

SYLLABUS OF SEMESTER SYSTEM
FOR THE TRADE OF

MECHANIC (TRACTOR)

UNDER

CRAFT INSTRUCTOR TRAINING SCHEME (CITS)
(ONE YEAR/TWO SEMESTERS)

REDESIGNED IN
2014

BY
GOVERNMENT OF INDIA
MINISTRY OF LABOUR & EMPLOYMENT (DGE&T)

GENERAL INFORMATION

1. Name of the Trade : MECHANIC TRACTOR
2. Duration : One year (Two semesters)
3. Power Norms : (a) Class Room: 1 kw
(b) Workshop : 15 kw
4. Space Norms : (a) Class Room : 30 Sq. Mt. (@ 1.5 Sq.Mt. per Trainee)
(b) Workshop : 500 Sq. meter.
5. Entry Qualification : NTC & NAC in Mechanic Tractor or Mechanic
Agriculture Machinery Trade
Or
Diploma/Degree in Agricultural Engg. / Automobile Engg.

Valid MCWG& LMV driving License Mandatory for all
7. Unit strength : 20 Trainees
8. Trainer's Qualification: Degree in Agricultural Engineering or Automobile
Engineering
OR
Diploma in Agricultural Engineering or Automobile with 3
Years Experience .
Or
NTC& NAC in Mechanic Tractor /Mechanic Agricultural
Machinery Trade With 2 Years Of Experience

CITS course in Mechanic Tractor / Mechanic Agricultural
Machinery Trade and Valid Tractor driving License
Mandatory for all.
9. Required staff : Two Training Officer, One Skilled Worker and
One Workshop Attendent

Distribution of training on Hourly basis:

Semester	Total hours /week	Trade practical	Trade theory	POT	Engg. Drawing	Wksp/sc calculation
I	40 Hours	20 Hours	5 Hours	--	6 Hours	9 Hours
II	40 Hours	20 Hours	5 Hours	15 hours	--	--

SYLLABUS FOR TRADE OF MECHANIC TRACTOR
FIRST SEMESTER (Semester Code.:)
Duration : 06 Months
FOR TRADE TECHNOLOGY –I

WEEK NO.	TRADE PRACTICAL	TRADE THEORY
1	<p>Practice 5s techniques in the automobile work shop.</p> <p>Practice 7QC techniques in the automobile work shop.</p> <p>Precautions to be observed while working in the automobile work shop and garage equipments.</p> <p>Familiarization with computer, Practice on data base creation with MS access and data base application.</p>	<p>Admission, introduction, facility available in the institute.</p> <p>Importance of safety, safety precautions & first aid.</p> <p>Concept of 5S & 7QC tools, time management as employed for quality circle. Importance of healthy environment.</p> <p>Application of computers & its Features. Physical & logical concept of data base.</p>
2	<p>Handling & maintenance of hand tools, special tools, equipment & machineries.</p> <p>Maintenance of garage equipment in the workshop.</p> <p>Preventive maintenance of vehicle/engines.</p>	<p>Application and safety to be observed while handling hand tools, special tools, equipment & machineries</p> <p>Importance and types of maintenance of vehicles/engines.</p>
3	<p>Checking engine vacuum & compression pressure.</p> <p>Taking Cylinder leakage test with compressed air.</p> <p>Measure the cubic capacity of an given engine.</p>	<p>Explanation of Principle of All types of SI and CI Engines with respect to pressure, volume and temperature.</p> <p>Thermodynamic cycles with respect to pv & ts diagrams.</p> <p>Valve timing diagram of all types of Engine</p>
4 & 5	<p>Servicing cylinder head assembly</p> <p>Remove all accessories attached with the engine dismantling the head components and its visual inspection-</p> <p>Measuring components for wear with precision measuring instruments-suggestions for remedy and taking remedial measures.</p> <p>Reassembling cylinder head components.</p>	<p>Importance of servicing cylinder head-Precautions to be observed while servicing cylinder head.</p> <p>Reasons for frequently occurring abnormal wear in cylinder head components and its Effects on engine performance.</p> <p>Constructional details, Advantages and disadvantages of variable valve timing</p>

<p>6 &7</p>	<p>Servicing cylinder block assembly Removing and dismantling piston and connecting rod assembly, crank shaft and flywheel, vibration damper from the engine.</p> <p>Visual inspection of cylinder block for various parameters such as bore, main journal etc. for wear and suggest remedial measures.</p> <p>Visual inspection of the cylinder blocks components (piston and connecting rod assembly, crank shaft, flywheel etc.)</p>	<p>Importance of servicing cylinder block- Precautions to be observed while servicing cylinder block.</p> <p>Reason for measuring cylinder block for various parameters to find out its serviceability and suggestions for remedial measures.</p> <p>Reasons for frequently occurring abnormal wear in cylinder block components and its Effects on engine performance.</p>
<p>8&9</p>	<p>Measuring cylinder block & components for wear with precision measuring instruments- suggestions for remedy and taking remedial measures.</p> <p>Reassembling the engine block and its components.</p> <p>Refit cylinder head assembly.</p> <p>Setting valve timing.</p> <p>Checking and setting valve clearance</p> <p>Practice on checking and setting variable valve timing</p>	<p>Importance of measuring cylinder block components for actual wear to decide serviceability.</p> <p>Engine assembly procedure as recommended by manufacturers.</p> <p>Importance and correct procedure of setting valve timing</p> <p>Importance of correct valve clearance</p> <p>Precautions to be observed while assembling engine components.</p>
<p>10&11</p>	<p>Maintenance, diagnosis and Servicing intake systems Servicing of different types of air cleaner, turbocharger, intercooler, throttle body, intake manifold</p> <p>Maintenance, diagnosis and Servicing exhaust systems Servicing of exhaust manifold, catalytic converter, resonator, muffler</p>	<p>Study about intake system components such as air cleaner, different types of turbo charger, super charger, throttle body, intake manifold etc.</p> <p>Importance of maintenance, diagnosis and Servicing intake systems.</p> <p>Causes of failure of the components of intake system.</p> <p>Trouble shooting in an intake system.</p> <p>Study about exhaust system components such as exhaust manifold, muffler, types of catalytic converter etc.</p> <p>Importance of maintenance, diagnosis and Servicing exhaust systems.</p> <p>Causes of failure of the components of exhaust system.</p> <p>Trouble shooting in an intake system.</p>
<p>12</p>	<p>Maintenance, diagnosis and servicing of basic petrol fuel system components Overhauling of fuel tank, mechanical fuel Pump, electrical pump, fuel filters, carburetors</p> <p>Testing of fuel pumps for proper functioning.</p>	<p>FUEL SUPPLY SYSTEM IN PETROL ENGINE Gasoline Fuel: properties of Gasoline fuel – combustion processes</p> <p>Study about carburetor fuel system and its components such as fuel tank, mechanical fuel</p>

		<p>Pump, electrical pump, fuel filters, carburetors and its circuits etc.</p> <p>Importance of maintenance, diagnosis and Servicing carburetor fuel system and its components.</p> <p>Causes of failure of the carburetor fuel system and its components.</p> <p>Trouble shooting in carburetor fuel system and its components.</p> <p>Importance of testing of fuel pumps.</p>
13&14	<p>Maintenance, diagnosis and servicing of conventional diesel fuel system and its components.</p> <p>Overhauling of fuel tank, fuel feed Pump, electrical pump, fuel filters, types of fuel injection pumps, governors, injector</p> <p>Testing of fuel feed pumps for proper functioning.</p> <p>Servicing of fuel tanks, Checking leaks in the fuel lines, draining of water separators.</p> <p>Replacing of primary& secondary filters.</p> <p>Phasing and calibration of fuel injection pump.</p> <p>Testing of injectors for its proper functioning.</p> <p>Setting fuel injection timing</p> <p>Bleeding diesel fuel system.</p>	<p>FUEL SUPPLY SYSTEM IN DIESEL ENGINES</p> <p>Diesel fuel & its properties – combustion processes</p> <p>Study about conventional diesel fuel system and its components such as fuel tank, fuel feed Pump, electrical pump, fuel filters, water separators, fuel injection pumps, governors, injectors etc.</p> <p>Importance of maintenance, diagnosis and Servicing diesel fuel system and its components.</p> <p>Causes of failure of the diesel fuel system and its components.</p> <p>Importance of testing of fuel feed pumps, FIP and injectors.</p> <p>Importance of setting correct FIP timing.</p> <p>Importance of bleeding the fuel system.</p> <p>Trouble shooting in diesel fuel system and its components.</p>
15&16	<p>Maintenance, diagnosis and servicing of lubrication system.</p> <p>Changing engine oil and filter.</p> <p>Tracing oil leak from the engine.</p> <p>Overhauling of oil pump,</p> <p>Checking oil pressure relief valves for proper functioning.</p> <p>Servicing oil coolers.</p> <p>Checking oil galleries</p> <p>Oil pressure testing.</p> <p>Removing of sludge by using flushing oil.</p>	<p>ENGINE LUBRICATION SYSTEM</p> <p>Lubricant, types, application and its properties.</p> <p>Study about lubrication systems and its components such as oil sump, oil strainer, oil pump, relief valve, filter, bypass valve, oil cooler etc.</p> <p>Study about oil filtering systems.</p> <p>Importance of maintenance, diagnosis and Servicing lubricating system and its components.</p> <p>Causes of failure of the lubricating system and its components.</p> <p>Importance of testing of oil pumps.</p> <p>Importance of servicing oil filter.</p> <p>Importance of checking and setting correct oil pressure.</p> <p>Reasons for sludge formation and its prevention</p>

		Trouble shooting in lubricating system and its components.
17&18	Maintenance, diagnosis and servicing of cooling system Flushing cooling system Replacing coolant. Tracing coolant leakage from the engine. Checking cooling system for proper functioning. Replacing/Overhauling of water pump. Checking thermostat valve. Adjusting fan belt tension. Checking radiator pressure cap for proper functioning. Replacing/Serviceing radiator. Diagnosis of improper operating temperature.	ENGINE COOLING SYSTEM Coolant, types, and its properties. Importance of maintaining correct coolant-water ratio. Study about cooling systems and its components such as radiator, pressure cap, types of hoses, types of water pump, electric fan, thermostat, fan belts, temperature gauge, temperature sensor etc. Study about oil filtering systems. Importance of maintenance, diagnosis and Serviceing cooling system and its components. Causes of failure of the cooling system and its components. Importance of testing of pressure cap. Importance of serviceing radiator. Trouble shooting in cooling system and its components.
19	Industrial visit/ in plant training / project work	
20	Maintenance, diagnosis and servicing battery Checking of battery condition using hydrometer and battery tester. Charging batteries in series and parallel. Maintenance of battery. Jump starting a battery. Preparation of electrolyte. Reconditioning of terminal post.	Battery/accumulator :- types, construction, working .Battery capacity &rating, Booster starting. IBS, Disposal of waste battery. Advantages of slow charging. Advantages of solidification of electrolyte by adding salicylic acid or introducing absorbed glass mat (AGM) – VRLA batteries Electrolyte-definition, percentage of sulphuric acid and water. effects of improper ratio of acid and water on battery life. specific gravity of water, acid and electrolyte. Temperature effect on specific gravity. Battery troubles and their remedies
21	Maintenance, diagnosis and servicing of starting system Checking starter circuit for proper functioning. Checking solenoid switches for proper functioning Overhauling all types of starter. Checking of starter for proper functioning.	Study about starting system and its components. Importance of checking starter circuit for proper functioning. Role of solenoid switch and relay, importance of its checking. Importance of testing starter components. Troubles and remedies in starting system.
22	Maintenance, diagnosis and servicing of charging system Checking charging circuit voltage drop test for proper functioning.	Study about Charging system and its components Importance of checking charging circuit for proper functioning. Importance of voltage regulation

	<p>On vehicle inspection of alternator for proper functioning.</p> <p>Overhauling of alternator</p> <p>Testing voltage regulator.</p>	<p>Importance of testing charging system components.</p> <p>Troubles and remedies in charging system.</p>
23	<p>Maintenance, diagnosis and servicing of conventional ignition system</p> <p>Checking ignition circuit for proper functioning.</p> <p>Checking magneto coil for proper functioning.</p> <p>Checking magneto for proper strength.</p> <p>checking and Setting of magneto ignition timing using Ignition Timing light.</p>	<p>Study about types of conventional Ignition system and its components.</p> <p>Importance of checking ignition circuit.</p> <p>Importance of checking and setting correct ignition timing</p>
24	<p>Overhauling distributor.</p> <p>Checking vacuum & centrifugal advance mechanism for proper functioning.</p> <p>Testing ignition coil, spark plug, condenser for proper functioning using testing equipment.</p> <p>Setting ignition timing. Checking of Ignition timing using Ignition Timing light</p>	<p>Study about distributor and its components.</p> <p>Importance of checking distributor for proper functioning.</p> <p>Importance of testing ignition coil, spark plug, condenser for proper functioning.</p> <p>Common troubles in Ignition system.</p>
25	<p>Checking of exhaust gas in petrol engine using exhaust gas analyser.</p> <p>Checking of exhaust gas in diesel engine using Smoke meter.</p> <p>Maintenance of crank case ventilation system.</p> <p>Maintenance of EGR system.</p>	<p>EMISSION CONTROL SYSTEM.</p> <p>Definition, Sources of emission (such as Exhaust system, crank case, fuel tank and carburetor) .</p> <p>Methods to control emission,(1. exhaust system with EGR OR Air injection system in to exhaust manifold with catalytic converter 2. Positive crank case ventilation. 3. Evaporative control system ie charcoal canister.). Vehicle emission standards- Euro and Bharat standards. Emission control</p>
26	REVISION & TEST	

SYLLABUS FOR TRADE OF MECHANIC TRACTOR
SECOND SEMESTER (Semester Code.:)
Duration : 06 Months
SYLLABUS FOR TRADE TECHNOLOGY –I I

Week no	TRADE PRACTICAL	Trade THEORY
1&2	Trouble tracing in lighting system, Head light alignment. Trouble tracing in digital dashboard gauges. Horn circuit, servicing of horn. Servicing of wiper motor.	Lighting system and its accessories:- Function, lay out, working of all circuits. Emergency light, Head lights, Indicator & Side light, Brake Light, Dashboard lights, Rear Servicing lights, Light circuit and switches. Dashboard gauges Horn and horn relay circuit, Wiper motor and its circuit, Flasher unit and its circuits
3&4	Determining the mechanical efficiency of the engine by Morse test using dynamometer and tachometer. Determining air consumption, lubricating oil consumption.	ENGINE PERFORMANCE TESTS Purpose of testing an I.C engine. Classification of tests, fault finding tests, Routine tests. Measurement of Horse power & torque, Indicated mean effective pressure. Mechanical efficiency, Fuel consumption, Thermal efficiency, Volumetric efficiency, Power take off test. Air Consumption, Lubricating oil consumption. Dynamometers and its types. Preparation of heat balance sheet.
5&6	Trouble tracing in engine using multi scan tool such as Engine management system, electronic fuel injection, Air flow measurement, Variable intake manifold system, types of EFI wiring system, Electronic control unit, malfunction indicating lamp, Data link connector, Onboard diagnostic system Checking of sensors. Checking of actuators. Checking of pumps.	ENGINE MANAGEMENT SYSTEM. Definition, Function, Types of system available, Parts of Engine Management System.(All sensors, actuators, pumps.) & their function. closed and open loop system, cold start system, Air flow measurement, Variable intake manifold system, EFI wiring system, Electronic control unit, pre heaters for inlet manifold, Data link connector, Onboard diagnostic system.
7	Trouble shooting for DTC(Diagnostic Trouble Code)-checking DTC circuits-identifying the trouble by scan tool-tracing the faults by trouble code-checking intermittent problems-final confirmation test	Details of trouble codes-functions of sensors and actuators-details of scan tool-precautions while working with sensors and actuators

8	<p>Maintaining fuel injection test bench Practice on overhauling & testing of different types inline fuel injection pump</p> <p>Servicing and testing different types of distributor type fuel injection pumps</p>	<p>Importance of testing the pumps. Procedure for testing before dismantling. Procedure as per the manufacturer for dismantling, inspecting and assembling inline pump.</p> <p>Detailed description of procedure of servicing mechanically controlled distributor type and solenoid valve controlled distributor type pumps- details of start assist systems.</p>
9	<p>Servicing CRDI fuel system: checking low pressure fuel supply circuit-preliminary check-checking fuel pump operation-checking fuel pressure-checking high pressure fuel supply circuit-checking fuel injector leak-checking fuel regulator</p>	<p>Precautions to be observed before removing the CRDI fuel system-study about the low and high pressure fuel supply circuits</p>
10	<p>Removing a CRDI pump from an engine-refit the pump to the engine. start and adjust slow speed of the engine. Overhauling of various types of injectors . Testing of various types of injector. Checking and replacing the components of CRDI system.</p>	<p>Electronic Diesel control- Electronic Diesel control systems, Common Rail Diesel Injection (CRDI) system, Hydraulically actuated electronically controlled unit injector (HEUI) diesel injection system. Sensors, actuators and ECU (Electronic Control Unit) used in Diesel Engines.</p>
11 & 12	<p>Diagnosis of clutch Assy. Overhauling of Clutch Assy. Adjusting clutch master slave cylinder/paddle play. Testing for correct functioning.</p>	<p>Transmission system, Clutch: Description and function of different types of clutches such as dog, frictional (dry & wet). Functional parts of frictional clutch such as flywheel, clutch plate, pressure plate, clutch release bearing, paddle & linkages. Advantages & working of dual plate clutch. Methods of fixing of clutch lining & material used for lining. Different types of clutch actuating mechanism. Common troubles & remedies. Care & maintenance.</p>
13	<p>Dismantling gearbox. Overhauling of Gearbox assembly Testing for correct functioning</p>	<p>Gear box : Types of gear box. Description and function of gear box used in tractors. Layout of four speed gear box. Constructional details of gear box. Use of synchromesh unit. Use of starting safety switch. Comparison between transmission system of a motor-vehicle and tractor. Common troubles and their remedies. Properties & grade of oil used in gear box. Care & maintenance</p>
14	<p>Overhauling, differential, final drive etc. Checking, repairing and replacing parts. Checking & adjusting backlash. Setting of</p>	<p>Joints:- Function & working PTO. Types of PTO drives. (propeller shaft & Belt Pulley system) Function & working of differential lock. Use of</p>

	differential lock/ PTO shaft. Checking oil leakage. Field operation of PTO shaft/ belt pulley with different agricultural machinery	slip joint & universal joint. Adjustments such as backlash, preloading. Common troubles and their remedies. Differential & final drive: Function of differential & final drive of tractors. Description and function of unit assemblies such as, differential, axle and final drive, wheel hub etc.
15	Servicing & adjustments of distributor. Checking/Inspection of Hydraulic connections. Hydraulic jacks-couplings. Field operation of different agricultural machinery with three point linkages system & with auxiliary hydraulic system.	Hydraulic system: Use of hydraulics, Different types of hydraulics and its mechanism. Function & Working of different parts such as hydraulic pump, distributor and operating valves & rams, hose pipe. Function & working of auxiliary hydraulic system. Description of hydraulic jack. Adjustments and maintenance procedure.
16	Removing Wheels from tractor, checking tyres for wear and tubes for leaks. Practice on refitting tyres and tubes and wheels and inflating to correct pressure Fitting wheels on tractors tightening wheel holding nuts in correct sequence. Safety precautions related to practical	Classification of Tractors Wheels & Tyres Description of various types of tractors in general. Chassis frame of tractor-constructional details, Reinforcement of engine mountings on chassis. Wheels tyres and tubes-solid and pneumatic tyres-various types and sizes, tread description and use. Fitting of tyres and tubes, importance of inflating tyres to correct pressure. Repair and maintenance of tyres and tubes. Balancing of Tractor wheels, importance of tyre blasting.
17	Layout of steering system of Mechanical steering System. Checking/Inspection of Steering linkage and necessary repair. Removal of steering wheel, steering gear box from tractor for overhauling. Removal front axle and spindle hub and steering linkage. Reassembling steering assembly and Test for correct function including steering geometry. Wheel track setting-front and rear. Ground clearance	Steering System(Mechanical) : Steering description, construction and function of steering gear unit including wheel, rod worm, quadrant arm link, tie rod, ball and socket joints etc. their movement and adjustment. Description and mechanism of foot steering pedal as incorporated in tractors. Importance of steering geometry (toe-in, toe-out, camber/caster, king pin inclination). Description of Wheel base , Wheel track and ground clearance.
18	Layout of steering system of Hydraulic steering System. Dismantling , Checking / Inspection of Hydraulic pump, steering distributor & connections. Reassembling steering assembly and Test for correct function	Steering System(Hydraulic): Description and working principle of the hydraulic steering system of tractors. Function & Working of different parts such as hydraulic pump, distributor and operating valves & rams, hose pipe etc. Adjustments of the hydraulic steering system of tractors. Faults & remedies. Care & maintenance.
19	Overhauling of mechanical (shoe/ disc) brakes. Practice of relining of brake shoes. Inspecting and setting parking brakes. Adjusting brake paddle play.	Brakes: Different types of brakes used in tractors. Description, working principle of mechanical brakes, such as shoes type, disc type brakes (dry & wet). Mechanism & function of

		disc type brakes. Mechanical hand brake for parking, and its fitting. Adjustment of brakes. Faults finding & remedies. Care & maintenance.
20	Diagnosis of brake system. Removing, Dismantling master cylinder & wheel cylinder. Inspecting master cylinder, wheel cylinder piston and valves. Replacement of washer and oil seals. Re-assembling of hydraulic brakes. Bleeding and adjustment of hydraulic brakes.. Field testing of hydraulic brakes.	Hydraulic brake : Properties & selection of brake fluid. Description, working principle of hydraulic brakes used in tractors. Types of master cylinder. Function & working of master cylinder & wheel cylinder. Bleeding and adjustment of hydraulic brakes. Brake testing, efficiency of brakes, braking distance & weight transfer during braking. Common troubles & remedies. Care & maintenance. Precautions related to the brakes.
21	Servicing & maintenance of Air Conditioning System and gas charging / recycling	Air Conditioning System: Necessity of air Conditioning System in tractors/ combine harvesters/Dozers. Working of AC. Study of different components of system such as compressor, condenser, evaporator, thermostat valve. Study of refrigerant/ gas used in Air Conditioning System
22	Practice on scheduled maintenance after 10, 50, 100, 250, 500, 1000 hours of operation of tractor	Introduction to Tractor maintenance, Trouble shooting. Precautions & Safety measures for handling Maintenance tools. Routine checkup and maintenance of tractor not in use.
23	PROJECT WORK/ INDUSTRIAL VISIT/INPLANT TRAINING.	
24	Exercise in driving a tractor. Trouble shooting in tractor driving and testing the performance of a tractor. Tractor driving with different implements.	Tractor driving: Description and function of tractor accessories such as Draw bar, top link & Belt Pulley. Importance & setting of draw bar & top link to correct height. Use of Draw bar, top link & Belt Pulley during operation. Motor Vehicle Act, Driving Rules.
25	Hitching & unhitching of Agricultural implements. Field operation of agriculture implements and adjustment for correct functioning.	Field operation: Tractor operated equipment. Brief description and function of ploughs, cultivator, harrows, seed drill of different types etc. Fitting, fixing and Adjusting of equipment, Danger in overloading and incorrect hitching/ operation of ploughs. Average of life of agriculture implements. Common troubles and their remedies
26	REVISION AND FINAL EXAMINATION	

TRADE: MECHANIC (TRACTOR)**LIST OF TOOLS & EQUIPMENTS****First Semester.****A. TRAINEESTOOLKIT FOR 20 TRAINEES +1 ISTRUCTOR**

SL. NO	ITEM WITH PECIFICATION	QTY
Trainees tool kit (10 Trainees +1 Instructor)		
1.	Steel rule 150 mm(graduated both English and metric) as per IS 1481	10+1 nos.
2.	Steel rule 300 mm(graduated both English and metric) as per IS 1481	10+1 nos.
3.	Steel measuring tape 10 meter in a case	10+1 nos.
4.	Engineers Try Square 150 mm with knife edge as per IS 2013	10+1 nos.
5.	Outside Caliper 15 cm spring type	10+1 nos.
6.	Inside Caliper 15 cm Spring type	10+1 nos.
7.	Dividers 15 cm Spring type	10+1 nos.
8.	Safety glasses	10+1 nos.
9.	Scriber 15 cm	10+1 nos.
10.	Knife double Blade Electrician	10+1 nos.
11.	Wire insulation Stripper for shinning conductors from 0.4mm to 4mm	10+1 nos.
12.	Electrician testing Pencil (Line / Neon tester)	10+1 nos.
13.	Electrician Screw Driver 250mm	10+1 nos.
14.	Centre punch 10 cm.	10+1 nos.
15.	Chisel cold flat 20 mm x 150 mm	10+1 nos.
16.	Hammer ball peen 0.5 kg with handle	10+1 nos.
17.	Screw driver 20cm.X 9mm. Blade	10+1 nos.
18.	Screw driver 30 cm. X 9 mm. Blade	10+1 nos.
19.	Spanner D.E. set of 12 pieces (6mm to 32mm) as per IS2028	10+1 nos.
20.	Combination Pliers 20 cm.	10+1 nos.
21.	Side cutting Pliers 15 cm	10+1 nos.
22.	Round nose Pliers 15 cm	10+1 nos.
23.	Flat nose Pliers 15 cm	10+1 nos.
24.	Hand file 20 cm. Second cut flat	10+1 nos.
25.	Hand file 20 cm. Second cut half-round	10+1 nos.
26.	Hand file 20 cm. smooth triangular	10+1 nos.

27.	Hand file 30 cm. bastard	10+1 nos.
28.	Hand file 30 cm. round bastard	10+1 nos.
29.	Ring spanner set of 12 pieces(6mm to 32mm)	10+1 nos.
30.	Feeler gauge 20 blades(metric)	10+1 nos.
31.	File card or cleaner	10+1 nos.
32.	Wire cutter and stripper	10+1 nos.
33.	Allen key set of 12 pieces(2mm to 14 mm)	10+1 nos.
34.	Steel tool box with lock and key (folding type) 400x200x150 mm	10+1 nos.
35.	Punch Letter 4mm	10 +1 nos.
<u>Tools, Instruments and General shop outfits</u>		
36.	Outside micrometer 0 to 25 mm with least count 0.010mm as per IS 2967	2 nos.
37.	Outside micrometer 25 to 50 mm with least count 0.010mm as per IS 2967	2 nos.
38.	Outside micrometer 50 to 75 mm with least count 0.010mm as per IS 2967	2 nos.
39.	Outside micrometer 75 to 100 mm with least count 0.010mm as per IS 2967	2 nos.
40.	Inside micrometer 25 -50,50-75,75-100,100-125,125-150mm, with least count 0.01mm	2 each
41.	Depth micrometer 0-25mm with least count 0.010mm	2 nos.
42.	Thread Micrometer 0-25mm with least count 0.010mm	2 nos.
43.	Adjustable micrometer sprit level to measure flatness, indication and taper with prismatic measuring base	2 nos.
44.	Vernier caliper 200mm inside and outside (graduated in inches and millimetres)	1no.
45.	Digital Vernier calliper outside 300mm least count 0.01mm	2 nos.
46.	Vernier depth Gauge 0-150 mm	2 nos.
47.	Vernier bevel protractor, least count 5minutes as per IS 4239	2 nos.
48.	Telescope gauge	2 nos.
49.	Dial test indicator plunger type (complete with clamping devices and stand)	4 nos.
50.	Universal Surface gauge	2 nos.
51.	Cylinder bore gauge capacity 20 to 160 mm	2 nos.
52.	Compression testing gauge suitable for petrol engine.	2 nos.

53.	Vacuum gauge to read 0 to 760 mm of Hg.	2 nos.
54.	Granite Marking table 1000X630X150 mm with adjustable stand as per IS7327	1 no.
55.	Granite surface plate ,Grade 0,630 x 630 x 100 mm with adjustable stand as per IS7327	1 no.
56.	Calipers 15 cm Hermaphrodite	2 nos.
57.	Chisels cross cut 200 mm X 6mm	2 nos.
58.	Chisel 10 cm flat	2 nos.
59.	Ball Peen Hammer 0.75 Kg	2 nos.
60.	Hammer copper 1 Kg with handle	2 nos.
61.	Hammer Mallet	2 nos.
62.	Hammer Plastic	2 nos.
63.	Hammer ball peen 0.25 kg with handle	2 nos.
64.	Philips Screw Driver set of 5 pieces (100 mm to 300 mm)	5 sets
65.	Insulated Screw driver 30 cm x 9mm blade	2 nos.
66.	Insulated Screw driver 20 cm x 9mm blade	2 nos.
67.	Electric testing screw driver	2 nos.
68.	Hand vice – 37 mm	2 nos.
69.	Work bench 240 x 120 x 75 cm with 4 vices 15cm Jaw	5 nos.
70.	Magnifying glass 75mm	2 nos.
71.	‘V’ Block 75 x 38 mm pair with Clamps (Hardened and ground) as per IS2949	2 nos.
72.	C Clamps 100mm	2 nos.
73.	C Clamps 150mm	2 nos.
74.	C Clamps 200mm	2 nos.
75.	Spanner, adjustable upto15cm.	2 nos.
76.	Spark plug spanner 14mm x 18mm x Size	2 nos.
77.	Spanners socket with speed handle, T-bar, ratchet and universal up to 32 mm set of 28 pieces with box	2 nos.
78.	Pipe wrench 350 mm	2 nos.
79.	Spanner T. flex for screwing up and up-screwing inaccessible	2 nos.
80.	Spanner Clyburn 15 cm	1 no.
81.	Magneto spanner set with 8 spanners	1 set
82.	Piston ring filing jig	2 nos.

83.	Cylinder ridge cutter	1 no.
84.	Vice grip pliers	10 nos
85.	Circlip pliers Expanding and contracting type 15cm and 20cm each	10 nos
86.	Grip Wrench 200mm	2 nos.
87.	Torque wrenches 5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
88.	pneumatic tools set	1 no.
89.	Air impact wrench	1 no.
90.	Air ratchet	1 no.
91.	Air chisel	1 no.
92.	Air blow gun	1 no.
93.	Car Jet washer	1 no.
94.	Pipe flaring tool	1 no.
95.	Pipe cutting tool	1 no.
96.	Universal puller for removing pulleys, bearings	1 no.
97.	Cleaning tray 45x30 cm.	4 nos.
98.	Cleaning tray- Aluminium 45 x 30 cm	4 nos.
99.	Stud extractor set of 3	2 sets
100.	Stud remover with socket handle	1 no.
101.	Paraffin pressure Gun	2 nos.
102.	Grease Gun	2 nos.
103.	Hacksaw frame adjustable 20-30 cm	4 nos.
104.	Files assorted sizes and types including safe edge file (20 Nos)	2 set
105.	Drill twist,metric straight shank 3 mm to 12 mm in step of 0.5 mm	1 set
106.	Drill point angle gauge	1 no.
107.	Set of stock and dies - UNC, UNF and metric	2 sets each
108.	Taps and wrenches - UNC, UNF and metric	2 sets each
109.	Taps and Dies complete sets (5 types)	1 set each
110.	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 each
111.	Lapping abrasives (consumable)	As required
112.	Oil can 0.5/0.25 litter capacity	2 nos.
113.	Oil Stone 15 cm x 5 cm x 2.5 cm CONSUMABLE	1 no.

114.	Straight edge gauge 2 ft.	1 no.
115.	Straight edge gauge 4 ft.	1 no.
116.	Thread pitch gauge metric, BSX, BSF, MC, MF & SAE	1 each
117.	Ladle 150mm Dia	1 no.
118.	Blow Lamp 1 litre	2 nos.
119.	Crow bar 910 x25mm	2 nos.
120.	Voltmeter 50V/DC	5 nos.
121.	Ammeter 300A/ 60A DC with external shunt	5 nos.
122.	DC Ohmmeter 0 to 300 Ohms, mid scales at 20 Ohms	1 no.
123.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts	2 each
124.	Copper bit soldering iron 0.25 Kg	5 nos.
125.	Thimbles of different sizes,,,	02 nos
126.	Wire Gauge (metric)	5 nos.
127.	Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm	2 nos.
128.	Hand rubber gloves tested for 5000 V CONSUMABLES	5 pair
129.	Digital Multimeter range of 0-500v AC/DC, 0-10A AC/DC, 3½ Digit(min), Diode test mode and continuity mode, accuracy ±0.01%	5 nos.
130.	Growler	1 no.
131.	Scientific Calculator	1 no.
132.	Hydrometer) CONSUMABLE	10 nos.
133.	High rate discharge tester (cell tester)	5nos
134.	Spray Gun (Painting) 500ml	1 no.
135.	Carburettor – Solex, Mikunji for dismantling and assembling	1 each
136.	Carburettor repair tool kit	1 no.
137.	Starter motor axial type, pre-engagement type & Co-	
138.	Distributor –Duel advance type, reluctance type	3 each
139.	Tester sparking plug ‘NEON’ Type	1 no.
140.	Alternator assembly used for LMV	2 nos.
141.	Starter motor assembly used for LMV	2 nos.
142.	Electronic engine control module	1 no.
143.	Fuel feed pump	1 no.
144.	Fuel pump for MPFI	1 no.
145.	Inline fuel injection pump and rotor type fuel injection pump	1no.each
146.	Petrol nozzle	8 nos.

147.	Drift copper 10 mm dia x 150 mm	2 nos.
148.	Piston ring compressor	2 nos.
149.	Piston ring expander	1 no.
150.	Valve spring compressor	1 no.
151.	Valve seat cutter complete set with guide and pilot bar (all angle in a box)	1 set
152.	Timing light	1 no.
153.	Tachometer	1 no.
154.	Battery 12V (Lead acid & Alkaline)	4 nos.
155.	Electrical horn (different types)	2 sets
156.	AC alternator slip ring puller	1 no.
157.	Executive Auto Electrical tool kit	2 nos.
	<u>GENERAL INSTLLATIONS/MACHINERES FOR 1ST SESEMESTER</u>	
1.	Demonstration board of 2Wheeler Ignition system.	1 no.
2.	Demonstration board of electronic Ignition system. 4W	1 no.
3.	Spark Plug cleaning and testing equipment	1 no.
4.	Working Condition of Petrol MPFI Engine Assembly with fault simulation board	2 nos.
5.	MPFI petrol engine with swiveling stand along with special tools for dismantling and assembling	2 nos.
6.	Demonstration board of MPFI system	1 no.
7.	Ultrasonic Injection cleaning equipment	1 no.
8.	Working Model of power windows	2 nos.
9.	Petrol Engine(2-stroke) Motor Cycle/Scooter along with special tools and accessories	2 nos.
10.	Cut model of 4 stroke Petrol engine on stand	1 no.
11.	Cut model of 2 stroke Petrol engine on stand	1 no.
12.	Mechanical Hoist/Plate Form Type	1 no.
13.	Multi scan tool /ECU diagnostics kit	1 no.
14.	Four stroke multi cylinder diesel engine in working condition	4 nos.
15.	Four stroke four cylinder CRDI diesel engine in working condition	2 nos.
16.	Functional/experiment model of different type of sensors.	1 set
17.	Auto Electrical test bench	2 nos.
18.	Cut section Model of Mock layout of a motor car –electrical system – working model	1 set
19.	Battery charger 6 – 72 v for charging with cut off circuit	1 no.

20.	Trolley type portable air compressor single cylinder with 45 liters capacity Air tank, along with accessories & with working pressure 6.5	1 no.
21.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth	1 no.
22.	Portable electric drill Machine	1 no.
23.	Spring tension tester	1 no.
24.	Valve refacing machine	1 no.
25.	Injector testing machine for diesel	1 no.
26.	Smoke meter for Diesel with camera and printer	1 no.
27.	Exhaust gas analyser with camera and printer	1 no.
28.	Connecting rod alignment fixture	1 no.
29.	engine lifting crane (jib)	1 NO
30.	Oil draining trolley	1 no
31.	Engine cranker 12v/24v, upto 500 amps to start engine	1 no
32.	Assembly of working model of wiper along with wind sheild	02 Nos.
33.	Wiper motor assembly	2 nos.
34.	Car stereo	1 no.

TRADE: MECHANIC TRACTOR
LIST OF TOOLS & EQUIPMENT
Second Semester

A. TRAINEESTOOLKIT FOR 20 TRAINEES +1 INSTRUCTOR

S No.	Name of Items	Quantity
1.	Chisel flat 20 mm x 150 mm.	5 Nos.
2.	Chisel half round 9 mm.	5 Nos.
3.	Chisel cross cut 20cm	5 Nos.
4.	Cleaning Tray 45x30 cm	10 Nos.
5.	Drift punch copper 15 cm	5 Nos.
6.	Feeler Gauge 26 blade	5 Nos.
7.	Gauge (plastic) Consumable	5 Nos.
8.	File flat bastard 30 cm.	5 Nos.
9.	File flat second cut 20 cm.	5 Nos.
10.	File half-round second cut 20 cm	5 Nos.
11.	File Round second cut 30 cm	5 Nos.
12.	File square second cut 20 cm.	5 Nos.
13.	File triangular second cut 15 cm.	5 Nos.
14.	Hacksaw frame adjustable for 30 cm blades	5 Nos.
15.	Hammer ball peen 0.5/ 0.75 kg.	5 Nos. each
16.	Hammer copper 1 kg. with handle.	5 Nos.
17.	Hammer plastic 0.25 kgs. with handle.	5 Nos.
18.	Hammer, Planishing.	2 Nos.
19.	Hollow punch set of seven pieces 6 mm to 15 mm	2Nos.
20.	Inspection lamp with guard and wandering lead of 50 ft. length	5 Nos.
21.	Mallet (Wooden/plastic)	5 Nos.
22.	Oil can 0.25/ 0.5 liter capacity	Two each
23.	Philips screw driver type set of 5 pieces (100 mm to 300 mm)	5 sets
24.	Plier combination 15 cm.	5 Nos.
25.	Pliers Circlip flat nose internal and external type 20 cm	5 Nos.
26.	Pliers Circlip long nose internal and external type 15 cm	5 Nos. each
27.	Pliers Circlip long nose internal and external type 20 cm	5 Nos. each
28.	Pliers side cutting 15 cm	5 Nos.
29.	Prick punch 15 cm.	5 Nos.
30.	Scraper, bearing.	5 Nos.
31.	Scraper, flat 25 cm handled.	5 Nos.
32.	Scraper, half round 25 cm.	5 Nos.

SPECIAL TOOLS

1.	Allen key set of 12 pieces (2 mm to 14 mm)	2set
2.	Blow lamp (LPG) with 5 Kg. cylinder.	One set
3.	Cylinder ridge remover/ cutter	One
4.	Dial test indicator to read 0.25 mm.	One
5.	Drill hand Pneumatic / Elect. Type.	One each
6.	Ex-tractor stud (EZYOUT TYPE)	Two
7.	Fire buckets with stand	4 Nos.
8.	Fire extinguisher Cap. 4.5 kgs. (CO2) type	2 Nos.
9.	Grease gun, pressure type.	One
10.	Horses and wheel choke	4 each.
11.	Hydraulic pump, ram & distributor	One each
12.	Pipe wrench 350 mm /450 mm	One each
13.	Puller mechanical/ hydraulic powered with attachments.	One each
14.	Pullers for steering wheel universal type	One
15.	Pullers set for bearing & bushes universal type	2 Nos.
16.	Punch letter set.	One set
17.	Snip bend/ straight.	2Nos. each
18.	Soldering iron 120 watt.	2 Nos.
19.	Soldering iron copper 280 gm (fire heated).	2 Nos.
20.	Spanner socket pneumatic / Power tool kit	One
21.	Spanner, T-flax for screwing up and screwing in inaccessible position.	One
22.	Spanners adjustable 20 cm.	2 Nos.
23.	Spare parts of tractor	As desire
24.	Stone, carburandum 15 x 5 x 4 cm smooth and rough. (consumable)	One
25.	Surface plate 60 x 60 cm.	One
26.	Techno meter (digital)	One
27.	Torque wrench (0 to 40 kg. meter)	One

General Installation/ machineries for 2nd Semester

1.	Air Compressor capacity 12 c.ft. piston type with pressure gauge (for insulating of tubes etc	One
2.	Chain and pulley block 3000 kg. Capacity electric type	One
3.	Disk brake with caliper assembly fitted on stand	Two
4.	Drilling machine electric pillar type up to 20 mm dia.	One
5.	Dynamo meter for performance testing of engine.	One
6.	Electric Arc welding Set portable	One
7.	Front axle with hub fitted on stand	One
8.	Grinder bench with two 18 cm wheels with hand grinding attachment	One
9.	Grinder electric pedestal with two 30 cm. wheel	One
10.	Hydraulic jack with trolley capacity 3 Ton	One
11.	Injector testing set (Hand tester)	One

12.	Lifting jack screw type 3050 kg.	One
13.	Puncture machine.	One
14.	Rear axle assembly-gear box steering box	One
15.	Screw jack one tone, capacity double lift	2 Nos.
16.	Steering gear box hydraulic type mounted on stand	One
17.	Steering gear box with drop arm and push rod Mechanical stand	One
18.	Valve re-facing machine.	One
19.	Washing unit/Car Washer	One
20.	Wheel alignment gauge	One
21.	Tractor 35 to 45 HP with A/C	One
22.	Tractor with power steering 60 HP Fitted With all accessories	One
23.	Cultivator 9 tine spring loaded.	One
24.	Disc harrow Trailing type	One
25.	Disc plough 2-furrow with scrapers.	One
26.	Equipment carrier	One
27.	Mould Board plough	One
28.	Seed cum fertilizer Drill	One
29.	Bench vices 12.5cm Jaw	04 Nos.
30.	Work bench 295 X 120 X 80 cm	2 Nos.
31.	Induction stove – 230 V	01 No.
32.	Beaker (consumable)	01 No.
33.	Thermometer. Range Max 150 deg C	01 No.

FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS BOTH SEMESTER

01	Class Room Chairs (armless) / Dual desk may also be allowed	25 nos.
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	25 nos.
03	Chair for Trainer (armed) movable	1no.
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	1no.
05	LCD / LED Projector	1no.
06	Multimedia Computer System with all accessories with UPS (0.5 KVA)	01 set
07	Computer & printer Table	Each 01 No.
08	White Board (6ft X 4 ft.)	1no.
09	LCD Projector Screen	1no.
10	Air Conditioner 2 ton	02 nos.
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Laser Printer with scanner	01 no
14	Steel Cupboard with 8 pigeon lockers	3 nos.
16	Steel cupboard 180x90x45cm	2 nos.
17	Steel cupboard 120x60x45cm	2 nos.
18	Multi drawer tool rack trolley with minimum 4 drawers and 20 tool	04 nos.

	capacity.	
19	First aid box.	1no.
20	Document Camera / Visualiser	01no.
21	Smart Board / Inter Active Board	01no.
22	Magnetic white board	01 No.
23	Video Camera with stand	01no.
24	Vacuum Cleaner	01 No.