

Approved Syllabus of Mechanic Tractor TT-I

(CRAFT INSTRUCTOR COURSE) Duration 3 Months

W N	Theoretical	Practical
1	<p>Importance of safety and general precautions to be observed in the Section./ Fire-precautions for different types of fires-importance of the trade in the development of Industrial Economy of the Country-What is related instructions on the subject to be taught, achievement to be made. Elementary First Aid.</p>	<p>Familiarisation with the Institute importance of trade training. Trade, introduction to safety equipments and their uses etc. Use of Fitter's hand tools, care and maintenance of tools, etc.</p>
2	<p><u>Types of tractors :</u> Description of various types of tractors in general. Chassis frame of tractor-constructional details. Reinforcement of engine mountings on chassis. Wheel tyres and tubes-solid and pneumatic tyres-various types and sizes, tread description and use. Fitting of tyres and tubes, importance of in-Flatting tyres to correct pressure. Repair and maintenance of tyres and tubes. Balancing of Tractor wheels. Importance of blasting. Uses of Fits, limits, tolerance and allowances.</p>	<p>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</p>
3	<p><u>Steering System(Mechanical) :</u> 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).</p>	<p>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.</p>
4	<p><u>Steering System(Hydraulic):</u> 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 Visit to tractor industry</p>	<p>Layout of steering system of Hydraulic steering System. Checking/Inspection of Hydraulic pump, steering distributor & connections. Reassembling steering assembly and Test for correct function.</p>
5	<p><u>Brakes:</u> 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 & remedies. Care & maintenance.</p>	<p>Overhauling of mechanical (shoe/ disc) brakes. Practice of relining of brake shoes. Inspecting and setting parking brakes. Adjusting brake paddle play. Fault tracing and remedy.</p>

6	<p><u>Hydraulic brake :</u> 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. Lay-out and working-principle of servo brakes. Description & advantages of special feature ABS with EBD(electronic brake distribution) system. Brake testing, efficiency of brakes, braking distance & weight transfer during braking. Common troubles & remedies. Care & maintenance. Precautions related to the brakes.</p>	<p>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. Overhauling servo mechanism (as applicable). Bleeding and adjustment of hydraulic brakes. Fault tracing and remedy. Field testing of hydraulic brakes.</p>
7	<p><u>Transmission system, Clutch:</u> Transmission system in different types of tractors. Description and function of different types of clutches such as dog, frictional (dry & wet) & fluid fly clutches. Functional parts of frictional clutch such as flywheel, clutch plate, pressure plate, c/release bearing, paddle & linkages. Advantages & working of dual plate clutch. Methods of fixing of clutch lining & material used for lining. Different types of clutch actuation mechanism. Common troubles & remedies. Care & maintenance.</p>	<p>Dismantling Tractor from clutch housing. Removing clutch assembly i.e. pressure plate, clutch plate, flywheel, pilot & c/release bearing. Inspecting, repairing and replacing parts of clutch (as necessary). Refitting of pilot bearing. Relining of clutch plate. Facing of flywheel & pressure plate. Re-assembling of flywheel, clutch plate, pressure plate & c/release bearing. Adjust pressure plate fingers. Re-assembling of clutch housing. Adjusting clutch paddle play. Testing for correct functioning. Fault tracing and remedy.</p>
8	<p><u>Gear box :</u> Purpose & types of gear box. Description and function of gear box used in tractors. Lay-out of four speed gear box. Constructional details of gear box. Use of sincro-mesh unit. Function & working of torque converter. 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>	<p>Dismantling gear box & torque converter. Checking, repairing and replacing parts (as necessary), Primary shaft, gear shift mechanism, selector fork, idler gears & shafts, slide spindle, drive gear chain. Reassembling the gear box. Testing for correct functioning.</p>
9	<p><u>Differential & final drive:</u> Function of differential & final drive of tractors. Description and function of unit assemblies such as, differential, axle and final drive, wheel hub etc. Function & working PTO. Types of PTO drives. (propeller shaft & Belly Pulley system Function & working of differential lock. Use of slip joint & universal joint. Adjustments such as backlash, preloading etc. Common troubles and their remedies</p>	<p>Overhauling, differential, final drive etc. Checking, repairing and replacing parts (as necessary). Checking & adjusting backlash. Setting of differential lock/ PTO shaft. Checking oil leakage. Field operation of PTO shaft/ belt pulley with different agricultural machinery.</p>
10	<p><u>Hydraulic system:</u> 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 etc. Function & working of auxiliary hydraulic system Description of hydraulic jack. Adjustments and maintenance procedure. Visit to tractor industry.</p>	<p>Servicing/ overhauling of hydraulic pump. 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.</p>

11	<p><u>Tractor driving:</u> 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. Maintenance & servicing procedure of tractor in terms of hours of run or mileage. Motor Vehicle Act, Driving Rules.</p>	<p>Exercise in driving a tractor. Trouble shooting in tractor driving and testing the performance of a tractor. Tractor driving with different implements. Routine checkup of tractor and maintenance of tractor.</p>
12	<p><u>Field operation:</u> 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</p>	<p>Checking tractor implements such as ploughs, cultivators, harrows, seed drill for serviceability before use and lubricating them as required. Fitting them to tractors and adjusting them for correct functioning. Field operation of agriculture implements.</p>
13	Revision and final Trade Test	

Approved syllabus of Mechanic Tractor TT-2
(CRAFT INSTRUCTOR COURSE) Duration 3 Months

W N	Trade theory	Trade Practical
1.	<p>Review of TT-I module & 5S system. Concept of 5S & 7 QC tools, time management as employed for quality circle. Importance of healthy environment. Use of computers. Its Features & applications. Physical & logical concept of data.</p>	<p>Revision of TT-I Precautions to be observed in the section. Write down the details of 5S needed for house keeping mech. Tractor workshop. Familiarization with computer, General & special purpose computer. Practice of data typing & file making.</p>
2	<p><u>Diesel engines:</u> Diesel engines-both mobile and stationery types, principles of working of diesel, kerosene, petrol and LPG, CNG gas engine. Working principles of Two and four stroke engines, compression ignition and spark ignition engine-single and multi-cylinder engines. Selection and specification of engine for various applications such as automobile, Gen set, marine, Diesel Loco etc. Types of engines required for tractors. Various methods of starting an engine.(Handle, rope, starter motor, auxiliary engine, compressed air etc.)</p>	<p>Exercises involving use of wrenches (including torque wrench) pliers, screw drivers and pullers. Cleaning and Lubrication of engine parts. Location & identification of engine components. Demonstration of models/cut section of 4 stroke and 2 stroke engines. Practice in starting, running and stopping engine. Practice on unserviceable diesel engine, removing jammed nuts and broken studs reconditioning and damaged stud hole, fitting with oversized studs.</p>
3&4	<p><u>Engine parts:</u> Description, function and Constructional details of engine assemblies such as cylinder block, crank case, crank shaft connecting rod, pistons, camshaft tappet, and valves. Care & maintenance.</p>	<p>Stripping of engine from tractor, dismantling, cleaning & inspecting parts, including crank shafts, main bearings and big end bearings. Inspecting piston and gudgeon pin etc. Taking measurement with the precision instruments, such as cylinder bore, crank pins & main journals, for ovality, tapperness and weariness.</p>
5	<p><u>Engine friction, bearings:</u> Definition of friction, its effect and methods to reduce friction in engine. Engine bearings classification and location. Composition of bearing materials. Shell bearing and their advantages. Special bearing material for diesel engine application bearing failure & its causes. Torque wrench and its use in tightening bolts to specified torque.</p>	<p>Overhauling cylinder head, pressure testing, decarburizing, facing valves and valve seats and grinding valves on seats, fitting new valves guides, fitting springs, caps, cotters & fitting of valve seats, inserts. Use of torque wrench, correct sequence of fitting cylinder head bolts, Connecting rod alignment & fitting gudgeon pin & new rings. Changing main & CR bearings.</p>
6	<p><u>Fuel system:</u> Types & grades of fuel used, properties of fuel used. Description of fuel supply system. Importance of overflow & non-return valves used in fuel supply system. Function & constructional details of fuel injection system. Types of fuel injection pumps. Air fuel ratio, fuel injection system, solid and air blast. Fuel injection timing and its regulation. Importance of governor and their types. Working of mechanical & pneumatic governor. Importance of venturi & diaphragm. Throttle adjustments.</p>	<p>Servicing of fuel supply system. Replacement of filters, adjustments of overflow & non-return valve. Servicing & calibration of fuel injection pump. Assembly & fitting of fuel tank, fuel pipes, unions & adaptors. Bleeding of fuel supply system. Practice on acceleration adjustments for ideal & maximum speed</p>
7	<p><u>Fuel injection timing:</u> Importance of timing the pump with engine. Effects</p>	<p>Setting of fuel injection timing. Dismantle, checking & servicing of injector.</p>

	of engine timing for advanced & retired. Adjustments of engine fuel timing. Function & constructional details of fuel injector. Different types of injector. Function & working of fuel injector testing pump. Study of air intake & exhaust system. Types of supper charger.	Checking performance for missing cylinder by isolating defective injector. Checking & servicing of turbo charger. Checking & servicing of air cleaners.
8	<u>Cooling system & coolant:</u> Need of cooling in engine, general description and types of cooling system. Antifreeze and antirust solution, coolant used in engine. Layout of cooling system, functional parts such as radiator, thermostat, water pumps and temperature gauge. Purpose of thermostat valve. Common troubles and remedy, maintenance of cooling system.	Removing radiator and water pump from engine, cleaning radiator, testing of thermostat and refitting on engine. Overhauling of water pump. Adjusting fan belt tension and connecting water pump with hoses & reverse flushing cooling system of the engine.
9	<u>Lubrication & Lubricants:</u> Need for lubrication system for diesel engines. Properties & selection of Lubricants. Types of lubrication oil system and its layout. Bypass & full flow filtering arrangement in diesel engine. Functional parts such as oil pumps, oil filters, oil pressure gauge & oil coolers. Types of oil pumps & oil filters. Common troubles. Care and maintenance.	Overhauling oil pump, oil filters, oil coolers. Checking and adjusting oil pressure relief valves. Changing engine oil, repairs to oil flow pipe lines and unions. Engine servicing & Overhauling procedure in terms of hours of run or mileage. Fitting of overhauled engine on tractor and testing for correct functioning. Checking oil pressure on different RPM of the engine. Tightening of cylinder head bolts to specified torque according to manufacturer recommendation.
10	<u>Electrical equipments:</u> Introduction to common electrical terms & their units. Function of ammeter, voltmeter and multi-meter. Function & description of Lead acid battery. Common troubles and remedy. Maintenance/ storage of Lead acid battery. Description of electrical circuits. Components of ignition system. Layout of the charging circuit. Working of self starter, dynamo/ alternator and regulator. Troubles and remedy in charging system.	Tracing of electrical circuits. Methods of use the ammeter, voltmeter and multi-meter. Preparation of electrolyte. Checking of battery condition with high rate discharge volt meter & hydrometer. Checking & servicing of self starter & dynamo/ alternator. Faults & rectification. Setting of regulator for correct charging current.
11	<u>Air Conditioning System:</u> 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 etc. Study of refrigerant/ gas used in Air Conditioning System	Servicing & maintenance of AC and gas charging. Visit to Ac workshop.
12	Visit to tractor Service station. Study of servicing equipments. Care & maintenance of servicing equipments.	Servicing/maintenance of various equipments used by a Service station. Such as air compressor, car washer, hydraulic & mechanical jack, grease gun & oil spray gun, valve refacer, injector tester, battery charger, electrical equipment test bench and tyre changer etc.
13	Revision and final Trade Test	

**LIST OF TOOLS AND EQUIPMENT
FOR THE TRADE OF MECHANIC TRACTOR**

TRAINEES TOOL KIT

S No.	Name of Items	Quantity
1	Caliper spring inside 15 cm.	5 Nos.
2	Caliper spring outside 15 cm.	5 Nos.
3	Centre punch 100 mm.	5 Nos.
4	Chisel flat 20 mm x 150 mm.	5 Nos.
5	Chisel half round 9 mm.	5 Nos.
6	Chisel cross cut 20cm	5 Nos.
7	Cleaning Tray 45x30 cm	10 Nos.
8	Drift punch copper 15 cm	5 Nos.
9	Feeler Gauge 20 blades (metric)	5 Nos.
10	Feeler Gauge (plastic)	5 Nos.
11	File flat bastard 30 cm.	5 Nos.
12	File flat second cut 20 cm.	5 Nos.
13	File half-round second cut 20 cm	5 Nos.
14	File Round second cut 30 cm	5 Nos.
15	File square second cut 20 cm.	5 Nos.
16	File triangular second cut 15 cm.	5 Nos.
17	Hacksaw frame adjustable for 30 cm blades	5 Nos.
18	Hammer ball peen 0.5/ 0.75 kg.	5 Nos. each
19	Hammer copper 1 kg. with handle.	5 Nos.
20	Hammer plastic 0.25 kgs. with handle.	5 Nos.
21	Hammer, Planishing.	2 Nos.
22	Hollow punch set of seven pieces 6 mm to 15 mm	2Nos.
23	Inspection lamp with guard and wandering lead of 50 ft. length	5 Nos.
24	Mallet (Wooden/plastic)	5 Nos.
25	Oil can 0.25/ 0.5 liter capacity	Two each
26	Philips screw driver type set of 5 pieces (100 mm to 300 mm)	5 sets
27	Plier combination 15 cm.	5 Nos.
28	Pliers Circlip flat nose internal and external type 20 cm	5 Nos.
29	Pliers Circlip long nose internal and external type 15 cm	5 Nos. each
30	Pliers Circlip long nose internal and external type 20 cm	5 Nos. each
31	Pliers side cutting 15 cm	5 Nos.
32	Prick punch 15 cm.	5 Nos.
33	Steel rule 30 cm to read inches and mm.	5 Nos.
34	Safety goggles (clear glass)	5 Nos.
35	Scraper, bearing.	5 Nos.
36	Scraper, flat 25 cm handled.	5 Nos.
37	Scraper, half round 25 cm.	5 Nos.
38	Screw driver 10 cm.	5 Nos.
39	Screw driver 30 cm.	5 Nos.
40	Screw driver-Electrician type-15 cm.	5 Nos.
41	Scriber 15 cm.	2 Nos.
42	Scriber bit with 15 cm scribing block universal	5 Nos.
43	Spanner, ring set of 12 metric size 6 to 32 mm	5set
44	Spanner, double ended set of 12 metric sizes 6 to 32 mm.	5set
45	Spanner Ring & double ended 36 to 41 mm	2 Nos. each
46	Spanner socket with speed handle, T-bar, ratchet and universal 8-32 mm.	2 set

SPECIAL TOOLS

47	Allen key set of 12 pieces (2 mm to 14 mm)	2set
48	Blow lamp (LPG) with 5 Kg. cylinder.	One set
49	Compression Tester	One
50	Cylinder bore gauge size 20 to 160 mm	One
51	Cylinder ridge remover/ cutter	One

52	Dial test indicator to read 0.25 mm.	One
53	Drill hand Pneumatic / Elect. Type.	One each
54	Ex-tractor stud (EZYOUT TYPE)	Two
55	Fire buckets with stand	4 Nos.
56	Fire extinguisher Cap. 4.5 kgs. (CO2) type	2 Nos.
57	Fuel injection pump test bench with accessories.	One
58	Fuel injection pump, pneumatic governor, RQV governor and RSV governor.	One each
59	Fuel pump ,Plunger/Electric type	One each
60	Grease gun, pressure type.	One
61	Horses and wheel choke	4 each.
62	Hydraulic pump, ram & distributor	One each
63	Micrometer inside 0-150 mm with extension rod.	One set
64	Micrometer outside 0-25 mm., 25 -50 mm,50-75 mm, 75-100 mm, 100-150 mm	One each
65	Pipe wrench 350 mm /450 mm	One each
66	Piston ring compression gauge /tester	2 Nos.
67	Piston ring compressor	Two
68	Piston ring expander and remover.	2 Nos.
69	Piston ring gap Filing jig for adjusting the	one
70	Piston ring groove cleaner.	One
71	Puller mechanical/ hydraulic powered with attachments.	One each
72	Pullers for steering wheel universal type	One
73	Pullers set for bearing & bushes universal type	2 Nos.
74	Punch letter set.	One set
75	Screw pitch gauge	2 Nos.
76	Snip bend/ straight.	2Nos. each
77	Soldering iron 120 watt.	2 Nos.
78	Soldering iron copper 280 gm (fire heated).	2 Nos.
79	Spanner socket pneumatic / Power tool kit	One
80	Spanner, T-flax for screwing up and screwing in inaccessible position.	One
81	Spanners adjustable 20 cm.	2 Nos.
82	Spare parts of tractor	As desire
83	Starter motor	One
84	Stone, carburandum 15 x 5 x 4 cm smooth and rough.	One
85	Surface plate 60 x 60 cm.	One
86	Techno meter (digital)	One
87	Torque wrench (0 to 40 kg. meter)	One
88	Valve key inserter	One
89	Valve seat cutting, tools complete with guides and pilot bar (all angles)	One
90	Valve seat lapping tool-suction type	Two
91	Valve spring compressor universal.	One
92	Valve spring Lifter	One
93	Vernier caliper set 250/ 300 mm inside and outside, depth to read inches and mm.	One

General Installation/ machineries

94	Air Compressor capacity 12 c.ft. piston type with pressure gauge (for insulating of tubes etc	One
95	Cage Wheel	One
96	Chain and pulley block 3000 kg. Capacity electric type	One
97	Compression gauge to read 0 to 150 kg/sq. cm and vacuum gauge 0 to 75 cm.	One
98	Disk brake with caliper assembly	Two
99	Drilling machine electric pillar type up to 20 mm dia.	One
100	Dynamo meter for performance testing of engine.	One
101	Electric Arc welding Set portable	One
102	Front axle with hub	One
103	Grinder bench with two 18 cm wheels with hand grinding attachment	One
104	Grinder electric pedestal with two 30 cm. wheel	One

105	Hydraulic jack with trolley capacity 3 Ton	One
106	Injector testing set (Hand tester)	One
107	Lifting jack screw type 3050 kg.	One
108	Puncture machine.	One
109	Rear axle assembly-gear box steering box	One
110	Screw jack one tone, capacity double lift	2 Nos.
111	Steering gear box hydraulic type	One
112	Steering gear box with drop arm and push rod Mechanical	One
113	Traction chassis and Mainframe	One
114	Valve re-facing machine.	One
115	Washing unit/Car Washer	One
116	Wheel alignment gauge	One
117	Tractor 35 to 45 HP	One
118	Tractor with power steering 60 HP Fitted With all accessories	One
119	Cultivator 9 tine spring loaded.	One
120	Disc harrow Trailing type	One
121	Disc plough 2-furrow with scrapers.	One
122	Ridger.	One
123	Rotavator	One
124	Seed cum fertilizer Drill	One
125	Desk top computer	2 Nos.
126	Printer	2 Nos.
127	LCD projector	One
128	Computer table	2 Nos.
129	Printer table	2 Nos.
130	Class room chair with writing pad	25 Nos.
131	Teacher chair	One
132	Teacher table 5 X 3 X 2.5 ft size	One
133	Lockers with 8 drawers (standard size)	3 Nos.
134	Steel almirah	2 Nos.
135	Work bench 295 x 120 x 80 cm with 4 vices 12.5 cm jaw.	2 Nos.
136	Metal rack 180 x 150 x 45 cm.	One
137	Air Conditioner 2 ton	2 Nos.
138	Magnetic white board	One
139	Drinking water cooler	One
140	Class Room for 25 trainees	30 sq. meters
141	Workshop	500 sq. meters
142	Power supply	15 Kw

SYLLABUS

ON

TRADE TECHNOLOGY

TRADE MECHANIC TRACTOR

3- MONTHS MODULE

FOR CRAFTS INSTRUCTOR TRAINING

SCHEME

**DIRECTORATE GENERAL OF EMPLOYMENT
& TRAINING**

**MINISTRY OF LABOUR & EMPLOYMENT
NEW DELHI**

**LIST OF EXPERTS
FOR THE SYLLABUS OF MECHANIC TRACTOR**

S No	Name of Experts S/ Sh.	Phone No.	Contact Adress
1	Dinesh Nijhawan Director	01612490 187	ATI Ludhiana
2	Dr. S S Ahuja Rtd. HOD (Farm power machinery PAU)	98760962 20	126 H, BRS Nagar Ludhiana
3	Dr. Rohnish Khurana	94173180 76	Dept. of farm power machinery & power eng. PAU Ludhiana
4	Er. S S Johal ASsitt. Profesor	98159633 42	GND Eng. Collage Ludhiana
5	Er. Narendra Kumar Sr. Eng.	93153 11951	Same Duets Tractor Phillor Ldh.
6	Er. Kulwant Singh Assitt Eng.	99144066 84	Sonalika Int. Tractor Hoshirpur.
7	P S Kharbanda Rtd. ADT	94179330 04	179 Green Field Ludhiana
8	Harvir Singh Instructor	97810000 43	ITI Ludhiana
9	Hardev Singh Sodhi Rtd. Instructor	01612497 364	H. No. 6836 St. No. 10 New Janta Nagar Ludhiana
10	Jagdev Singh Grewal Rtd. Instructor	01612500 727	H.No.4004 Phase II Dugri Ludhiana
11	Balwinder Singh Instructor	81460832 00	ITI Patti Amritsar
12	Kamakhya Manjhi Instructor	09905068 223	ITI Motihari Bihar
13	Sukhdev Singh Bhullar Instructor	94170878 65	ITI Sunam (Pb.)
14	Jagdish Kumar Instructor	94176821 34	ITI Sunam (Pb.)
15	Pawan Kumar Oriya Instructor	09827262 163	ITI Satna (MP)
16	Ram Raj Jt. Director	01612490 187	ATI Ludhiana
17	Sukhdev Singh Dy. Director	01612490 187	ATI Ludhiana
18	Gurcharan Singh Assitt. Director	01612490 187	ATI Ludhiana
19	Harbans Singh Trg. Officer	01612490 187	ATI Ludhiana
20	Sanjeev Kumar Instructor	01612490 187	ATI Ludhiana