</p> <p>112. Skim brake drum and disc plate. (8 hrs.)</p>	<p>Braking Systems - Braking fundamentals Principles of braking, Drum & disc brakes, Lever/mechanical advantage, Hydraulic pressure & force, Brake fade.</p> <p>Braking systems - Brake type used on tractor - principles, Air brakes,</p> <p>Braking system components- Park brake system, Brake pedal, Brake lines, Brake fluid, <u>Bleeding</u>, Master cylinder, Divided systems, Tandem master cylinder, Power booster or brake unit, Hydraulic brake booster, Applying brakes, Brake force, Brake light switch</p> <p>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. (14 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Overhaul Major Assemblies of Power Tiller and carryout Field Operation.</p>	<p>113. Overhaul power tiller transmission system including main clutches, steering clutch/brakes mechanism-gear box.</p>	<p>Description, working principle & use of power tiller (two wheel tractor) power unit. Method of power transmission to wheel from engine. Main clutch assembling working</p>

		<p>(18 hrs.)</p> <p>114. Perform wheel hub testing for field operation without implements and with implements. (7 hrs.)</p> <p>115. Drive with trolley/trailer.</p>	<p>procedure steering Clutch/brakes mechanism method of power transmission to implement (Rotation), irrigation pump, thresher. Hitching of M.B. Plough, trailerdisc harrow. (07 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Overhaul and troubleshoot for correct functioning of Implements of Tractor.</p>	<p>116. Check implements such as ploughs, harrows, cultivators, seed drills, tractor trailer, & P.T.O. units etc. for serviceability before use. Lubricate them as required. (5 hrs.)</p> <p>117. Perform Hitching practice (single & three points). Exercise in driving a tractor with different implements. (15 hrs.)</p> <p>118. Adjust agriculture implements for correct functioning during field operation. (5 hrs.)</p>	<p>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. (07 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Perform battery testing, charging operations and overhaul charging and Starting System of Tractor.</p>	<p>119. Clean and top up a lead acid battery. (1 hr.)</p> <p>120. Test battery with hydrometer, connect battery to a charger for battery charging. (1 hr.)</p> <p>121. Inspect & test a battery after charging. (1 hr.)</p> <p>122. Measure and Diagnose the cause(s) of excessive Key-off battery drain (parasitic draw) and do corrective action. (4 hrs.)</p> <p>123. Test relay, solenoids and its circuit. (2 hrs.)</p> <p>124. Remove alternator from vehicle. (1 hr.)</p> <p>125. Dismantle, clean and</p>	<p>Description of Chemical effects, Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF) batteries, Magnetic effects, Heating effects, Thermo-electric energy, Thermistors, Thermo couples, Electrochemical energy, Photo-voltaic energy, Piezo-electric energy, Electromagnetic induction, Relays, Solenoids, Primary & Secondary windings, Transformers, stator and rotor coils.</p> <p>Tractor Electrical Maintenance: Lighting arrangement in tractors (As applicable).</p>

		<p>check for defects. (3 hrs.)</p> <p>126. Assemble and test for motoring action of alternator & fitting to vehicles. (3 hrs.)</p> <p>127. Remove starter motor vehicle and overhaul and test the starter motor. (6 hrs.)</p> <p>128. Service storage batteries, trace lighting circuit and rectify Fault. (3 hrs.)</p>	<p>Description of charging circuit. Operation of alternator, regulator unit ignition warning lamp troubles and remedy in charging system. Fault finding in electrical system.</p> <p>Description of starter motor circuit, common troubles and remedy in starter circuit. Description of lighting circuit. Charging & discharging of lead acid Battery. (06 Hrs)</p>
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SYLLABUS – MECHANIC AGRICULTURAL MACHINERY

Second Year

Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 50Hrs; Professional Knowledge 18 Hrs	Test and rectify faults in functionality of major components and assemblies of Mould Board Plough, Disc Plough and troubleshoot of tillage and its implements.	129. Use of PPE while dismantling and assembling of Mould Board plough. (10 hrs.) 130. Explain range of machinery used in the trade & their features. (8 hrs.) 131. Demonstrate precautions to be observed in handling farm machinery. (7 hrs.)	Introduction to the trade curriculum. Importance of the trade in the advancement of Agriculture technology in the country. (09 Hrs)
		132. Dismantle Mould Board plough. Check, repair & replace their Component. (4 hrs.) 133. Assemble MB plough, measure Horizontal & Vertical suction. (3 hrs.) 134. Dismantle disc plough, check, repair & replace their components. (3 hrs.) 135. Assemble disc plough, measure disc & tilt angle of disc plough. Workshop adjustments. (4 hrs.) 136. Perform Hitching of ploughs. Field operation & adjustments. (6 hrs.) 137. Identify Faults and apply remedies. (2 hrs.) 138. Perform care and maintenance. (3 hrs.)	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 (09 Hrs)
Professional Skill 25 Hrs; Professional Knowledge 9 Hrs	Check, test and troubleshoot faults in functionality of major components and assemblies of Chisel Plough and Rotavator.	139. Service sub soiler and dismantle chisel plough. (1 hr.) 140. Check, repair & replace the component. (3 hrs.) 141. Assemble chisel plough. (1 hr.) 142. Hitch sub soiler/ chisel plough. (2 hrs.)	Function & working of sub soiler/ chisel plough. Constructional details. Function & working of Rotavator. Workshop adjustments. Method of hitching. Importance of weight

		<p>143. Dismantle Rotavator, check repair and replace its components. (5 hrs.)</p> <p>144. Assemble Rotavator and conduct workshop adjustments. (5 hrs.)</p> <p>145. Perform field operations & adjustments. (3 hrs.)</p> <p>146. Find Faults and apply remedies. (3 hrs.)</p> <p>147. Perform Care and maintenance. (2 hrs.)</p>	<p>transfer. Method of ploughing. Method of Field operation.</p> <p>Recommended speeds for operation of rotavators. Daily and periodical maintenance (09 Hrs)</p>
<p>Professional Skill 50Hrs;</p> <p>Professional Knowledge 18 Hrs</p>	<p>Troubleshoot & Test the functionality of major components and assemblies of disc harrows (Off set Type/Double action and single action) and Power harrows.</p>	<p>148. Dismantle& assemble disc harrows (Off set Type/Double action). (5 hrs.)</p> <p>149. Dismantle& assemble disc harrows (Single action). (4 hrs.)</p> <p>150. Measure gang angle. (1 hr.)</p> <p>151. Dismantle& assemble bar/power harrows. (1 hr.)</p> <p>152. Service spring/blade harrow. (2 hrs.)</p> <p>153. Plan and prepare Hitching arrangements. (1 hr.)</p> <p>154. Perform field operation & adjustments. (7 hrs.)</p> <p>155. Detect Faults and apply Remedies. (2 hrs.)</p> <p>156. Perform Care and maintenance. (2 hrs.)</p>	<p>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. (18 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 09 Hrs</p>	<p>Check and Service proper functionality of major components and assemblies of cultivators and soil forming equipments.</p>	<p>157. Dismantle the cultivator (Spring /Rigid) and check, repair & replace the components. (6 hrs.)</p> <p>158. Assemble the cultivator. (1 hr.)</p> <p>159. Illustrate setting of cultivators with the help of floor diagram. (3 hrs.)</p> <p>160. Demonstrate Workshop adjustments, and perform field operation & adjustments. (6 hrs.)</p> <p>161. Trace Faults and implement</p>	<p>Types of cultivator. Working Principles & their constructional details, adjustments. Common types of shovels & seeps. Adjustments, mode of operation. Trouble shooting. Care & Maintenance. (09 Hrs)</p>

		Remedies. (6 hrs.) 162. Perform Care and maintenance.(3 hrs.)	
Professional Skill 25 Hrs; Professional Knowledge 09Hrs	Identify and check functionality of major components and assemblies of Lazar leveler, trencher & post hole digger.	163. Dismantle and assemble levelers, scrapers/ blade terracer, ditchers and bund formers/dozer/dumper. (5 hrs.) 164. ServiceLazar leveler, post hole digger. (5 hrs.) 165. Dismantle, check, repair & replace the components of Lazar leveler, trencher & post hole digger. (5 hrs.) 166. Assemble Lazar leveler, trencher & post hole digger. (4 hrs.) 167. Arrange and perform Workshop adjustments. (3 hrs.) 168. Setadjust and troubleshoot field operation. (3 hrs.)	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. (09 Hrs)
Professional Skill 50Hrs; Professional Knowledge 18 Hrs	Dismantle, assemble and troubleshoot seed drills.	169. Dismantle& assemble seed drills. (5 hrs.) 170. Calibrate seed & fertilizer rates. (5 hrs.) 171. Perform Workshop adjustments of special drills such as zero till, strip drill/rotto drill & Happy seeder. (18 hrs.) 172. Conduct Field operation & adjustments of special drills such as zero till, strip drill/rotto drill & Happy seeder. (18 hrs.) 173. Trace Faults and apply remedies. (4 hrs.)	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. (18 Hrs)
Professional	Test and verify functions of major	174. Dismantle& assemble of planters, calibrate seed	Types of planters. Constructional details of

<p>Skill 100 Hrs; Professional Knowledge 36 Hrs</p>	<p>components and assemblies of planters and fertilizer applicators.</p>	<p>&fertilizer rates. (10 hrs.) 175. Conduct Workshop adjustments and set planter with different seed plates & adjusts for planting. (12 hrs.) 176. Repair furrow openers. (5 hrs.) 177. Servicing of veg. transplanter. (5 hrs.) 178. Use veg. transplanter and adjustments. (5 hrs.) 179. Service paddy transplanter and raise type of MAT type nursery for paddy. (5 hrs.) 180. Use paddy transplanter. Raise bed and adjustments. (4 hrs.) 181. Use cage-wheels and paddy Puddles. (4 hrs.) 182. Dismantle and assemble fertilizer applicators. (18 hrs.) 183. Perform minor repairs of fertilizer applicator; calibrate fertilizer applicator. (7 hrs.) 184. Perform field operation & adjustments of fertilizer applicators and troubleshoot the problems. (18 hrs.) 185. Follow precautions to be observed in handling fertilizer. (7 hrs.)</p>	<p>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. (18 Hrs) 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. (18 Hrs)</p>
<p>Professional Skill 50Hrs; Professional Knowledge 18 Hrs</p>	<p>Identify and check functionality of major components and assemblies of volute type centrifugal pump and submersible pump.</p>	<p>186. Visit to a tube well boring sites for study of boring and its operation. (8 hrs.) 187. Dismantle and assemble a volute type centrifugal pump. (4 hrs.) 188. Prepare foundations and install a pumping set. (8 hrs.) 189. Check Adjustments and operation of a pumping set. (5 hrs.) 190. Service a submersible pump. (10 hrs.)</p>	<p>Source of water. Study common irrigation and drainage systems. Types of irrigation systems. Types of pumps. Working principles & constructional details of centrifugal pumps. (09 Hrs) Types of centrifugal pumps constructional</p>

		191. Measure discharge of water and install HDPE, QRC, PVC & dipper pipe line. (15 hrs.)	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. (09 Hrs)
Professional Skill 25 Hrs; Professional Knowledge 09 Hrs	Service irrigation valves and hydrants.	192. Repair and adjust irrigation valves and hydrants. (5 hrs.) 193. Install sprinkler and fogger. (5 hrs.) 194. Install pop-up and drippers. (3 hrs.) 195. Install drippers on level/ hilly ground. (3 hrs.) 196. Field operation & adjustment (angular/ full circle). Faults and remedies. Troubles and remedies. (9 hrs.)	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. (09 Hrs)
Professional Skill 50Hrs; Professional Knowledge 18 Hrs	Service and Trouble shoot power tillers/power weeder.	197. ServicePower tiller/power weeder. (6 hrs.) 198. Perform field operation with different attachments with Common adjustments. (10 hrs.) 199. Dismantle and assemble a cultivator and performrepairing andmaintenance. (8 hrs.) 200. Adjust the cultivator with the help of floor diagram. (3 hrs.) 201. Set shovels and sweeps. (1 hr.) 202. Perform field operation of cultivator with shovels and	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

		<p>sweeps. (10 hrs.)</p> <p>203. Troubleshoot faults and apply remedies. (6 hrs.)</p> <p>204. Plan and prepare care and maintenance work. (6 hrs.)</p>	<p>for their applications.</p> <p>Trouble shooting and remedies. Daily and periodical maintenance. Precautions in handling weedicides. (18 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 09 Hrs</p>	<p>Identify and check functionality of grain handling seed treating and drying and troubleshoot major components and assemblies of AC motors.</p>	<p>205. Familiarize to the trade curriculum. (13 hrs.)</p> <p>206. Explain importance of the trade in the advancement of Electrical technology in the country. (12 hrs.)</p>	<p>Introduction to the trade curriculum. Importance of safety precaution to be observed in the section. Range of machinery used in the trade & their features.</p> <p>Precautions to be observed in handling farm machinery. (09 Hrs)</p>
<p>Professional Skill 50Hrs;</p> <p>Professional Knowledge 18 Hrs</p>	<p>Identify and troubleshoot faults in major components and assemblies of sprayers & dusters.</p>	<p>207. Dismantle and assemble AC motors and identify their parts. (3 hrs.)</p> <p>208. Demonstrate motor starting devices and its periodical maintenance. (4 hrs.)</p> <p>209. Detect faults and apply remedies. (4 hrs.)</p> <p>210. Dismantle and assemble common sprayers. (4 hrs.)</p> <p>211. Calibrate sprayers and carryout field adjustments & operation of sprayers. (4 hrs.)</p> <p>212. Dismantle and assemble common dusters. (3 hrs.)</p> <p>213. Service fogging machine and Calibrate common dusters. (4 hrs.)</p> <p>214. Carryout field adjustments & operation of duster. (3 hrs.)</p> <p>215. Service high clearance/cotton sprayers. (3 hrs.)</p> <p>216. Service Aero blast sprayers. Calibrate & adjust high clearance/ cotton sprayers & Aero blast sprayers. (4 hrs.)</p> <p>217. Carryout repairs and maintenance work. (4 hrs.)</p> <p>218. Perform field operation & adjustments. (4 hrs.)</p>	<p>Types of electrical motors used on the farm, their constructional details, selection, operation, care and maintenance.</p> <p>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.</p> <p>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. (18 Hrs)</p>

		<p>219. Troubleshoot faults and apply remedies. (4 hrs.)</p> <p>220. Apply precaution measure while handling insecticides and pesticides. (2 hrs.)</p>	
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 09 Hrs</p>	<p>Detect and troubleshoot major components and assemblies of reaper, reaper winder, straw-reapers.</p>	<p>221. Dismantle and assemble a reaper. (4 hrs.)</p> <p>222. Carryout Workshop adjustments. (3 hrs.)</p> <p>223. Dismantle and assemble reaper winder and demonstrate workshop adjustments. (5 hrs.)</p> <p>224. Dismantle and assemble straw-reapers and carryout their workshop adjustments. (4 hrs.)</p> <p>225. Carryout hitching and fitting with prime mover. (3 hrs.)</p> <p>226. Perform field operation & adjustment of reapers/ reaper winder/ straw - reapers. (8 hrs.)</p> <p>227. Trace faults and ensure correct functioning. (3 hrs.)</p>	<p>Reapers & their types</p> <p>Functions, working principles, constructional details. Field adjustments & operation Care and maintenance. Trouble shooting.</p> <p>Precautions in working & transporting. (09 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 09 Hrs</p>	<p>Troubleshoot the faults in functionality of major components and assemblies of Thresher, Maize seller, Groundnut decorticator.</p>	<p>228. Dismantle and assemble thresher. (4 hrs.)</p> <p>229. Carryout workshop adjustments. Fit with prime mover. (3 hrs.)</p> <p>230. Select tools and use for adjusting and operating in field. (2 hrs.)</p> <p>231. Dismantle and assemble Maize seller. (4 hrs.)</p> <p>232. Dismantle and assemble groundnut decorticator; fit with prime mover. (4 hrs.)</p> <p>233. Measure important speeds affecting the performance. (1 hr.)</p> <p>234. Detect fault and apply remedies. (2 hrs.)</p> <p>235. Demonstrate precautionary</p>	<p>Types of threshers, maize Sheller and ground nut decorticators. Working principles, constructional details.</p> <p>Adjustments and operations.</p> <p>Prime mover and driving systems. Trouble shooting and remedies.</p> <p>Transmission of power belts and pulleys. Safety precautions. (09 Hrs)</p>

		measures for safe operation. (5 hrs.)	
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Identify and check functionality of major components and assemblies of combine harvester-cutter bar assembly, feeder unit, threshing unit, separating unit.	236. Perform on different components systems of combine harvester. (5 hrs.) 237. Describe drive mechanism and controls of combine harvester. (5 hrs.) 238. Drive combine harvester. (5 hrs.) 239. Dismantle cutter bar assembly. Dismantle feeder unit. (2 hrs.) 240. Dismantle threshing unit /separating unit. (2 hrs.) 241. Check, repair and replace the defective components. (6 hrs.) 242. Assemble the components of different systems of combine harvester. (8 hrs.) 243. Carryout workshop adjustments. (4) 244. Transport practice of the combine. (8 hrs.) 245. Operate the combine in the field and adjust according to the field and crop conditions. (8 hrs.) 246. Carryout its servicing and maintenance work. (6 hrs.) 247. Compute grain losses. Storage during off season and perform care and maintenance work. (6 hrs.)	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. (27 Hrs)
Professional Skill 75Hrs; Professional Knowledge 27Hrs	Test and troubleshoot functionality of major components and assemblies of mower, folder harvester, power	248. Dismantle and assemble mower / fodder harvester. (12 hrs.) 249. Demonstrate dismantling and assembling of power chaff/ silage-cutter. (12 hrs.) 250. Perform Workshop	Need of green harvesting equipment. Working principles, constructional details of mover. Functions, working principles, constructional details of folder harvester.

	chaff/silage cutter.	<p>adjustments. (14 hrs.)</p> <p>251. Perform hitching and fitting with prime-mover. (13 hrs.)</p> <p>252. Carryout field operation and adjustments. (12 hrs.)</p> <p>253. Perform servicing and maintenance. (12 hrs.)</p>	<p>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. (27 Hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 09 Hrs</p>	<p>Detect and rectify functionality of major components and assemblies of rotary harvester, haybailer.</p>	<p>254. Dismantle and assemble rotary harvester/ hay bailer. (2 hrs.)</p> <p>255. Carryout Workshop adjustments. (3 hrs.)</p> <p>256. Perform Hitching and fitting with prime- mover. (3 hrs.)</p> <p>257. Perform field operation and adjustments. (8 hrs.)</p> <p>258. Use Safety precautions while servicing and maintenance. (2 hrs.)</p> <p>259. Troubleshoot Faults and apply remedies for proper functioning. (7 hrs.)</p>	<p>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. (09 Hrs)</p>
<p>Professional Skill 50Hrs;</p> <p>Professional Knowledge 18 Hrs</p>	<p>Find and troubleshoot faults in major components and assemblies of groundnut digger, potato / oniondigger</p>	<p>260. Dismantle groundnut digger /potato / onion digger. (08 hrs.)</p> <p>261. Check, repair and replace the defective components. (08hrs.)</p> <p>262. Assemble groundnut digger potato /onion digger. (07 hrs.)</p> <p>263. Carryout Workshop adjustments. Attachment of diggers with prime- movers. (07 hrs.)</p> <p>264. Perform field operation and adjustments, servicing and maintenance work. (13 hrs.)</p> <p>265. Identify and troubleshoot faults following safety precautions and apply</p>	<p>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. (18 Hrs)</p>

		remedies for proper functioning. (08 hrs.)	
Professional Skill 50Hrs; Professional Knowledge 18 Hrs	Service and troubleshoot winnower, cleaner & grader.	266. Service and adjust the winnower, cleaner & graders. (10 hrs.) 267. Fit with prime mover attachment. (10 hrs.) 268. Operate winnower, cleaner and grader. (20 hrs.) 269. Trace Common troubles and its causes. (10 hrs.)	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. (18 Hrs)
Professional Skill 50Hrs; Professional Knowledge 18 Hrs	Maintain and service rice huller, polisher, feed grinder-cum-mixer, hammermill.	270. Service and adjust the rice huller, polisher, the feed grinder-cum- mixer. (15 hrs.) 271. Service and adjust the hammer mill and fit with prime mover. (10 hrs.) 272. Operate rice huller, polisher, hammer mill. (15 hrs.) 273. Trace Common troubles and its causes. (10 hrs.)	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 Hrs)
Professional Skill 100Hrs; Professional Knowledge 36 Hrs	Detect and rectify functionality of grain handling seed treating and drying equipment.	274. Visit to a grain drying and storing plant and study different aspects of the construction, adjustments, controls. (15 hrs.) 275. Operate grain handling seed treating and drying equipment. (25 hrs.) 276. Explain silo structure. (10 hrs.)	Working of fans and blowers. Purpose of grain auger, bucket elevator etc., Constructional details and working of a grain drier. Grain storage structure i.e. concrete and sheet metal bins (silo structure). Methods and instruments used for measuring moisture contents of grains. Equipment and methods used for treating and fumigating seeds and grains. (18 Hrs)

		<p>277. Prepare Log books. (5 hrs.) 278. Maintain necessary records i.e. Log books of tractors, combines etc. (10 hrs.) 279. Plan and prepare service schedules, off season storage of farm equipment. (15 hrs.)</p>	<p>Operation of transporting and handling equipment i.e. Tractor, tractor trailer, power tiller & combine harvester. (09 Hrs)</p>
		<p>280. Visit to a Government Farms, Haryallee and Co-operative Societies. (6 hrs.) 281. Describe farm records, accounts and log books. (8 hrs.) 282. Plan and prepare service schedule of farm machinery, off season storing of farm equipment. (6 hrs.) 283. Plan and prepare layout and list of equipment of a typical farm workshop. (5 hrs.)</p>	<p>Procedure and principle for efficient management and organization of a farm. Discussion on different farm shop layout. (09 Hrs)</p>

SYLLABUS FOR CORE SKILLS	
1.	Workshop Calculation & Science (Common for two year course) (80 hrs + 80 hrs)
2.	Engineering Drawing (Common for Group-I (Mechanical Trade Group))(80 hrs + 80 hrs)
3.	Employability Skills (Common for all CTS trades) (160 hrs + 80 hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

List of Tools & Equipment			
MECHANIC AGRICULTURAL MACHINERY (For batch of 24Candidates)			
S No.	Name of the Tools& Equipment	Specification	Quantity
A. TRAINEES TOOL KIT			
1.	Allen Key	set of 12 pieces (2mm to 14mm)	6+1 Nos.
2.	Caliper inside	15 cm Spring	6+1 Nos.
3.	Calipers outside	15 cm spring	6+1 Nos.
4.	Center Punch	10 mm. Dia. x 100 mm.	6+1 Nos.
5.	Dividers	15 cm Spring	6+1 Nos.
6.	Electrician Screw Driver	250mm	6+1 Nos.
7.	Hammer ball peen	0.5 kg with handle	6+1 Nos.
8.	Hands file	20 cm. Second cut flat	6+1 Nos.
9.	Philips Screw Driver	set of 5 pieces (100 mm to 300 mm)	6+1 Nos.
10.	Pliers combination	20 cm.	6+1 Nos.
11.	Screw driver	20cm.X 9mm. Blade	6+1 Nos.
12.	Screw driver	30 cm. X 9 mm. Blade	6+1 Nos.
13.	Scriber	15 cm	6+1 Nos.
14.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	6+1 Nos.
15.	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	6+1 Nos.
16.	Spanners socket with speed handle, T-bar, ratchet and universal	upto 32 mm set of 28 pieces with box	6+1 Nos.
17.	Steel rule	30 cm inch and metric	6+1 Nos.
18.	Steel tool box with lock and key (folding type)	400x200x150 mm	6+1 Nos.
19.	Wire cutter and stripper		6+1 Nos.
B. Tools Instruments and General ShopOutfits			
20.	AC alternator slip ring puller		1No.
21.	Adjustable spanner	Pipe wrench 350 mm	2 Nos.
22.	Air blow gun with standard accessories		1No.
23.	Air impact wrench with standard accessories		4 Nos.
24.	Air ratchet with standard accessories		4 Nos.
25.	Allen Key	set of 12 pieces (2mm to 14mm)	2 Nos.
26.	Alternator for tractor – different type		2 Nos.
27.	Ammeter	300A/ 60A DC with external shunt	4 Nos.
28.	Angle plate adjustable	250x150x175	1No.
29.	Angle plate size	200x100x200mm	2 Nos.

30.	Anvil 50 Kgs with Stand		1No.
31.	Arbor press hand operated	2 ton capacity	1No.
32.	Auto Electrical test bench		1No.
33.	Battery –charger		2 Nos.
34.	Belt Tensioner gauge		1No.
35.	Blow Lamp	1 litre	2 Nos.
36.	Caliper inside	15 cm Spring	4 Nos.
37.	Calipers outside	15 cm spring	4 Nos.
38.	Car Jet washer with standard accessories		1No.
39.	Carburetor repair tool kit		1No.
40.	Chain Pulley Block-	3 ton capacity with tripod stand	1No.
41.	Chaser hard W/V	9 to 40 T.P.I. set of 11 external.	1 set
42.	Chaser, hand W/W	9 to 40 T.P.I. set of 11 internal.	1 set
43.	Chisel	10 cm flat	4 Nos.
44.	Chisels cross cut	200 mm X 6mm	4 Nos.
45.	Circlip pliers Expanding and contracting type	15cm and 20cm each	4 Nos.
46.	Clamps C	100mm	2 Nos.
47.	Clamps C	150mm	2 Nos.
48.	Clamps C	200mm	2 Nos.
49.	Cleaning tray	45x30 cm.	4 Nos.
50.	Clutches, different types such as cone type, disc type		1 each
51.	Compression testing gauge suitable for diesel Engine		2 Nos.
52.	Connecting rod alignment fixture		1No.
53.	Copper bit soldering iron	0.25 Kg	4 Nos.
54.	Cut section model of fuel filter		1No.
55.	Cylinder bore gauge capacity	20 to 160 mm	4 Nos.
56.	Cylinder liner- Dry & wet liner, press fit & slide fit liner		1 each
57.	DC Ohmmeter	0 to 300 Ohms, mid scales at 20 Ohms	2 Nos.
58.	Depth micrometer	0-25mm	4 Nos.
59.	Dial gauge type	1 Gr. A (complete with clamping devices and stand)	4 Nos.
60.	Different type of Engine Bearing model		1 set
61.	Different type of piston model		1each
62.	Dividers	15 cm Spring	4 Nos.
63.	Drift Punch Copper	15 cm	4 Nos.

64.	Drift, copper	10 x 15 1/2 mm	2 Nos.
65.	Drill point angle gauge		1No.
66.	Drill twist	1.5 mm to 15 mm (various sizes) by 0.5 mm	4 Nos.
67.	Electric Soldering Iron	230 V 60 watts 230 V 25 watts	2 each
68.	Electric testing screw driver		2 Nos.
69.	Engineer's square	15 cm. Blade	2 Nos.
70.	Engineers stethoscope		1 No.
71.	Equipment puncture, in box,		1No.
72.	Feeler gauge	20 blades (metric)	2 Nos.
73.	File flat	20 cm bastard	4 Nos.
74.	File, half round	20 cm second cut	4 Nos.
75.	File, Square	20 cm second cut	4 Nos.
76.	File, Square	30 cm round	4 Nos.
77.	File, triangular	15 cm second cut	4 Nos.
78.	Files assorted sizes and types including safe edge file	(20 Nos)	2 set
79.	Flat File	25 cm second cut	4 Nos.
80.	Flat File	35 cm bastard	4 Nos.
81.	Fuel feed pump for diesel		2 Nos.
82.	Fuel injection pump (Diesel) inline		1 No.
83.	Glow plug tester		2 Nos.
84.	Granite surface plate	1600 x 1000 with stand and cover	1 No.
85.	Grease Gun		2 Nos.
86.	Grover	3, 4, 6mm.	1 Each
87.	Growler		2 Nos.
88.	Hacksaw frame adjustable	20-30 cm	10 Nos.
89.	Hammer Ball Peen	0.75 Kg	4 Nos.
90.	Hammer Chipping	0.25 Kg	4 Nos.
91.	Hammer copper	1 Kg with handle	4 Nos.
92.	Hammer Mallet		4 Nos.
93.	Hammer Plastic	(i) for crimping up to 4mm and (ii) for crimping up to 10mm	4 Nos.
94.	Hand operated crimping tool		2 Nos.
95.	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
96.	Hand Shear Universal	250mm	2 Nos.
97.	Hand vice	37 mm	2 Nos.
98.	High rate discharge tester (cell tester)		1 No.
99.	Hollow Punch set of seven pieces	6mm to 15mm	2 sets each

100.	Hydraulic jack HI-LIFT type -	3 ton capacity,	1 No.
101.	Injector – Multi hole type, Pintle type		4 each
102.	Injector cleaning unit		1 No.
103.	Injector testing set (Hand tester)		1 No.
104.	Insulated Screw driver	20 cm x 9mm blade	4 Nos.
105.	Insulated Screw driver	30 cm x 9mm blade	4 Nos.
106.	Left cut snips	250mm	4 Nos.
107.	Lifting jack screw type	3 ton, 5ton	1 each
108.	Magneto spanner	set with 8 spanners	1 set
109.	Magnifying glass	75mm	2 Nos.
110.	Marking out table	90X60X90 cm.	1 No.
111.	Multi Scan Tool		1 No.
112.	Multimeter digital		5 Nos.
113.	Oil can	0.5/0.25 liter capacity	2 Nos.
114.	Oil pump for dismantling and assembling.		2 Nos.
115.	Oil Stone	15 cm x 5 cm x 2.5 cm	1 No.
116.	Oscilloscope	20MHz	1 No.
117.	Outside micrometer	0 to 25 mm	4 Nos.
118.	Outside micrometer	25 to 50 mm	4 Nos.
119.	Outside micrometer	50 to 75 mm	1 No.
120.	Outside micrometer	75 to 100 mm	1 No.
121.	Pat melting		2 Nos.
122.	Philips Screw Driver	set of 5 pieces (100 mm to 300 mm)	2 sets
123.	Pipe cutting tool		2 Nos.
124.	Pipe flaring tool		2 Nos.
125.	Piston ring compressor		2 Nos.
126.	Piston Ring expander and remover.		2 Nos.
127.	Piston Ring groove cleaner.		1 No.
128.	Pliers combination	20 cm.	2 Nos.
129.	Pliers flat nose	15 cm	2 Nos.
130.	Pliers round nose	15 cm	2 Nos.
131.	Pliers side cutting	15 cm	2 Nos.
132.	Poker		2 Nos.
133.	Portable electric drill Machine		1 No.
134.	Portable oil monitoring Indicator		1 No.
135.	Power Supply	0-12 v, lamp	1 No.
136.	Prick Punch	15 cm	4 Nos.
137.	Punch Letter	4mm	2 set
138.	Radiator cut section-cross flow		1 No.

139.	Radiator cut section-down flow		1 No.
140.	Radiator pressure cap		2 Nos.
141.	Rake		1 No.
142.	Rear axle assembly-gear box steering box assembly of the diesel engine		2 set
143.	Ridger		2 Nos.
144.	Right cut snips	250mm	4 Nos.
145.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4 Nos.
146.	Scraper flat	25 cm	2 Nos.
147.	Scraper half round	25 cm	2 Nos.
148.	Scraper Triangular	25 cm	2 Nos.
149.	Scriber	15 cm	2 Nos.
150.	Scriber with scribing black universal		2 Nos.
151.	Set of stock and dies - Metric		2 sets
152.	Shear Tin Man's	450 mm x 600mm	4 Nos.
153.	Sheet Metal Gauge		2 Nos.
154.	SherTinmans	300mm	4 Nos.
155.	Shovel		2 Nos.
156.	Soldering Copper Hatchet type	500gms	4 Nos.
157.	Solid Parallels in pairs (Different size) in Metric		2 Nos.
158.	Spanner Clyburn	15 cm	1 No.
159.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	4 Nos.
160.	Spanner T. flocks for screwing up and up-screwing inaccessible positions		2 Nos.
161.	Spanner, adjustable	15cm.	2 Nos.
162.	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	2 Nos.
163.	Spanners socket with speed handle, T-bar, ratchet and universal	upto 32 mm set of 28 pieces with box	2 Nos.
164.	Spark lighter		2 Nos.
165.	Spark plug spanner	14mm x 18mm x Size	2 Nos.
166.	Spirit level	2V 250, 05 metre	2 Nos.
167.	Spring tension tester		1 No.
168.	Stake grooving.		2 Nos.
169.	Stake, hatchet.		2 Nos.
170.	Starter motor for tractor –different type		2 Nos.
171.	Steel measuring tape	10 meter in a case	4 Nos.
172.	Steel rule and metric	15 cm inch	4 Nos.
173.	Steel rule and metric	30 cm inch	4 Nos.
174.	Steel wire Brush	50mmx150mm	5 Nos.
175.	Stone, carborandum	15 x 5 x 4 cm smooth and rough.	1each

176.	Straight edge gauge	2 ft.	2 Nos.
177.	Straight edge gauge	4 ft.	2 Nos.
178.	Stud extractor	set of 3	2 sets
179.	Stud remover with socket handle		1 No.
180.	Surface gauge with dial test indicator plunger type	0.01 mm	2 Nos.
181.	Tachometer (Counting type)		1 No.
182.	Taps and Dies complete sets (5 types)		1 set
183.	Taps and wrenches -Metric		2 sets
184.	Telescope gauge		4 Nos.
185.	Temperature gauge	0-100 degree	2 Nos.
186.	Thermostat		2 Nos.
187.	Thread pitch gauge metric, BSW		1 No.
188.	Timing lighter		1 No.
189.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
190.	Trammel	30 cm	2 Nos.
191.	Turbocharger cut sectional view		1 No.
192.	Tyre pressure gauge with holding nipple		2 Nos.
193.	Universal puller for removing pulleys, bearings		1 No.
194.	VBlock with Clamps	75 x38 mm pair	2 Nos.
195.	Vacuum gauge to read	0 to 760 mm of Hg.	2 Nos.
196.	Valve Lifter		1 No.
197.	Valve spring compressor universal.		1 No.
198.	Vernier calliper	0-300 mm with least count 0.02mm	4 Nos.
199.	Vice grip pliers		2 Nos.
200.	Voltmeter	50V/DC	4 Nos.
201.	Water pump for dismantling and assembling		2 Nos.
202.	Wing compass	25 cm	2 Nos.
203.	Wire Gauge (metric)		4 Nos.
204.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	4 Nos.
C. General Installation/Machineries			
205.	3 furrow disc plough with scrapersyk		1 No.
206.	9 tine cultivator-spring loaded mounted type		1 No.
207.	Air conditioner		As Required
208.	Arbor press hand operated	2 ton capacity	1 No.
209.	Automotive exhaust	5 gas analyzer (petrol & Diesel) or Diesel Smoke meter	1 No.

210.	Axle flow vegetable thresher		1 No.
211.	Bench lever shears	250mm Blade x 3mm Capacity	1 No.
212.	Bund maker (disc type)		1 No.
213.	Centrifugal Pump with electric motor		1 No.
214.	Chaff cutter and silage cutter		1each
215.	Chisel Plough-	5/7 tone	1 No.
216.	Dal Mill		1 No.
217.	Diesel GEN SET-	25/50 KVA with AMF facility	1 No.
218.	Disc Harrow	(14 Mounted type) off set	1 No.
219.	Disc Harrow	8x8 trailed type	1 No.
220.	Disc Plough	2 Bottom reversible l	1 No.
221.	Disc Plough	3 Bottom	1 No.
222.	Discrete Component Trainer / Basic Electronics Trainer		1 No.
223.	Drier (Solar/Heater)		1 No.
224.	Drilling machine bench to drill	up to 12mm dia along with accessories	1 No.
225.	Dual Magnetization Yoke	AC / HWDC, 230 VAC, 50Hz	1 set
226.	Electric motor	3 Phase 10 H.P.	1 No.
227.	Electric motor	3 Phase 7.5 H.P.	1 No.
228.	Engine - for walking and riding type reapers		2 Nos.
229.	Floor Mill		1 No.
230.	Fodder Harvester/ Chopper Flale type		1 No.
231.	Fodder kit for self Propelled reaper		1 No.
232.	Gas Welding Table	1220mm x760mm	2 Nos.
233.	Grinding machine (general purpose) D.E. pedestal	300 mm dia wheels rough and smooth	1 No.
234.	Groundnut decorticator		1 No.
235.	Header Assembly for maize and sun-flower		1 No.
236.	High capacity multi crop thresher		1 No.
237.	Kino/ Orange grader		1 each
238.	Knapsack /foot sprayer		1 No.
239.	Laser Leveler complete with transmitter, receiver, control box, survey		1 No.
240.	Leveler/spike Leveler	3 meter width	1 No.
241.	Liquid penetrant Inspection kit		1 set
242.	Maize crophresher		1 No.
243.	Mechanical Power Weeder		1 each

244.	Mould Board Plough-Augur type		1 No.
245.	Mower/Grass Cutter		1 No.
246.	Multi crop thresher		1 No.
247.	Multi Scan Tool		1 No.
248.	P.T.O. operated rotary lawn mower		1 No.
249.	Paddy harrow	(14 Disc mounted type)	1 No.
250.	Paddy transplanter		1 No.
251.	Picking platform		1 No.
252.	Pipe Bending Machine (Hydraulic type)	12mm to 30mm	1 No.
253.	Pneumatic rivet gun		2 Nos.
254.	Power Operated Cleaner		1 No.
255.	Power operated fogging machine		1 No.
256.	Power operated Grader (wheat, maize)		1 No.
257.	Power operated manure spreader		1 No.
258.	Power operated potato Grader		1 No.
259.	Power operated soybean reaper		2. Nos.
260.	Power Tiller		1 No.
261.	Prime movers (Engine Stationery type)		2 Nos.
262.	Pulverizing Roller (Tractor Mounted) with spring loaded (11tyne) cultivator		1 No.
263.	Rice Mill/Paddy dehauskar		1 No.
264.	Rice Polisher		1 No.
265.	Rotary duster		1 No.
266.	Rotary Harvester		1 No.
267.	Rotavator	5.5" cutting Width	1 No.
268.	Self propelled Combine Harvester axial flow/Track type combine Harvester		1 No.
269.	Self propelled high clearance sprayer	20 hp diesel engine	1 No.
270.	Self propelled riding type Reaper/Reaper winder		1 No.
271.	Semi-axial flow multi crop thresher		1 No.
272.	Sewing Machine/Bag stitcher		1 No.
273.	Solar streetlight		1 No.
274.	Spring tension tester		1 No.
275.	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	As desired

		<p>Accessories and fitting for spray pop-ups</p> <p>Low volume & High volume rain gun range 15 to 30 meter die Accessories and fitting for rain gun</p> <p>Compression Fittings (Elbow, Elbow Treaded, Joiner, Tee, End Cap, adopter Male.)</p> <p>HDPE fittings (Elbow, Elbow Treaded, Joiner, Tee, End Cap, adopter Male.)</p> <p>PVC Fittings (Elbow, Elbow Treaded, Joiner, Tee, End Cap, adopter Male.)</p> <p>PVC Control valve different sizes</p> <p>Air Release Valve different sizes</p> <p>Butterfly / G.M. Gate Valves different sizes</p> <p>Fertigation Tank 30 to 160 Litres</p> <p>Fertigation Equipment Pump 30 to 160 Litres</p> <p>Filters (Primary filter) Sand, Hydro cyclone, Screen, Plastic/metal & Disc and Drip line</p> <p>Poly joiner , reducer, Tee, Elbow ,End stop different sizes</p> <p>Grommet hole plug different sizes</p> <p>Pressure gauge</p> <p>Three way cock for gauge PVC valve box different sizes</p> <p>Water meter, Brase pressure regulator and irrigation drum</p> <p>Jain spanner repair tool kit & Drip line binder</p> <p>Single phase electric motor 3 HP high speed (Booster)</p>	
276.	Straw reaper		1 No.
277.	Sub solier	24 -30 inch.	1 No.
278.	Submersible Pump complete unit		1 No.
279.	Sugar cane transplanter		1 No.
280.	Thresher rasp bar type		1 No.
281.	Tin smiths bench folder	600 x 1.6mm	1 No.
282.	Tractor PTO operated aero blast spray		1 No.
283.	Tractor PTO operated sprayer for cotton		1 No.
284.	Tractor	60 HP power steering	1 No.
285.	Tractor	75 HP 4WD	1 No.

286.	Tractor Diesel Engine	4 stroke for Dismantling and assembling with swiveling stand	2 Nos.
287.	Tractor operated bed farmer cum three rows planter		1 No.
288.	Tractor Operated Combine Harvester multi- crops		1 No.
289.	Tractor operated ground nut digger		1 No.
290.	Tractor operated hay bailer		1 No.
291.	Tractor operated implement loading beam		1 No.
292.	Tractor operated onion digger		1 No.
293.	Tractor operated potato digger		1 No.
294.	Tractor operated two rows Semi /automatic potato planter		1 No.
295.	Tractor operated two rows vegetable trans planter (semi automatic)		1 No.
296.	Tractor operator Angle blade Tracer		1 No.
297.	Tractor Operator ditcher		1 No.
298.	Tractor operator Front mounted dozer with Hydraulic single cylinder		1 No.
299.	Tractor Operator post hole digger		1 No.
300.	Tractor operator scraper and bucket scraper		1 No.
301.	Tractor Operator Seed cum fertilizer drill cum planter		1 No.
302.	Tractor Operator trencher	10" to 16" Width & 4 ft depth	1 No.
303.	Tractor Operator Zero/ strip till Seed cum fertilizer drill	9/11 rows	1 No.
304.	Tractor PTO operated multi - crop direct sowing happy seeder		1 No.
305.	Tractor trailer with hydraulic system		1 No.
306.	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 No.
307.	Vaccine Machine		1 No.
308.	Weighing balance		2 Nos.
309.	Welding plant Oxy-Acetylene complete (high pressure)		1 No.
310.	Welding Transformer (150-300 Amps)		1 No.
311.	Wheel type tractor fitted with diesel engine with standard accessories and special tools (30 to 40 draw-bar H.P).		2 Nos.
312.	Wind mill		1 No.

313.	Winnower		1 No.
List of Consumable:			
314.	Automatic Transmission oils		As required
315.	Battery- SMF		As required
316.	Brake fluids		As required
317.	Chalk, Prussian blue.		As required
318.	Chemical compound for fasteners		As required
319.	Diesel		As required
320.	Different type gasket material		As required
321.	Different type of oil seal		As required
322.	Drill Twist (assorted)		As required
323.	Emery paper	36–60 grit , 80–120	As required
324.	Engine coolant		As required
325.	Engine oil		As required
326.	Gear oils		As required
327.	Hacksaw blade (consumable)		As required
328.	Hand rubber gloves tested	5000 V	5 pair
329.	Holder, lamp teakwood boards, plug sockets, solders, flux wires and cables batteries round consumable blocks and other consumables as required		As required
330.	Hydrometer		8 Nos.
331.	Lapping abrasives		As required
332.	Leather Apron		5 Nos.
333.	Petrol		As required
334.	Power steering oil		As required
335.	Radiator Coolants		As required
336.	Safety glasses		As required
337.	Steel wire Brush	50mmx150mm	5 Nos.
338.	Engine Spare Parts		As per req.
339.	Field crops like wheat, Soya bean, paddy etc.		As desired
340.	Gloves for Welding (Leather and Asbestos)		5 sets
Workshop Furniture			
341.	Book shelf (glass panel)	6½" , x 3" x 1½"	As required
342.	Computer Chair		1+1 Nos.
343.	Computer Table		1+1 Nos.
344.	Desktop Computer	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher.	1+1 Nos.

		RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	
345.	Discussion Table	8" x 4" x 2½ "	2 Nos.
346.	Fire Extinguishers, first- aid box		As required
347.	Instructional Material – NIMI Books/Ref.books		Asrequired
348.	Internet connection with all accessories		Asrequired
349.	Laser printer		1 No.
350.	LCD projector/ LED /LCD TV	42"	1 No.
351.	Multimedia DVD for Automotive application/subjects		Asrequired
352.	Online UPS		As required
353.	Stools		26 No.
354.	StorageRack	6½ " x 3" x 1½ "	As required
355.	Storageshelf	6½ " x 3" x 1½ "	As required.
356.	Suitable class room furniture		As required
357.	Suitable Work Tables with vices		As required
358.	Tool Cabinet -	6½ " x 3" x 1½ "	2 Nos.
359.	Trainees locker	6½ " x 3" x 1½ "	As required

Note: -

1. Internet facility is desired to be provided in the class room.

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert members contributed/ participated for finalizing the course curriculum of Mechanic Agricultural Machinery Trade.			
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2.	G Satish Kumar, Manager	Ashok Leyland	MEMBER
3.	GM Cholanrajan, Sr. Manager, Training	Lansun Toyota, Chennai	MEMBER
4.	M Shanavas Khan	Hinduja Foundries	MEMBER
5.	Dr. Abhijit KR Mandal	National Automotive Testing and R&D Infrastructure Project, Global, Automotive Research center, Chennai	MEMBER
6.	Vadivelan, National	Automotive Testing and R&D Infrastructure Project, Global, Automotive Research center, Chennai	MEMBER
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8.	M. K. Gupta	Maruti Suzuki	MEMBER
9.	Pandey, Director	SRFMTTI, Anathapur	MEMBER
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12.	R.A. Armstrong	TAFE	MEMBER
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18.	K. Aravind, Regional Trainer	Bosch Ltd., Chennai	MEMBER
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44.	S Horlyok Chelladurai, Retd. ITI Principal		MEMBER

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities

