

# **SYLLABUS**

ON

## **TRADE TECHNOLOGY- I (TT-I)**

**TRADE OF MECHANIC DIESEL**

**3 MONTHS MODULE**

**FOR CRAFTS INSTRUCTOR TRAINING SCHEME**

**DIRECTORATE GENERAL of EMPLOYMENT & TRAINING  
MINISTRY OF LABOUR & EMPLOYMENT – NEW DELHI.**

**TRADE EXPERT COMMITTEE MEMBERS**  
**for**  
**PREPARATION of SYLLABUS for Diesel Mechanic Trade**  
**Trade Technology Module 1 & 2**  
**Under Craft Instructor Training Scheme ,**

Sl. No.	Name & Designation – S/Shri. – Smt.	Organization
1.	Dr. S S Ahuja, Chairman	Ex. Head of Deptt, Punjab Agriculture University , Ludhiana
2.	Er. Sukhdev Singh, Secretary	Dy. Director , ATI Ludhiana
3.	Uday J. Salvi	Training Head, Tata Motors Ltd., Panth Nagar, Uttra Khand
4.	Ajay Aggarwal	Diesel Engine Expert, Tata Motors Ltd., Panth Nagar, Uttra Khand
5.	V K Grover,	AGM Training, HMT Ltd. Pinjore
6.	Harmeet Singh	Maruti , Guljar Motors Ltd. Ludhiana
7.	Sukhdev Singh	Lecturer, GNDE polytechnic, udhiana
8.	Dr. Davinder Dhingra	Sr. scientist, CIPET ( ICAR ) Ludhiana
9.	Er. Pardeep Lohat	Lecturer, Research & Development Centre, Ludhiana.
10.	Er. Sukhdev Singh	Lecturer, Research & Development Centre, Ludhiana.
11.	S S Parkash	Ex. Joint Director of Training, ATI Ludhiana
12.	P S kharbanda	Ex. Asstt. Director of Training, ATI Ludhiana
13.	Hardev Singh Sodhi	Trade Expert in Agriculture industries, Ludhiana.
14.	Baldev Singh	Ex.Training Officer, ATI Ludhiana
15.	Gurcharan Singh	Asstt. Director , ATI Ludhiana.
16.	C M Diggawadi	Training Officer
17.	Karnail Singh	Training officer, ATI Ludhiana
18.	Amar Singh	Training officer, ATI Ludhiana
19.	Sanjeev Kumar	Trade Incharge , ATI Ludhiana.
20.	Harbans Singh	Training Officer , ATI Ludhiana
21.	Vipan Kumar	Training Officer , ATI Ludhiana
22.	Parveen Patil	Expert, ATI Ludhiana.

### 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: = 40 Sessions.
4. Industrial visit = 16 Sessions.
5. Available Sessions = 520 – 56 = 464 Sessions.
6. Practical = 324 Sessions
7. Theory = 140 Sessions.

### Evaluation Scheme: -

		Maximum Marks	Pass Marks
1.	Theory	= 75	45
2.	Sessional	= 15	09
3.	Practical	= 175	105
4.	Sessional	= 35	21
	Total	= 300	180

# SYLLABUS FOR THE TRADE OF MECHANIC DIESEL

## CRAFT INSTRUCTOR

### SYLLABUS FOR TRADE TECHNOLOGY-I (TT-I)

#### THREE MONTH TRAINING MODULE - RELATED INSTRUCTION AND TRADE PRACTICAL

Week No.	Theory	Practical
1	2	3
1.	<p>General instructions:</p> <ul style="list-style-type: none"> <li>• Revision/discussion of NCVT syllabus topic covered in CTS/ATS.</li> <li>• General Introduction to the course its duration, course content etc</li> <li>• General Rules pertaining to the Institute &amp; facilities Available in Institute &amp; Hostel, Time table.</li> <li>• Concept of Preventive maintenance.</li> <li>• Importance of cleanliness, fire fighting equipments for different types of fire.</li> <li>• Storing and Handling Inflammable Materials.</li> <li>• Introduction to ISO/BIS/DIN standards as applicable to Diesel Mech.Trade.</li> <li>• Familiarization with the Tools &amp; Machinery Available in the shop and their use.</li> <li>• Importance of Maintenance of Workshop, Tools, Jacks, and Hoses.</li> <li>• Safety precautions etc needed in Diesel mech. work shop.</li> <li>• Use of pedestal grinder, press, hoist, car washer, lifting device etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Scope of the trade related to industry and instructor's contribution.</li> <li>• Demonstration of first Aid &amp; fire fighting.</li> <li>• Observing safety precautions &amp; care.</li> <li>• Drafting the specifications of various Tools using – ISO/BIS/DIN standards etc.</li> <li>• Practice on Pedestal Grinder and press.</li> <li>• Practice on use of hoist, car washer and lifting device.</li> </ul>
2.	<p>Precision Measurements:</p> <ul style="list-style-type: none"> <li>• Detailed study of precision vernier caliper, micrometer (outside and inside ) used in industry, its least counts and methods of using . Safety needed in handling precision instruments.</li> <li>• Detailed study of Bevel angle protractor and combination set, its least count and methods of using.</li> <li>• Study of cylinder bore gauge, feeler gauge, Thread gauge and introduction to comparators.</li> <li>• Metric and FPS measurements and its conversion.</li> <li>• Difference between accuracy and precision errors.</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Practice on use of Vernier calipers, micrometers, bore gauge and Bevel angle protractor by measuring Diameter of pistons, Main Journals, Crankpins, connecting rod big &amp; small end, main bearings cylinder Bores etc.</li> <li>• Practice on bevel angle protractor, combination set.</li> <li>• Practice on bore gauge , feeler gauge, Thread gauge and taking the reading in metric and its conversion in FPS system.</li> </ul>

3.	<p>Threads and inserts</p> <ul style="list-style-type: none"> <li>• Thread nomenclature, its types and specifications.</li> <li>• Reconstruction of threads.</li> <li>• Uses of inserts in thread applications.</li> <li>• Method of extraction of broken stud or bolt.</li> <li>• Description of Tapes &amp; Dies.</li> <li>• Uses of different types of taps &amp; dies and 'V' threads.</li> <li>• Precautions while using taps &amp; dies.</li> <li>• Description and use of different types of scrapers.</li> <li>• Description and use of different types of Reamers , emery.</li> <li>• Description of flaring , bending and pipe cutter operation.</li> </ul>	<ul style="list-style-type: none"> <li>• Tapping a through and blind hole- selection of tap drill size – use of lubrication – cutting threads on a bolt/stud – adjustment of two piece Die – reaming a hole/bush to suit the given pin/shaft – scraping a given machined surface.</li> <li>• Practice on recondition of threads by inserting threading inserts.</li> <li>• Practice on flaring, bending, and pipe cutting by using various tools.</li> </ul>
4.	<p>4 stroke Engines:</p> <ul style="list-style-type: none"> <li>• General Description &amp; Construction of diesel engine.</li> <li>• Construction of Petrol engine.</li> <li>• Characteristics &amp; Classification of engine based on fuel i.e petrol, diesel, gas, CNG etc</li> <li>• Working principles of 4 stroke diesel &amp; Petrol engine and cycles on which they works.</li> <li>• Advantages/disadvantages/Comparison between the different Engine based on fuel.</li> <li>• Selection and specification of engine for various applications such as automobile, Gen set, marine, Diesel Loco etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Exercises involving use of Wrenches, pliers, screw drivers and pullers – cleaning and Lubrication of engine parts. Location &amp; identification of engine components.</li> <li>• Demonstration of models/cut section of 4 stroke and 2 stoke engines</li> <li>• Practice on unserviceable diesel engine, Use of stud extractor for removal of broken bolt/ stud..</li> </ul>
5.	<p>2 stroke Engine:</p> <ul style="list-style-type: none"> <li>• Working principal of Two stroke cycle diesel Engine. compression ratio &amp; Compression pressures.</li> <li>• Types of scavenging uniflow and loop flow scavenge.</li> <li>• Differences between two stroke and 4 stroke diesel engine.</li> <li>• Constructional details of Engine and cylinder materials liners and their advantages <ul style="list-style-type: none"> <li>• Cylinder arrangements.</li> <li>• Description of cylinder heads, function, care and maintenance.</li> <li>• Types of combustion chambers.</li> <li>• Location of combustion chamber in cylinder heads and also heater plugs and port.</li> <li>• Engine valve arrangements.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Detection of leakage part of diesel engine cutting of gaskets and packing</li> <li>• Compression testing of cylinders.</li> <li>• Practice on starting and stopping of 2 stroke diesel engines - use of speed counter in determining the engine speed – running of engine on load/idle condition – checking temperature fuel and oil compression testing of cylinders.</li> <li>• Removing cylinder liner from unserviceable cylinder block, practice in measuring and refitting new liners as per manufacturer recommendations..</li> </ul>

	<ul style="list-style-type: none"> <li>• Construction of Cylinder liners &amp; purpose.</li> <li>• Types &amp; material of cylinder liner.</li> <li>• Advantages of wet and dry liners, wear pattern.</li> <li>• Method used to fit the liner in cylinder bore.</li> </ul>	
6.	<ul style="list-style-type: none"> <li>• Importance of valve mechanism system</li> <li>• Types of valve &amp; working of valve operating Mechanism.</li> <li>• Function and parts of valve operating Mechanism.</li> <li>• Description of hydraulic valve lifter.</li> <li>• Study of Valve timing diagram.</li> <li>• Camshaft &amp; timing gears, types of drives used in engines.</li> <li>• Chain tension &amp; its importance.</li> <li>• Necessity of valve clearance prescribed by engine manufacturer, Effects of incorrect clearances.</li> <li>• Common troubles &amp; remedies in cylinder head.</li> <li>• Detailed study on Preventative maintenance and its need</li> <li>• Scheduled and Routine maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Overhauling of rocker arm assembly &amp; manifolds from cylinder head. Removing valves &amp; its parts – by using hydraulic valve lifter</li> <li>• Decarburising – checking valve seats &amp; valve guide – reconditioning valve seats &amp; re-facing valves – lapping valves on its seats testing leaks of valve seats for leakage .</li> <li>• Inspection of cylinder heads – surfaces for margin &amp; cracks.</li> <li>• Preparation of preventive &amp; Routine Maintenance cards</li> <li>• Maintenance of history sheets needed for diesel mech. work shop Trade.</li> <li>• Maintenance checks - daily, weekly, monthly for different types of engines – writing up of inspection schedules</li> </ul>
7.	<p>Recondition of Engine:</p> <ul style="list-style-type: none"> <li>• Function of Piston and piston rings, its types and material.</li> <li>• Recommended clearances for the rings and its necessity.</li> <li>• Precautions while fitting rings in the cylinder.</li> <li>• Connecting rods its types, material and function.</li> <li>• Methods of fixing gudgeon pin on small end.</li> <li>• Method of lubrication provided for small end bushes.</li> </ul>	<ul style="list-style-type: none"> <li>• Overhauling of piston &amp; connecting rod from engine, check for piston ring lands wear, piston skirts, for cracks &amp; distortions. clean oil holes .</li> <li>• Check connecting rod for bend , twist and parent bore for taper, ovality and gudgeon pin bushes for wear .measure ovality, taper of main journal, crankpin and gudgeon pin.</li> <li>• Check elongation of cap fixing bolts and reassemble it.</li> </ul>
8.	<p>Crankshaft:</p> <ul style="list-style-type: none"> <li>• Function &amp; Constructional details of Crankshaft &amp; its materials.</li> <li>• Arrangements of crank pins and Main journals.</li> <li>• Balancing methods of crankshaft.</li> <li>• Flywheel construction its function &amp; material.</li> <li>• Elementary knowledge of function of clutch &amp; coupling units attached to flywheel.</li> <li>• Crank case and oil pan and their construction water jacket passage.</li> <li>• Wall thickness - bolt hole dimensions for cylinder head fixing provision for mounting accessories</li> </ul>	<ul style="list-style-type: none"> <li>• Remove crankshaft and camshaft from engine, check for bend &amp; twist, oil retainer and thrust surfaces for wear. measure crank shaft journal for wear &amp; tear, checking flywheel and mounting flanges, Spigot, bearing, check vibration damper for defects. Rectification if and reassembling.</li> <li>• Checking cylinder blocks surface, measure cylinder bore for taper &amp; ovality – Clean oil gallery passage and oil pipe line – check main bearing cap bolt holes check cam shaft, bearings and tappet bore – de-scale</li> </ul>

	<p>like oil pump, water pump filters.</p> <ul style="list-style-type: none"> <li>Oil flow passages and cleaning plugs.</li> </ul>	<p>water passages and plugs check cylinder head for warping. Rectification and re assembling.</p>
9.	<p>Friction, Bearings :</p> <ul style="list-style-type: none"> <li>Definition of friction, its effect and methods to reduce friction in engine</li> <li>Engine bearings – classification and location.</li> <li>Composition of bearing materials.</li> <li>Shell bearing and their advantages.</li> </ul> <p>Special bearing material for diesel engine application bearing failure &amp; its causes – care &amp; maintenance.</p>	<ul style="list-style-type: none"> <li>Fixing bearing inserts in cylinder block &amp; gap checking and spread clearance &amp; oil holes &amp; locating lugs fix crank shaft on block – torque bolts – check end play remove shaft – check seating, repeat similarly for connecting rod and Check seating and refit.</li> </ul>
10.	<p>Lubricants and Lubrication:</p> <ul style="list-style-type: none"> <li>Need for lubrication system for diesel engines.</li> <li>Properties, selection &amp; classification of lubricants.</li> <li>Oil grease high detergent oil for diesel engine lubrication.</li> <li>Layout of the lubrication system by pass &amp; full flow arrangement in diesel engine.</li> <li>Types of oil pumps, oil filters, oil coolers. Common troubles – care and maintenance.</li> <li>Engine assembly procedure.</li> <li>Need for cleanliness of engine and special tools, gauges used for engine assembling.</li> <li>Frequency of decarburizing and overhauling of engine in terms of hours of run or mileage.</li> <li>Engines Overhauling procedure</li> </ul>	<ul style="list-style-type: none"> <li>Overhauling oil pump, oil filters, oil coolers air cleaners and air filters, check and adjust oil pressure relief valves – changing oil in the sump, repairs to oil flow pipe lines and unions.</li> <li>Dismantle Reassemble all parts of engine in correct sequence and torque all bolts and nuts as per maker's recommendations for engines.</li> </ul>
11.	<p>Cooling system and Coolants.</p> <ul style="list-style-type: none"> <li>Need of cooling in engine, general description and types of air and liquids cooling – Auto control unit.</li> <li>Antifreeze and antirust solution, coolant, used in engine.</li> <li>Layout of cooling system, function of parts like radiator, thermostat and water pumps.</li> <li>Purpose of thermostat valve.</li> <li>De-aeration cooling system, no loss tank/expansion tank.</li> </ul>	<ul style="list-style-type: none"> <li>Removing radiator and water pump from engine, cleaning &amp; reversing flushing radiator testing thermostat and refitting on engine – overhauling - water pump refitting, adjusting fan belt tension and connecting water pump with hoses &amp; flushing cooling system of the engine.</li> <li>Visit to industry</li> </ul>
12.	<p>Air induction system:</p> <ul style="list-style-type: none"> <li>Importance of air intake and exhaust system</li> <li>Importance of air cleaner, its types, working function and parts of air cleaner. Need of turbo Charger its working and exhaust mechanism.</li> <li>Description &amp; operation of air compressor and exhauster attached to automobiles engines.</li> <li>Common troubles &amp; maintenance of both</li> </ul>	<ul style="list-style-type: none"> <li>Dismantling , servicing and assembling of dry &amp; wet type air cleaner .</li> <li>Servicing and operation of turbo charger.</li> <li>Servicing of induction manifold and exhaust system.</li> <li>Dismantling air compressor and exhauster – cleaning all parts measuring wear in the cylinder and blades reassembling all parts</li> </ul>

	<p>their specific application for the brakes of the vehicle</p> <ul style="list-style-type: none"> <li>• Use of air for spray gun paint application.</li> <li>• Revision/completion of pending work.</li> </ul>	<p>and fitting them in the engine.</p> <ul style="list-style-type: none"> <li>• Revision/completion of pending work .</li> </ul>
13.	Revision and Exam.	<ul style="list-style-type: none"> <li>• Visit to Industries.</li> </ul>

# SYLLABUS

ON

## **TRADE TECHNOLOGY-II (TT-II)**

**TRADE OF MECHANIC DIESEL**

**3-MONTHS MODULE**

**FOR CRAFTS INSTRUCTOR TRAINING SCHEME**

**DIRECTOR GENERAL EMPLOYMENT & TRAINING**

**MINISTRY OF LABOUR – NEW DELHI.**

### **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: = 40 Sessions.
4. Industrial visit = 24 Sessions.
5. Available Sessions = 520 – 64 = 456 Sessions.
6. Practical = 320 Sessions
7. Theory = 136 Sessions.

**Evaluation Scheme: -**

		Maximum Marks	Pass Marks
1.	Theory	= 75	45
2.	Sessional	= 15	09
3.	Practical	= 175	105
4.	Sessional	= 35	21
	Total	= 300	180

# SYLLABUS for the MECHANIC DIESEL Trade CRAFT INSTRUCTOR COURSE

## Module TRADE TECHNOLOGY-II (TT-II) 3 MONTH TRAINING MODULE – RELATED INSTRUCTION & TRADE PRACTICAL

4

week No.	Theory	Practical
1	2	3
1.	<p>Basic and safety precautions:</p> <ul style="list-style-type: none"> <li>• Brief of TT2 module and review of TT1 module already covered.</li> <li>• Study of engine components , their location &amp; function in Diesel engine.</li> <li>• Study of safety features for LPG, CNG, Diesel and Petrol Engines.</li> <li>• Types of fuel supply system for CRDI, CNG &amp; MPFI engines.</li> <li>• Layout &amp; function of each part - Ignition system in a petrol engine</li> <li>• System layout &amp; parts of ignition system and functions of each part.</li> <li>• Working of the system, importance of Firing order, ignition Advanced, Retard mechanism.</li> <li>• Importance of periodical maintenance and upkeep of shop equipments – preventive maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Practice on engine tune up operations involving testing vacuum and compression of engine.</li> <li>• Identifications of Location of various engine parts on Diesel engine.</li> <li>• Adjustment of valve clearance, setting and adjusting ignition timing.</li> <li>• Identification of various types of engines existing in market and their comparison.</li> <li>• Overhauling fuel Pump &amp; Testing for its working cleaning spark Plugs &amp; testing and setting as per maker's recommendation starting engine. Adjusting slow speed.</li> <li>• Preparation of maintenance charts and Preventive maintenance scheduling for Diesel Mech. workshop</li> </ul>
2.	<p>Pollution and exhaust emission:</p> <ul style="list-style-type: none"> <li>• Effect of Pollution, exhaust emissions of all types of engines and Norms, preventive measures. Reasons for excessive exhaust smoke, overheating vibration, missing &amp; hunting noises</li> <li>• Study of norms of Bharat Stage II, III, IV.</li> <li>• Step by step method of diagnosis of troubles in the lubrication and cooling system.</li> <li>• Reasons of engine over heating &amp; remedies for the same.</li> <li>• Crank case dilution &amp; crank case ventilation flow,</li> <li>• Study of test rate recommended for radiator.</li> </ul>	<ul style="list-style-type: none"> <li>• Methods to adopt the pollution control norms and selection of a best engines on the basis of pollution emission.</li> <li>• Exhaust emission testing and control.</li> <li>• Practice on trouble shooting in cooling and lubrication system/engine checking up and rectifying oil and water leaks changing defective packing and gaskets</li> <li>• Practice on testing radiator leaks &amp; testing functioning of thermostat.</li> <li>• Checking of engine for crank case dilution and its remedial measure.</li> </ul>
3.	<p>Engine noise:</p> <ul style="list-style-type: none"> <li>• Study of reasons for development of noises in the engine components.</li> </ul>	<ul style="list-style-type: none"> <li>• Diagnosis of engine faults like main bearing – noises, piston pin noise, flywheel knock &amp; valve noise – and crank noises and diesel</li> </ul>

	<ul style="list-style-type: none"> <li>Study of methods of assembling practice to be followed during engine overhauling as per recommendations of Engine manufacturers.</li> <li>Basic of Electric control module (ECM). Sensors its working principal, input and output sensor, fail safe backup sensor.</li> <li>Study of starting methods, such as compressor starting, Crank starting</li> <li>Diesel engines used for transport, agricultural, marine, industrial purposes brief description of each method</li> <li>Methods to eliminate starting difficulty in a diesel engine. Fuel saving – concepts of super charges and turbo charges.</li> <li>Different types of noises coming from engine-bearing knock out, gudgeon pin and tappet .</li> <li>Introduction to engine tuning, Torque developed. fuel consumption, exhaust gases etc.</li> </ul>	<ul style="list-style-type: none"> <li>knock and their setting.</li> <li>Check all sensors, voltage with car scanner. Clearing DTC (Diagnostic trouble code) and output test.</li> <li>Diagnosis of reasons for starting difficulty in a diesel engine and rectifying the faults.</li> <li>Diagnosing noises and faults in engine and rectifying them checking under carriage noise and rectifying them. Road testing vehicle</li> </ul>
4.	<p>Erection of engine:</p> <ul style="list-style-type: none"> <li>Study of method of engine erection on foundations.</li> <li>Types of grounding, mixture for grounding foundation bolts, dimension of pits &amp; boxes to suit engine base – purpose of template – need for aligning the engine on HD bolts.</li> <li>Types of fuel feed system in diesels engine, Air injection and airless injection. fuel feed system, general description &amp; layout.</li> <li>Introduction of water separators &amp; its constructional details.</li> </ul>	<ul style="list-style-type: none"> <li>Practice in erecting overhauled engines on stands &amp; preparation of foundations templates for holes location, setting/adjustment of engine over foundation.</li> <li>Cleaning fuel tanks, its checking for leaks and remedial measures</li> <li>Practice on removal of water from fuel with separator.</li> </ul>
5.	<p>Fuel filters:</p> <ul style="list-style-type: none"> <li>Types of fuel filters used in Diesel Engines.</li> <li>Study of fuels used in Diesel engines i.e High speed Diesel and Low speed diesel.</li> <li>Importance of Overflow and Non return valves used in fuel supply system.</li> <li>Types of fuel injection pump such as Inline pump, rotary pump, electrical pump, pneumatic &amp; electronic pump. CRDI Injector,</li> <li>Constructional detail of various fuel injection pump used in diesel engines.</li> </ul>	<ul style="list-style-type: none"> <li>Replacement of filter of diesel engine.</li> <li>Servicing of fuel feed pump</li> <li>Dismantle overflow and Non return valve and fit its fitting/setting after cleaning/inspection.</li> <li>Dismantle, servicing and calibration of fuel injection pumps.</li> </ul>
6.	<p>Governors:</p> <ul style="list-style-type: none"> <li>Importance &amp; need of Governor and their types.</li> <li>Working of mechanical, pneumatic governor. Details of any engine not requiring governor.</li> </ul>	<ul style="list-style-type: none"> <li>Servicing of mechanical Governor and its adjustment.</li> <li>Practice on acceleration adjustment in pneumatic governor.</li> <li>Servicing of air intake and exhaust system</li> </ul>

	<ul style="list-style-type: none"> <li>• Study of setting and adjusting methods of mechanical governors.</li> <li>• Importance of venturie, diaphragm, throttle adjustment.</li> <li>• Study of Air in take and exhaust system</li> <li>• Methods of Bleeding.</li> </ul>	<ul style="list-style-type: none"> <li>• of diesel engine.</li> <li>• Practice on bleeding of fuel supply system.</li> </ul>
7.	<p>Injector &amp; nozzle</p> <ul style="list-style-type: none"> <li>• Description &amp; operation of Fuel injection injector and Nozzles.</li> <li>• Operation of each type injector/nozzle, spray angles &amp; prefaces, their characteristics.</li> <li>• Types of injector and injector tester</li> <li>• Construction &amp; function, types of test &amp; their purpose .</li> <li>• Effects of incorrect setting of nozzles on engine performance</li> </ul>	<ul style="list-style-type: none"> <li>• Dismantle, Checking and servicing of the injector.</li> <li>• Servicing of nozzle and its grinding.</li> <li>• Checking performance for missing cylinder by isolating defective injectors &amp; testing – dismantle and replace defective parts &amp; reassemble.</li> <li>• Inspection of engine for its rated torque after nozzle/ injector servicing.</li> </ul>
8.	<p>Fuel Injection Timing:</p> <ul style="list-style-type: none"> <li>• Importance of timing the pumps with engine</li> <li>• Closed slot cross coupling marks vernier scale on coupling advancing and retarding methods.</li> <li>• Effect of over advancing, timing device and its details – critical adjustments of jerk – pump phasing and calibration adjustment for maximum speed – idle speed &amp; smoke limits. Defects and remedies of FIP and injector.</li> </ul>	<ul style="list-style-type: none"> <li>• Practice on calibration of injector and fuel injection pump.</li> <li>• Defects and remedial action pertains of Fuel injection pump</li> <li>• Practice on starting engine, adjust idling speed and damping device– checking performance of engine with off load adjusting timings in DPA Systems. PT pumps and inline pump.</li> </ul>
9.	<p>Overhauling of Diesel engine:</p> <ul style="list-style-type: none"> <li>• Study of Overhauling procedure of Diesel Engine</li> <li>• Study of History cards, Data recording and history storing on cards, procedure adopted in industry/ organization.</li> </ul>	<ul style="list-style-type: none"> <li>• Dismantling of diesel engine and its inspection and complete overhauling.</li> <li>• Recording the data on history cards of diesel engine.</li> <li>• Assembling of engine after reconditioning and mounting on stand/frame.</li> </ul>
10.	<p>Electrical equipments:</p> <ul style="list-style-type: none"> <li>• Introduction to common electrical terms their units. Methods of use the ammeter and voltmeter and watt meter.</li> <li>• Lead acid battery - their description – construction – common troubles and remedy Maintenance procedure for Batteries.</li> <li>• Description of electrical circuits –ignition system and the components, purpose of induction coil, condenser</li> </ul>	<ul style="list-style-type: none"> <li>• Practice on Electrical fault finding in diesel engine.</li> <li>• Practice on maintenance of battery including setting of Charging current, Electrolyte etc.</li> <li>• Trouble shooting related to alternator, self starter.</li> <li>• Practice on use of Growler for checking armature of electrical items.</li> </ul>
11.	<p>Electrical circuit:</p> <ul style="list-style-type: none"> <li>• Spark- plug Its inspection, cleaning and gap setting. common troubles in ignition</li> </ul>	<ul style="list-style-type: none"> <li>• Preventive maintenance and routine maintenance of DG set</li> <li>• Practice on electrical equipment test</li> </ul>

	<p>circuit and remedy.</p> <ul style="list-style-type: none"> <li>• Description of charging circuit operation of dynamo and regulator unit – ignition warning lamp troubles and remedy in charging system.</li> <li>• Visit to industry</li> </ul>	bench
12.	<p>Concept of Quality Circles and QC tools:</p> <ul style="list-style-type: none"> <li>• Introduction to Quality circles its concept &amp; importance</li> <li>• Concept of 5S &amp; 7QC tools.</li> <li>• Uses and advantages of Pneumatic tools in Diesel mech. Workshop.</li> <li>• Revision / completion of pending work.</li> </ul>	<ul style="list-style-type: none"> <li>• Practice on use of pneumatic tools .</li> <li>• Writing down the details of 5 S needed for house keeping of Diesel mech. Workshop.</li> <li>• Completion / revision of pending work</li> </ul>
13	Revision and Exam.	<ul style="list-style-type: none"> <li>• Visit to Industries.</li> </ul>

**LIST OF TOOLS AND EQUIPMENTS  
For a Batch of 20 Trainees**

Sl.No.	Trainees Kit	For Trainees
1.	Hammer Ball peen 0.75 kg	5
2.	Center punch 10 cm	5
3.	Steel Rule 15 cm English and metric graduations	5
4.	Screw Driver 30 cm x 9 mm blade	5
5.	Screw Driver 20 cm x 9 mm blade	5
6.	Spanner D.E. set of 12 metric 6-12 mm	5
7.	Pliers combination 15 cm	5
8.	Hand file 20 cm Second cut	5
9.	Feeler Gauge 20 blades (metric)	5
10.	Ring Spanner set of 12 metric 6-32 mm	5
11.	Steel tool box with locks and keys (folding Type) Size 400 x 200 x 150 mm	5
13.	Allen key set of 12 pieces (2 mm – 14 mm)	5 sets
14.	Circlip Pliers (ext. & Int./) 150 mm and 200(two each)	5 sets
15.	Philips screw Driver type set of 5 pieces (100-300)	5sets.
16.	Plastic Hammer 30 mm	5 pc
17.	Hacksaw frame	5 pc

**TOOLS, MEASURING INSTRUMENTS AND GENERAL SHOP OUTFIT**

1.	Rule Steel 30 cm	1
2.	Dividers spring 15 cm	1
3.	Prick punch 15 cm	1
4.	Chisel cross cut 9 x 3 cm	1
5.	Hammer ball pein 0.5 kg	1
6.	Hammer copper 1 kg with handle	1
7.	Engineers square 15 cm blade	1
8.	Scriber 15 cm	1
9.	Surface plate 60 x 60 cm	1
10.	V block 75 x 38 cm pair with clamps	2
11.	Punch hollow 6,7,8,9,10.5 and 12 mm set	2 set
12.	Letter & Number Punch 8 mm	1 set
13.	Punch letters set 3 mm	1 set
14.	Hand vise 3 – 7 mm	2
15.	Screw driver, Electrician type 15 cm size	2
16.	File, flat 25 cm second cut	2
17.	File, flat 20 cm smooth	2
18.	File, flat safe edge 25 cm smooth	1
19.	File, triangular 15 cm second cut	1
20.	File, half round 40 cm second cut	1
21.	File round 30 cm second cut	1
22.	File square 20 cm second cut	1
23.	Drill – twist, metric 3 mm x 12 mm x 1 mm	1 set
24.	Taps and dies complete set in box BSW and metric	1 set
25.	H.S.S. Hand reamer adjustable 10.5 to 11.25 mm,	

	11.25 to 12.75 mm, 12.78 to 14.25 mm, 14.25 to 15.75 mm	1 set
26.	Scraper, flat 25 cm handled	1
27.	Scraper half round 25 cm	1
28.	Scraper triangular 25 cm	1
29.	Scraper bearing	1
30.	Sets of Morse socket 0-1 1-2 and 2-3	1 set
31.	Digital Micrometer, outside 0 to 25 mm	1
32.	Digital Micrometer, outside 25 to 50 mm	1
33.	Digital Micrometer, outside 50 mm to 75 mm, 75 mm to 100 mm	1 each
34.	Digital Micrometer, with extension rod (Inside) 50 mm to 150 mm	1
35.	Digital Vernier calipers set 0 or 250 cm inside outside depth to Read with inches and in mms.	1
36.	Bevel Angle protector	1
37.	Safety goggles (clear glass)	2 pairs
38.	Soldering iron 120 watts	1
39.	Pliers nose (round and straight)	1 each.
40.	Snip straight and bent	1
41.	Spanners, adjustable 20 cm	1
42.	Spanner for sparking plug 14 mm,18mm	1 each
43.	Turbo Charger suitable for latest engine	1 Nos.
44.	Spanner, socket set in mm 8-32 with standard accessories	1
45.	Drift. Copper 10 mm x 150 mm	2
46.	Grease Gun .	1
47.	Tray cleaning 45 x 30 cm	5
48.	Drilling machine bench to drill upto 20 mm dia.	1
49.	Oil can 0.5 litre.capacity	5
50.	Lifter, valve spring.	1
51.	Tool valve Grinding, suction type (consumable tool)	6
52.	Valve seat cutting tools complete with guides & pilot bar (all angles) in a box.	1 set
53.	Extractor, stud "Ezy out" Type	1
54.	Compression gauge to read 120 kg/sq. cm and vacuum Gauge 0 to 75 cm	1 each
55.	Vacuum Cleaner blower type portable	2 no.
56.	Magnetic stick	2 no.
57.	Inspection lamp DC type with crocodile clip.	5 no.
58.	Stone Carborandum 15 x 5 x 3.75 cm rough and smooth (Consumable)	2
59.	Digital Cylinder bore gauge, with accessories.	1
60.	Digital Torque Wrench 0 -75 Kgm.	1
61.	Ring Expander and remover	1
62.	Digital Torque wrench (0 to 25 kg meter)	1
63.	Work bench 250 x 120 x 75 cm with 1 vice of 125 mm jaw.	4
64.	Fuel feed pump	2
65.	Fuel injection pump	2
66.	Water pump and oil pump	1 each
67.	Fire extinguisher	2
68.	Fire buckets with stand	2
69.	Tachometer (counting type)	1
70.	Compressor air piston type (Vehicular)	1

71.	Clutches, different types	1
72.	Alternator	1
73.	Starter motor – different type	2
74.	Injector different types	2 each
75.	Battery – 12 Volt (Lead Acid)	2
76.	Pulley set universal for bearing and bushes	1 set
77.	Hydraulic Lifting jack	2 nos.
78.	Piston ring compressor	2 nos.
79.	Valve key inserter	1
80.	Connecting rod alignment fixture	1
81.	Valve re-facer	1
82.	High rate discharge tester	1
83.	A.V.O. Meter	1
84.	Pneumatic tools such power gun with suitable socket arrangement	1 set
85.	Multi point fuel injection pump	2
86.	Fuel injection pump Distributor type	2
87.	Fuel injection pump rotary type	2
88.	Fuel injection pump Diesel in line	2
89.	Injector testing set (Hand operated)	1
90.	Injector cleaning kit	2 sets
91.	Glow plug	1 set
92.	Nozzle Holder Jigs	1 set
93.	P.T. Injector	1 no.
94.	Fluid fly wheel torque convertor	1 each
95.	Piston Groove cleaner	1 no.
96.	Thread pitch gauge	1
97.	Fillet radius gauge	1
98.	Stud Remover	2 sets
99.	Electrical equipments test benches.	1 no.
100.	Battery charger	1
101.	Timing light	1
102.	Helical Insert with accessories.	1 set
103.	Cut section running models of diesel engines	1

#### **GENERAL MACHINERY.**

1.	Pedestal Grinder with two 18 cm wheels with twist drill grinding Attachment.	1
2.	Light commercial vehicle in running condition with latest diesel engine	1
3.	Diesel engine CRDI (latest type) vehicular type mounted on stand.	2 nos.
4.	Petrol engine MPFI (latest type) mounted on stand	2 nos.
5.	Diesel Engine Stationary type latest mounted on stand	2 nos.
6.	Growler	1
7.	Timing lighter	1
8.	car washer with detergent and steam mixed facility.	1
9.	Exhaust Gas analyzer with multimedia computer, printer &UPS	1
10.	Portable lifting crane one ton capacity.	1
11.	Trolley type portable air compressor 1 single cylinder with 45 liters capacity Air tank all accessories and with Working pressure 6.5 kg/sq.cm <sup>2</sup>	1
12.	Smoke tester fully computerized.	1 no.
13.	Hydraulic press 5 tone.	1 no.
14.	Engine scanner latest (Petrol & diesel etc.)	1 no.
15.	Engine de-carbonizing machine Diesel and petrol & injector	

cleaning machine.	1 no.
16. Engine model equipped with electronic ignition system.	1
17. Engine tuning equipment such as dual angle tester etc.	1
18. Fuel injection pump calibration equipment and its Accessories and special tools with attachment for Distributor pump and inline pump.	1 no.
19. Silent DG set 20 KW	1
20. Engine with P.T. fuel System	1

### **FURNITURE & TEACHING AIDS**

1. Wall charts	10
2. LCD projector	1
3. White Board 180 x 90 cm	1
4. Flexible steel pointer	2
1. Student Chair with full size writing Pad	25
2. Teacher Table	1
3. Teacher Chair	1
4. Almirah (cup board large)	5
5. Steel rack	2
6. Table for Computer.	2
7. Chair for computer	4
8. Lockers with 8 drawers (Standard size)	3
9. Water Dispenser	1
10. Photocopier machine	1.
11. Desk top computer, printer, scanner and UPS	1.