

SYLLABUS

ON

TRADE TECHNOLOGY (TT) – II

TRADE OF MECHANIC MOTOR VEHICLE

3-MONTHS MODULE

FOR

CRAFTS INSTRUCTOR TRAINING SCHEME

**List of members attended the workshop for designing the syllabus on
 “TRADE TECHNOLOGY-II” for Mechanic Motor Vehicle Under
 Craft Instructor Training Scheme on 28.05.2009 at ATI Gill Road
 Ludhiana.**

Sl. No	Name of member & Designation S/Sri...	Representing Organization with address	
1	Dinesh Kumar Nijhawan, Director	ATI, Ludhiana	Chairman
2	C.P.Sharma, Jt. Director	ATI, Ludhiana	Member
3	Sukhdev Singh , DDT	ATI, Ludhiana	Member
4	Gurcharan Singh, ADT	ATI, Ludhiana	Member
5	Baljinder Singh, Principal	ITI, Ludhiana	Member
6	V.K.Bansal. Principal	ITI Patiala	Member
7	Rajesh Sharma, C.I.	ITI Patiala	Member
8	Subhash Gupta, C.I.	ITI Patiala	Member
9	P.S.Khrabanda, Ex. ADT	ATI, Ludhiana	Member
10	M.R.Sharda, Trg. Officer	ATI, Ludhiana	Member
11	Jagdish Singh, ADT	ATI, Ludhiana	Member
12	Vipan Kumar, Trg. Officer	ATI, Ludhiana	Member
13	Harbans Singh,Trg. Officer	HMT Ltd. Pinjore	Member
14	Vijay Kumar ,Trg. Officer	ATI, Ludhiana	Member
15	P.L.Arora	Munjral Casting (Hero Group), Ludhiana	Member
16	Karnail Singh,Trg. Officer	ATI, Ludhiana	Member
17	Manish Gossain	Bhagat FORD, Ludhiana	Member
18	P.K.Aggarwal	Vardhman Textile Ltd.Ludhiana.	Member
19	Harmet Singh	Gulzar Motor Ltd.,G.T.Road , Dholewal, Ludhiana	Member
20	Sat Pal, Asstt. Director (Mech.)	MSME,D1, Ludhiana	Member
21	Harbans Lal ,Trg. Officer	ATI, Ludhiana	Member

Available Sessions:

1. Monday to Friday 5 days x 8 Sessions = 40 Sessions
(Each Session of One Hour duration)
2. Total Session : 40 x13 =520 Sessions
3. Admission & Final Test: = 40Sessions.
4. Industrial visit = 40 Sessions.
5. Available Sessions = 520 – 80 = 440 Sessions.
6. Practical = 264 Sessions
Theory = 176 Sessions.

Evaluation Scheme: -

		Maximum Marks	Pass Marks
1.	Theory	= 100	60
2.	Sessional	= 50	30
3.	Practical	= 200	120
4.	Sessional	= 50	30
	Total	= 400	240

SYLLABUS FOR THE TRADE OF MECHANIC MOTOR VEHICLE FOR CRAFT INSTRUCTOR

SYLLABUS FOR TRADE TECHNOLOGY (TT) -I THREE MONTH TRAINING MODULE - TRADE PRACTICAL AND RELATED INSTRUCTION

SUSPENSION SYSTEM	1	Description of wheel and tyres Type-section of tyres. Ply rating, inflation pressure and carrying capacity, storage of tyres. Different types of rims.	Removing wheels from vehicles, dismantle tyres and tubes checking and repairing puncturing in tubes, assembling inflating to correct pressure, rotating the wheel in a vehicle. Minor repairing of wheels and tyres.
	1	Frame-description and function –common trouble in conventional suspension system. Type of leaf spring. Different type of shock absorber-their description, operation and maintenance.	Inspecting the frame- checking alignment of frame –servicing of spring –replacing new brushes for shackle pins-changing brushes in shock absorber-cleaning and lubrication of wheel bearing adjusting wheel bearing.
	1	Description of different type of suspension system-special feature in each system. Maintenance and lubrication of front suspension system and air suspension system.	Description of different type of independent suspension system-special features in each system. Maintenance and lubrication of
	1	The front axle-description and function; type of steering knuckles, arrangement of steering knuckles, general layout of steering linkage. Joint	Inspection and overhaul front and rear suspension –rear spring coil springs coil springs torsion bar. Check-up of dead axle for alignment.
STEERING SYSTEM	2	Description of different type of steering boxes, special feature of each, adjustment repair and maintenance of steering boxes. Hydraulic and electronic Power steering, description and its advantages.	Inspect and adjust steering wheels with respect to front wheel.
	2	Description of Ackerman's angle, caster, camber, Toe-in and Toe-out, purpose and effect of these angles.	Inspect and overhaul steering boxes-adjusting steering. Gear backlash and end play. Check and adjust toe-in, camber angles. Checking kingpin inclination and caster angle

Achievement for 2 weeks of training from 1st to 2nd week

1. Repair the tube, overhauling front and rear suspension..
2. Adjust toe- in, toe out of the vehicle.
3. Follow safety precaution while doing above repairs.

BRAKE SYSTEM	3	Arrangement of brakes in trucks and cars-descriptions of hand brake and its purpose. Layout of mechanical and hydraulic brake system in car.	Adjusting brake pedal play checking brake binding. Dismantling wheel brake assembly –cleaning and inspecting –adjusting brake shoe for proper clearance. Bleeding hydraulic brakes.
	3	Master cylinder type including the tandem Master cylinder, special feature of each function –common trouble and remedy.	Removing master cylinder Dismantling cleaning and inspection of parts assembling and testing bleeding the breaking system after cleaning the pipe line.
	3	Brake lining-type, uses relining the brake shoes-precaution to be observed. Wheel cylinder-description, function and type. Brakes fluids –description and type of fluid used.	Dismantling wheel brake assembly-removing old lining and fitting new lining on brake shoe. Removing and cleaning of brake drum. Inspecting wheel cylinder and brake drum-fitting new cups and brakes re-assembling and adjusting wheel bearing & testing and adjusting all 4 wheel breaks.
	4	Description and advantages of vacuum assisted hydraulic brake, special, features ABS with EBD common trouble in hydraulic assisted brakes.	Removing and refitting of vacuum boosters –checking of pipe line-adjusting the brake in vacuum assisted hydraulic brake. Working of ABS with EBD (electronic Brake distribution) system.
	4	Description of air brake system – major components in system, description and purpose of each part, their care and maintenance –trouble in air brake assembly and there remedy.	Adjusting air brakes to tank unit, air –compressor, brake valve assemblies. Wheel brake adjusters –locating air leaks in the brake lines and rectifying general maintenance and care.
	4	Brake testing –efficiency of breaks-breaking distance, weight transference during breaking a vehicle-common trouble in break and there remedy.	Trouble tracing in braking system of a vehicle –adjusting brakes, precautions to be observed while testing brakes. Points to remember while preparing the vehicle brake certificate.

Achievement for 2 weeks of training from 3rd to 4th week

1. Dismantling assembling the components of the engine.
2. Overhauling the water, pump, oil pump and water pump.
3. Follow safety precaution while doing above repairs.

TRANSMISSION SYSTEM	5	Layout of transmission system description of single plate clutch and multiple plate clutch function-different type clutches used in there description, special features and advantages different type of clutches actuation mechanism.	Adjustment clutch pedal play removing gear box and clutch assembly from vehicles. Dismantling clutch cleaning and inspecting parts.
	5	Clutches lining; type –material used-bonded and riveted lining clutches plate construction purpose of damper and cushion spring precaution while relining the clutch plate. Types of pressure plate spring(coil & Diaphragm type)	Removing and fitting of new pilots bearings. Removing and fitting of ring gear in fly wheel. Relining the clutch plate, checking condition of fly wheel and pressure plate surface for refacing.
	5	Fluid coupling – description operation and advantages of using fluid coupling common trouble and remedy.	Assembling of pressure plates; adjusting the fingers-checking run out of flywheel and aligning clutch assembly with flywheel.
	6	The purpose and types (manual & automatic transmission) of gear box in vehicles description and function sliding gear mesh common trouble in gear box and there remedies. Free wheel, over drive and auxiliary gear box.	Dismantling a four speed sliding Mesh gear box. Cleaning, inspection of parts of wear damage. Assembling the gear box and filling the oil.
	6	Lubrication of gear box and there description and advantages.	Dismantling cleaning, Assembling the gear shift mechanism-changing oil in gear box studying gear ratio in gear box.
	6	Universal joint and propeller shaft open and close type propeller shaft. Type of universal joint care and maintains constant velocity joints special futures and advantages.	Removing the open type propeller shaft from vehicles removing universal joints-cleaning inspecting – replacing worn out parts, assembling and fitting of vehicles. Special precaution while removing the torque tube drive shaft.
	7	Description and purpose of different type of rear axle special features and advantages of each type, lubrication of rear axle reason for oil in break drum.	Removing rear break drum and adjusting the wheel bearing in full floating rear axles and semi-floating axels replacing oil seal in rear axles.
	7	Description and function of final Drive assembly-crown wheel and tail pinion hypoid gear and its lubrication. Differential lock.	Removing rear axles assembly from vehicles, dismantling cleaning inspecting parts for wear and damage, cutting packing/gaskets, removing tail pinion and bearing-cleaning and inspection oil seal and bearing.

	7	Description and function of differential gear types. Tooth contact and backlash, pre-loading adjustment. Common troubles and there remedies in rear axle assembly.	Checking tooth contact in crown and pinion and adjusting backlash, adjusting pre load of crown and pinion. Assembling the rear axles and fitting the rear axle assembly on vehicles and testing.
	8	Description and purpose of optional fitting such as transfer case –free wheel-power take off-common trouble in these units and there remedies-care and maintenance.	Trouble shooting in transmission system of vehicles-detecting noise from clutch, gear box, universal joints and rear axle assembly.
	8	Synchromesh gear box, advantages, operation indifferent gear positions common troubles and remedies, types of synchromesh gear box, their special features.	Dismantling a synchromesh gear box, cleaning, inspection, replacement of worn out defective parts, assembling and testing for correct performance, identifying noises from gear boxes and rectifying.
	8	Description and operation of four wheel drive, purpose of transfer case and the arrangement of shifting mechanism, common troubles and remedies. Over drive mechanism its advantages, maintenance and care.	Remove transfer case from the vehicle, dismantling, cleaning, inspection, replacement of worn out/ damaged parts, reassembling, testing and fitting. Repairing of 4 wheel drive shifter mechanism. Overhauling of front wheel drive propeller shaft unit. Overhaul over drive mechanism.
	9	Systematic procedure of locating noises from the transmission units-common troubles in the system and their remedies.	Trouble shooting in the transmission system identifying the noises from clutch, assembly, gear box, universal joints-rear axle drive and the differential unit. Checking oil leaks and correcting.

ACHIEVEMENT FOR 5 WEEKS OF TRAINING FROM 5th TO 9th WEEK

TRAINEES SHOULD BE ABLE TO:

1. DO RELINING THE CLUTCH PLATE AND ADJUST PADDLE FREE PLAY
2. REPAIR DEFECTS IN CLUTCH PADDLE ASSEMBLY, GEAR BOX, AND REAR AXEL
3. OBSERVE SAFTY PRECAUTIONS.

	10	Industrial visit	
SERVICE STATION EQUIPMENT AND WHEEL BALANCING	11	Study of different type of garage equipments. Spark plug tester, valve refacer, injector tester and car washing equipment.	Repair of jacks, grease guns, oil spray guns and other shop floor equipments. Care and maintenance of compressor, valve refacer, drill machine, injector tester, spark plug tester and servicing of vehicle washing equipments.
	11	Importance of wheel balancing. Details of equipment and method.	Wheel balancing and use of equipment.

Achievement for 2 weeks from 11th to 12th week:

Trainees should be able to:

- (i) Diagnose noises and faults in the engine and rectify them.
- (ii) Repair jacks, grease gun, oil spray guns and other shop floor equipment.
- (iii) Operate the wheel balanced.
- (iv) Follow necessary safety precautions.

Car Air conditioning system Repair and Maintenance	12	Fitting and repairing air conditioning unit in Motor vehicle. Tuning engine with respect to the air conditioning. Installation of car music system and its wiring. Maintenance of power windows.	Introduction to air conditioning system in motor vehicle. Compatibility of air conditioning system with vehicle engine. Power window & its advantages.
---	----	--	--

Achievement for 12 week:

Trainees should be able to:

- (i) Undertake servicing, rectification and installation of Air Conditioning System in Motor vehicles.
- (ii) Follow necessary safety precautions.

	13	Revision and All India Trade Test	
--	----	--	--

LIST OF TOOLS AND EQUIPMENTS

THE LIST INDICATES THE REQUIREMENT OF 3 Months Training Programme

For a batch of unit of 20 trainees

TOOL KIT

1	Hammer Ball Peen 0.75	20	
2.	Chisel Cold Flat 19 mm	20	
3.	Centre Punch 10 mm Dia x100 mm	20	
4.	Steel Rule 15 cm English and Metric	20	
5.	Screw Driver 30 cm x 9 mm Blade	20	
6.	Screw Driver 20 cm x 9 mm blade	20	
7.	Spanner D.E. set of 12 pieces(6 mm – 32 mm)	20	
8.	Pliers Combination 15 cm	20	
9.	Hand file 20 cm second cut	20	
10.	Feeler gauge 20 blades(metric)	20	
11.	Ring Spanner set of 12 pieces(6 mm -32 mm)	20	
12.	Steel tool box with lock and key(Folding type) Size: 400 x 200 x150 mm	20	
13.	Allen Key set of 12 pieces. (2 mm – 14 mm)	4 sets	
14	Star Allen Key set (Star bit set) 20,25,30,35 No.	2 set each	
15	Star Socket set 40, 45, 50, 70 NO.	2 set each	
16.	Circlip Pliers(ext. & Int./) 150 mm and 200(two each)	20 sets	
17.	Philips screw Driver set of 5 pieces(100 – 300 mm)	5 sets	

Tools, Measuring Instruments and General Shop outfit.

1	Rule steel 300mm	2 No's	
2	Divider Spring Joint 150mm	2No's	
3	Prick Punch 15cm	2No's	
4	Chisel cross cut 200mmx6 mm	1 No.	
5	Hammer Ball Peen 0.5 kg.	2	
6	Hammer Copper 1 kg. with handle	1	
7	Engineering square 15 cm blade	2	
8	Scriber 15 cm	2	
9	Scriber Block Universal	1	
10	Marking out tables 90 x60x 90 c. (high)	1	
11	Surface Plate for 30 cm blade	1	
12	Hacksaw frame for 30 cm blade	4	
13	"V" Block 75 x 38 mm pair with clamps	2	
14	Punch Hollow, 6,7, 8, 9, 10.5 and 12 mm set	1 set	
15	Punch figure set 3 mm	1 set	
16	Punch letters set 3 mm	1 set	
17	Hand vice 37 mm	2	
18	Screw Driver, Electrician type 15 cm size	2	
19	File, flat 35 cm bustard	2	
20	File, flat 25 cm second cut	2	
21	File, flat 20 cm smooth	2	
22	File, flat safe edge 25 cm smooth	2	
23	File triangular 15 cm second cut	2	

24	File half round 20 cm second cut	2	
25	File square 30 cm rough	2	
26	File square 20 cm second cut	2	
27	Twist drill, metric 3 mm to 12 mm(1 mm step)	1 set	
28	Taps and dies complete set in box, metric with handles	2 set each	
29	Hand Reamer adjustable 10.5 mm to 11.25 mm,11.25 mm to 12.75 mm, 12.75 mm to 14.25 mm and 14.25 mm to 15.75 mm	1 set	
30	Scraper flat 25 cm,	1	
31	Scraper Triangular 25 cm	1	
32	Scraper half round 25 cm	1	
33	Set of Morse socket M T 0 to 1, 1to 2 and 2 to 3	1	
34	Digital Micrometer outside 25 to 50 mm	1	
35	Digital outside micrometer 0 to 25 mm	1	
36	Digital outside micrometer 50 to 75 mm	1	
37	Digital outside micrometer 75 to 100 mm	1	
38	Micrometer inside 25 to 50 mm, 50 to 75 mm 75 to 100, 100 to 125,and 125 to 150 mm	1 each	
39	Digital venires caliper 0 to 250 mm inside, outside and depth	1	
40	Safety Goggles	2 pair	
41	Hammer Cross peen	1	
42	Setting Hammer	1	
43	Mallet (Wooden)	1	
44	Trammel 30 cm	1	

45	Below lamp 0.5 liter	3 Nos.	
46	Soldering Iron 120 watt	3 No's	
47	Soldering Iron Copper 225 gms fire heated 150 mm and 200 mm	2	
48	Pliers notch (Round and Straight)150 to 200 mm	2 each	
49	Snip Straight 250 mm	5 No's	
50	Engineer Stethoscope	2 Nos.	
51	Tyre Pressure Gauge	2 Nos.	
52	Double open ended Ignition spanner set of 5 Nos. 0-9 mm	5 sets	
53	Spanner adjustable 20 cm	16	
54	Bearing Puller Screw Power and Hydraulic Powered with attachments, maximum spread 80, 160, 250 & 450 MM.	2 Nos.	
55	Spark Plug spanner 16 mm and 21 mm	20 each	
56	Magneto spanner set of 8 spanner	1 set	
57	Socket set 6 to 32 mm socket complete set	5 sets	
58	Spanner T flex for screwing up and unscrewing in accessible position	1 No.	
59	Double ended open tappet spanner	2 sets	
60	Drift copper 10 mm dia x 150 mm	1	
61	Spray Gun Kerosene	1	
62	Pressure Grease Gun	1	
63	Chain Pulley Block 3 ton capacity	1	
64	Tray cleaning 45 x 30 cm	20	
65	Drilling Machine(Bench) 12 mm dia	1 No.	
66	Oil cane 0.5 liters	5 No's	
67	Lifter valve spring	5	

68	Tool valve Grinding suction type	5	
69	Valve sheet cutting tools complete with guide and pilot bar(all angle) in a box	1 set	
70	Extractor stud easy out type	5	
71	Compression gauge to read 17.5 kg/sq cm.	1	
72	Vacuum gauge 0 to 75 cm	1	
73	Stone Carborandum 15 x 53.75 cm rough and smooth	2 Nos Each	
74	Cylinder Bore gauge (mm) 20 mm to 125 mm	1 set	
75	Torque wrench 0 to 95.5 kg meter set of 3 pieces	1 set each	
76	Work bench 240 x 120 x 75 cm with 4 vice 12.5 cm jaw	4 set	
77	Locker with 8 drawers standard size	2 No's	
78	Metal Rack 180 x 150 x 145 cm	1	
79	Vice grip pliers	5 No.	
80	Steel Almirah 180 x 90 x 50 cm	1	
81	Black Board 6" x 3"	1	
82	Table 3" X 5" for Instructor	1	
82	Fire Extinguisher, foam type, CO2,	2 Each	
83	Fire buckets with stand	4	
84	Tachometer with dwell angle	2	
85	Jack, hydraulic hi-lift (trolley type)	2	
86	Tester sparking plug " NEON" type	1	
87	Compressor air piston type (vehicular)	1	
88	Oil filter clamp	4	
89	Sectional engine gear box and differential mounted on chassis	1	

90	Brake assembly, master cylinder, wheel cylinder and servo	1	
91	Vacuum assisted hydraulic brake assembly with vacuum booster	1	
92	Air brake assembly	1	
93	Brake lining riveting machine(foot operated)	1	
94	Clutches, different types such as cone type disc type diaphragm type etc.	1	
95	Axle , gear boxes, steering box, front axle, axle assembly independent front wheel spring assembly, synchromesh gear box assembly, live front axle assembly transfer case	1	
96	Full floating axle and semi-floating axle assembly	1 each	
97	Steering assembly- Rack and Pinion type	1	
98	Steering assembly power steering	1	
99	Spring tension scale 0-4.5 kg	1	
100	Valve spring compressor	1	
101	Carburetor repair tool kit	1	
102	Puller set steering wheel universal	1 set	
103	Puller set universal bearing and bushes	1 set	
104	Lifting jack, screw type	4	
105	Coil spring compressor for suspension spring	1	
106	Hot patch clamp	2	
107	Piston ring compressor	2	
108	Valve key inserter	1	
109	Wall chart	1	
110	Connecting rod alignment fixture	1	
111	Valve refacer	1	

112	Piston ring expander	1	
113	High rate discharge test	1	
114	A.V.O. meter (Multi meter) distal / Analog	1 each	
115	Pneumatic tools with sockets and guns	2 set	
116	Impact screw driver	1 set	
117	General purpose puller	1 set	
118	Stud Extractor	1 set	
124	Spring Pliers 150, 200 mm	1 set	
125	Plastic tip Hammer, 50 mm dia	5 Nos.	
126	Growler	1	
127	Battery charger	1	
128	Timing light	2	
129	Hydrometer	5	
130	AC Car unit	2 set	
131	Tyre changer	1	
132	Fuel injection pump Diesel in- line	1	
133	Fuel injection pump Diesel rotary type	1	
134	Fuel injection pump Distributor type	1	
135	Multi point fuel injection pump	2	
136	High pressure Pump	1	
137	MPFI injector cleaning Machine with four injectors	1 set	
138	Diesel injector cleaning Machine with four Injector	1set	

GENERAL MACHINERY:

1	Grinder with two 7" wheels with twist drill grinding attachment	1	
2	Arbor press hand operated ½ ton	1	
3	Motor car in running condition with CRDI Engine and with electronic power steering (EPS)	2	
4	Motor car in running condition with MPFI Engine and power steering	2	
5	Light commercial vehicle – 3 ton	1	
6	Heavy commercial vehicle(one should be 4 x 4)	2	
7	Petrol engine running condition MPFI type engine	2	
8	Petrol running condition carburetor type	2	
9	Diesel engine running condition with CRDI engine	2	
10	Petrol engine motor cycle	2	
11	Spark plug cleaning and testing equipment	1	
12	Air compressor 2 stages 500 liters with 5 HP motor and air receiver	1	
13	Mechanical hoist / Platform type	1	
14	Exhaust Gas analyzer	1	
15	Smoke tester	1	
16	Two pole hydraulic/electric lift 4 ton capacity	2	
17	AC Gas charger equipment	1	
18	Car washer with detergent and steam mixed facility	1	
19	Engine tuning equipment such dual angle tester etc.	1	
20	Car air conditioning fitted on stand.	1	
21	Disc brake working model (solid & ventilated)	1 each	

22	Engine model with petrol injection	1	
23	Engine model equipped with electronic Ignition system	1	
24	Car scanner	1	
25	Illuminated magnifier 10 x	1	
26	Engine de-carbonizing machine Diesel & petrol	1	
27	Wheel Alignment equipment	1	
27A	Wheel balancer	1	
28	Air brake assembly, master cylinder, wheel cylinder and vacuum booster	1	
29	Air Conditioner 4 Ton	4 Nos	
30	White attractive board	1	
31	Lap top latest with Trade related soft wear	2 nos.	
32	Computer latest with color laser printer and UPS	5 Nos.	
33	LCD projector latest	1	
34	Injector dismantling and reassembling jig & Fixture	1	