GENERAL INFORMATION

1. Name of the Trade : Mechanic Tractor
2. N.C.O. Code No. : 845, 20
3. Entry Qualification : i) Essential : Should have passed 8th class examination under 10+2 system of education(or its equivalent.

ii) Desirable : Passed 10th class examination under 10+2 system of education with Science (with Physics and Chemistry as one of the subjects) or its equivalent.

4. Duration of Craftsman Training. : 1 Year
5. 5. Duration of Apprentice : 3 year including 1 year Basic Training. Ship Training.
6. Rebate for Ex- I.T.I. Trainees. : i) Full ii) 1 year (farm Mechanic)
7. Ratio of Apprentice to Workers. : 1 :3

Week No.	Practical	Theoretical
1.	2.	3.
1.	INDUCTION TRAINING : Familiarisation with the Institute- importance of trade training. Introduction to machinery used in the trade –type of work done by trainees in the Institute type of jobs done by the trainees in the trade introduction to safety equipment's and their uses etc.	Importance of safety and general precautions observed in the Section. Fire Precautions for different types of fires- importance of the trade in the development of the Industrial Economy of the Country –What is related instructions on the subject to be tough achievement to be made. Elementary First Aid. Recreational , Medical facilities and extra –curricular activities at the Institutes (All necessary guidance to be provide to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures etc.
2	Use of Fitter's hand tools care	Safety precautions , description of Fitter's hand tools , chisels. Hammers, hacksaw, files,

	and maintenance of tools , filing practice.	drill,, taps, dies and surface plate etc. Care and maintenance of tools. Workshop Calculation & science : Applied workshop problems involving multiplication and division, common fractions addition , subtraction, multiplication and division application of fraction of shop problems. Engg. Drawing : Free hand sketching of straight lines , rectangles , squares , circles polygons etc.
3.	Filling –Filling to line marking off – use of center punch, dividers , calipers, steel rule etc. Filling true and square.	Marking out, chipping and sawing hacksaw blades and its selections , causes of breakage of blades . Filing classification of files. Different filing operations. Use of measuring instruments., vernier caliper etc. Workshop Calculations & Science : Properties and uses of cast iron , wrought iron. Plain carbon steel, high speed steel & alloy steel. Egg. Drawing : Free hand sketching with dimension and proportionate sketching.
4.	Chipping , grinding of chisels hacksawing.	Marking out for drilling Ratchet brace –its manipulation and use . Hand drill brief description, operation & use . Flat and twist drills cutting angles of chisels. Workshop Calculation & Science : Applied workshop problems as in week No.2. Egg. Drawing : Reading of simple Blue print.
5.	Simple drilling . Use of taps and dies. Use of hand reamers.	Type of reamers the manipulation and uses. Taps & dies their uses. Workshop Calculation & Science : Properties and uses of copper zinc , lead , tin aluminum., brass, bronze, solder, bearing metals, timber and rubber Engg. Drawing : Reading of simple Blue Print.
6.	Introduction to centre lathe , setting up work between centers. Use of side cutting tools. Parallel turning and stipped turning.	Safety precautions in the ;use of lathe-essential parts, their description ;and functions. Workshop Calculation and Science: Deciamal-adddition, subtraction multiplication, conversion of decimals to common fractions-shop problems. Engg. Drawing: Free hand sketching with dimension of simple

		solid such as cubes, rectangular;, blocks, cylinders etc.
7.	Joining of metals by soft soldering. Simple marking out of metals by gas and electric welding.	Sheet metal worker's common hand tools, their names and description. Safety precautions, simple forging process, simple heat treatment to cutting tools. Description of simple soldering and brazing fluxes used on common joints. Workshop Calculation & Science : Brief description of manufacturing process of pig iron and cast iron. Engg. Drawing : Sketching of views of simple solid bodies as week no. 6 above when viewed perpendicular to their surfaces and axis.
8.	Simple sheet metal work cutting, bending & simple fold joints.	Sheet and wire –gauges. The blow lamp –its uses and pie fitting s Workshop Calculation & Science : Reduction of common fractions to decimal fractions – shop problems . Engg. Drawing : Sketching of views of simple solid bodies as mentioned when viewed perpendicular to their surfaces and axis.
9.	Pipe Bending and appealing, fitting of nipples & unions by soldering , brazing by using blow lamp.	Description giving composition , manufacture of various common engineering materials like cast iron, mild steel, brass, bronze, copper & aluminum. Workshop Calculation & Science : Brief description of manufacturing process of steel, copper and aluminum. Engg. Drawing : Sketching of views of simple solid bodies as mentioned above when viewed perpendicular to their surfaces and axis.
10.	General cleaning, oiling and greasing of tractors. Checking and tightening of bolts and nuts. Function of different parts of the tractor.	Development of mechanical framing . Use of bulldozers and tractors , various tractor assemblies and their functions. Workshop Calculation & Science : Metric system weight and measurements units conversion factors. Engg. Drawing : Free hand sketching of nuts & bolts with dimensions from samples.
11.	Checking engines auxiliaries, fuel , oil and cooling	Description of various types of tractors in general use their advantages and disadvantages . chasis frame of a tractor constructional

	system . practice in starting , running and stepping engine.	details . Reinforcement of engine mounting on chasis. Precautions observed while starting, running and stopping the tractors. Workshop Cal. & Science : Meaning of tenacity elasticity, malleability, brittleness, hardness, compressibility & ductility and their examples. Engg. Drawing : Free hand sketching of rivets and washers with dimension from samples.
12.	Removing wheels from tractors; checking tyres for wear and tubes for leaks. Repairing puncture.	Wheel tyre and tubes solid and pneumatic tyres. Various and size, description and use fitting of tyres & tubes importance of inflating tyres to correct pressure. Repair and maintenance of tyres and tubes. Workshop Cal. & Science : Shop's problems on metric system of weight and measurement. Engg. Drawing : Free hand sketching of key and screw threads with dimension from samples.
13	Practice on refitting tyres and tubes and wheels and inflating the correct pressure.	Wheel tyres and tubes solid and pneumatic tyres various types and sizes description and use. Fitting of tyres and types inflating tyre to correct pressure. Repair and maintenance of tractor wheels . Workshop Cal. & Science : Effects of alloying elements on properties of cast iron & steel . Engg. Drawing ; Free hand sketching of key and screw threads with dimension from samples .
14.	Fitting wheels on tractors tightening wheel holding nuts in correct sequence wheel track setting front and rear .	Fits , limit tolerance and allowances. Workshop Cal & Science : Square root perfect square. The square of a whole number and a decimal. Engg. Drawing : Explanation of simple orthographic projection-Ist.
15.	Overhauling steering assembly including inspection, repair /replacement of parts front axles, spindles.	Steering description, construction 7 function of steering gear unit including wheel, rod, ball and socket joints etc. Their movement and adjustment description and mechanism of foot steerage pedals as incorporated in tractors. Workshop Cal. & Science : Mass unit of mass force absolute unit of force.

	Reassembling steering assemblying and testing for correct functioning.	The weight of a body unit of weight shop problem. Engg. Drawing : Explanation of simple orthographic projection 3rd angle.
16.	Overhauling steering asssembly including inspection repair / replacement of parts front axles, spindles. Spindle Reassembling steering assembly and testing for correct functioning.	Steering description. Construction and function of steering gear unit including wheel rod worm quadrant arm link tie rod, bell and socket joints etc. Their movement and adjustment, description and mechanism foot steerage pedals as incorporated in tractors. Workshop Cal & Science : Percentage and its application shop problems. Engg. Drawing : Views of simple hollow and solid bodies with dimension. Use of different types of lines and symbols for drawing.
17.	Dismantling brake system pedal mechanism. Cleaning, inspecting and repairing parts as necessary and reassemble. Testing for correct functioning.	Description and working principle of the steering system on crawler type tractors. Steering by brake steering –clutch its description, function, adjustment and maintenance. Workshop Cal. & Science : C.G.S.& F.P.S. system of units of force, weight etc. Their conversion problems. Engg. Drawing : Views of simple hollow and solid bodies with dimensions .Use of different types of lines and symbols for drawings.
18.	Overhauling steering clutches and brakes of crawler type tractors including dismantling, cleaning, checking and refitting, testing for correct functioning.	Description and working principle of the steering system on crawler type tractors. Steering by clutch and brake. Steering clutch its description, function adjustment and maintenance. Workshop Cal. & Science : Ratio and proportion shop problems. Engg. Drawing : Views of simple hollow and solid bodies with dimensions use of different type of lines and symbols for drawings.
19.	Overhauling Brakes including cleaning and inspection of all components, relinning Shoes	Brakes types used on tractors mechanical hand brake for parking its fitting and adjustment. Description working principle and function of hydraulic brakes. Function of master & auxiliary cylinder. Bleading & adjustment of brakes serve system. Layout and work

	setting and actuating shoe clearance angle. Inspecting spring of both shoe and lever Inspecting and setting hydraulic main brake including replacement of washer & oil seals, overhauling serve mechanism (as applicable) inspecting piston and valves, bleeding and adjustment of brakes. Fault tracing and remedy.	principle brake, shoes and drums their fitting . Knowledge of disc type brakes. Workshop Cal & Science: Work-unit of work energy power unit of power applied applied problems. Engg. Drawing : Views of simple hollow and solid bodies with dimension. Use of different types of liner and symbols for drawings.
20.	Overhauling brakes including cleaning and inspection of all components; Relining shoes, setting and actuating shoe clearance angle. Inspecting spring of both shoe and lever. Inspecting & setting hydraulic main brake including replacement of washer and oil seals. Overhauling serve mechanism (As applicable) Inserting piston and valves. Bleeding and adjustment of brakes. Fault	Brakes types used on tractors mechanical hand brake for parking, its fitting and adjustment. Description working principle & function of hydraulic brakes function of master & auxiliary cylinder. Bleeding and adjustment of brakes serve system, layout and work principle –brake, shoes and drums, their fitting, knowledge of disc type brakes. Workshop Cal. Science : Simple problems on work, energy and power. Engg. Drawing : Simple isometric drawings isometric views of simple objects such as square, rectangles, cubes, rectangular blocks etc.

	tracing and remedy.	
21.	--------do-------	Brakes types used on tractor, mechanical hand brake for parking its fitting and adjustment. Description working principle and function of hydraulic brakes. Function of master and auxiliary cylinders, brake fluid , filling of master cylinder Bleeding and adjustment of brakes serve system, layout and working principle brake shoes and drums and their fitting. Workshop Cal. & Science : Simple problems on work energy and power . Engg. Drawing : Simple isometric drawings isometric views of simple objects such as square, rectangles, cubes, rectangular blocks etc.
22.	Stripping unserviceable engine, cleaning & inspection.	Diesel engines both mobile and stationery types principle of working of diesel semi diesel, kerosene, petrol and gas engine. Two and four stroke engines, compression ignition and spark ignition engines. Single and multi Cylinder engines. Types of engines fitted on tractors : Various methods of starting on engine. Workshop Cal. & Science : Meaning of friction examples meaning of center gravity examples specific gravity examples. Engg. Drawing : Simple isometric drawing isometric views of simple objects such as square, rectangles, cubes, rectangular blocks etc.
23.	Stripping unserviceable engine, cleaning and inspection.	Diesel engines – both mobile and stationery types; principle of working of diesel, semi-diesel, kerosene, petrol and gas engine. Two and four stroke engines, compression ignition and spark ignition engine Single and multi-cylinder engines. Types of engines fitted on tractors. Various methods of starting on engine.

		Workshop Cal. & Science : Mensuration –areas of rectangles, squares, triangles, circles, regular polygons etc. Calculation of areas. **Engg. Drawing** : Simple isometric drawings isometric views of simple objects such as squares. Rectangles, cubes, rectangular blocks etc.
24.	Cylinder head overhaul pressure testing phasing decarbonising engines, facing valves and valve seats and grinding valves of seats fitting valves guides, fitting springs, caps, clotters and fitting of valve seats inserts. Use of torque wrench, correct sequence of tightening cylinder heat bolts.	Description and function of engine assemblies such as cylinder block crank case , crank shaft –connecting rod, pistons, carnkshaft tapact and valves, regulator and governor etc. Workshop Cal & Science : Simple problems straight and ball –cranked levers. Engg. Drawing : Use of drawing instruments, T-square and drawing board.
25.	Inspecting and changing main bearing and big and bearings. Reconditioning of water pump . Overhauling of fuel and oil pumps.	Engine cooling methods- air and water cooling , radiator, water pump, thermostatics purpose, common troubles and remedy, maintenance of cooling system. Workshop cal. & Science : Calculation of volume and weight of simple solid bodies such ;as cubes , square and hexagonal prisms- prisms-shop problems. Engg. Drawing: Construction of simple figures and solids as mentioned above with dimensions and titles. Use of different types of scales in ;inches and millimeters.
26..	--------do------	Different types of lubrication systems in vehicles description of components in the system-oil filters types and uses. Lubrication oil and its properties.

		Workshop Cal. & Science : Heats and temperature therametric scale – Fahrenheit and centigrade scales and their conversion. Name and use of temperature measuring instruments normally used in workshops. Engg. Drawing: Construction of simple figures and solids as mentioned in week No. 24 with dimension and use of different types of scale in inches and millimeter
27	Inspecting piston and gudgeon pin etc. And fitting new rings, connecting rod. Alignment.	Diagnosing the overhauling requirement by measuring bore, ring size and wear etc.
		Workshop Cal. & Science Heat and temperature thermometric scale, Fahrenheit and certrigrade scales and their conversion name and use of temperature measuring instruments normally used in workshops. Engg. Drawing : Lettering number and alphabets.
28	Inspecting piston and gudgeon pin etc. And fitting new rings.	Diagnosing the overhauling reqirement by measuring bore, ring size and wear etc. Workshop Cal Science : Shop problems on determination of volume and weight of simple solid bodies. Engg. Drawing : Lettering number and alphabets.
29.	Reassembling engine, dismantling,	Torque wrench and its use in tightening cylinder head bolts to specified pressure according to manufacturer's recommendation.

	checking, cleaning and resetting injectors, engine testing for correct functioning.	Workshop Cal & Science : Meaning of stress, strain modules of elasticity and ultimate strength examples. Engg. Drawing : Free hand isometric sketching of simple objects with dimensions.
30.	-----do----	Fuel system types and grades of fuel used properties of fuel feed assembly and fitting of fuel tank, fuel pipes, unions adapters, filters & fuel pump. Description and function of non-return and pressure relief valves. Setting of relief to correct pressure. Air fuel ratio fuel injection – solid and air blast. Fuel injector timing and its regulation. Function and regulation of governer. Workshop Cal. & Science : Geometry –properties of lines, angles, triangles and circles. Engg. Drawing : Free hand isometric sketching of simple objects with dimensions.
31 & 32	Complete overhauling serviceable engines and testing for correct functioning. Checking oil pressure on different R.P.M. of the engine.	Fuel system -types and grades of fuel used properties of fuel- fuel feed. Assembly & fitting of fuel tank, fuel pipes, unions, adaptors, filters and fuel pump. Description and function of non return and pressure relief valve. Setting of relief valve to correct pressure. Air fuel ratio, fuel injection solid and air blast fuel injection timing and its regulation of governer. Workshop Cal. Science : Factors of safety examples. Different types of stresses examples. Engg. Drawing : Free hand sketching isometric of simple objects with dimensions. Fuel system types and grades of fuel used properties of fuel fuel feed. Assembly & fitting of fuel tank, fuel pipes, unions adaptors, filters and fuel pumps. Description and function of

		non return of pressure relief valves. Setting of relief valve to correct pressure. Air fuel ratio fuel injection timing & its regulation. Function and regulation of governer. Workshop Cal. Science : Effect of forces on material in such application as extending, bending and shearing. Engg. Drawing : Free hand Sketching of plain ;and elevation of simple objects like hexagonal bar, square bar, circular bar, tapered bar, hollow bars etc.
33.	Complete overhauling serviceable engines and testing for correct functioning.	Fuel system types & grades of fuel used properties of fuel feed, assembly and fitting of fuel pipes unions adaptors, filters and fuel pump. Description and function of non-return and pressure relief valve to correct pressure. Air fuel ratio, fuel injection –solid and air blast, fuel injection timing and its regulation. Function and regulation of governer. Workshop cal. Science : Technical advantage velocity ratio and applied problems. Engg. Drawing : Free hand sketching of plain and elevation of simple objects like hexagonal bar, square bar, circular, tapered bar, hollow bar etc.
34.	Complete overhauling serviceable engines and testing for correct functioning.	Fuel system types and grades of fuel used properties of fuel. Fuel feed Assembly and fitting of fuel pipes , unions adaptors filter and fuel pump. Description and function of non-return and pressure relief valve to correct pressure . Air fuel ratio . fuel injection solid and air blast timing and its regulation of governer. Workshop Cal. & science : Technical advantage velocity ratio and applied problems. Engg. Drawing : Free hand sketching of plain and elevation of

		simple objects like hexagonal bar , circular bar, hollow bars etc.
35.	Overhauling transmission assembly including master clutch , gear box, charge speed mechanism, selector fork, idler gears, slide spindle drive gear, train differential, final drive, torque convertor etc. Checking, repairing, replacing parts (as necessary). Testing for correct functioning.	Transmission system in different types of tractors. Description and function of unit assemblies such as fly wheel master clutch gearbox, change speed mechanism , selector forks, drive gear chain differential axle and wheel drum etc. Comparison between transmission system of a Motor vehicle and tractor. Procedure for dismantling and assembling the torque convertor. Workshop Cal. & Science : Useful work a machine-mechanical efficiency of a machine problems. Engg. Drawing : Views of simple solid and hollow bodies cut by section plane.
36.	Overhauling transmission assembly including master clutch, gear box, change speed mechanism, selector fork, Idler gears, slide spindle , drive gear, train differential , final drive, torque convertor etc. Checking , repairing, replacing parts (as necessary). Testing for correct functioning.	Transmission system in different types of tractors Description and function of unit assembly such fly wheel master clutches gear box change speed mechanism selector forks, drive gear chain differential axle & wheel drum etc. Comparison between transmission systems of a motor vehicle and a tractor. Procedure for dismantling and assembling the torque convertor. Workshop Cal. Science : Useful work of a machine –mechanical efficienncy of a machine problems. Engg. Drawing : Views of simple solid and hollow bodies cut by section plane.
37.	----do---	Transmission system in different types of tractors. Description and function of unit assemblies such as wheel ,master clutch gear box, change speed mechanism, selector forks drive gear chain differential, axle and wheel drum etc. Comparison between transmission

		system of a motor vehicle and a tractor. Procedure for dismantling and assembling the torque convertor. Workshop Cal. Science : Machines basic principles, determination of velocity ratio mechanical advantage and efficiency. Engg. Drawing : Reading of simple Blue print.
38.	Tractor hydraulics and power take off mechanism. Hydraulic jacks – couplings.	Use of hydraulics different types of hydraulics and its mechanism, use of power take off for belt pulleys and other application . Types of coupling and their uses. Description of Hydraulic jack. Workshop cal & Science: Machines basic principle , determination of velocity ratio, mechanical advantage and efficiency. Engg. Drawing : Exercise on Blue print Reading.
39.	Tractor hydraulics and power take off mechanism. Hydraulic jack couplings.	Use of hydraulics different types of hyrudrics and its mechanism, use of power take off for belt pulleys and other application. Types of couplings and their uses. Description of hydraulic jacks. Workshop Cal. Science : Logarithm use of logarithmic tables for multiplication and division. Engg. Drawing : Exercises on Blue print Reading.
40.	Overhauling track driving assembly including track frame , track roller, carrier roller, idler, track recoil unit etc. Of crawler tractor. Testing for correct functioning.	Description working principle and use of crawler type tractors. Driving mechanism of the tractors. Description, construction and function of track frame, track roller, cartier, roller, maintenance of track assembly. Starting a crawler type tractor, engine with the help of auxiliary starter engine unit precautions to be taken Care & maintenance of engines. Workshop Cal. Science :

		Determination of efficiency of simple machines like winch, pulley blocks, wheel and compound axles. Engg. Drawing : Exercises on Blue print Reading .
41.	---do---	Description, working principle and use of crawler type tractors. Driving mechanism of the tracks. Description of construction and function of track frame, track roller, carrier roller, idler track recoil units etc. Care and maintenance of track assembly. Starting a crawler type tractor engine with the help of auxiliary starter engine unit. Precautions to be taken. Care & maintenance of engines. Workshop cal. & Science : Further practice in the use of logarithmic tables. Engg. Drawing : Exercises on Blue print Readings.
42.	Servicing, storage Batteries electrical and starter systems.	Electrical equipment lighting arrangements in tractors (as applicable) including storing battery, dynamo, regulator switch and spotlights both front and rear Maintenance of battery. Workshop Cal. & Science : Electricity and its use. Electric current positive terminals. Use of Switches and fuses conductors and insulators. Engg. Drawing : Free hand sketching of simple objects related to the trade & preparation of simple drawings and sketches.
43.	Servicing storage Betteries starter generation and regulator systems.	Electrical equipment lighting arrangement in tractors (as Applicable) Including storage battery, dynamo, regulator switch and spot-lights both front and rear. Maintenance of battery. Workshop Cal. Science : Ohm’s Law. Measuring current, voltages

		resistance in a circuit. Engg. Drawing : Free hand sketching of simple objects related to the trade and preparation of simple working drawings and sketches.
44.	Tracing lighting Circuit and fault rectification.	Description of lighting circuit. Setting of regulators for correct charging rate Fault finding in electrical system. Workshop Cal .& Science Different forms of energy heat mechanical and electrical examples. Conversion from one another. Engg. Drawing : Further practice in Blue print Reading and exercises related to the trade.
45.	Checking tractor Implements such as discs . ploughs, Cultivators, P. T. O. Units etc. For serviceability before use and lubricating them as required . Fitting them to tractors And adjusting them for correct functioning.	Tractor equipment description and function of off set and tandem disc. Harrow seed drill ploughs of different types etc. Fitting and fixing of equipment. Danger in over leading and incorrect hitching of ploughs. Average life of plough shares and disc. Workshop Cal. & Science : Generation of electricity AC & DC generators and motors charging circuit in a vehicle. Engg. Drawing : Further practice in Blue print Reading exercise related to the trade.
46.	Checking tractor implements as discs, ploughs cultivators, P.I.O., units etc. For serviceability before use and lubricating them as required. Fitting them to tractors and adjusting them for correct	Tractor equipment description and function of off set and tandem disc. Harrow speed drill ploughs of different types etc. Fitting and fixing of equipment danger in over loading and incorrect hitching of ploughs. Average life of plough shares and discs. Workshop Cal & Science Plotting and reading of simple graphs. Engg. Drawing : Further practice in Blue print Reading and

	functioning.	exercises related to the trade.
`47.	Visit to Tractor service stations and observing use of servicing equipments.	Short description of various equipment used by service station. Workshop Cal. & Science : Meaning of Horse Power and Brake horse power . Simple problems on work, energy & power rating . Engg. Drawing : Free hand sketching of simple objects related to the trade preparation of simple objections working drawing from the sketches.
48.	Exercise in driving a Tractor with different implements.	Description & function of Tractor implements & accessories. Draw bar importance offsetting draw bar to correct height use of Hydraulic lift & belly pulley mounted on tractors. Maintenance of tractor accessories. Driving servicing & maintenance of tractor Motor Vehicle act. Driving Rules. Workshop Cal. & Science : Calculation of volume and weight of simple solid bodies by using logarithm. Engg. Drawing : Further practice in Blue print Reading & exercises related to the trade.
49 & 50	Trouble shooting in tractor driving & testing of the performance of a tractor & tractor driving with implement.	
51. & 52.	Revision and Final assessment.	

FINAL ACHIEVEMENTS TO BE OBTAINED BY THE TRAINEE AFTER COMPLETION OF 52 WEEKS TRAINIG

TRADE COMPETENCE:

1. 1. To use measuring tools and instruments :-

Calipers, compass, try square, feeler gauges, dial test indictor, vernier, micrometer, pressure gauge, vacuum gauge etc.

2. 2. To handling machines and their accessories such as simple drilling machine, pedestal grinding power
   Press, lathe, air compressor etc.
3. 3 To perform shop operation :-
   Major assemblies of an engine, gear box, differential , steering , brakes, cooling system air induction system , hydurlic system fuel system lubrication cleaning of the injector electrical system etc.
4. 4 Drilling tractors and handling different controls while using implements.
5. 5 Knowledge of oils and lubricants used in the maintenance of tractors and implements.
6. 6 Understanding and solving problems related to the trade
7. 7 To know, read and understand :-
   Simple Blue print Reading and making of free hand sketching, use of reference tables, purpose of safety precaution and regulations, use of fire extinguisher driving precaution read Rules, proper maintenance of tractor, bull-dozer and tractor implements and accessories.