Government of Maharashtra

Directorate of Vocational Education and Training

Craftsman Training Scheme

SPECIFICATION FOR AUTOMOBILE MACHINES AND EQUIPMENTS

VERSION 4, 2024

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1.3. Carburetor should be of good quality
1.4. Type: Mikuny Type (any equivalent make)
1.5. Parts Catalogue

2. Carburetor - Solex type for Dismantling and Assembling

2.1. Basic Indicative Diagram

2.2. Single barrel side draft carburetor
2.3. Carburetor should be of good quality
2.4. Type: Solex Type (any equivalent make)
2.5. Parts Catalogue

3. Distributor - Dual Advance Type

3.1. Basic Indicative Diagram

3.2. Brand-new item should be used

3.3. Distributor Assembly Centrifugal weight with cam lob attaches vacuum diaphragm system with following components

- 3.3.1. CB point
- 3.3.2. Condenser
- 3.3.3. Rotor
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- 3.3.5. Centrifugal advance and vacuum advance with Diaphragm Assembly pipe
- 3.3.6. Parts catalogue suitable sketch on Vinyl Board

4. Distributor - Reluctance Type

4.1. Basic Indicative Diagram

4.2. Brand-new item should be used
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4.4. Distributor cap and lead set with complete accessories.
4.5. Centrifugal advance and vacuum advance with Diaphragm Assembly pipe.
4.6. Parts catalogue suitable sketch on Vinyl Board

5. Injector - Multi hole, Pintle type

5.1. Basic Indicative Diagram

5.2. Multi hole CRDI (4 holes)
5.3. Single Hole Pintle Type
5.4. Set should consist of 4 Injector
5.5. Parts catalogue suitable sketch on Vinyl Board

6. Petrol Engine - 2 Stroke, Motor Cycle/ Scooter

6.1. Basic Indicative Diagram

6.2. The petrol engine setup should be supplied along with silencer, air filter
6.3. All mounted on to a sturdy iron frame with caster wheels (mobile trolley)
6.4. Suitably sectioned to show piston movement, inlet and exhaust port, carburetor, multiplate clutch, gear box and rear wheel assembly.
6.5. Different color painting to be done for different systems (Intake port - Dark blue, Exhaust port- Red, Oil- Yellow, Cut area- Signal red)
6.6. Necessary parts of engine should be attractively coloured for better understanding.
6.7. Parts catalogue suitable sketch on Vinyl Board with clearance and torque

7. Connecting Rod Alignment Fixture

7.1. Basic Indicative Diagram

7.2. Connecting Rod alignment fixture
7.3. Checking: Bent, Twist, Offset, Precision ground surface
7.4. Should be supplied with following accessories
7.5. Bent and Twist indicator, Bending Bar with Aligner
7.6. Dial Indicator etc.

8. Injector Cleaning Unit

8.1. Basic Indicative Diagram

8.2. Manual Cleaning Unit
8.3. Suitable for cleaning Diesel Engines
8.4. Brush Lengths:
- 8.4.1. 3” long with flat head bristles
- 8.4.2. 3” long with sharp head bristles
- 8.4.3. 3’ long with slim bristles
- 8.4.4. 4” long with round head bristles
- 8.4.5. 4” long with sharp head bristles
- 8.4.6. 4’ long with slim bristles
- 8.4.7. 6” long with slip bristles
- 8.4.8. Handle for brush holder
- 8.4.9. Hand brush

8.5. Material MS GI.
8.6. The entire items should be securely packed in wooden / plastic box.

9. Injector Testing Set - Hand Tester

9.1. Basic Indicative Diagram

9.2. Transparent fuel container with filter.
9.3. Manual Hand operating lever / Handle with grip. Along with split pin.
9.4. Three way shut off valve with valve spindle.
9.5. High quality Pressure Gauge Range: 0 - 400 BAR and 0 - 40 MPa
9.6. All type of Injector fuel pressure chart
9.7. Suitable fuel pipes for all injector

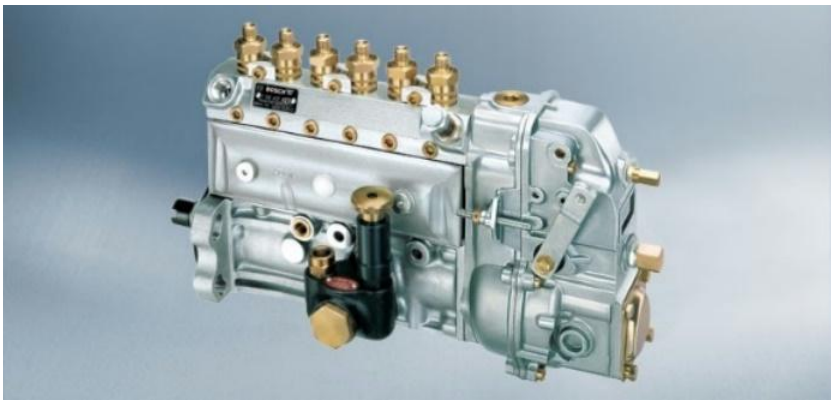
10. Fuel Feed Pump for Diesel

10.1. Basic Indicative Diagram

10.2. Brand-new item should be used
10.3. Suitable for six cylinder diesel engine manufactured by standard company
10.4. The model is mounted on to a wooden base and it is suitably painted.
10.5. Parts catalogue suitable sketch on Vinyl Board

11. Fuel Injection Pump - Diesel, Inline

11.1. Basic Indicative Diagram



11.2. Good working condition item should be used
11.3. Suitable for six cylinder diesel engine manufactured by standard company
11.4. RSV type governor
11.5. Parts catalogue suitable sketch on Vinyl Board

12. Fuel Injection Pump - Dismantling Tool Kit

12.1. Basic Indicative Diagram

12.2. Contents following components:

- 12.2.1. Universal vice
- 12.2.2. Pre stroke setting attachment with gauge
- 12.2.3. Pump couplings
- 12.2.4. Control setting gauge with attachment
- 12.2.5. Tappet adjusting spanner (thin)
- 12.2.6. Ring wrench
- 12.2.7. Tappet lifter
- 12.2.8. Mechanical finger (gripper)
- 12.2.9. Adapter capsule box for FIP
- 12.2.10. Thread puller for fly weight
- 12.2.11. Drift for bottom plug
- 12.2.12. Impact screw driver
- 12.2.13. Flower/ Trox Allen key set
- 12.2.14. Attachment for setting angle of accelerate lever
- 12.2.15. Coupling for FIP cam, Coupling wrench
- 12.2.16. Round nut spanner different type
- 12.2.17. VE pump holding attachment
- 12.2.18. Inline and rotary pump holding attachments
- 12.2.19. Drift for installing and removing oil seal
- 12.2.20. Holder spanner
- 12.2.21. Spring locking plates
- 12.2.22. Governor weight remover

13. Fuel Injection Pump - Distributor Fuel Rotary Pump with Standard Accessories

13.1. Basic Indicative Diagram

13.2. As this item is not available in the market, old pump can be supplied. However, the Item should be in good working condition.
13.3. Suitable for four cylinder diesel engine manufactured by standard company
13.4. Parts catalogue suitable sketch on Vinyl Board

14. Fuel Injection Pump - VE Pump with Standard Accessories

14.1. Basic Indicative Diagram

14.2. Good working condition item should be used
14.3. Suitable for four cylinder diesel engine manufactured by standard company
14.4. Parts catalogue suitable sketch on Vinyl Board
14.5. Pump should be fitted on sturdy stand

15. Multi Point Fuel Injection Pump

15.1. Basic Indicative Diagram

15.2. Brand new item should be used
15.3. Contents following components
- 15.3.1. Electric Motor Armature
- 15.3.2. Motor Brushes
- 15.3.3. Turbine Impeller
- 15.3.4. One way Check valve
- 15.3.5. Filter

15.4. Body: Plastic
15.5. Parts catalogue suitable sketch on Vinyl Board

16. Cylinder Liner - Dry and Wet Liner

16.1. Basic Indicative Diagram

16.2. The model of Cylinder Liners is made out of original Used Liners.
16.3. The entire system is suitably painted and mounted on wooden base.
16.4. Dry Liner:
- 16.4.1. Inner Diameter: 107mm
- 16.4.2. Outer Diameter: 113mm

16.5. Wet Liner:
- 16.5.1. Inner Diameter: 96mm
- 16.5.2. Outer Diameter: 100.6mm

17. Cylinder Liner - Press Fit and Slide Fit

17.1. Basic Indicative Diagram

17.2. The model of Cylinder Liners is made out of original Used Liners.
17.3. The entire system is suitably painted and mounted on wooden base.
17.4. Press Fit Liner:
- 17.4.1. Inner Diameter: 107 mm
- 17.4.2. Outer Diameter: 111 mm

17.5. Slide Fit Liner:
- 17.5.1. Inner Diameter: 48 mm
- 17.5.2. Outer Diameter: 54 mm

18. Radiator Pressure Cap

18.1. Basic Indicative Diagram

18.2. Brand-new item should be supplied
18.3. Should consists of
  18.3.1. Upper Seal
  18.3.2. Main Seal Spring
  18.3.3. Main Rubber Seal
  18.3.4. Low Pressure Valve
18.4. Parts catalogue suitable sketch on Vinyl Board

19. Steering Assembly - Power Steering

19.1. Basic Indicative Diagram

Electric Power Steering

19.2. Good working condition item should be used
19.3. Set of Two Power Steering (Hydraulic and Electronic)
19.4. Hydraulic Power Steering Assembly with stand
19.5. Hydraulic pumps assembly
  19.5.1. Pressure pipe
  19.5.2. Return pipe
  19.5.3. Pump reservoir
  19.5.4. Steering column
  19.5.5. Rack assembly with control valve
  19.5.6. Tie end rod
19.6. Electric Assisted Power Steering
  19.6.1. Rack and pinion
  19.6.2. Electric Motor
  19.6.3. Motor Control Module
19.7. Both models should be mounted on independent sturdy iron frames
19.8. Suitable color painting to be done for different parts for easy identification.
19.9. Parts catalogue suitable sketch on Vinyl Board

20. Steering Assembly - Rack and Pinion

20.1. Basic Indicative Diagram

20.2. Good working condition item should be used
20.3. Should consist of
- 20.3.1. Rack and Pinion Steering assembly
- 20.3.2. Rack Shaft with Pinion
- 20.3.3. Steering Column
- 20.3.4. Tie End Rod

20.4. The entire model should be mounted on a sturdy iron frame
20.5. Suitable color painting to be done for different parts for easy identification.
20.6. Parts catalogue suitable sketch on Vinyl Board

21. Steering Assembly - Recirculating Ball

21.1. Basic Indicative Diagram

21.2. Good working condition item should be used
21.3. Should consist of
  21.3.1. Re circulating Steering assembly-
  21.3.2. Re- circulating ball with nut and sector cross shaft
  21.3.3. Drop Arm steering column
21.4. The entire model should be mounted on a sturdy iron frame
21.5. Suitable color painting to be done for different parts for easy identification.
21.6. Parts catalogue suitable sketch on Vinyl Board

22. Steering Assembly - Worm and Roller

22.1. Basic Indicative Diagram

22.2. As this steering assembly is not available in the market, this part should be suitably reconditioned and supplied

22.3. Should consist of:

- 22.3.1. Steering column assembly,
- 22.3.2. Worm and roller
- 22.3.3. Drop arm

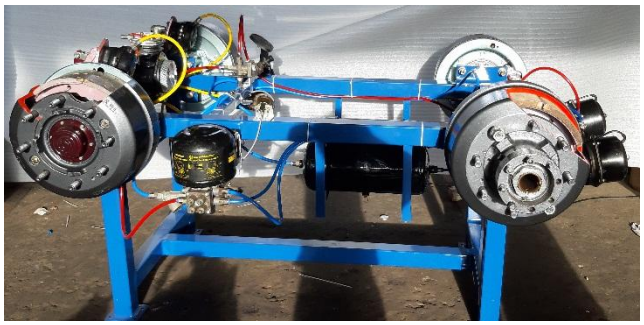
22.4. The entire model should be mounted on a sturdy iron frame

22.5. Suitable color painting to be done for different parts for easy identification.

22.6. Parts catalogue suitable sketch on Vinyl Board

23. Air Brake Trainer Assembly

23.1. Basic Indicative Diagram



23.2. Airbrake system of a truck
23.3. Foot valve
23.4. Two air reservoirs
23.5. Air dryer with unloader valve
23.6. Purge tank
23.7. Air filter
23.8. System protection valve
23.9. Air compressor
23.10. Rear spring brake chamber with hand brake chamber
23.11. Hand brake valve
23.12. Two Front wheel assembly with following components
    23.12.1. Brake Drum
    23.12.2. Brake Liner
    23.12.3. Anchor Plate
    23.12.4. Wheel Hub
    23.12.5. Slake Adjuster
    23.12.6. Brake Cam
    23.12.7. Cam Roller
    23.12.8. Front Brake Chamber
    23.12.9. Return Springs
23.13. Air Pressure gauge for front and rear systems separately.
23.14. The entire air brake system should be made working using high air pressure compressor head connected to 3 HP single phase motor with double belt pulley system. The Air compressor head should be connected to the air tank by UHP hose pipe.
23.15. Sturdy iron frame with NC spray painting.
23.16. Pneumatic connections to be with flexible Polyethylene Tubing of 12mm Outer Diameter
23.17. Coloured circuit/ Schematic diagram with labelling/naming to be printed on to Aluminium cladded Organic sun board.

24. Alternator Assembly - LMV

24.1. Basic Indicative Diagram

24.2. Brand-new item
24.3. Alternator with Aluminium body.
24.4. 12 V alternator with maximum output current of 65 Amps
24.5. Regulating Voltage: 14.2+0.5V
24.6. Approx. weight 5.0 Kg with external fan and pulley
24.7. Parts catalogue suitable sketch on Vinyl Board

25. Engine Bearing Model Set

25.1. Basic Indicative Diagram

25.2. Good working condition item should be used

25.3. Complete bearings of Engine assembly of following types

- 25.3.1. Needle Bearing
- 25.3.2. Roller Bearing
- 25.3.3. Taper Roller Bearing
- 25.3.4. Ball Bearing
- 25.3.5. Thrust Bearing
- 25.3.6. Main Bearing
- 25.3.7. Cam Shaft Bush Bearing
- 25.3.8. Connecting Rod Bearing

25.4. All the bearings should be displayed on to a suitable board with technical and constructional diagram details printed on to a colorful panel with details of applications

26. Piston Model Set

26.1. Basic Indicative Diagram

26.2. Complete Pistons of Car Engine assembly

26.3. The set should contain the following 5 types of pistons

- 26.3.1. Flat Head Piston: Carburetor engine (Brand-new item should be used)
- 26.3.2. Recessed Head: MPFI Engine (Brand-new item should be used)
- 26.3.3. Concave: Diesel Engine (Brand-new item should be used)
- 26.3.4. Bowl Type Piston: CRDI (Brand-new item should be used)
- 26.3.5. Dome Head: 2 stroke Bajaj scooter (Old item can be used)

26.4. All the pistons should be displayed on to a suitable board with technical and constructional diagram details printed on to a colourful panel with details of applications

27. Front Axle Assembly, Rzeeppa Joint with stand for Dismantling and Assembly

27.1. Basic Indicative Diagram

27.2. Good Working condition item will be used
27.3. Front wheel drive transmission
27.4. Rzeeppa Joint (Constant velocity joint)
27.5. Tire end rod
27.6. Front Suspension system
27.7. Disc brake
27.8. Caliper assembly
27.9. The above model should be mounted on paint finished metal stand with caster wheels.
27.10. Suitable color painting to be done for different parts for easy identification.
27.11. Parts catalogue suitable sketch on Vinyl Board

28. Full Floating Axle and Semi Floating Axle Assembly

28.1. Basic Indicative Diagram

28.2. Good Working Condition item should be used

28.3. Fully Floating assembly should consist of following components:

- 28.3.1. Banjo Housing
- 28.3.2. Differential Gear Box
- 28.3.3. Brake Drum Assembly
- 28.3.4. Brake Shoe
- 28.3.5. Brake shoe cam
- 28.3.6. Axel
- 28.3.7. Wheel Hub Assembly
- 28.3.8. Should be mounted on suitable metal frame, paint finish

28.4. Semi floating assembly should consist of following components:

- 28.4.1. Differential Gear Box
- 28.4.2. Brake Drum Assembly
- 28.4.3. Brake Shoe
- 28.4.4. Wheel Cylinder
- 28.4.5. Axle
- 28.4.6. Axle housing
- 28.4.7. Rear axle body
- 28.4.8. Should be mounted on suitable metal frame, paint finish

28.5. Parts catalogue suitable sketch on Vinyl Board

29. Wiper Motor Assembly

29.1. Basic Indicative Diagram

29.2. The wiper Motor should be mounted on sturdy frame with glass and wiper arm, SMPS, wiper switch and necessary connection for operating the wiper motor.
29.3. The models should be made should all NEW Parts.
29.4. Parts catalogue suitable sketch on Vinyl Board

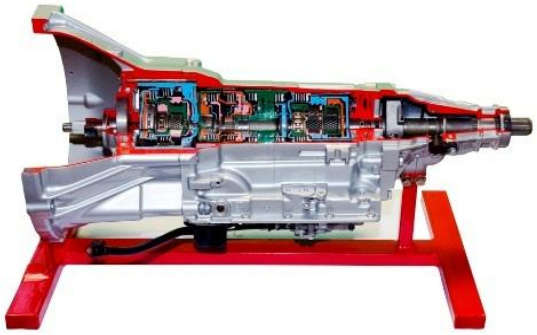
30. Cut Section Model - 4 Cylinder Diesel Engine

30.1. Basic Indicative Diagram

30.2. The cutting should enable the moving parts like connecting rod, piston, valve and spring, pump, crankshaft, Timing gear / chain etc. are visible
30.3. Internal components - timing gears, chain, hardware (bolts and nuts), push rod should be chrome plated
30.4. Inlet Valve and Outlet Valves should be painted differently.
30.5. Cooling system in sectional - radiator, water pump, elbow, water jackets and Thermostat Valve.
30.6. Lubricating System in sectional - oil pump, oil filter, oil chamber.
30.7. Fuel Supply system in sectional - Fuel injection pump (CRDI), injector (only two injector cut), air cleaner, intake manifold.
30.8. Exhaust system in sectional - exhaust manifold, silencer catalytic converter.
30.9. Electrical system in sectional - starter and Alternator.
30.10. The following movable and stationary parts should be visible.
    30.10.1. Cylinder Head
    30.10.2. Engine Block
    30.10.3. Piston, Rings and Connecting Rod
    30.10.4. Rocker Shaft Assembly
    30.10.5. Crank Shaft
    30.10.6. Timing Gear
    30.10.7. Fly Wheel
    30.10.8. Valves
    30.10.9. Cam Shaft, Tappet and Push Rod
    30.10.10. Oil Pump
30.11. Suitable Electric motor drive with reduction gear to be provided to understand moving parts of engine.
30.12. RGB-LED lighting to show the working of four strokes (inlet in white, compression in blue, power in orange and exhaust in red) should be done for all cylinders.
30.13. Different color painting to be done for different systems (Intake- Dark blue, Exhaust- Red, Coolant- Light blue, Oil- Yellow, Cut area- Signal red)
30.14. Necessary parts of engine should be attractively coloured for better understanding.
30.15. Whole assembly should be mounted on suitable metal stand.
30.16. Vinyl Display Board displaying complete Engine specifications with engine torque and clearance

31. Cut Section Model - Automatic Transmission Gear Box

31.1. Basic Indicative Diagram



31.2. For Rear Wheel Drive
31.3. Automatic Transmission with Aluminium body
31.4. Should contain the following components
- 31.4.1. Gears
- 31.4.2. Clutch Plate
- 31.4.3. Oil Seal
- 31.4.4. Hydraulic Valve
- 31.4.5. Sensors
- 31.4.6. Bearing
- 31.4.7. Torque Converter
- 31.4.8. Turbine
- 31.4.9. Impeller
- 31.4.10. Input Shaft
- 31.4.11. Ring Gear

31.5. The sectioning should be done such that the internal details such as different clutch plate set up for speed variation and reduction planetary gear setup etc. with its connectivity should be clearly displayed by sectioning
31.6. The painting should be carried out in such a way that different colours should be used for different components such as identification of sectioned area etc. according to the colour code for easy identification of different systems and mechanisms.
31.7. All the hardware and gears should be suitably electroplated.
31.8. The entire model should be mounted on sturdy iron stand with lockable caster wheels.
31.9. Vinyl Display Board displaying complete Gear Box specifications with torque and clearance

32. Cut Section Model - Centrifugal Clutch Assembly

32.1. Basic Indicative Diagram

32.2. Centrifugal Clutch with Continuously Variable Transmission with following components
- 32.2.1. Gear box
- 32.2.2. Spring
- 32.2.3. Belt
- 32.2.4. Driven Pulley

32.3. The sectioning will be done such that the internal details such as different clutch plate set up for speed variation setup etc. with its connectivity will be clearly displayed by sectioning.

32.4. The painting will be carried out in such a way that different colours will be used for different components such as identification of sectioned area etc. according to the colours code for easy identification of different systems and mechanisms.

32.5. The model should be coupled with variable speed DC motor- 600 RPM(minimum).

32.6. By operating DC motor, the centrifugal clutch engagement and dis-engagement at high RPM and low RPM can be displayed.

32.7. Helical gear is used to shift the clutch and the V shaped gear has multiple ratios on it which keeps on changing and adjusting according to the slippage due to the higher RPM.

32.8. All the hardware's and gears will be suitably electroplated.

32.9. The entire model will be mounted on sturdy iron stand with lockable caster wheels

32.10. Vinyl Display Board displaying complete Gear Box specifications with torque and clearance

33. Cut Section Model - Diaphragm Clutch Assembly

33.1. Basic Indicative Diagram

33.2. Clutch system of Car Assembly with following components
- 33.2.1. Fly wheel
- 33.2.2. Pressure Plate
- 33.2.3. Clutch Disc
- 33.2.4. Release Bearing
- 33.2.5. Clutch Cable
- 33.2.6. Clutch Pedal

33.3. The model should be connected to a foot pedal through necessary cable circuit, so that by pressing the pedal the clutch engagement and dis engagement can be seen.

33.4. The clutch assembly should be sectioned to show the pressure plate, clutch plate releaser bearing etc. the sectioning should be done in such a way that the operation of the clutch is not hampered.

33.5. The entire model should be mounted on a sturdy iron frame

33.6. Suitable color painting to be done for different parts for easy identification with specific Vinyl Display Board.

34. Cut Section Model - Radiator, Cross Flow

34.1. Basic Indicative Diagram

34.2. Components:
- 34.2.1. Side Tank
- 34.2.2. Radiator Core
- 34.2.3. Radiator Cap

34.3. Radiator should be used for sectioning to show the cross flow and radiator core and (fins) construction.

34.4. Internal coloring to identify coolant path to be provided.

34.5. The model should be mounted on to a paint finished metal stand

34.6. Vinyl Display Board displaying water flow with naming.

35. Cut Section Model - Radiator, Down Flow

35.1. Basic Indicative Diagram

35.2. Components:
- 35.2.1. Side Tank
- 35.2.2. Radiator Core
- 35.2.3. Radiator Cap

35.3. Radiator should be used for sectioning to show the down flow and radiator core and (fins) construction.

35.4. Internal coloring to identify coolant path to be provided.

35.5. The model should be mounted on to a paint finished metal stand

35.6. Vinyl Display Board displaying water flow with naming.

36. Cut Section Model - Shock Absorbers

36.1. Basic Indicative Diagram

36.2. Shock Absorber with metal body,
36.3. Component:
- 36.3.1. Damper
- 36.3.2. Hydraulic Oil Area
- 36.3.3. Rubber Seal
- 36.3.4. Fluid return valve

36.4. The shock absorber should be sectioned such a way that the fluid return valve and the connections should be shown
36.5. Coloured circuit/ Schematic diagram with labelling/naming to be printed on to Aluminium cladded Organic sun board
36.6. The Shock absorbers should be place on 25mm imported acrylic with metal frame for display of Technical details and schematics.

37. Cut Section Model - Single Plate Clutch Assembly

37.1. Basic Indicative Diagram

37.2. Clutch system of Car Assembly (Coil spring type) with following component
- 37.2.1. Fly wheel
- 37.2.2. Pressure Plate
- 37.2.3. Clutch Disc
- 37.2.4. Release Bearing
- 37.2.5. Clutch Cable
- 37.2.6. Clutch Spring
- 37.2.7. Clutch Pedal

37.3. The model should be connected to a foot pedal through necessary cable circuit, so that by pressing the pedal the clutch engagement and dis engagement can be seen.

37.4. The clutch assembly should be sectioned to show the pressure plate, clutch plate releaser bearing etc. the sectioning should be done in such a way that the operation of the clutch is not hampered.

37.5. The entire model should be mounted on a sturdy iron frame

37.6. Suitable color painting to be done for different parts for easy identification

37.7. Vinyl Display Board displaying Clutch Assembly with naming.

38. Cut Section Model - Turbocharger

38.1. Basic Indicative Diagram

38.2. Should be suitably sectioned to demonstrate the internal construction details showing the minute information,
38.3. The model is suitably sectioned to show the internal details such as turbine and compressor wheel, gun metal bushes, oil path etc
38.4. The model should be suitably painted and mounted on a suitable wooden base.
38.5. Suitable color painting to be done for different parts for easy identification
38.6. Vinyl Display Board displaying Turbo Charger with naming.

39. Demonstration Board - Car Anti Theft Device

39.1. Basic Indicative Diagram

39.2. The instruction board should incorporate the real components of central door locking system with anti-theft system to illustrate locking and safety system structure and working principle. The components should be rigged onto a colour circuit diagram. And made functional.

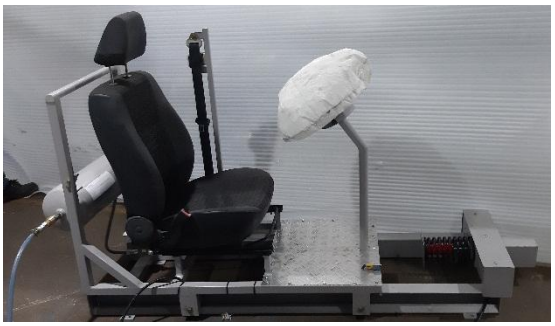
39.3. Real and operatable central door locking with antitheft system should be assembled onto a colour printed board to illustrate the structure and working process.

39.4. All the components of Central locking system/anti-theft alarm system should be assembled on to the printed board, necessary wiring will be done so that by connecting the system to a battery the central locking and antitheft alarm system should be demonstrated.

39.5. The training module should be fabricated using steel pipe frame with spray painted for good looks.

40. Automotive Safety Air Bag Simulator

40.1. Basic Indicative Diagram



40.2. The Instruction board should adopts the real components of Air bag system to illustrate Air bag safety system structure and working principle.
40.3. Real and operatable Air bag system should be assembled along with colour printed board to illustrating the structure and working process.
40.4. The model should be equipped with seat cart, seat belt for actual working principle of the system.
40.5. The Vehicle Crash should be Simulated by pushing and hitting the crash sensor along the seat cart provided to demonstrate the quick air bag inflation.
40.6. A person should be able to sit in the seat cart secured with seat belt.
40.7. By pushing the seat cart and colliding, the air bag should explode and a real feel of collision should be experienced with air bag safety.
40.8. The training module should be fabricated using steel pipe frame with spray painted.
40.9. Option for floor grouting should be provided.

41. Car Air Conditioner Trainer

41.1. Basic Indicative Diagram

41.2. This model should be made out of original New parts, and should be suitably Arranged on to a Metal frame with wooden base.
41.3. The details of Piping connections, wiring circuit, gas filling and recovery etc., can be demonstrated and studied.
41.4. All the accessories such as Cooling fan, compressor, evaporator, necessary hoses, condenser, expansion valve and dryer unit should be assembled as per original circuitry
41.5. The model should be made to work using a FHP motor coupled to the AC compressor, so that by operating the AC panel the operation and cooling effect of the same can be demonstrated.
41.6. The Model should be connected a SMPS for the operation of the blower and Magnetic clutch
41.7. The entire system should be suitably painted
41.8. The Model should be equipped with Printed circuit board with operation principle diagram and electrical connection diagram. And neatly arranged on to a sturdy iron frame.
41.9. The model should be assembled using original NEW parts in working condition.
41.10. The compressor should be coupled to a AC motor for operation so that the different service operations such as, vacuuming, charging of gas can be worked on.
41.11. AC Refrigerant Flow line diagram, Parts catalogue suitable sketch on Vinyl Board

42. Demonstration Board - CRDI System

42.1. Basic Indicative Diagram

42.2. The Instruction board should adopt the real components of electronic fuel injection system (CRDI) to illustrate engine fuel system structure and working principle. The components should be rigged onto colour circuit diagram and made functional.

42.3. Real and operatable engine fuel injection system with partial engine block should be assembled onto a colour printed board to illustrate the structure and working process

42.4. Coloured circuit diagram on the training Module printed on to 6mm organic glass base, where in the students can compare the diagram and actual diagram.

42.5. Detection terminals for operator to detect various sensors, actuators, electrical signals for engine control unit, such as resistive, voltage, current, frequency and wave form signals should be provided on to the printed circuit diagram.

42.6. The training module should be fitted with diagnostic socket (DLC) along with Scan tool to read fault codes, clear fault codes and read data stream.

42.7. Fault setting switch bank will be provided to induce faults in the training module to demonstrate the fault and to diagnose faults.

42.8. User can adjust the number and type of faults- Set the line break, grounding short circuit, improper contact or open circuit faults can be induced

42.9. Good working condition Parts should be provided with fuel tank of heavy gauge of sheet. The instruction board should be connected to 220V AC socket.

42.10. The training module should be fabricated using steel pipe frame with spray painted

42.11. The entire setup is provided with caster wheels with brakes for easy movement of the same.

43. Demonstration Board - Electronic Ignition System and Ignition Coil

43.1. Basic Indicative Diagram

43.2. The Electronic ignition system Module should be designed on the Good working condition Ignition system of an automobile four wheeler, where in the principle of operation and working of the same can be demonstrated.

43.3. The model should consist of the following

- 43.3.1. Electronic Control Unit (ECU)
- 43.3.2. Inductive Distributor
- 43.3.3. Ignition Coil
- 43.3.4. HT Wires
- 43.3.5. Spark Plugs
- 43.3.6. Suitable Battery

43.4. All parts and accessories should be arranged on to a Color printed board and the system should be made functional. The electrical circuit diagram with parts and its connection should be printed on to a color base.

43.5. This open demonstration working unit should be made from original parts such as Switches, Electronic ignition coil, Distributor, three spark plugs and a battery for Power source, with necessary wiring connections. By switching on the switch and by giving rotation to the Distributor, Sequential Sparks in the Spark Plugs can be demonstrated.

43.6. The above model should be fixed on Printed Circuit Sun Board with working Principle diagram.

44. Disk Brake Trainer

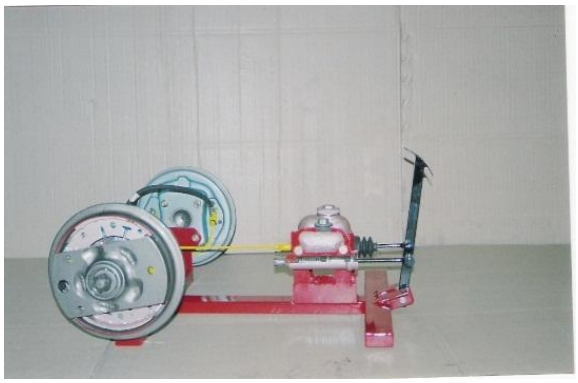
44.1. Basic Indicative Diagram

44.2. Good working condition item should be used
44.3. Complete front Disc brake system of Car contents following components
- 44.3.1. Calliper assembly
- 44.3.2. Master Cylinder
- 44.3.3. Brake Fluid Tank
- 44.3.4. High Pressure Pipe
- 44.3.5. Disc Pad
- 44.3.6. Brake Pedal

44.4. The model is made from two sets of Disc brake with caliper and master cylinder
44.5. The model is equipped with two discs with hubs, two master cylinder, two caliper assembly, etc.
44.6. One side is made working another side is sectioned to show the inner construction details
44.7. The entire model should be mounted on a sturdy iron frame
44.8. Suitable color painting to be done for different parts for easy identification.
44.9. Parts catalogue suitable sketch on Vinyl Board

45. Drum Brake Trainer

45.1. Basic Indicative Diagram



45.2. Good working condition item should be used
45.3. The assembly should consist of following components:
- 45.3.1. Brake system of Car
- 45.3.2. Hub Bearing Drum
- 45.3.3. Wheel Cylinder
- 45.3.4. Brake Shoe Brake self-adjusting system
- 45.3.5. Tandem Master Cylinder
- 45.3.6. Brake Fluid Tank
- 45.3.7. Brake Pedal
- 45.3.8. Metal flexible Pipeline

45.4. The model should be made from two sets of Drum brake and master cylinder
45.5. The model should be equipped with two drum brake with hubs, two master cylinder.
45.6. One side should be made working another side is sectioned to show the inner construction details.
45.7. The entire model should be mounted on a sturdy iron frame
45.8. Suitable color painting to be done for different parts for easy identification.
45.9. Parts catalogue suitable sketch on Vinyl Board

46. Working Model - Power Windows

46.1. Basic Indicative Diagram

46.2. Should be the Driver side door assembly
46.3. The Door assembly should be suitably sectioned, to show the working of power window motor, glass plane, window lift mechanism etc.
46.4. A battery should be connected to the door assembly with suitable wiring and orginal door switch should be provided on the door pad and by operating the switch the model can be demonstrated.
46.5. The entire model should be mounted on a sturdy iron frame
46.6. Suitable color painting to be done for different parts for easy identification.
46.7. Parts catalogue suitable sketch on Vinyl Board

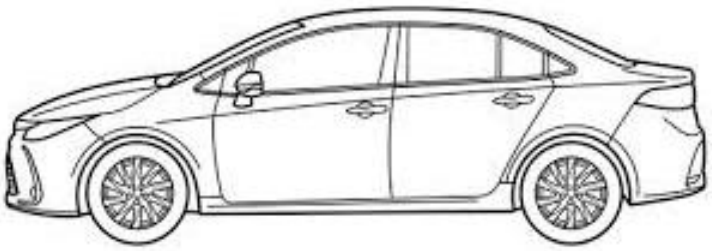
47. Working Model - Torque Converter

47.1. Basic Indicative Diagram

47.2. It should be supplied as a set of two pieces, Complete torque converter and cut section of converter. Both torque converters can be old but should be in good condition.
47.3. Complete torque converter
47.4. It should be sealed and mounted on paint finished sturdy iron frame with handle for rotating.
47.5. Cut section of converter
47.6. It should display the internal details such as the stator-turbine, rotor, Impeller, Torrington bearing (one side rotating) and spring loaded clutch plate.
47.7. By rotating the handle provided, stator, rotor, turbine, etc., can be operated and demonstrated
47.8. The entire model should be mounted on a suitable base.
47.9. Parts catalogue suitable sketch on Vinyl Board

48. MPFI vehicle - Passenger Car with all required accessories

48.1. Basic Indicative Diagram



48.2. Description of store:

48.2.1.	Type of automotive vehicles:	M1 as per IS:14272:2011 latest
48.2.2.	Description: A vehicle used for carriage of passengers, comprising not more than eight seats in addition to the driver's seat.	
48.2.3.	Type of Body:	Sedan
48.2.4.	Type of Fuel:	Petrol
48.2.5.	Vehicle Colour Type:	Metallic
48.2.6.	Colour of the Vehicle:	White
48.2.7.	Seating Capacity (Including Driver):	5
48.2.8.	Drive Axle:	Front wheel drive

48.3. Engine and Transmission Parameters

48.3.1.	Vehicle Engine Capacity (cc):	1450 to 1500
48.3.2.	Maximum Engine Output / Power (kW) at rated RPM: 75 to 80 kiloWatt	
48.3.3.	Engine Maximum Torque (Nm) at rated RPM: 130 to 140	
48.3.4.	Number of Cylinder in Engine:	4
48.3.5.	Vehicle Mileage (declared by OEM as certified by Test Agency) (in litre per 100 km):	4.5 to 5.0
48.3.6.	Vehicle Air Intake System:	Natural
48.3.7.	Vehicle Transmission System:	Manual Transmission (MT)
48.3.8.	Number of Speed/ Gears:	5
48.3.9.	Fuel Tank Capacity:	40 to 50 liter

48.4. Dimensions

48.4.1.	Overall Length of Vehicle:	4400 to 4500 millimeter
48.4.2.	Overall Width of Vehicle:	1725 to 1750 millimeter
48.4.3.	Overall Height of Vehicle (Unladen):	1450 to 1500 millimeter
48.4.4.	Minimum Ground Clearance:	130 to 140 millimeter
48.4.5.	Wheel Base:	2600 to 2700 millimeter
48.4.6.	Number of Doors:	4
48.4.7.	Kerb Weight with 90% fuel, spare wheel, etc.: 1000 to 1100 kilogram	
48.4.8.	Maximum Gross Vehicle Weight (Kerb weight + Payload): 1500 to 1600 kilogram	
48.4.9.	Boot Space:	500 to 550 liter

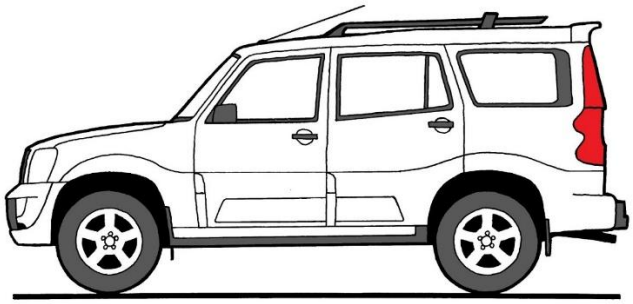
48.5. Construction

48.5.1.	Type of Steering:	Power Steering
48.5.2.	Anti-roll bar:	Front
48.5.3.	Type of Service Brake (Front):	Disc Brake
48.5.4.	Type of Service Brake (Rear):	Drum Brake
48.5.5.	Type of Main Wheel Rim:	Alloy wheel rim
48.5.6.	Type of Stepony Wheel Rim:	Sheet Metal

	48.5.7.	Tyre Type:	Tubeless
	48.5.8.	Tyre size designation including ply rating:	185/65 R15
	48.5.9.	Spare Wheel/ Tyre:	Available
48.6.	Accessories/Features		
	48.6.1.	Air Conditioning:	Available
	48.6.2.	Number of Airbags:	2 (Driver and Co-Passenger)
	48.6.3.	Vehicle fitted with ABS:	Available
	48.6.4.	Low fuel warning light:	Available
	48.6.5.	Driver side view mirror:	Available
	48.6.6.	Passenger side view mirror:	Available
	48.6.7.	Type of side view mirror:	Powered ORVMs
	48.6.8.	Front Seat Belts:	Available
	48.6.9.	Rear Seat Belts:	Available
	48.6.10.	Central Locking:	Available
	48.6.11.	Power Door Locks:	Available
	48.6.12.	Front Power Windows:	Available
	48.6.13.	Rear Power Windows:	Available
48.7.	Mandatory Requirements:		
	48.7.1.	Vehicle Emission Compliance:	BS VI
48.8.	Warranty		
	48.8.1.	Vehicle Warranty Time:	24 Months
	48.8.2.	Battery Warranty Time:	24 Months
	48.8.3.	Vehicle Warranty Distance (in KM) (Warranty period- time/ distance is dependent on whichever occurs earlier):	24 Months or 40,000 kms whichever is earlier
	48.8.4.	Number of Free Services:	3

49. CRDI Vehicle - Passenger Car with all required accessories

49.1. Basic Indicative Diagram



49.2. Generic Parameters

49.2.1.	Type of automotive vehicles:	M1 as per IS:14272:2011 latest
49.2.2.	Description of store: A vehicle used for carriage of passengers, comprising not more than seven seats in addition to the driver's seat.	
49.2.3.	Type of Body:	SUV (Sports Utility Vehicle)
49.2.4.	Type of Fuel:	Diesel
49.2.5.	Vehicle Colour Type:	Metallic
49.2.6.	Colour of the Vehicle:	White
49.2.7.	Seating Capacity (Including Driver):	7
49.2.8.	Drive Axle:	Rear wheel drive

49.3. Engine and Transmission Parameters

49.3.1.	Vehicle Engine Capacity (cc):	2100 to 2200
49.3.2.	Maximum Engine Output/ Power (kW) at rated RPM: 170 to 175 HP	
49.3.3.	Engine Maximum Torque (Nm) at rated RPM: 350 to 375	
49.3.4.	Number of Cylinder in Engine:	4
49.3.5.	Vehicle Mileage (declared by OEM as certified by Test Agency) (in litre per 100 km):	Above 6.00
49.3.6.	Vehicle Air Intake System:	Turbocharged
49.3.7.	Vehicle Transmission System:	Manual Transmission (MT)
49.3.8.	Number of Speed/ Gears:	5
49.3.9.	Fuel Tank Capacity:	50 to 60 liter

49.4. Dimensions

49.4.1.	Overall Length of Vehicle:	4500 to 4750 millimeter
49.4.2.	Overall Width of Vehicle:	1900 to 2000 millimeter
49.4.3.	Overall Height of Vehicle (Unladen):	1800 to 1900 millimeter
49.4.4.	Minimum Ground Clearance:	160 to 175 millimeter
49.4.5.	Wheel Base:	2500 to 2750 millimeter
49.4.6.	Number of Doors:	5
49.4.7.	Kerb Weight:	1900 to 2000 kilogram
49.4.8.	Boot Space:	450 to 500 liter

49.5. Construction

49.5.1.	Type of Steering:	Power Steering
49.5.2.	Anti-roll bar:	Front
49.5.3.	Type of Service Brake (Front):	Disc Brake

	49.5.4.	Type of Service Brake (Rear):	Disc Brake
	49.5.5.	Type of Wheel Rim:	Sheet metal / Steel wheel rim
	49.5.6.	Tyre Type:	Tubeless
	49.5.7.	Tyre size designation including ply rating: 245/ 65 R17	
	49.5.8.	Spare Wheel/Tyre:	Available
49.6.	Accessories/ Features		
	49.6.1.	Air Conditioning:	Available
	49.6.2.	Number of Airbags:	2 (Driver and Co-Passenger)
	49.6.3.	Vehicle fitted with ABS:	Available
	49.6.4.	Low fuel warning light:	Available
	49.6.5.	Driver side view mirror:	Available
	49.6.6.	Passenger side view mirror:	Available
	49.6.7.	Type of side view mirror:	Powered ORVMs
	49.6.8.	Front Seat Belts:	Available
	49.6.9.	Rear Seat Belts:	Available
	49.6.10.	Central Locking:	Available
	49.6.11.	Power Door Locks:	Available
	49.6.12.	Front Power Windows:	Available
	49.6.13.	Rear Power Windows:	Available
49.7.	Mandatory Requirements:		
	49.7.1.	Vehicle Emission Compliance:	BS VI
49.8.	Warranty		
	49.8.1.	Vehicle Warranty Time:	24 Months
	49.8.2.	Battery Warranty Time:	24 Months
	49.8.3.	Vehicle Warranty Distance (in KM) (Warranty period- time/ distance is dependent on whichever occurs earlier): 24 Months or 50,000 kms whichever is earlier	
	49.8.4.	Number of Free Services:	3

50. Electric Vehicle - Passenger Car with all required accessories

50.1. Basic Indicative Diagram

50.2. Generic Parameters

50.2.1. Description of store: An Electric Car is a car which is propelled by one or more Electric Motors, using energy stored in Rechargeable Batteries, with Zero tailpipe emission.

50.2.2. Type of Body: Compact SUV (Sports Utility Vehicle)

50.2.3.	Power Drive:	Electric Motor
50.2.4.	Power Storage:	Battery
50.2.5.	Vehicle Emission:	Zero Tail Pipe Emission
50.2.6.	Vehicle Colour Type:	Metallic
50.2.7.	Colour of the Vehicle:	White
50.2.8.	Seating Capacity Including Driver:	5

50.3. Engine and Transmission Parameters

50.3.1. Driving Range (Mileage) with Fully Charged Battery as per Test Report (Kms): 450 to 500

50.3.2. Max Speed @ Rated Load (Kmph) as per Test Report: 150

50.3.3. Motor Type: Permanent Magnet Synchronous Motor (PMSM)

50.3.4. Max Motor Power (kW) as per Test Report: 100 to 110 kiloWatt

50.3.5.	Rated RPM @ Max Power:	5500 to 6000

50.3.6. Motor Torque Max (Nm) as per Test Report: 200 to 225

50.3.7.	Acceleration (Time in seconds to reach the speed from 0 to 100 kmph) (certified by OEM):	8.5 to 9.0 seconds
50.3.8.	Transmission:	Automatic
50.3.9.	Traction Battery Capacity (kWh):	45
50.3.10.	Battery Chemistry:	Lithium Ion-LFP
50.3.11.	Power Regeneration Facility:	Available
50.3.12.	Vehicle Traction System Voltage:	307.2 Volt
50.3.13.	Vehicle System Voltage:	12 Volt.

50.4. Dimensions

50.4.1.	Overall Length of Vehicle:	3750 to 4000 millimeter
50.4.2.	Overall Width of Vehicle:	1775 to 1825 millimeter
50.4.3.	Overall Height of Vehicle (Unladen):	1600 to 1650 millimeter
50.4.4.	Minimum Ground Clearance:	140 to 150 millimeter
50.4.5.	Wheel Base:	2450 to 2500 millimeter
50.4.6.	Number of Doors:	4
50.4.7.	Boot Space (Liter):	300 to 350 liter
50.4.8.	Kerb Weight (Kg):	1500 to 1600 kilogram

50.4.9. Minimum Turning Radius (mm): 5250 to 5500 millimeter

50.5. Construction

50.5.1. Type of Steering: Power Steering
50.5.2. Type of Service Brake (Front): Disc Brake
50.5.3. Type of Service Brake (Rear): Disc Brake
50.5.4. Type of Main Wheel Rim: Alloy wheel rim
50.5.5. Type of Stepony Wheel Rim: Sheet Metal
50.5.6. Tyre Type: Tubeless
50.5.7. Tyre size designation including ply rating: 215/60 R16
50.5.8. Spare Wheel/ Tyre: Available

50.6. Accessories/ Features

50.6.1. Air Conditioning: Available
50.6.2. Number of Airbags: 2 (Driver and Co-Passenger)
50.6.3. Vehicle fitted with ABS: Available
50.6.4. Driver side view mirror: Available
50.6.5. Passenger side view mirror: Available
50.6.6. Type of side view mirror: Powered ORVMs
50.6.7. Front Seat Belts: Available
50.6.8. Rear Seat Belts: Available
50.6.9. Central Locking: Available
50.6.10. Power Door Locks: Available
50.6.11. Front Power Windows: Available
50.6.12. Rear Power Windows: Available

50.7. Charger Parameters

50.7.1. Portable AC Charger / Portable Charging Cable: Available
50.7.2. Capacity of Portable AC Charger / Portable Charging Cable: 3.3 kiloWatt
50.7.3. Wall Mounted AC Charger: Available
50.7.4. Capacity of Wall Mounted AC Charger: 3.3 kiloWatt
50.7.5. Wall Mounted installation Cable for AC Charger: 15 meter
50.7.6. Charging Standard: CCS2 (Combined Charging System)
50.7.7. Estimated Regular Charging Time (SOC 10% to 100% from any 15A plug point): 15 to 18 Hours
50.7.8. Estimated Regular Charging Time (SOC 10% to 100% from additional AC fast charger): 6 to 7 Hours
50.7.9. Estimated Fast Charging Time (SOC 10%-80%) from 50 kW DC Fast Charger: 45 to 60 minutes

50.8. Warranty

50.8.1. Vehicle Warranty Time: 36 Months
50.8.2. Vehicle Warranty Distance: 1,00,000 kilometer
50.8.3. Vehicle Warranty Distance (in KM) (Warranty period- time/ distance is dependent on whichever occurs earlier): 36 Months or 1,00,000 kms whichever is earlier
50.8.4. Battery Pack Warranty Time: 96 Months
50.8.5. Battery Pack Warranty Distance: 1,50,000 kilometer
50.8.6. Battery Pack Warranty Distance (in KM) (Warranty period- time/ distance is dependent on whichever occurs earlier): 96 Months or 1,50,000 kms whichever is earlier
50.8.7. Number of Free Services: 3

50.9. Certification

50.9.1. The Vehicle is confirming to AIS-048 (Latest Version), Battery Operated Vehicle - Safety Requirements of Traction Batteries

50.9.2. The Vehicle is confirming to AIS-038 (Latest Version), Safety Requirements with respect to The Electric Power Train of Motor Vehicles of Categories M and N, As Defined in Rule 2 (u) of CMVR

50.9.3. The Vehicle is Confirming to AIS-038 (Latest Version), Safety Requirements with Respect to The Rechargeable Electrical Energy Storage System (REESS), of Motor Vehicles of Categories M and N, As Defined In Rule 2 (u) Of CMVR

50.9.4. The Vehicle is confirming to AIS-007 (Latest Version), Information on Technical Specifications to be submitted by the Vehicle Manufacturer

50.9.5. The Vehicle is confirming to AIS-049 (Latest Version), Electric Power Train Vehicles - CMVR type Approval for Electric Power Train Vehicles

50.9.6. The Vehicle is confirming to AIS-039 (Latest Version), Electric Power Train Vehicles - Measurement Of Electrical Energy Consumption

51. Dent Puller

51.1. Basic Indicative Diagram

51.2. Should be used for low thickness car body elements (bonnet, door, roof panel, wings)
51.3. Input Voltage: 220 V, 50/60 Hz
51.4. Rated Input Power: 11.5 KVA
51.5. Rated Input Current: 1800 A
51.6. Maximum Input Current: 32 A
51.7. Output Voltage: 1-11 V (Adjustable)
51.8. Welding Time: 0-99 Seconds (Adjustable)
51.9. Metal Diameter Capacity: 0.8 to 1.2 mm
51.10. Should be supplied with Portable hand-held welding gun with trolley
51.11. Main unit should be detachable for working in confined spaces
51.12. Voltage transformer for high output voltage and heavy-duty load
51.13. Mobility features: Two universal wheels, two caster wheels and a portable handle
51.14. Should be capable to recover small dents with one-time pull
51.15. Standard Accessories
    51.15.1. Welding Gun
    51.15.2. Dent Pulling Hammer

52. Denting Hammer Kit

52.1. Basic Indicative Diagram

52.2. Tools should be inside the hard foam so that the tools are in its place when placed back after usage

52.3. Should consists of

52.3.1. Punch and Chisel - Set of 5 Nos.

- Chrome plated for corrosion resistance,
- Should be heat treated

52.3.2. Ball pin hammer - 200 grams

- Head material is medium carbon steel with black baked paint finish,
- Normal polished on striking face

52.3.3. Soft face hammer - 300 mm

- Combination steel and soft face dead blow,
- One-piece urethane or equivalent construction

52.4. The set should be in the hard plastic/ metal box

53. Denting Kit Set

53.1. Basic Indicative Diagram

53.2. Should consists of

53.2.1. Bumping Hammer - 1 No.
- Extra large faces for large area work
- Serrated for shrinking and smooth for finishing

53.2.2. Pick and Finish Hammer - 1 No.
- For bumping when filing or where metal is covered with sound-proofing material

53.2.3. Curve Dolly - 1 No.
- For dinging flat surfaces,
- Measures 4 3/4" X 2 1/4" X 11/16", 1000 Grams

53.2.4. Double End Dolly - 1 No.
- For use in sharp corners and wide radii,
- Measures 3" X 2 1/4" X 1 3/8"; 800 Grams

53.2.5. Shrinking Dolly - 1 No.
- For deep, skirted fenders and shrinking when using heat
- Measures 3" X 2 1/4" X 1 3/8", 800 Grams

53.2.6. Utility Dolly - 1 No.
- Essential for supporting irregular shapes and contours on doors, fenders and other body panels
- Thin profile to get in tight areas, should not scratch surface; 3 3/4" W X 5 3/4" L

53.3. The set should be in the hard plastic/ metal box

54. Ultrasonic Injection Cleaning Equipment

54.1. Basic Indicative Diagram

54.2. Functions

54.2.1. Uniformity/ Sprayability Test: Should be able to test the uniformity of injecting amount of each injector, and to monitor the spraying status of each injector with the help of backlight.

54.2.2. Leakage Test: Should be able to test the sealing and dribbling conditions of injectors under system pressure.

54.2.3. Injecting flow test: Should be able to check the injecting amount of the injector in 15 seconds of constant injection.

54.2.4. Auto test: Should be able to test injectors by simulating different working conditions.

54.2.5. Ultrasonic cleaning: Should be able to perform simultaneous cleaning on several injectors and to remove the carbon deposits on the injector completely. It should be provided with proper cleaning agent.

54.2.6. On-vehicle cleaning: The unit should be equipped with various adaptors and couplers that facilitate cleaning on the injectors on vehicle.

54.2.7. Couplers and demo injectors should be provided.

54.3. Features

54.3.1. It Should be suitable for all EGI (Exhaust Gas Ignition) vehicles and should help to achieve automatic cleaning and testing of injectors.

54.4. Working conditions:

54.4.1.	Temperature:	-10 ～ +45 Degree Celsius
54.4.2.	Relative humidity:	< 85%
54.4.3.	Intensity of outer magnetic field:	< 400A/m
54.4.4.	No naked flame within:	2 meter

54.5. Specifications:

54.5.1.	Main unit power supply:	AC 220V ± 10%, 50 Hz
54.5.2.	Ultrasonic cleaner power:	100W
54.5.3.	Simulated RPM Range:	10 ～ 9990 RPM; Step: 10 RPM
54.5.4.	Time range:	1～9999s
54.5.5.	Pulse width:	0.5～25ms; Step 0.1 ms
54.5.6.	Fuel tank capacity:	3500 to 4000ml (± 10%)
54.5.7.	Dimensions:	400mm X 400mm X 600mm; (± 10%)

54.5.8. Weight: 30 Kg (± 10%)

55. Compression Testing Gauge - Suitable for Diesel Engine with Standard Accessories

55.1. Basic indicative diagram

55.2. Quick-connect adapter Push pressure scale: 0 <> 1000 PSI, 0 <> 7000 KPA
55.3. Reads pressure from 0 to 1000 PSI
55.4. 2-9/16" diameter gauge
55.5. Thumb button air release
55.6. Should be supplied with adapters for Suzuki, Hyundai, GM, Ford, Isuzu, Mercedes, Toyota, Volkswagen and Peugeot.
55.7. All above items should be placed secured in a blow molded plastic box or metal box

56. Two Post Car Lift - Capacity 4 Ton, Electric Operated

56.1. Basic Indicative Diagram

56.2. Paint: Powder coat mat finish
56.3. Mechanical lock: Single point lock release
56.4. Arm Lock: Spring loaded lock
56.5. Arm Design: Symmetric design
56.6. Post Design: Symmetric design
56.7. Piston: Direct drive hydraulic piston for fast and steady operation
56.8. Technical specification

56.8.1.	Lifting Capacity:	4 Tons
56.8.2.	Over all Height:	3500 mm ± 5 %
56.8.3.	Over all Width:	3400 mm ± 5 %
56.8.4.	Under Bar Clearance:	3300 mm ± 5 %
56.8.5.	Inside Column Distance:	2800 mm ± 5 %
56.8.6.	Load Distribution:	1: 1
56.8.7.	Lifting Time:	< 45 seconds.
56.8.8.	Drive through clearance:	2500 mm ± 5 %
56.8.9.	Maximum lifting height:	1800 mm ± 5 %

56.9. Lifting arm adjustment

56.9.1.	Max / Min Front:	780 / 1140mm ± 5 %
56.9.2.	Max / Min Rear:	780 / 1140mm ± 5 %
56.9.3.	Power Supply:	380 V AC, 3 Phase, 50Hz
56.9.4.	Motors:	3.0 HP

57. Radiator Pressure Tester

57.1. Basic Indicative Diagram

57.2. Reduces system filling time, eliminates airlocks and checks for system leaks
57.3. Compact size allows access in restricted under hood areas
57.4. Cone adaptor ensures unit will work on most Indian passenger vehicles and light trucks
57.5. Push-button control valve should be provided to eliminates the need to interchange hoses
57.6. Shop air (90 PSI) to quickly draw a powerful vacuum
57.7. Should eliminates system bleeding and purging
57.8. All above items should be placed secured in a blow molded plastic box or metal box

58. Glow Plug Tester

58.1. Basic Indicative Diagram

58.2. Should enable fast diagnosis of glow plug failure or degradation without the need to disassemble the plug from the engine.
58.3. Suitable for any 12 Volt DC vehicle system.
58.4. Should connect directly to vehicle battery.

59. Tyre Changer Machine

59.1. Basic Indicative Diagram

59.2. Turn table

59.2.1.	Inside clamping capacity:	12 - 24"
59.2.2.	Outside clamping capacity:	10 - 22"
59.2.3.	Maximum Tyre diameter:	1000 mm
59.2.4.	Maximum Tyre width:	13"
59.2.5.	Rotation Speed:	6.8 RPM ± 5%
59.2.6.	Bead Loosener Range:	70-340 mm
59.2.7.	Clamping Cylinders:	2
59.2.8.	Motor Power:	0.75 HP

59.3. Mounting Tool

59.3.1.	Column:	Fixed
59.3.2.	Head clamping:	Manual
59.3.3.	Power Supply:	Single Phase, 230V
59.3.4.	Operating Pressure:	8 -10 Bar
59.3.5.	Number of Pedals	4/ 5 Pedals

59.4. Accessories

59.4.1.	Tyre Lever:	Yes
59.4.2.	Plastic protection for Mounting Nose:	Yes
59.4.3.	Manual Inflator:	Yes
59.4.4.	FRL:	Yes

60. Tyre Pressure Gauge with Holding Nipple

60.1. Basic Indicative Diagram

60.2. Easy change chuck system
60.3. 1 button operation
60.4. Auto shut-off for increased battery life
60.5. Displays KgF, BAR, PSI, KPA measurements
60.6. Large face LCD digital read-out
60.7. Unit covered with rubber sleeve for extra comfort and durability
60.8. ON power Button, auto shut off in 90 seconds if not in use
60.9. LCD backlight
60.10. 2-position lever - 1st position deflates, 2nd position inflates
60.11. With 21” hose and 2 AAA batteries

61. Wheel Alignment Machine - Computerized 3D

61.1. Basic Indicative Diagram

61.2.	Measurement System:	True 3D modeling of vehicle spindle Plane	
61.3.	Camera support configuration:	Fixed Beam.	
61.4.	Installation Configuration:	Suitable in Wheel alignment PIT as well as the Alignment lift	
61.5.	Wheel Clamp Range:	Rim clamp - self centering clamp 11" to 22"	
61.6.	Measuring Range		
61.6.1.	Track Width:	48 to 96"	
61.6.2.	Wheel Base:	79" to 180"	
61.6.3.	Individual Toe:	± 35 degree	
61.6.4.	Camber:	± 55 degree	
61.6.5.	Caster and SAI:	± 30 degree	
61.7.	Toe out on turns		
61.8.	Hardware:	2 Camera version with PC	
61.9.	Software:	Window based application software	
61.10.	System Footprints:	Turn table center to camera system front 82" - 111"	
61.11.	Accuracy and Range	Accuracy	Range
61.11.1.	Camber	0.05 deg	55 deg
61.11.2.	Caster	0.08 deg	30 deg
61.11.3.	Kingpin	0.08 deg	30 deg
61.11.4.	Toe	0.04 deg	35 deg
61.11.5.	Setback	2.5mm/0.1"	
61.11.6.	Thrust Angle	0.02 deg	35 deg
61.11.7.	Included Angle	0.13 deg	30 deg
61.11.8.	Lock Angle	0.06 deg	35 deg
61.11.9.	Toe out Turn	0.03 deg	measured at 20 deg
61.12.	Power Supply:	230 VAC, 1Phase, 50 Hz	
61.13.	Display Type:	Monitor	

61.14. Should be supplied with Printer, Set of 4 clamps and targets
61.15. Machine Weight: 70 Kgs (± 10 %)
61.16. Suitable in Wheel alignment PIT will be provided by the institute.
61.17. Supplier has to submit necessary drawing in advance.
61.18. Fixed 3D Camera Beam - 3D Imaging Alignment technology,
61.19. Four Wheel alignment
61.20. Two camera technology
61.21. Suitable to measure caster, camber, sai and rear toe and camber

62. Wheel Balancing Machine

62.1. Basic Indicative Diagram

62.2. Max Wheel Weight: 60 Kg
62.3. Rim Diameter: 12” ~ 22”
62.4. Rim Width: 1.5” ~ 16”
62.5. RPM: 200 RPM
62.6. Accuracy: 3 Grams
62.7. Features
- 62.7.1. Optimization
- 62.7.2. Hidden Weight
- 62.7.3. 5 Alloy Modes
- 62.7.4. Motorcycle Mode
- 62.7.5. Real plane imaging (RPI) technology
- 62.7.6. Required wheel guard

63. Car Air Conditioning Service Unit

63.1. Basic indicative diagram

63.2. Service Processes

63.2.1.	Refrigerant Extraction and Recycling:	Fully Automatic
63.2.2.	Draining Old Oil :	Automatic
63.2.3.	Evacuation/ Creating Vacuum:	Automatic
63.2.4.	Vacuum Check / Leak Check:	Automatic
63.2.5.	Fresh Oil Filing:	Automatic
63.2.6.	Refrigerant Filing:	Automatic

63.3. Operation and Display

63.3.1.	Process Control:	User friendly display
63.3.2.	Display:	7” Touch Screen
63.3.3.	Pressure Gauge for HP/LP (100 mm):	Should be available
63.3.4.	Manual Evacuation Time Adjustment:	Should be available
63.3.5.	Status Display:	72 A/audio
63.3.6.	Maintenance Tasks Display:	Static Diagnosis
63.3.7.	Printer:	Should be provided
63.3.8.	UV dye injection should be provided	

63.4. Recovery/ Recycling/ Recharge

63.4.1.	Refrigerant:	R134a
63.4.2.	Internal Reservoir (Refrigerant Bottle):	18 liters
63.4.3.	Compressor:	3/8 HP
63.4.4.	Vacuum Pump Power:	120 L/min
63.4.5.	Refrigerant Filling Accuracy:	± 10 gm

63.5. General Equipment Data

63.5.1.	Power Supply:	230 V

63.6. Standard Accessories

63.6.1. Service Hoses HP/LP
63.6.2. Quick Connectors HP/LP
63.6.3. Oil Bottles - 2 Nos.

64. Automotive Battery Charger

64.1. Basic Indicative Diagram

64.2.	Input:	230 V AC / 50 HZ
64.3.	Charging Mode:	Manual
64.4.	Output:	6/12 V
64.5.	Charging current:	2/10/40 A
64.6.	Boost/Start:	200 A
64.7.	Meter Display should be available	
64.8.	Adapter battery capacity range:	4-400 AH
64.9.	Adapter battery:	GEL/AGM/STD lead battery
64.10.	12V FUL detection	
64.10.1.	GEL Model:	Voltage > 13.8 ± 0.2V and Current < 0.8 ± 0.5A, FUL
64.10.2.	AGM Model:	Voltage > 14.8 ± 0.2V and Current < 0.8 ± 0.5A, FUL
64.10.3.	STD Model:	Voltage > 14.5 ± 0.2V and Current < 0.8 ± 0.5A, FUL
64.11.	6V FUL detection	
64.11.1.	GEL Model:	Voltage > 6.9 ± 0.3V and Current < 0.8 ± 0.5A, FUL
64.11.2.	AGM Model:	Voltage > 7.4 ± 0.3V and Current < 0.8 ± 0.5A, FUL
64.11.3.	STD Model:	Voltage > 7.2 ± 0.3V and Current < 0.8 ± 0.5A, FUL

65. Automotive Battery Tester/ Analyser

65.1. Basic Indicative Diagram

65.2. Should have integrated thermal printing facility.
65.3. Should be designed for testing all types of 6V and 12V starter batteries, including Lead Acid, Gel and AGM,
65.4. Bad cell detection capability.
65.5. Should have voltmeter mode for testing both the Starter and the Charging System, Anti-sparking clamps for safe operation.
65.6. Should have Back-Lit Display, 4 Lines 16 Characters LCD for easy viewing.
65.7. Button layout and housing design should allow for one-handed operation.
65.8. Test Range: 100-1400 CCA (Cold Cranking Amps)
65.9. Starter system testing: Pressing the down arrow should display the captured voltage from cranking the engine.
65.10. Charging system testing: Pressing the up arrow should display the captured high voltage from the alternator.
65.11. Detachable Test Lead: 50cm/2”
65.12. Screen Size: 75mm x 40mm (± 5%)
65.13. Voltmeter: 7.6V ~ 17V via Battery Clamp
65.14. Clamp Size: 90 mm
65.15. Weight: 500 Grams (± 5%)

66. Battery Terminal Cleaner Tool

66.1. Basic Indicative Diagram

66.2. Length: 3 - 3/8 inch
66.3. Stiff wire bristles

67. Air Blow Gun with accessories

67.1. Basic Indicative Diagram

67.2. Die Cast Al construction
67.3. Extended 9 inch X ø 6.2mm(ID) long aluminum tube
67.4. 1/2 inch rubber tip
67.5. 5m polyurethane coil Hose, Kink resistant and lightweight
67.6. Hose ID ø 5mm, Hose OD ø 8mm; ¼ inch Threads
67.7. Hose material PUR - Ester
67.8. Hose Hardness 98 Shore 'A'
67.9. Polyacetal bend restrictors
67.10. Burst Pressure 508PSI (35 Bar)
67.11. Crimped with solid brass swivel (360°) with quick change connector of Steel construction with standard seal material suitable for air application
67.12. Compressed air pressure less than 30 PSI when outlet blocked
67.13. Solid Brass swivel fittings at both ends offer 360° rotation
67.14. Noise level should be <85dBA
67.15. Each gun should includes hanging hook and paddle-type air control lever
67.16. Variable flow trigger for precise air flow control
67.17. Six-outlet "star tip" delivers an even distribution of air
67.18. 4" Full Flow tube and ergonomic handle for increased comfort
67.19. Triggers regulate airflow from partial to full line pressure
67.20. Maximum Working Pressure: 175 PSI (12 bar)
67.21. Should comply with OSHA safety standards
67.22. Valve should have no cutoff and no restrictions
67.23. Each tip should be side vented
67.24. Air Inlet: 1/4" NPT

68. Air Impact Wrench with Impact Sockets

68.1. Basic Indicative Diagram

68.2. ½ Inch Sq. drive Impact Wrench,
68.3. Handle Housing Material: Aluminum, Front case material: Steel
68.4. Max. Torque-745 Nm (@15s)
68.5. Air Inlet ¼ inch , Net Weight 2.3 kg max (± 10%)
68.6. Air consumption 4 CFM max.
68.7. Twin hammer mechanism with front Exhaust
68.8. 3 speed position control to adjust tool speed
68.9. ½ Inch 14 Piece Cr Mo impact socket set: 10mm, 11mm, 12mm, 13mm, 14mm, 15mm, 16mm, 17mm, 18mm, 19mm, 21mm, 22mm, 24mm
68.10. Impact sockets in Blow Mould Case
68.11. Hardness of Impact sockets 38 - 55 HRC with Super Grip Profile
68.12. Black Oxide Finish
68.13. Torque: 1.5X ANSI/1.3X DIN
68.14. Brand and Size etched on each individual socket to ensure quick and convenient identification
68.15. ½ Inch (F) to 3/8 inch (M) impact reducer adaptor with same material construction as of impact sockets.

69. Engineers Stethoscope

69.1. Basic Indicative Diagram

69.2. Should be able to locate noises in engines or bearings and other moving parts
69.3. High quality surgical grade PVC and rubber parts for increased sound definition
69.4. Plastic ear pieces to minimize outside noise with aluminium alloy probe / needle for finding exact location of specific noises
69.5. Sensor clamp helps to detect noises during test drives that can not be duplicated in the work bay
69.6. Sensor tip mounted on 6” flexible shaft allows access to hard-to-reach areas
69.7. 5" inductive metal probe allows user to pinpoint source of noise or vibration
69.8. Ultra sensitive microphone provides a full range of sound
69.9. Rotary volume control allows easy adjustment
69.10. Ear-bud style earphones provide excellent sound quality

70. Grease Gun - 500 grams

70.1. Basic Indicative Diagram

70.2. 150 mm rigid Steel extension and 4 jaw coupler
70.3. Aluminium die Cast grease gun head with built - in release wall
70.4. Soft Rubber grip on lever handle
70.5. Powder Coated Body
70.6. Delivers: Upto 1 Gram/ Stroke
70.7. Develops: Upto 6,000 PSI
70.8. 500 gms Bulk Capacity/ 400gms with Cartridge

71. Oil Can - 500 ml

71.1. Basic Indicative Diagram

71.2. Metal Oil can with 500ml Capacity
71.3. 150 mm rigid Steel spout
71.4. Tin coated Steel body with premium powder coated finish
71.5. Steel pump with double ball check
71.6. Discharge of 16 - 18 ml per 10 strokes with general Mobil oil

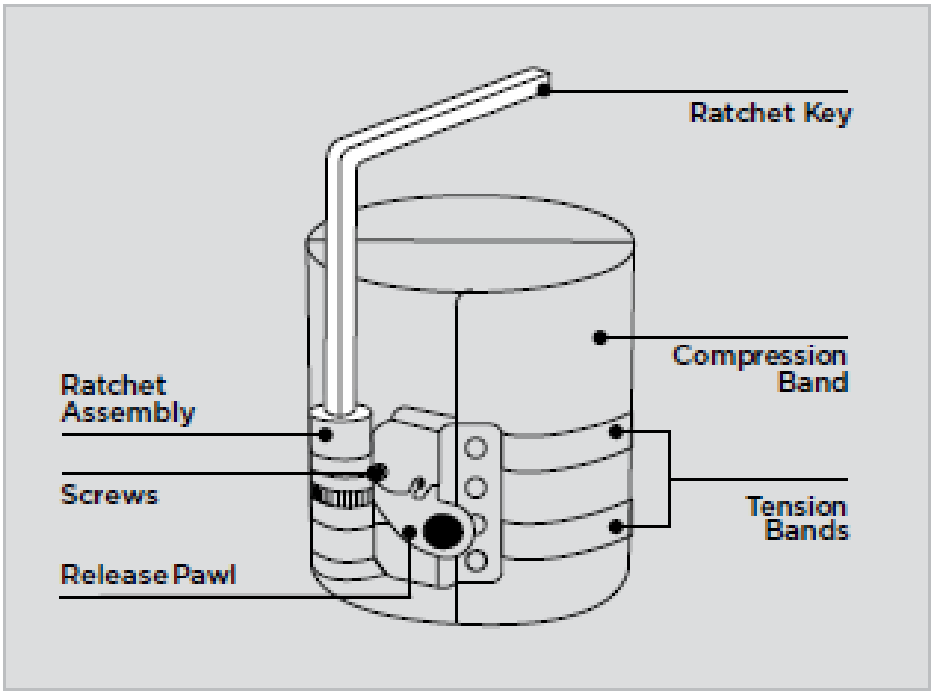
72. Oil Filter Wrench - upto 500 mm

72.1. Basic Indicative Diagram

72.2. Oil filter wrench with strap Length 500mm min.
72.3. Comfortable Vinyl Grip
72.4. Compatible for Engine oil filter upto ø 4 inch (100mm)
72.5. Should be Plated Steel body

73. Piston Ring Compressor - 50 mm to 100 mm

73.1. Basic Indicative Diagram



73.2.	Material:	High Grade Spring Steel
73.3.	Minimum Ring Diameter:	50 mm
73.4.	Maximum Ring Diameter:	125 mm
73.5.	Height:	75 mm
73.6.	Comes with Ratchet key	
73.7.	Friction proof edges	

74. Piston Ring Expander and Remover - 50 mm to 100 mm

74.1. Basic Indicative Diagram

74.2. Capacity: ø 50 - 100 mm
74.3. Overall Length: 215mm
74.4. Material: High Grade Special Tool Steel
74.5. Finish: Bright Nickel Plated

75. Piston Ring Groove Cleaner

75.1. Basic Indicative Diagram

75.2. Handles pistons ø 1 inch to 5 inch
75.3. For pistons with grooves of sizes i.e. cutter wheel sizes
- 75.3.1. 5/64 inch
- 75.3.2. 3/32 inch
- 75.3.3. 1/8 inch
- 75.3.4. 5/32 inch
- 75.3.5. 3/16 inch

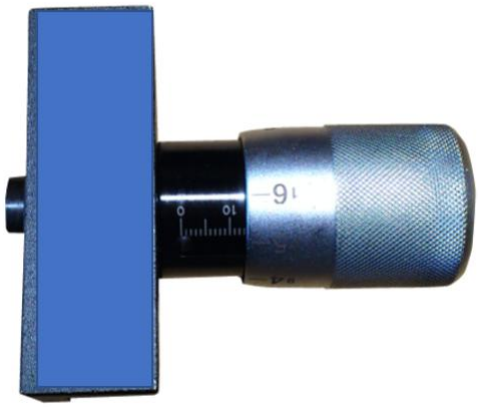
76. Suspension Coil Spring Compressor - Pair

76.1. Basic Indicative Diagram

76.2. Drop forged Cr Mo Steel jaws and lead screws (370mm)
76.3. CR - MO Construction
76.4. Should be able to use with 21mm wrench or 1/2 inch square drive tools
76.5. Should be able to wrap coil claws for safety

77. Belt Tensioner Gauge

77.1. Basic Indicative Diagram



77.2. Should be used to measure and set the tension of the cam belt
77.3. Should be used on vehicle belts where the manufacturer specifies the timing belt tension to be set at a specific location on the belt span between pulleys
77.4. Should have clear incremental markings with knurled knob for accurate measurement
77.5. Should speed up timing belt installation
77.6. Readings should be provided in Nm
77.7. Should be suitable for belts with a widths between 2 and 8 mm
77.8. Should be supplied in a foam inlay box
77.9. Length: 95 mm (± 10%)
77.10. Width: 80 mm (± 10%)
77.11. Height: 40 mm (± 10%)
77.12. Weight: 0.35 Kg (± 10%)

78. Car Jet Washer with Standard Accessories

78.1. Basic Indicative Diagram

78.2. Motor:

- 78.2.1. Phase: 3 Phase
- 78.2.2. Power: 1 HP
- 78.2.3. Pulley diameter: 80 mm
- 78.2.4. With starter

78.3. Type of Mounting: Stationary base with heavy duty stand

78.4. Material of Chassis: Mild Steel as per IS:2062 (Grade-A)

78.5. RPM: Minimum 1400

78.6. Minimum discharge: 10 Liters/ minute

78.7. Minimum Working Pressure: 18 Kg/Cm^2

78.8. Plungers: 03 Nos. of Reciprocating Plungers

78.9. Electrical Cable: 5 meters

78.10. Hose Length: 8 meters

78.11. Jet Gun:

- 78.11.1. Quantity: 1 No.
- 78.11.2. Material: Brass Nozzle
- 78.11.3. With pressure regulator and gauge
- 78.11.4. With water filter

79. Auto Electrical Work Bench

79.1. Basic Indicative Diagram

79.2. General Features:

79.2.1. The readings can be read through digital meters - 10” touch screen LCD Monitor
79.2.2. 3 HP, 3 Phase, 1440 RPM motor induction motor suitable for 50 Hz / 415 V AC Supply
79.2.3. 3HP, 3 Phase, Variable frequency drive for speed variation suitable for induction motor suitable for 50Hz / 415 V AC Supply
79.2.4. Alternator loading up to 100 A / 14 V and 60 A / 24 V
79.2.5. Heavy duty transformer for starter testing with light run test
79.2.6. Poly V/ V groove/ small pulley for alternator checking
79.2.7. Interface PLC Modules with Relay modules
79.2.8. Battery charging ammeter to read the battery current
79.2.9. Heavy duty rugged frame for mounting alternator and starter
79.2.10. Three phase 4 pole isolator switch
79.2.11. All tripping MCB’s available
79.2.12. PCB / bat excitation available
79.2.13. Accessories like bulbs/ fuses/ belts and cables for test of alternator/ starter/ continuity/ battery along with manual and calibration certificates to be provided
79.2.14. Facility to check continuity test of excitation winding using 6 V - DC Output
79.2.15. Facility to check short circuit of starter/ alternator- rotor using 40/ 80 V AC
79.2.16. Dimensions: Length X Width X Height: 800mm X 850mm X 650mm (Approx.)
79.2.17. Weight: 150 Kgs (Approx.)
79.2.18. Facility to charge battery using appropriate cable harness

79.3. Components of Auto Electrical Test Bench:

79.3.1. HMI Based 10” LCD Touch Screen Monitor
79.3.2. 16 Channel Relay Module For Interface
79.3.3. ECU Simulation LIN Based PLC System With DI/ DO/ AI/ AO/ LIN/ 485 Protocol

79.3.4.	Motor 5HP(3.7KW), 50 Hz, 415 Volt AC	1 No.
79.3.5.	Variable Frequency Drive 415V 3PH ,3HP/2.2Kw	1 No.
79.3.6.	Diode, 150 A, 400 V	4 Nos.
79.3.7.	Transformer, 12V / 200 A, 24 V / 150 A	1 No.
79.3.8.	Transformer, 0-240 V Primary, 12-0-12 V Secondary	1 No.
79.3.9.	Transformer, 0-240 V Primary, 0-6V-40V-80V Secondary	1 No.
79.3.10.	Contactor, 25 A, 240V Coil	1 No.
79.3.11.	Contactor, 9 A, 240V Coil	1 No.
79.3.12.	Timer, Aux 240 V	1 No.
79.3.13.	Toggle Switch, Double Pole Double Throw 6 A 240 V	4 Nos.
79.3.14.	Shunt 30 A, 75 mV	1 No.
79.3.15.	Toggle Switch, Single Pole Single Throw 6 A 240 V	1 No.
79.3.16.	MCB Single Pole, 25 A 240 V, 50 Hz	2 Nos.
79.3.17.	Isolator Double Pole, 63 A 240 V, 50 Hz	1 No.
79.3.18.	40 A 4 Pole main switch isolator	1 No.
79.3.19.	Rotary Switch, 15 A, 220 V	8 Nos.
79.3.20.	Fuse Holder	2 Nos.
79.3.21.	Push Button, Green	2 Nos.
79.3.22.	Push Button, Yellow	1 No.
79.3.23.	Normally Open Element, Green 240 V, 10 A	3 Nos.
79.3.24.	Normally Closed Element, Red 240 V, 10 A	1 No.
79.3.25.	Indicator, 22.5 Mm R / Y / B	4 Nos.
79.3.26.	Emergency Switch	1 No.
79.3.27.	Shunt, 200 A 75mv	2 Nos.
79.3.28.	Terminals: BTI-100, 100 A Red and Black	2 No Each
79.3.29.	Terminals: BTI-60, 60 A Red	3 Nos.
79.3.30.	Terminals: BTI -30, 30 A Red and Black	1 No. Each
79.3.31.	Terminals: BS-5 Red	9 Nos.
79.3.32.	Terminals: BS-5 Black	6 Nos.
79.3.33.	Terminals: BS-5 Yellow	1 Nos.
79.3.34.	LED Holder / Led: 10 mm	4 Nos.
79.3.35.	Resister: 2.7 Ohm / 350 W	2 No.
79.3.36.	Resister: 1.4 Ohm / 350 W	11 Nos.
79.3.37.	Solenoid Switch: 12 V DC	2 Nos.
79.3.38.	Fan: 240 V, 4” Cooling Fan	2 Nos.
79.3.39.	Relay: 12V DC, 250 Ohm, 10 A	1 No.
79.3.40.	Single Phase Preventer: 415 V, 50 Hz	1 No.
79.3.41.	Bridge: 35 A	1 No.
79.3.42.	Mounting Bushes	4 Nos.
79.3.43.	Wires	As Required
79.3.44.	Metal Chassis	
79.3.45.	Mounting Vice (X-Y directional movement and V block with clamping arrangement)	1 No.
79.3.46.	Pulley 28 Bore for multispeed	1 No.
79.3.47.	Vacuum Kit with Tank	1 No.
79.3.48.	PCBs: Power / Control	2 Nos.
79.3.49.	V Belt / Poly V Belt: A-52 / A42 / 6pk 1345	
79.3.50.	6 Sq.mm Terminal Block	1 No.
79.3.51.	Hylams (Different sizes)	05 Sizes
79.3.52.	Front Plate	01 No.
79.3.53.	RPM variation potentiometer 5K	01 No.
79.3.54.	Auto transformer 0-220 V, 8 Amps with motor	01 No.

79.4. Programmable Controller Module
- 79.4.1. Power: 12VDC, 2A
- 79.4.2. Digital Output Isolated 14 Channels
  - High Side 12V Coil Relay Drives
  - 300mA, Resettable Fuse
  - Freewheeling Protection
- 79.4.3. Non-Isolated 3 channels (3.3V output): Can be used to trigger external Relay Drives
- 79.4.4. Digital Inputs: 4 Isolated Channels, 12V
- 79.4.5. High-Speed Counter / Frequency Measurement
- 79.4.6. Analog Measurement: 0-30VDC: 4 Channels , 0-75mV: 2 Channels
- 79.4.7. Communication: 1 X RS485, 1 X RS232, 1 X USB-CDC, 1 X LIN Comm
- 79.4.8. Micro-SD Data Storage for System Configuration

79.5. Relay board
- 79.5.1. This product is autorich machinery and automation.
- 79.5.2. Relay card OMRON 1 C/O 8 channel, 24 V DC
- 79.5.3. Relay module for industrial suitability.
- 79.5.4. Switching current upto 12 A at 230 V AC (or 30 V DC)
- 79.5.5. Low coil drive current (4.7 mA to 100 mA)
- 79.5.6. Easy to replace pluggable relays.
- 79.5.7. Possibility of bussing (jumpering) relays in common negative and common positive configuration.
- 79.5.8. Freewheeling diode across relay coil.
- 79.5.9. Mounting options available: din rail mounting and panel mounting.
- 79.5.10. Relay OMRON make, 5amp. Heavy duty OMRON make relay
- 79.5.11. 12amp. Heavy duty OMRON make relay, contact material – copper
- 79.5.12. Input voltage - 24VDC
- 79.5.13. Application - control panel
- 79.5.14. Din rail mounting
- 79.5.15. AUTORICH relay card OMRON 1 c/o 8 channel,24VDC, relay module for industrial suitability.
- 79.5.16. Switching current upto 5 A at 230 V AC (or 30 V DC)
- 79.5.17. Low coil drive current (4.7 mA to 100 mA)
- 79.5.18. Easy to replace pluggable relays.

79.6. 10” Touch Screen Display
- 79.6.1. 10" HMI with Resistive touch screen colour display with serial (RS485/RS232)
- 79.6.2. Features: Inbuilt ladder, macros and RTC functions
- 79.6.3. Third party Inbuilt Communication protocols
- 79.6.4. Functionalities: User management, alarm management, data logging capability (with internal 128MB and USB Disk)
- 79.6.5. Auxillary Supply: 12VDC

79.7. Voltage LCD in built
- 79.7.1. Maximum Display 1999 Counts l Resolution 1 Count
- 79.7.2. Polarity Indication “-” is indicated for Negative Input
- 79.7.3. Over Range Indication “1” or “-1”
- 79.7.4. 0- 199.9 V voltage measurement range

79.8. Ammeter LCD in built
- 79.8.1. Maximum Display 1999 Counts l Resolution 1 Count
- 79.8.2. Over Range Indication “1” or “-1”
- 79.8.3. 0-1000 Amps current measurement range

79.9. RPM Meter LCD in built

79.9.1. Maximum Display 6000 Counts l Resolution 1 Count

79.10. Motor

79.10.1. TEFC Class F Insulation foot mounted induction motor

79.10.2. AC Supply Voltage 415 V ± 10%, 50 Hz ± 5% class F insulation

79.10.3. 4 pole motor with foot mounting 1440 RPM max

79.10.4. Frame Size: 100 S/M 4 pole

79.11. Diodes with Aluminium Heat Sink

79.11.1. Maximum Average forward current (T=130o): 150 A

79.11.2. Maximum Peak forward voltage drop: 1.4 V

79.12. Step Down Transformer

79.12.1. Copper wound foot mounted with CRNO core

79.12.2. Step down type of winding

79.12.3. 2.8KVA rating

79.12.4. AC Supply Voltage: 240 V ± 10%, 50Hz ± 5%, Class F Insulation

79.12.5. Ambient Max Temperature of 120 deg

79.12.6. Output Voltage: 15 V ± 10%

79.12.7. Output Current: 150 A max @ 15 V

79.13. Contactor / Overload Relays

79.13.1.	Contactor application:	Motor control
79.13.2.	Poles description:	3P
79.13.3.	Pole contact composition:	3 NO
79.13.4.	Control Circuit Type:	AC 50 Hz
79.13.5.	Control Circuit Voltage:	240 V AC 50 Hz
79.13.6.	Auxiliary contact composition:	1 NO + 1 NC

79.14. MCB

79.14.1.	Rated current:	25 A
79.14.2.	Number of poles:	1P
79.14.3.	Rated operational AC Voltage:	240 V
79.14.4.	Frequency:	50 Hz
79.14.5.	Number of modules:	1

79.15. Push Button / Indicator with Element Switches

79.15.1.	Operating positions:	All positions
79.15.2.	Contact:	Block
79.15.3.	Contact Operation:	Slow Break NO or NC

79.16. 200 A/mV DC Shunt

79.16.1.	Operating Temperature:	-10°C to 55°C

79.16.2. Maximum load: The load should not exceed 0.1% of the nominal current rating for specified accuracy.

79.17. Terminals - Push Button / Indicator with Element Switches

79.17.1.	Mounting Arrangement:	Panel Mounting
79.17.2.	Rating:	100 A / 60 A / 30 A 240 V AC

79.17.3. Contact Material: Brass Nickel Plated
79.17.4. Insulation Material: Phenolic (Bakelite)
79.17.5. Color: Red / Black

79.18. LED Holder with LED


79.18.1. Metal holder of housing 10mm LED
79.18.2. Supply voltage: 240V MAX
79.18.3. Dimensions (L X Di): 15 X 14 mm
79.18.4. Peak Forward Current: 120 mA
79.18.5. Continuous Forward Current: 30 mA

79.19. Resistors

79.19.1. Power Rating full power dissipation at 70°C to 350°C
79.19.2. Temperature Range: -55°C to 350°C
79.19.3. Voltage Rating / Limiting Voltage / Max working Voltage V = P X R
79.19.4. Voltage Proof / Dielectric Withstanding Voltage

79.20. Cooling Fan
79.20.1. Operating Voltage: 240 V (185 – 245 VAC)
79.20.2. Insulation: Class B

79.21. DC Relay
79.21.1. Contact resistance: 50 mΩ max
79.21.2. Operate Time: 25 ms max
79.21.3. Release Time: 25 ms max

79.22. Contactor / Overload Relays (Item 36)
79.22.1. Output Contact Rating: 5 A, 240 V AC (Resistive)
79.22.2. Unbalance Trip Setting: 50 V ± 10 VAC
79.22.3. Trip Time Delay for unbalance: 3.5 Second, ± 1.5 Second
79.22.4. Resetting: Auto Reset
79.22.5. Enclosure: HIP moulded

79.23. Wires
79.23.1. Resistance as per: IS 8130
79.23.2. Tensile strength / annealing as per: IS 8130
79.23.3. Wrapping as per: IS 8130
79.23.4. Diameter as per: IS 8130

79.24. Chassis
79.24.1. Complete fabricated structure with laser cutting and Turret punching
79.24.2. Angles and CRCA sheets
79.24.3. Powder coated
79.24.4. Heavy duty mounting flats at the corners for base mounting bush

79.25. Standard Accessories
- 79.25.1. Accessories / Attachment Required for Auto Electrical Test bench
- 79.25.2. Alternator cable: 01 No.
- 79.25.3. Starter cable: 01 No.
- 79.25.4. Battery cable: 01 No.
- 79.25.5. Continuity Test cable: 01 No.
- 79.25.6. Belts: 2 sizes
- 79.25.7. Bulbs / Fuses 01 each
- 79.25.8. Operation Manual: 01 No.
- 79.25.9. Maintenance Chart / Schedule: 01 No.

79.26. Other Features
- 79.26.1. Safety requirements: Emergency stop button

79.27. Space Requirement for Installation
- 79.27.1. Floor arrangement in mm: 1000 mm X 1000 mm (Approx.)

79.28. Foundation / Installation Specification
- 79.28.1. Mechanical and electrical and civil Installation and commissioning, loading and unloading will be done by bidder at site.

79.29. Electric Supply Specification
- 79.29.1. Mains Supply: 415 V AC, 3 Phase, 50 Hz AC Power supply

79.30. Variable Speed Drive
- 79.30.1. LCD Display Type
- 79.30.2. Programmable
- 79.30.3. 3HP/2.2 KW 415V 50HZ
- 79.30.4. Output variation from 0 to 415V
- 79.30.5. Speed setting through potentiometer
- 79.30.6. 0-5000 RPM settable range

79.31. Auto transformer
- 79.31.1. Copper wound foot mounted with CRNO core
- 79.31.2. 220 V 8 Amps capacity
- 79.31.3. Fitted with motor and gears
- 79.31.4. Motor rating 3 Kg-cm torque
- 79.31.5. 0-220 V variation with arm rotating
- 79.31.6. Push button motor operation

79.32. List of Experiments/ Practicals to be performed
- 79.32.1. LIN (Local Intra Network) Based Alternator Testing Simulation
- 79.32.2. Multifunction Based Alternator Testing
- 79.32.3. WL Lamp Type and Mono Type Alternator Testing
- 79.32.4. Simulation of ECU Based Communication Alternator Testing
- 79.32.5. RPM Vs Output (KW, Amps) Graph Plotting for Alternator
- 79.32.6. Dashboard Battery Lamp Simulation of Alternator from 0 Rpm and to plot the cut in RPM Data
- 79.32.7. Battery less Alternator Testing and Plotting of RPM/ Output Graph
- 79.32.8. Frequency Output Simulation
- 79.32.9. Rotor Energisation Test for Alternator
- 79.32.10. Voltage Regulation Test for Alternator
- 79.32.11. Low RPM High Load, High RPM low load test for Alternator
- 79.32.12. Fault Simulation Test
- 79.32.13. Starter Solenoid Test
- 79.32.14. Starter Cranking Test without Load
- 79.32.15. Starter Amps and Voltage Test
- 79.32.16. Starter Pinion Movement Test