

MECHANIC MOTOR VEHICLE

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



SECTOR – AUTOMOBILE



सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING



Directorate General of Training



Skill India
कोशल भारत - कुशल भारत

MECHANIC MOTOR VEHICLE

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)



NSQF LEVEL - 5

Skill India
कौशल भारत - कुशल भारत

Developed By

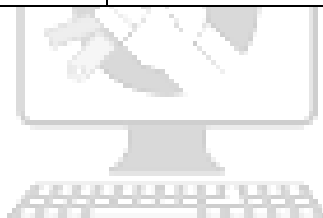
Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

ACKNOWLEDGEMENT

The DGT sincerely expresses appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum. Special acknowledgement to the following industries/organizations who have contributed valuable inputs in revising the curricula through their expert members:

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
1.	Shri S P Rewaskar ADT	ATI, Sion Mumbai	Expert
2.	Shri N J Mane VI	ATI, Sion Mumbai	Expert



Skill India
कौशल भारत - कुशल भारत

Sl. No.	Topics	Page No.
1.	Background	1 – 2
2.	Training System	3 – 7
3.	Job Role	8
4.	NSQF Level Compliance	9
5.	General Information	10
6.	Learning Outcome	11 – 12
7.	Learning Outcome with Assessment Criteria	13 - 16
8.	Syllabus	17 – 29
9.	Syllabus - Core Skill	30 – 38
	9.1 Core Skill – Workshop Calculation & Science and Engineering Drawing	
	9.2 Core Skill – Employability Skill	
10.	Details of Competencies (On-Job Training)	39 – 40
11.	List of Trade Tools & Equipment Basic Training - Annexure I	41 – 51
12.	Format for Internal Assessment -Annexure II	52

1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate (ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are four categories of apprentices namely; trade apprentice, graduate, technician and technician (vocational) apprentices.

Qualifications and period of apprenticeship training of trade apprentices vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.



Skill India
कौशल भारत - कुशल भारत

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

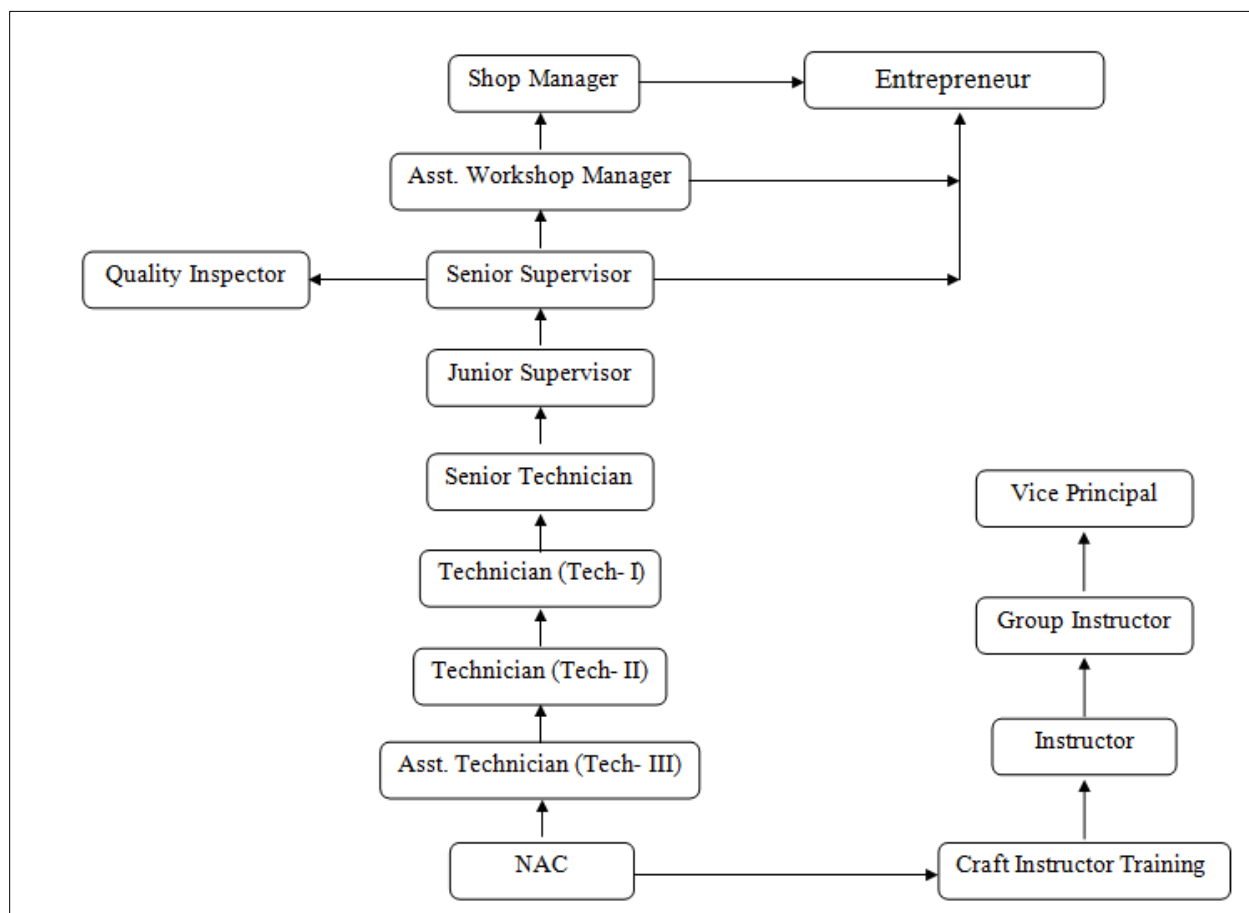
Mechanic Motor Vehicle trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Repairs overhauls and services motor vehicles to keep them in good running condition.
- Measures essential parts like cylinder, bores piston, sizes crank pins etc. using gauges, micrometer and other precision tools and gets cylinders re-bored, liners filled, valve seats refaced, bearings replaced etc. as necessary.
- Trouble shooting and rectification of engine, chassis, and auxiliary system
- State the importance of Motor vehicle act and rules
- Sensitive to environment, self-learning and productivity Communicate with required clarity and understand technical English.
- Dismantles partially or completely defective unit or parts of vehicle such as engine, gear box, rear axle, front axle, steering assembly, radiator, etc. according to nature of repairs to be done, using hoist, jack, pullers, hand tools and other devices.

2.2 CAREER PROGRESSION PATHWAYS:

- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	Block– I	-----	Block – II	-----
Practical Training (On - job training)	----	Block – I	-----	Block – II

Mechanic Motor Vehicle

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)

For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	For 01 Yr. course
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	1000	500

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline (section-2.4.2). The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check individual trainee's profile as detailed in assessment guideline (section-2.4.2) before giving marks for practical examination.**

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

Brief description of Job roles:

- Mechanic Motor Vehicle: **Mechanic Motor vehicle** repairs overhauls and services motor vehicles to keep them in good running condition.
 - Examines vehicle to ascertain nature and location of defects either by running engine or driving vehicle on road.
 - Dismantles partially or completely defective unit or parts of vehicle such as engine, gear box, rear axle, front axle, steering assembly, radiator, etc. according to nature of repairs to be done, using hoist, jack, pullers, hand tools and other devices.
 - Measures essential parts like cylinder, bores piston, sizes crank pins etc. using gauges, micrometer and other precision tools and gets cylinders re-bored, liners filled, valve seats refaced, bearings replaced etc. as necessary.
 - Repairs or overhauls and assembles engine such as replacing defective parts, scrapping bearings, setting timing, cleaning injectors, tuning carburettor, MPFI and CRDI Engines etc. according to maker's specification.
 - Replaces or repairs defective parts of gear box, rear axle, steering mechanism etc. and sets them right ensuring correct alignment, clearance, meshing of gears, specified movements and operations.
 - Relines and builds brakes, sets wheel alignment, adjust, steering, clutch, hand brakes etc fits new or repaired accessories and body parts, makes electrical connection, and performs other tasks to effect repairs.
 - Lubricates joints, tightens loose parts, tests performance of vehicle by driving on road and makes necessary adjustments to attain desired standard.
 - Trouble shooting and rectification of engine, chassis, and auxiliary system.
 - State the importance of Motor vehicle act and rules
 - Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team.
 - Communicate with required clarity and understand technical English.
 - Sensitive to environment, self-learning and productivity.
- Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity, understand and implement technical English, Sensitive to environment, self-learning and productivity.

Reference NCO & NOS 2015: 7231.0100 - Mechanic, Automobile

4. NSQF LEVEL COMPLIANCE

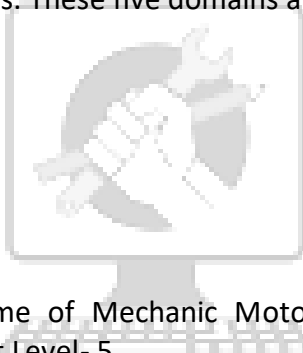
NSQF level for Mechanic Motor Vehicle trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

- a. Process
- b. Professional Knowledge,
- c. Professional Skill,
- d. Core Skill and
- e. Responsibility.



The Broad Learning outcome of Mechanic Motor Vehicle trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	MECHANIC MOTOR VEHICLE
NCO-2015	7231.0100
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months Total duration of Basic Training: 6 months
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months Total duration of Practical Training: 18 months
Entry Qualification	Passed 10 th Class with Science and Mathematics under 10+2 system of Education or its equivalent
Selection of Apprentices	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for Basic Training	As per related trades of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for Mechanic Motor Vehicle Apprenticeship	1. Mechanic Motor Vehicle

Note:

- Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.
- For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.

6.1GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Mechanic Motor Vehicle course of 02 years duration under ATS.

Block I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block-I

1. Plan & perform basic fastening & fitting operations of various parts of vehicle using various tools and equipment observing standard procedure used in automotive workshop.
2. Trace and Test Electrical and Electronic Components and Circuits and assemble to ensure functionality of system
3. Overhaul Charging and Starting System of vehicle as per standard procedure and check functioning of system.
4. Repair/ replace the defective gauges fitted on dashboard and check engine performance.
5. Overhaul and service Diesel Engine, its parts as per standard procedure, analyze engine and check functionality.
6. Service Diesel Fuel System as per manufactures guidelines and check proper functioning.
7. Analyze and adjust Engine Emissions Control Systems.

Block-II

8. Plan and overhaul the Petrol Engine, check functionality and analyze to perform engine tune up.
9. Test functionality of Multi Point Fuel Injection Components and Electronic Components of Petrol Vehicle and analyze to repair/ replace defective gauges.
10. Overhaul and Service the Air Conditioning system Components, Air Conditioning and check functionality of system.
11. Perform Service and Overhauling of transmission system, test system and analyze test report for proper functioning.
12. Carryout overhauling of light /heavy vehicle chassis system including steering, suspension and braking system as per standard procedure and check functionality.
13. Carry out removal, repair and fitting, wheel balancing activities of tyres and tubes of light & heavy vehicle as per standard procedure.
14. Diagnose and troubleshoot the electrical system accessories of vehicle.
15. Drive, diagnose and trouble shoot faults in the vehicle

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic electrical and	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
	2.2 Measure dimensions as per drawing

Mechanic Motor Vehicle

apply in day to day work. <i>[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]</i>	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]</i>	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, vernier calipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts

Mechanic Motor Vehicle

6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution. 6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship. 7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme. 7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site. 8. 2. Plan workplace/ assembly location with due consideration to operational stipulation 8. 3. Communicate effectively with others and plan project tasks 8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

SPECIFIC OUTCOME

Block-I & II (Section:10)

*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I & block – II**(section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*

Skill India
कौशल भारत - कुशल भारत

BASIC TRAINING (Block – I)**Duration: (03) Three Months**

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1.	Importance of trade training, List of tools & Machinery used in the trade. Occupational Safety & Health Importance of housekeeping & good shop floor practices. Health & Safety: Introduction to safety equipments and their uses. Introduction of first aid, operation of Electrical mains. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Health, Safety and Environment guidelines. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Personal protective Equipments(PPE):- Use of Fire extinguishers. Job opportunities in the automobile sector, Importance of maintenance and cleanliness of Workshop. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of Used engine oil.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept & its application. Environment guidelines. Legislations & regulations as applicable. Response to emergencies eg; power failure, fire, and system failure. Introduction to the Course duration, course content, study of the syllabus. Safe handling of Fuel Spillage, Fire extinguishers used for different types of fire. Safe disposal of toxic dust, safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles. Safety disposal of Used engine oil, Electrical safety tips.
2.	Practice using all marking aids, like steel rule with spring calipers, dividers,	Auto Industry in India-History, leading manufacturers, development in

Mechanic Motor Vehicle

	scriber, punches, Chisel etc., Layout a work piece- for line, circle, arcs and circles. Practice to measure a wheel base of a vehicle with measuring tape. Practice to measure valve spring tension using spring tension tester Practice to remove wheel lug nuts with use of an air impact wrench Practice on General workshop tools & power tools and equipments.	automobile industry, trends, new product. Brief about Ministry of Road transport & Highways. The Automotive Research Association of India (ARAI), National Automotive Testing and R&D Infrastructure Project (NATRIP), & Automobile Association. Classification of vehicles. Identification of vehicle information Number (VIN). Hand & Power Tools:- Marking material. Sockets & accessories, Pliers. Pneumatic and Power Tools.
3.	Practice on General cleaning, checking and use of nut, bolts, & studs etc., Removal of stud/bolt from blind hole. Practice on cutting tools like Hacksaw, file, chisel, Sharpening of Chisels, center punch, safety precautions while grinding. Practice on Hacksawing and filing to given dimensions. Practice on Marking and Drilling clear and Blind Holes, Sharpening of Twist Drills Safety precautions to be observed while using a drilling machine. Practice on Tapping a Clear and Blind Hole, Selection of tap drill Size, use of Lubrication, Use of stud extractor.	Cutting tools. Fasteners. Limits, Fits & Tolerances. Taps and Dies. Welding techniques. Sheet metal.
4.	Cutting Threads on a Bolt/ Stud.	Hand Taps and wrenches.

Mechanic Motor Vehicle

	Adjustment of two piece Die, Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface. Practice on Liquid penetrant testing method and Magnetic particle testing method. Practice to make straight beads and Butt, Lap & T joints Manual Metal Arc Welding. Setting of Gas welding flames, practice to make a straight beads and joints Oxy – Acetylene welding Practice on making Rectangular Tray. Pipe bending, Fitting nipples unions in pipes. Soldering and Brazing of Pipes Identification of Hydraulic and pneumatic components used in vehicle. Tracing of hydraulic circuit on hydraulic power steering, and Brake circuit.	Hand Reamers. Mechanical properties of materials, Engineering Material Used in Automotive Industry. Non-destructive Testing Methods Welding processes Introduction to Hydraulics & Pneumatics: -
5	Practice in joining wires using soldering Iron, Construction of simple electrical circuits, Measuring of current, voltage and resistance using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers Diagnose series, parallel, series-parallel circuits using Ohm's law, Check electrical circuit with a test lamp, perform voltage drop test in circuits using multimeter, measure current flow using multimeter /ammeter, use of service manual wiring diagram for troubleshooting. Cleaning and topping up of a lead acid battery, Testing battery with hydrometer, Connecting battery to a charger for	Basic electricity, Electricity principles. Fuses & circuit breakers in Automotives Description of Chemical effects, Batteries & cells, Lead acid batteries& Stay Maintenance Free (SMF) batteries, Magnetic effects, Heating effects, Thermo-electric energy, Thermistors, Thermo couples, Electrochemical energy, Photo-voltaic energy, Piezo-electric energy, Electromagnetic induction, Relays, Solenoids, Primary & Secondary windings, Transformers, stator and rotor coils.

Mechanic Motor Vehicle

	battery charging, Inspecting & testing a battery after charging, Measure and Diagnose the cause(s) of excessive Key-off battery drain (parasitic draw) and do corrective action. Testing of relay and solenoids and its circuit.	
6.	Identify and test power and signal connectors for continuity, Identify and test different type of Diodes, NPN & PNP Transistors for its functionality, Practice on removing starter motor from vehicle. Checking a starting system, Jump-starting a vehicle Trace the light circuit - test bulbs, align head lamps, Aiming headlights. Changing a headlight bulb, Checking of a head light switch and to replace if faulty. Trace the wiring circuit of traffic signal flashers light circuit-tracing Defects in the flasher circuits, replacing fuse bulb.	Basic electronics: Description of Semiconductors, Solid state devices. Starting system- purpose of starting system, Starting system components, Starter motor principles, study of starter control circuits. Starter motor construction, Starter magnet types, Starter motor engagement, Commutation, Switching, solenoid construction. Lighting system, Lamps/light bulbs, Lamp/light bulb information, LED lighting,. Headlight & dimmer circuits, Park & tail light circuits, Brake light circuits, turn signal circuit, Cornering lights, Fog lights circuit, interior lights- courtesy, reading and instrument panel lights, Smart lighting, Reverse lights
7.	Demonstration of Garage & Service station equipments.-Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands. Observe and report the reading of Tachometer, Odometer, temp and Fuel gauge under ideal and on load condition. Identification of parts in a diesel engine of LMV/ HMV Practice on dismantling Diesel engine	Brief description and uses of Vehicle hoists – Two posts and four post hoist, Engine hoists, Jacks, Stands. Study of various gauges/instrument on a dash board of a vehicle Procedure for dismantling of diesel engine from a vehicle. Principle of Spark Ignition engine, Differentiate between C.I. engine and S.I. Engine, 4-stroke and 2 strokes, Otto cycle and Diesel cycle. Direct injection, Indirect

	of LMV/HMV as per procedure.	injection, scavenging, Crankshaft rotation, Engine output, Power range.
8.	Practice on starting and stopping of diesel engines. Demonstration of Diesel Engine Components.	Introduction to Engine: Description of internal & external combustion engines, different types of I.C. Engines Diesel Engine Basics: Introduction, Compression- ignition engines- Description of 4-strokediesel principles and cycle, 2-strokediesel principles and cycle, Three phases of combustion. Different type of starting and stopping method of Diesel Engine. Diesel Engine Components: Description and Constructional feature of Cylinder head, Importance of Cylinder head design, Type of Diesel combustion chambers, Effect on size of Intake & exhaust passages, Head gaskets. Importance of Turbulence.
9.	Identify Valve train components, OHC, DOHC Demonstration of Piston. Practice on identifying different types of pistons.	Valves & Valve Trains Valve- timing diagram, Concept of Variable valve timing. Description of Camshafts & drives. Description of Overhead camshaft, Technical Terms Related to Engine
10.	Practice on Flywheel, vibration damper. Crankcase & oil pump, gears timing mark, Chain sprockets, chain tensioners etc. Demonstration on Engine Assembly	Engine and Its Components. Crankshaft, Camshaft, Flywheel, Connecting Rod, Piston, Piston Pin, Cylinder Head, Cylinder Block, Oil Cooler, Water jackets. Engine assembly procedure with aid of

		special tools and gauges used for engine assembling. Introduction to Gas Turbine, Comparison of single and two stage turbine engine, Difference between gas turbine and Diesel Engine.
11.	Practice on cooling system	Need for Cooling systems, Heat transfer method, Boiling point & pressure, Centrifugal force, Vehicle coolant properties and recommended change of interval, Different type of cooling systems, Basic cooling system components- Radiator, Coolant hoses, Water pump, Cooling system thermostat, Cooling fans, Temperature indicators, Radiator pressure cap, Recovery system, Thermo-switch.
12	Practice on FIP, Diesel tanks & lines, Diesel fuel filters, water separator, Lift pump, Plunger pump, Priming pump, Demonstration on EDC, CRDI and HEUI Practice on Stationary oil engines. Starting and stopping of stationary engines.	Diesel Fuel Systems- Description and function of Diesel fuel injection,, fuel characteristics, concept of Quiet diesel technology & Clean diesel technology. Diesel fuel system components– Description and function of Diesel tanks & lines, Diesel fuel filters, water separator, Lift pump, Plunger pump, Priming pump, Inline injection pump, Distributor-type injection pump, Diesel injectors, Glow plugs, Cummins & Detroit Diesel injection. Electronic Diesel control-Electronic Diesel control systems, Common Rail Diesel Injection (CRDI) system, Hydraulically actuated electronically controlled unit injector (HEUI) diesel injection system. Sensors, actuators and ECU (Electronic Control Unit) used in Diesel Engines.

Mechanic Motor Vehicle

		Marine & Stationary Engine:-Types, Double acting engines, opposed piston engines, starting systems, cooling systems, lubricating systems, supplying fuel oil, hydraulic coupling, reduction gear drive, electromagnetic coupling, electrical drive, generator and motors, supercharging.
13.	Demonstration of Emission control methods.	Emission Control:- Vehicle emissions Standards- Euro and Bharat II, III, IV, V Sources of emission, Combustion, Combustion chamber design. Types of emissions: Characteristics and Effect. Description of Evaporation emission control, Catalytic conversion, Closed loop, Crankcase emission control, Exhaust gas recirculation(EGR) valve,, Controlling air-fuel ratios, Charcoal storage devices, Diesel particulate filter(DPF). Selective Catalytic Reduction (SCR), EGR VS SCR.
Internal Assessment/Examination 03days		

NOTE: -

More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

BASIC TRAINING (Block – II)**Duration: (03) Three Months**

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Identification of petrol Engine components. Practice on starting and stopping of petrol engines. Observe and report the reading of Tachometer, Odometer, temp and Fuel gauge under ideal and on load condition. Identification of different major components of Heavy vehicle and their function & placement study of different make lorry/bus/tractor in Institute with different dealers or organizations. Removing a petrol engine from a motor vehicle. Dismantling cylinder head, de carbonizing. Practice on Carbureted systems, Electronic fuel injection systems, Exhaust systems. Practice on Petrol engine Air cleaners and intake manifold.	Study of different major components & assemblies of heavy vehicle, and different make (indigenous). Name plate-constructional differences and their merits. leading manufacturers in Heavy vehicle Industry Petrol Engine Basics: 4-stroke spark-ignition engines- Basic 4-stroke principles, 4-stroke engine cycle. 2-stroke principles, 2-stroke engine cycle, Spark-ignition engine components- Basic engine components, 4 & 2-stroke engine differences, Engine cams & camshaft, Engine power transfer, Scavenging, Counter weights, Piston components. Intake & exhaust systems.
2.	Simple repairs in fuel feed system Practice on Cleaning fuel tank, checking for leaks in Fuel tank. Identification of various components of MPFI system.	Gasoline Fuel Systems : Description of Gasoline fuel, Gasoline fuel characteristics, Controlling fuel burn, Stoichiometric ratio, Air density, Fuel supply system, Pressure & vacuum Carburetor operation- Carburetion, Carburetor systems, Metering jets, Accelerating, Carburetor barrels Carbureted system components The carburetor, Mechanical fuel pumps, Electric fuel pumps, Tanks & lines, Fuel lines, Charcoal canister, Carburetor filters. Introduction to Electronic fuel injection (EFI) fuel

		supply system ,Basic EFI principles, Air supply, Air volume, Multi-point injection systems (MPI/MPFI), Simultaneous injection, Efficient combustion EFI fuel supply system components - Fuel pumps, Fuel filters, Tanks & lines, Fuel lines, Fuel rail, Fuel pressure regulator, Injectors, Tachometric relay, Thermo time switch, EFI sensors, Potentiometer, Auxiliary air valves, Idle speed control devices, Inertia sensors.
3.	Identification of Electronic control Unit. Set up for testing, Identification of various sensors installed in engine & its mounting.	Introduction to EFI Engine Management -EFI operation Modes of EFI, Electronic fuel injection, Idle speed control systems, Feedback & looping, Cold start systems, Air measurement, Air-flow monitoring, Variable intake manifold system, Electrical functions, EFI wiring diagram Electronic control unit (ECU) - EFI system ECU, Electronic control unit settings, Engine speed limiting, Malfunction indicator lamp. Importance of Diagnostic Trouble Code (DTC) & its general format. Use of scan tool and retrievals of codes. EFI sensors- Intake Temperature sensor, Mass airflow sensor, Manifold absolute pressure sensor, Air vortex sensor, Fuel system sensor, Throttle position sensor, Exhaust gas oxygen sensor, Crank angle sensor, Hall effect voltage sensor.
4.	Identification and of checking ignition system Practice on checking spark plug, spark plug gap, spark plug cleaning. Checking a charging system Inspecting & adjusting an engine drive belt,	Ignition principles and Faraday's laws, Primary and secondary winding of transformer, Ignition components, Spark plugs, Spark plug components, Vacuum & centrifugal units, Plug firing voltage, Induction, Inductive system operation, Induction wiring, Hall effect sensors, Hall effect operation, Optical type sensors Distributor less ignition systems, Insulated coils, Distributor less ignition system timing Charging system- The purpose of Charging system, charging system components, charging system circuit, Alternator principles, Alternating current, Alternator components, Rectification, Phase winding connections, Rotor circuit, Voltage regulation, System operating voltage, High voltage charging systems, Rotor, Stator, Alternator end frames, Slip ring & brush assembly, Rectifier assembly, Alternator cooling fan.

5-6	Identification of Air conditioning components. Checking a heating system, Identify Abnormal noise from compressor, Remove and install wiper motors and wiper switches. Checking & replacing wiper blades. Check horn for proper functioning. Remove and install new horn.	Heating Ventilation Air Conditioning (HVAC) legislation, Vehicle heating, ventilation & cooling systems, Basic air-conditioning principles, Air-conditioning capacity, Air-conditioning refrigerant, Humidity Description and function of Fixed orifice, Control devices, Thermostatic expansion valve system, Thermal expansion valves, Air-conditioning compressors, Condensers & evaporators, Receiver drier, Lines & hoses, TX valve construction, Temperature monitoring thermostat, Refrigerants, Pressure switches, Heating elements Air-conditioning ECU, Ambient air temperature sensor, Servo motors, Electric servo motors, Automatic climate control sensors, Evaporator temperature sensor, Blower speed control, Ventilation systems. Accessories: Horn circuit, wiper circuit, power window components and circuit. Power door lock circuit, automatic door lock circuit, remote keyless entry system circuit.
7	Practice on adjusting clutch pedal play Checking and Changing oil in gear box. Identifying noises from gear boxes and rectifying. Identify basic layout of Front-wheel drive, Rear-wheel drive, Four-wheel drive, All-wheel drive.	Clutches & Manual Transmissions Clutch components- Pressure plate, Driven/ center plate, Throw-out bearing. Manual transmissions- Gear ratios, Compound gear trains, Gear selection, Bearings, Oil seals & gaskets, Brief about Automated Manual Transmission (AMT) Gearbox layout & operation- Gearbox layouts. Gear shift mechanism. Final Drive & Drive Shafts - Basic layouts Front-wheel drive layout, Rear-wheel drive layout, Four-wheel drive layout, All-wheel drive layout, 4WD v/s AWD Front-wheel drive, Front-wheel drive shafts, Front-wheel final drives, Front-wheel differentials Rear-wheel drive- Propeller shaft, Type of Universal joints, Type of Constant velocity Joints, Rear-wheel final drives, Salisbury axles, Rear-wheel drive differentials, Limited slip differentials. Four-wheel drive. All-wheel drive.
8.	Identification of Automatic transmission components.	Automatic Transmissions - Torque converters, Torque converter principles, drive plate, Converter

		operation, Torque multiplication, Fluid flow, Heat exchanger, Lock-up converters, clutches. Planetary gearing Electronic control transmission Continuously variable transmission (C.V.T.).
9.	Identify components of Steering system. Practice on steering geometry components.	Steering Systems:-Description and function of Steering systems, Principles of steering, Steering Gear boxes. Power Assisted steering, Steering process, Flow-control valve, Electric power assisted steering, Basic electric power steering operation Steering arms & components- Forward control vehicle steering, Steering linkages, Joints, Bushes/bushings.
10.	Practice on visual Inspection of chassis frame for crack, bent and twists. Inspection of shackle, leaf spring, front & rear suspension. Lubricating a suspension system. Identify Components of Air Suspension system	Suspension Systems:- Principles of suspension, Suspension force, Unsprung weight, Wheel unit location, Dampening. Types of suspension-Suspension systems, Solid axle, Dead axle Independent suspension, Rear independent suspension, Rear-wheel drive independent suspension, electronically controlled air suspension (ECAS), Adaptive air suspension operation. Types of springs - Description and function of Coil springs, Leaf springs, Torsion bars, Rubber springs. Shock absorber types- Front suspension types & components- Mcpherson Strut suspension, Short/long arm suspension, Torsion bar suspension Rear suspension types & components- Air Suspension System, Types, Parts, Construction and working.
11.	Practice on removing wheels from light & Heavy vehicle, dismantling tyres and tubes checking puncture. Assembling and inflating to correct pressure. Rotating the wheels in vehicle minor repairs to wheels and tyres.	Wheel alignment fundamentals; Wheels & Tyres-Wheel types & sizes Wheels, Rim sizes & designations, Types of wheels Tyre types & characteristics. Tyre construction, Types of tyre construction, Tyre materials, Hysteresis, Tyre sizes & designations, Tyre information, Tyre tread designs, Tyre ratings for temperature & traction. Descriptions Tire wear Patterns and causes Nitrogen v/s atmospheric air in tyres.

Mechanic Motor Vehicle

	Checking for tyre wear patterns.	
12.	Practice on Adjusting brake pedal play. Bleeding hydraulic brakes & Disk brakes.	Braking Systems :-Principles of braking, Drum & disc brakes, Lever/mechanical advantage, Hydraulic pressure & force, Brake pad, Regenerative braking. Braking systems - Brake type - principles, Air brakes, Exhaust brakes, Electric brakes, Parking brakes, Engine brakes, Regenerative braking Braking system components Drum brakes & components Disc brakes & components Antilock braking system & components The construction and operation of heavy vehicle Anti-Slip Regulation / Traction Control (ASR) system.
13.	Identify antitheft system. Identify location of airbags in vehicles. Practice on Identifying Proximity sensor, Parking sensor, crash sensor, Rain and Light sensor. Practice on identifying components of CNG and LPG system. Identify different location of various ECUs in vehicle.	Antitheft system, immobilizer system. Navigation system, Car radio and cassette player, car videos. Description and function of Airbags, Seatbelt, Vehicle safety systems, Crash sensors, Seat belt pre-tensioners, Tire pressure monitoring systems. Integrated communications, Proximity sensors, Reflective displays, Global positioning satellites, Triangulation/trilateration, Telemetric. Networking & multiplexing. Introduction, function and advantages of parking sensor, crash sensor, Rain and Light sensor, Car immobilizer system. Introduction to C.N.G and L.P.G. and Biofuels Its uses and advantages. Modern CNG systems like Gas Injection ECU Communications- Communication between different ECUs. LIN Bus, MOST Bus, CAN Bus.
Internal Assessment/Examination 03days		

NOTE: -

- *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration : - 30 hrs.)
1.	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2.	Fractions: Fractions, Decimal fraction, Addition, Subtraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Calculator.	Drawing Instruments : their uses Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
3.	Properties of Material : properties - Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous Alloys.	Lines : - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line Methods of Division of line segment.
4.	Average : Problems of Average. Ratio &Proportion : Simple calculation on related problems.	Drawing of Geometrical Figures: Drawing practice on: - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram.

		- Circle and its elements.
5.	<u>Mass, Weight and Density:</u> Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density.	<u>Dimensioning:</u> - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead Leader Line with text
6.		<u>Free hand drawing of</u> - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches.
7.	<u>Percentage:</u> Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	<u>Method of presentation of Engineering Drawing</u> - Pictorial View - Orthogonal View - Isometric view
8.	- Forces definition. - Definition and example of compressive, tensile, shear forces, axial and tangential forces. Stress, strain, ultimate strength, factor of safety for MS. <u>Speed and Velocity:</u> Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation.	<u>Symbolic Representation (as per BIS SP:46-2003) of :</u> - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings
9.	<u>Mensuration:</u> Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere. - Area of cut-out regular surfaces: circle and segment and sector of circle. - Volume of cut-out solids: hollow	<u>Dimensioning practice:</u> - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance.

	cylinders, frustum of cone, block section. - Volume of simple solid blocks.	
10.	Algebra : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables). - Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force.	Construction of Geometrical Drawing Figures: - Polygons and their values of included angles. Conic Sections (Ellipse)
11.	Work, Power and Energy: work, unit of work, power, unit of power, Horse power, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1 st angle and 3 rd angle projection as per IS specification. Drawing of Orthographic projection from isometric/3D view of blocks.

Skill India
कौशल भारत - कुशल भारत

Block – II		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration : - 30 hrs.)
1.	Trigonometry: Trigonometric ratios, Trigonometric tables. - Finding the value of unknown sides and angles of a triangle by Trigonometrical method. - Finding height and distance by trigonometry.	- Machined components; concept of fillet & chamfer; surface finish symbols.
2.	Friction and its application in Workshop practice.	- Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS.
3.	Heat & Temperature: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	- Reading & interpretation of assembly drawing and detailing.
4.	Basic Electricity: Introduction, use of electricity, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy. Concept of earthing.	- Reading of drawing. Simple exercises related to missing lines, dimensions and views. How to make queries.
5.	Heat treatment – Necessity, different common types of Heat treatment.	- Simple exercises related to trade related symbols. - Solution of NCVT test papers.
6.	Graph: - Read images, graphs, diagrams –Bar chart, pie chart. - Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.	
7.	Transmission of power: By belt, pulleys & gear drive.	
8.	Concept of pressure – units of pressure, atmospheric pressure, gauge pressure – gauges used for measuring pressure. Introduction to pneumatics & hydraulics	

	systems. Solution of NCVT test papers	
--	---	--

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I (Duration – 55 hrs.)	
1. English Literacy Duration : 20 Hrs. Marks : 09	
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy Duration : 20 Hrs. Marks : 09	
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document.

Mechanic Motor Vehicle

	Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	
Duration : 15 Hrs. Marks : 07	
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude

Block – II	
Duration – 55 hrs.	
4. Entrepreneurship Skills	
Duration : 15 Hrs. Marks : 06	
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity	
Duration : 10 Hrs. Marks : 05	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education	
Duration : 15 Hrs. Marks : 06	
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.

Mechanic Motor Vehicle

Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	
Duration : 05 Hrs. Marks : 03	
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools	
Duration : 10 Hrs. Marks : 05	
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.

Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.



Skill India
कौशल भारत - कुशल भारत

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

BROAD LEARNING TO BE COVERED IN INDUSTRY FOR MECHANIC MOTOR VEHICLE TRADE:

1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)
2. Record keeping and documentation
3. Making components observing different metal removing procedure and perform different fitting job.
4. Assembling of different components as per requirement and check functionality.
5. Carryout maintenance of different Vehicles and Various Systems of Automotive Vehicles

Note: Actual training will depend on the existing facilities available in the establishments.

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block-I

1. Plan & perform basic fastening & fitting operations of various parts of vehicle using various tools and equipment observing standard procedure used in automotive workshop.
2. Trace and Test Electrical and Electronic Components and Circuits and assemble to ensure functionality of system
3. Overhaul Charging and Starting System of vehicle as per standard procedure and check functioning of system.
4. Repair/ replace the defective gauges fitted on dashboard and check engine performance.
5. Overhaul and service Diesel Engine, its parts as per standard procedure, analyze engine and check functionality.
6. Service Diesel Fuel System as per manufactures guidelines and check proper functioning.
7. Analyze and adjust Engine Emissions Control Systems.

Block-II

8. Plan and overhaul the Petrol Engine, check functionality and analyze to perform engine tune up.
9. Test functionality of Multi Point Fuel Injection Components and Electronic Components of Petrol Vehicle and analyze to repair/ replace defective gauges.
10. Overhaul and Service the Air Conditioning system Components, Air Conditioning and check functionality of system.

Mechanic Motor Vehicle

11. Perform Service and Overhauling of transmission system, test system and analyze test report for proper functioning.
12. Carryout overhauling of light /Heavy vehicle chassis system including steering, suspension and braking system as per standard procedure and check functionality.
13. Carry out removal, repair and fitting, wheel balancing activities of tyres and tubes of light & heavy vehicle as per standard procedure.
14. Diagnose and troubleshoot the electrical system accessories of vehicle.
15. Drive, diagnose and trouble shoot faults in the vehicle.

NOTE: Learning outcomes are reflection of total competencies of

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.



Skill India
कौशल भारत - कुशल भारत

MECHANIC MOTOR VEHICLE			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT			
Sl. no.	Name of the Tool & Equipments	Specification	Quantity
1	Allen Key set of 12 pieces	2mm to 14mm	5 nos.
2	Caliper inside	15 cm spring	5 nos.
3	Calipers outside	15 cm spring	5 nos.
4	Center Punch	10 mm. Dia. x 100 mm.	5 nos.
5	Dividers	15 cm Spring	5 nos.
6	Electrician Screw Driver	250mm	5 nos.
7	Hammer ball peen	0.5 kg with handle	5 nos.
8	Hands file	20 cm. Second cut flat	5 nos.
9	Pliers combination	20 cm.	5 nos.
10	Screw driver	20cm.X 9mm. Blade	5 nos.
11	Screw driver	30 cm. X 9 mm. Blade	5 nos.
12	Scriber	15 cm	5 nos.
13	Spanner D.E.	set of 12 pieces (6mm to 32mm)	5 nos.
14	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	5 nos.
15	Spanners socket with speed handle, T-bar, ratchet and universal	upto 32 mm set of 28 pieces with box	5 nos.
16	Steel rule	30 cm inch and metric	5 nos.
17	Steel tool box with lock and key (folding type)	400x200x150 mm	5 nos.
18	Wire cutter and stripper		5 nos.
B : INSTRUMENTS & GENERAL SHOP OUTFIT			
19.	AC alternator slip ring puller		1
20.	Adjustable spanner	pipe wrench 350 mm	2
21.	Air blow gun		1
22.	Air impact wrench		1

Mechanic Motor Vehicle

23.	Air ratchet		1
24.	Allen Key	set of 12 pieces (2mm to 14mm)	2
25.	Alternator assembly used for LMV		2
26.	Ammeter	300A/ 60A DC with external shunt	2
27.	Angle plate adjustable	250x150x175	1
28.	Anvil	50 Kgs with Stand	1
29.	Battery –charger		2
30.	Belt Tensioner gauge		1
31.	Blow Lamp	1 litre	2
32.	Caliper	inside 15 cm Spring	2
33.	Calipers	outside 15 cm spring	2
34.	Carburetor	Solex, Mikun for dismantling and assembling	1 each
35.	Carburetor repair tool kit		1
36.	Chain Pulley	Block-3 ton capacity	1
37.	Chisel	10 cm flat	2
38.	Chisels cross cut	200 mm X 6mm	2
39.	Circlip pliers Expanding and contracting	type 15cm and 20cm each	2
40.	Clamps C	150mm	2
41.	Cleaning tray	45x30 cm.	4
42.	Compression testing gauge suitable for diesel Engine		2
43.	Connecting rod alignment fixture		1
44.	Constant Mesh Gear box with stand for Dismantling and assembly.		1
45.	Copper bit soldering iron	0.25 Kg	2
46.	Cut section Model of Mock layout of a motor car –electrical system working model		1 set
47.	Cut section models of shock absorbers		1
48.	Cut section of cross ply and radial tyres		1
49.	Cylinder bore gauge	capacity 20 to 160 mm	2
50.	Cylinder liner- Dry & wet liner, press fit & slide fit liner		1 each
51.	DC Ohmmeter	0 to 300 Ohms, mid scales at 20 Ohms	2
52.	Depth micrometer	0-25mm	4

Mechanic Motor Vehicle

53.	Dial gauge type 1 Gr. A (complete with clamping devices and stand)		4
54.	Different type of Engine Bearing model		1 set
55.	Different type of piston model		1each
56.	Direct reading vernier caliper B 300 (direct reading with dial)		1
57.	Disk brake with caliper assembly		2
58.	Distributor –Duel advance type, reluctance type		1 each
59.	Dividers	15 cm Spring	2
60.	Drift Punch Copper 15 Cm	15 Cm	4
61.	Drill point angle gauge		1
62.	Drill twist	1.5 mm to 15 mm (various sizes) by 0.5 mm	4
63.	Drum brake assembly	Drum brake assembly	1
64.	Electric Soldering Iron	230 V 60 watts 230 V 25 watts	2 each
65.	Electric testing screw driver		2
66.	Electrical horn (different types)		2
67.	Electronic engine control module		1
68.	Engineer's square	15 cm. Blade	2
69.	Executive Auto Electrical tool kit		1
70.	Feeler gauge	20 blades (metric)	2
71.	File flat	20 cm bastard	4
72.	File, half round	20 cm second cut	4
73.	File, Square	20 cm second cut	4
74.	File, Square	30 cm round	4
75.	File, triangular	15 cm second cut	4
76.	Flat File	35 cm bastard	4
77.	Front axle (Rzeppa Joint) with stand for Dismantling and assembly		1
78.	Fuel feed pump		1
79.	Fuel injection pump (Diesel) inline		1
80.	Gloves for Welding (Leather and Asbestos)		5 sets
81.	Granite surface plate	1600 x 1000 with stand and cover	1
82.	Grease Gun		2
83.	Growler		1

Mechanic Motor Vehicle

84.	Hacksaw frame adjustable 20-30 cm	20-30 cm	10
85.	Hammer Ball Peen	0.75 Kg	2
86.	Hammer copper	1 Kg with handle	2
87.	Hammer Plastic		2
88.	Hand operated crimping tool	(i) for crimping up to 4mm and (ii) for crimping up to 10mm	2
89.	Hand reamers	adjustable 10.5 to 11.25 mm, 11.25 to 12.75 mm, 12.75 to 14.25 mm and 14.25 to 15.75 mm	2sets
90.	Hand rubber gloves tested	5000 V	5 pair
91.	Hand Shear Universal	250mm	2
92.	Hand vice	37 mm	2
93.	Hollow Punch set of seven pieces	6mm to 15mm	2 sets each
94.	Horn and Horn relay		2
95.	Injector – Multi hole type, Pintle type		4 each
96.	Injector cleaning unit		1
97.	Diesel Injector testing set (Hand tester)		1
98.	Insulated Screw driver	20 cm x 9mm blade	8
99.	Insulated Screw driver	30 cm x 9mm blade	8
100.	Left cut snips	250mm	4
101.	Lifting jack screw type	3 ton capacity	4
102.	Magneto spanner set	8 spanners	1 set
103.	Magnifying glass	75mm	4
104.	Marking out table	90X60X90 cm.	1
105.	Multimeter digital		5
106.	Multi-point fuel injection pump		1
107.	Oil can	0.5/0.25 liter capacity	2
108.	Oil pump for dismantling and assembling.		2
109.	Oil Stone	15 cm x 5 cm x 2.5 cm	1
110.	Outside micrometer	0 to 25 mm	1
111.	Outside micrometer	25 to 50 mm	4
112.	Outside micrometer	50 to 75 mm	1
113.	Petrol nozzle		4
114.	Philips Screw Driver	set of 5 pieces (100 mm to 300 mm)	8
115.	Pipe cutting tool		2

Mechanic Motor Vehicle

116.	Pipe flaring tool		2
117.	Piston ring compressor		2
118.	Piston Ring expander and remover.		2
119.	Piston Ring groove cleaner.		1
120.	Pliers combination	20 cm.	2
121.	Pliers flat nose	15 cm	2
122.	Pliers round nose	15 cm	2
123.	Pliers side cutting	15 cm	2
124.	Portable electric drill Machine		1
125.	Prick Punch	15 cm	4
126.	Punch Letter	4mm	2 set
127.	Radiator cut section-cross flow		1
128.	Radiator cut section-down flow		1
129.	Radiator pressure cap		2
130.	Right cut snips	250mm	4
131.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4
132.	Scraper flat	25 cm	2
133.	Scraper half round	25 cm	2
134.	Scraper Triangular	25 cm	2
135.	Scriber 15 cm	15 cm	2
136.	Scriber with scribing black universal	Scriber with scribing black universal	2
137.	Set of stock and dies – UNC, UNF and metric		2 sets
138.	Sheet Metal Gauge		2
139.	Sliding mesh Gear box with stand for Dismantling and assembly.		2
140.	Soldering Copper Hatchet type	500gms	5
141.	Solid Parallels in pairs (Different size) in Metric		2
142.	Spanner Clyburn	15 cm	1
143.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	4
144.	Spanner T. flocks for screwing up and up-screwing inaccessible positions		2
145.	Spanner, adjustable	15cm.	2
146.	Spanner, ring set	12 metric sizes 6 to 32 mm.	2
147.	Spanners socket with speed handle, T-bar,	32 mm set of 28 pieces	2

Mechanic Motor Vehicle

	ratchet and universal	with box	
148.	Spark plug spanner	14mm x 18mm x Size	2
149.	Steel measuring tape	10 meter in a case	2
150.	Steel rule	15 cm inch and metric	2
151.	Steel rule	30 cm inch and metric	2
152.	Straight edge gauge	2 ft.	1
153.	Straight edge gauge	4 ft.	1
154.	Stud extractor	set of 3	2 sets
155.	Stud remover with socket handle		1
156.	Surface gauge with dial test indicator plunger type	0.01 mm	2
157.	Synchronous Gear box with stand for Dismantling and assembly.		1
158.	Tachometer (Counting type)		1
159.	Tandem master cylinder with booster		2
160.	Taps and Dies complete sets (5 types)		1 set
161.	Taps and wrenches – UNC, UNF and metric		2 sets
162.	Telescope gauge		4
163.	Temperature gauge with sensor 0-100 deg c	0-100 deg c	2
164.	Tester sparking plug 'NEON' Type		1
165.	Thermostat		2
166.	Thread pitch gauge metric, BSW		1
167.	Timing lighter		1
168.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
169.	Trammel 30 cm	30 cm	2
170.	Tread wear indicator		1
171.	Tubed tyre of car, trucks & motorcycle		1
172.	Tubeless tyre of cars & trucks		1
173.	Turbocharger cut sectional view		1
174.	Tyre & split rim wheel assembly		1
175.	Tyre pressure gauge with holding nipple		2
176.	Universal puller for removing pulleys, bearings		1
177.	V' Block	75 x 38 mm pair with Clamps	2
178.	Vacuum assisted hydraulics brake assembly with vacuum booster		1

Mechanic Motor Vehicle

179.	Vacuum gauge	read 0 to 760 mm of Hg.	2
180.	Valve Lifter		1
181.	Valve spring compressor universal.		1
182.	Vernier caliper 0-300 with inside and depth measurement	0-300 with inside and depth measurement	4
183.	Vice grip pliers		2
184.	Water pump for dismantling and assembling		2
185.	Wheel cylinder		4
186.	Wiper motor assembly		2
187.	Wire Gauge (metric)		5
188.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	1
189.	4 Point relays		2
190.	5 Point relays	5 Point relays	2
191.	Scraper flat	25 cm	1

C : GENERAL MACHINERY INSTALLATIONS

1.	Air conditioned MPFI vehicle with accessories		1
2.	Arbor press hand operated 2 ton capacity		1
3.	CRDI Vehicle in running condition		1
4.	Diesel Engine	2 stroke for Dismantling and assembling with swiveling stand	2
5.	Drilling machine bench to drill	12mm dia along with accessories	1
6.	Gas Welding Table	1220mm x760mm	2
7.	Grinding machine (general purpose) D.E. pedestal	300 mm dia wheels rough and smooth	1
8.	Heavy Commercial vehicle (Optional/Old)		1
9.	Hydraulic jack HI-LIFT type	3 ton capacity,	1
10.	Multi Scan Tool with oscilloscope (Optional)		1
11.	Petrol Engine(2-stroke) Motor Cycle/Scooter along with special tools and accessories		1
12.	Battery Charger 12v	12v	1
13.	Tin smiths bench folder 600 x 1.6mm	600 x 1.6mm	1

Mechanic Motor Vehicle

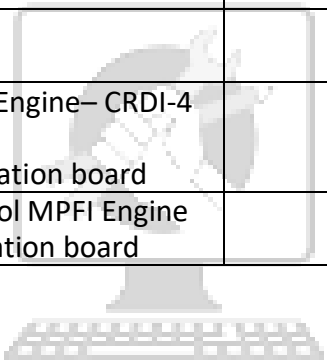
14.	Transfer case with stand for Dismantling and assembly (Optional/Old)		1
15.	Trolley type portable air compressor single cylinder	45 liters capacity Air tank, along with accessories & with working pressure 6.5 kg/sq cm	1
16.	Tube/ tyre vulcanizing machine		1
17.	Tubeless tyre repair kit		
18.	Tyer Changer Machine (Optional)		1
19.	Ultrasonic Injection cleaning equipment (Optional)		1
20.	Welding plant Oxy-Acetylene complete (high pressure)		2
21.	Welding Transformer	200 to 400 Amps	2
22.	Wheel alignment Machine (Optional)		1
23.	Wheel balancing machine (Optional)		1
24.	Working Condition of Petrol MPFI Engine Assembly with fault simulation board (Optional)		1
25.	Air bag simulator		As required
26.	Air conditioned CRDI Vehicle in running condition-LMV		As required
27.	Air conditioning service Unit (Car)		As required
28.	Air conditioning trainer kit		As required
29.	Arbor press hand operated	2 ton capacity	As required
30.	Automotive exhaust	5 gas analyzer (petrol & Diesel) or Diesel Smoke Meter	As required
31.	250mm Bladex3mm Capacity	250mm Bladex3mm Capacity	As required
32.	Diesel Engine – CRDI-4 stroke for Dismantling and assembling with swiveling stand	Diesel Engine – CRDI-4 stroke for Dismantling and assembling with swiveling stand	As required
33.	Diesel engine (Running condition) Stationary type	Diesel engine (Running condition) Stationary type	As required
34.	Discrete Component Trainer/ Basic Electronics Trainer	Discrete Component Trainer/ Basic	As required

Mechanic Motor Vehicle

		Electronics Trainer	
35.	Drilling machine bench Type drill	12mm dia along with accessories	As required
36.	Dual Magnetization Yoke	AC / HWDC, 230 VAC, 50Hz	As required
37.	Four stroke petrol engine with CNG setup-working condition		As required
38.	Gas Welding Table	220 mm x 760mm	As required
39.	Grinding machine (general purpose)	D.E. pedestal with 300 mm dia Wheels rough and smooth	As required
40.	Hand operated Hydraulic press		As required
41.	Heavy Commercial vehicle type (without body on frame)		As required
42.	Hydraulic jackHI-LIFTtype	3 ton capacity, and5 Ton capacity	As required
43.	Liquid penetrate Inspection kit	Liquid penetrate Inspection kit	As required
44.	MPFI petrol engine with swiveling stand along with special tools for Dismantling and assembling		As required
45.	Multi Scan Tool with oscilloscope		As required
46.	Petrol Engine(2-stroke)Motor Cycle/Scooter along with special tools and accessories		As required
47.	Pipe Bending Machine (Hydraulic type)	12mmto30mm	As required
48.	Pneumatic rivet gun with standard accessories		As required
49.	Spring tension tester		As required
50.	Tinsmithsbenchfolder600xl.6mm		As required
51.	Transfer case with stand for Dismantling and assembly.		As required
52.	Trolley type portable air compressor single cylinder	45 liters Capacity Air tank, along with accessories & with working pressure 6.5kg/sq cm	As required

Mechanic Motor Vehicle

53.	Tube/tyre vulcanizing machine		As required
54.	Two post car lift – capacity 4000 kg	4000 kg	As required
55.	Tyre Changer Machine		As required
56.	Ultrasonic Injector cleaning equipment		As required
57.	Welding plant Oxy-Acetylene complete (high pressure)		As required
58.	Welding Transformer	150-300Amps	As required
59.	Wheel alignment Machine –computerized 3D		As required
60.	Wheel balancing machine		As required
61.	Working Condition Diesel Engine– CRDI-4 stroke Engine Assembly with fault simulation board		As required
62.	Working Condition of Petrol MPFI Engine Assembly with fault simulation board		As required



Skill India
कौशल भारत - कुशल भारत

**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING
DRAWING**

TRADE: MECHANIC MOTOR VEHICLE

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) **Infrastructure:**

A : TRAINEES TOOL KIT:-			
Sl. No.	Name of the items	Specification	Quantity
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid 45°	250 X 1.5 mm	20+1 set
3.	Set square celluloid 30°-60°	250 X 1.5 mm	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board IS: 1444	700mm x500 mm	20+1 set
B : Furniture Required			
Sl. No.	Name of the items	Specification	Quantity
1	Drawing Board		20
2	Models : Solid & cut section		As required
3	Drawing Table for trainees		As required
4	Stool for trainees		As required
5	Cupboard (big)		01
6	White Board	size: 8ft. x 4ft.	01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
<i>Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.</i>		

Skill India
कौशल भारत - कुशल भारत

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :						Year of Enrollment :								
Name & Address of ITI (Govt./Pvt.) :						Date of Assessment :								
Name & Address of the Industry :						Assessment location: Industry / ITI								
Trade Name :			Semester:			Duration of the Trade/course:								
Learning Outcome:														
Sl. No	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total internal assessment Marks	Result (Y/N)
	Candidate Name	Father's/Mother's Name	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA		
1														
2														