



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

COMPETENCY BASED CURRICULUM

MECHANIC TWO & THREEWHEELER

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR –AUTOMOTIVE



Directorate General of Training

MECHANIC TWO & THREE WHEELER

(Engineering Trade)

(Revised in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

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

www.cstaricalcutta.gov.in

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1. COURSE INFORMATION

During the one-year duration of “Mechanic Two & Three-Wheeler” trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill related to job role. In addition to this, a candidate is entrusted to undertake project work, extracurricular activities and on-the-job training to build up confidence. The broad components covered under Professional Skill subject are as below: -

During one year duration the trainees learn about safety aspect in general and specific to the trade, identification of tools & equipment, raw materials used. The trainee will perform Measuring & marking by using various Measuring & Marking tools. The trainee will be able to plan and perform basic fastening and fitting operations. Familiarize with basics of electricity, test and measure the electrical parameter. Practice on maintenance of batteries. Practice making various welding joints by using Arc and gas welding. The candidate will practice on dismantling Engine of Two and Three-Wheeler as per given standard procedures. Able to achieve skill on Overhauling of Cylinder Head, valve train, Piston, connecting rod assembly, crankshaft, flywheel and mounting flanges, spigot and bearings, camshaft etc. practice reassembling all parts of engine in correct sequence as per workshop manual. Perform troubleshooting of Excessive smoke, knocking or abnormal noise etc. Practice servicing of Fuel Tank and its components, repair and overhaul Steering and suspension system of three wheelers. The trainee will overhaul brake system, transmission system and LPG/CNG fuel system of Two and three wheelers. Perform servicing and maintenance.

2.1 GENERAL

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

Mechanic Two & Three Wheeler trade under CTS is one of the popular courses delivered nationwide through a network of ITIs. The course is of one-year duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while the core area (Workshop calculation & Science, Engineering Drawing and Employability Skill) imparts requisite core skills, knowledge, and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Trainee broadly needs to demonstrate that they are able to:

- Read and interpret technical parameters/ documentation, plan and organize work processes, identify necessary materials and tools.
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- Check the components as per workshop manual, identify and rectify errors and repair/replace components.
- Document the technical parameter related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Technician and will progress further as Senior Technician, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can join the apprenticeship program in different types of industries leading to a National Apprenticeship Certificate (NAC).
- Self employment
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one-year:

| S No. | Course Element | Notional Training Hours |
|-------|---------------------------------------|-------------------------|
| 1 | Professional Skill (Trade Practical) | 1000 |
| 2 | Professional Knowledge (Trade Theory) | 280 |
| 3 | Workshop Calculation & Science | 80 |
| 4 | Engineering Drawing | 80 |
| 5 | Employability Skills | 160 |
| | Total | 1600 |

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGT from time to time.

a) The **Continuous Assessment** (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines as per the guideline. The pattern and marking structure is being notified by DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.**

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

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 the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the 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 and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examining 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 should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and | <ul style="list-style-type: none"> • Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while undertaking different work with those |

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| practices | <p>demanded by the component/job.</p> <ul style="list-style-type: none"> • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job. |
| (b) Weightage in the range of 75%-90% to be allotted during assessment | |
| <p>For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices</p> | <ul style="list-style-type: none"> • Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% accuracy achieved while undertaking different work with those demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job. |
| (c) Weightage in the range of more than 90% to be allotted during assessment | |
| <p>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.</p> | <ul style="list-style-type: none"> • High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% accuracy achieved while undertaking different work with those demanded by the component/job. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project. |

Mechanic, Motor Cycle; after successful completion of the above course, the trainee shall be able to perform the following skills with proper sequence. Repairs, services and overhauls motor cycles, auto rickshaws, scooters; etc., to keep them roadworthy. Examine motor cycle or scooter to locate faults by running engine in stationary position or by driving it on road. Dismantle parts such as engine, ignition system, dynamo forks, shock absorbers, gear box etc., as necessary. Grinds valves, sets timings, relines brakes, re-bushes steering mechanism, replaces worn out parts, assembles gear box clutch etc. Performs other tasks to affect repair, cleans and sets carburetor, fits driving chain, wheels silencer, kick, gear, clutch and brake levers and other accessories. Adjusts control cables for brake, clutch and accelerator, sets tappets and wheel alignment, tightens loose parts and makes necessary fittings and connections. Changes engine and gear box oil, starts engine and tunes it up. Tests performance of vehicle by driving on road and makes further adjustments to remove defects noticed if any. Assembles motor cycle or auto-rickshaws from previously dismantled parts.

Auto Service Technician (two and three wheelers); is responsible for the repairing and routine servicing and maintenance (including electrical and mechanical aggregates) of two/three-wheeler vehicles.

Plan and organize assigned work and detect & resolve issues during execution in his own work area within defined limit. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Reference NCO-2015:

- i. 7231.0500 - Mechanic, Motor Cycle
- ii. 7231.0501 - Auto Service Technician

4. GENERAL INFORMATION

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| Name of the Trade | Mechanic Two & Three Wheeler |
| Trade Code | DGT/1068 |
| NCO - 2015 | 7231.0500, 7231.0501 |
| NSQF Level | Level-4 |
| Duration of Craftsmen Training | One year (1600 Hours) |
| Entry Qualification | Passed 10 th class examination with Science and Mathematics or its equivalent. |
| Minimum Age | 14 years as on first day of academic session. |
| Eligibility for PwD | LD, LC, DW, AA, LV, DEAF |
| Unit Strength (No. Of Student) | 20 (There is no separate provision of supernumerary seats) |
| Space Norms | 100 sq. m (including parking area) |
| Power Norms | 3 KW |
| Instructors Qualification for | |
| 1. Mechanic Two & Three Wheeler | <p>B.Voc /Degree in Automobile/ Mechanical Engineering (with specialization in Automobile) from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>3 years Diploma in Automobile/Mechanical (specialization in automobile) from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/NAC passed in the trade of “Mechanic Two & Three Wheeler” with three years' experience in the relevant field.</p> <p>Essential Qualification: Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT. Must possess valid LMV and MCWG Driving License.</p> <p>NOTE: - Out of two Instructors required for the unit of 2(1+1), one must</p> |

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| | <p><i>have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them must possess NCIC in any of its variants.</i></p> |
| <p>2. Workshop Calculation & Science</p> | <p>B.Voc /Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>3 years Diploma in Engineering from AICTE /recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the engineering trades with three years' experience.</p> <p><u>Essential Qualification:</u> National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>NCIC in RoDA or any of its variants under DGT</p> |
| <p>3. Engineering Drawing</p> | <p>B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>3 years Diploma in Engineering from AICTE /recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the Electrical trades categorized under Engg. Drawing' / D'man Mechanical / D'man Civil' with three years' experience.</p> <p><u>Essential Qualification:</u> National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT.</p> |
| <p>4. Employability Skill</p> | <p>MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes.</p> <p>(Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above)</p> <p style="text-align: center;">OR</p> <p>Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT institutes.</p> |



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| 5. Minimum Age for Instructor | 21 Years | | | | |
| List of Tools and Equipment | As per Annexure – I | | | | |
| Distribution of training on Hourly basis: (Indicative only) | | | | | |
| Total Hrs. /week | Trade Practical | Trade Theory | Workshop Cal. & Sc. | Engg. Drawing | Employability Skills |
| 40 Hours | 25 Hours | 7 Hours | 2 Hours | 2 Hours | 4 Hours |

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES (TRADE SPECIFIC)

1. Comply with environment regulations and housekeeping in the work shop following safety precautions.
2. Check & Perform precision measurements and marking by using various measures and marking tools used in automotive work shop practices.
3. Plan and Perform basic fastening and fittings operation by using correct hand tools, machine tools and equipments.
4. Perform surface finishing operations in the given job.
5. Construct electrical circuits and test its parameters by using electrical measuring instruments.
6. Perform basic electrical testing in two and three wheelers.
7. Perform battery testing and charging operations.
8. Construct basic electronic circuits and testing.
9. Join Components by using Arc & Gas welding.
10. Inspect the Auto component using nondestructive testing method.
11. Identify the hydraulic and pneumatic components in a vehicle.
12. Check and interpret vehicle specification data and VIN, select & operate various service station equipment.
13. Carry out the general servicing of two and three wheelers.
14. Carry out Engine overhaul of two/three wheelers.
15. Overhauling of cylinder head assembly.
16. Diagnosis and trouble shoot for excessive smoke, engine overheating and abnormal noise.
17. Carry out Servicing of fuel tank.
18. Carry out overhauling of steering and suspension system.
19. Overhauling front and rear wheels, brake.
20. Overhaul automatic/manual transmission of two and three wheeler.
21. Overhaul AC generator.
22. Check ignition circuit for proper functioning.
23. Overhaul the LPG/ CNG fuel supply system and check exhaust smoke.
24. Carry out servicing and maintenance of Electric two and three wheeler.

6. ASSESSMENT CRITERIA

| LEARNING OUTCOMES | ASSESSMENT CRITERIA |
|---|---|
| 1. Comply with environment regulations and housekeeping in the workshop (5S / Kaizen) following safety precautions. | Identify environmental pollution and contribute to the avoidance of instances of environmental pollution |
| | Carryout maintenance and cleaning of work shop and lifting equipment environmentally friendly manner. |
| | Avoid waste and dispose waste as per procedure the working environment. |
| | Recognize different components of 5S and apply the same in the working environment. |
| 2. Check & perform measuring and marking by using various measuring and marking tools. | Plan the working principles of measuring instruments and special tools required for auto workshop. |
| | Select, care and use of measuring instrument. |
| | Select, care and use of measuring instrument. |
| 3. Plan and perform basic fastening operation by using correct hand tools, machine tools and equipments. | Describe the purpose, use of auto hand tools. |
| | List the safety rules for hand tools. |
| | Select the correct tool for the job. |
| | Set up the tacked pieces in specific position. |
| | Joint components by Brazing, Soldering, Riveting as per given drawing. |
| | Produce components by different operation (Drilling, Reaming, Taping, Dieing) |
| 4. Perform surface finishing operations in the given job. | Do surface finishing of the job to meet specifications by scraping. |
| | Sharpen the scraping tool by grinding. |
| | Check accuracy/correctness of the job using measuring instruments. |
| | Do surface finishing of the job to meet specifications by scraping. |
| 5. Construct electrical circuits and test its parameters by using electrical measuring instruments. | Plan and organize the work for basic electrical operations. |
| | Select the tools, instruments and materials required to do the job. |
| | Comply with safety rules when performing the basic electrical operations. |
| | Perform electrical wire joints, form electrical circuits and test basic electrical parameters as per the circuit drawings and |

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| | operating procedures. |
| 6. Perform basic electrical testing in two and three wheelers | <p>Plan and organize the work for auto electrical component testing.</p> <p>Tracing the auto electrical components in a vehicle.</p> <p>Test continuity and voltage drop in the electrical circuits.</p> <p>Operate the electrical components in a vehicle and test lamps.</p> |
| 7. Perform battery testing and charging operations. | <p>Ascertain and select tools and materials for the job.</p> <p>Comply with safety rules when performing the following operations.</p> <p>Plan and select different methods for charging the battery.</p> <p>Perform battery testing as per the operating procedure.</p> |
| 8. Construct basic electronic circuits and testing. | <p>Plan and select different types of basic electronic components and measuring instruments.</p> <p>Construct and test the basic electronic gate circuits and its components as per the standard procedure.</p> |
| 9. Join components by using Arc & Gas welding. | <p>Determine the principles, process of different welding process applicable in automobile industry.</p> <p>Demonstrate the edge preparation for butt and fillets welds.</p> <p>Select the type and size of filler rod and flux/electrode, size of nozzle and gas pressure/welding current, preheating method and temperature as per requirement.</p> <p>Set and tack metals as per drawing.</p> <p>Deposit the weld maintaining appropriate technique and safety aspects.</p> <p>Cool the welded joint by observing appropriate cooling method. Use post heating, peening etc. as per requirement.</p> <p>Clean the joint and inspect the weld for its uniformity and different types of surface defects.</p> |
| 10. Inspect the Auto Component using non-destructive testing methods. | <p>Classify different vehicle components by its manufacturing processes.</p> <p>Ascertain and select tools and equipment to do NDT test the given job.</p> <p>Plan and organize the work for nondestructive testing.</p> <p>Perform different types of nondestructive tests using</p> |

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| | appropriate testing equipment. |
| | Observe safety/ precaution during testing the job. |
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| 11. Identify the hydraulic and pneumatic components in a vehicle. | Comply with safety rules when performing the following operations. |
| | Locate and identify the hydraulic components in a vehicle. |
| | Locate and identify the pneumatic components in a vehicle. |
| | |
| 12. Check & Interpret Vehicle Specification data and VIN. Select & operate various Service Station Equipments. | Identify of different type of vehicle |
| | Identify the different vehicle specification data and information |
| | Demonstrate the garage, service station different equipment |
| | |
| 13. Carry out the general servicing of two & three wheeler. | Follow and maintain procedure to achieve a safe working environment in line with general servicing of two & three wheeler. |
| | Identify & locate the parts of two & three wheeler. |
| | Comply with safety rules when performing the operation. |
| | Select tools, equipment's and material required for servicing of vehicle. |
| | Wash the vehicle with washer with appropriate pressure required for each parts. |
| | Change and maintain the oil level as required. |
| | Lubricate the components which are necessary. |
| | |
| 14. Carry out engine Overhaul of two and three wheelers. | Carry out Engine overhaul of two / three wheeler. |
| | Plan and select the correct tools, equipments and material to carry out the job. |
| | Remove engine from vehicle. |
| | Dismantle the engine as per standard procedure of mfg. |
| | Check the components and compare with standard specification for its correctness. |
| | Replace the parts by doing necessary adjustments. As per specification |
| | Reassemble the engine. (Torque requirement, soft / hard joint knowledge / understanding). |
| | Refill the engine oil. Understanding of different types of |

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| | automobile oils. |
| | Check drive chain tension and lubricate it. |
| | Check the performance of electrical system. |
| | |
| 15. Overhauling of cylinder head assembly. | Select tools, equipment's, measuring instruments and material required for servicing of overhauling head assembly. |
| | Comply with safety rules when performing the operation. |
| | Check cylinder head assembly for functioning. |
| | Remove dismantle and clean cylinder head assembly. |
| | Measure dimension of all components in accordance with standard specification by using precision gauges. |
| | Replace/Repair and assemble the components of cylinder head assembly. |
| | Assemble cylinder head assembly as per mfg. guide line. |
| | Check and adjust tappet clearance as per specification. |
| | Set ignition timing and start engine set for idling. |
| | |
| 16. Diagnosis and trouble shoot for excessive smoke, engine overheating and abnormal noise | Select tools, equipment's, measuring instruments and material required for servicing of cylinder head assembly. |
| | Comply with safety rules when performing the operation. |
| | Diagnosis and trouble shoot for excessive smoke. |
| | Diagnosis and trouble shoot for engine overheats. |
| | Diagnosis and trouble shoot for engine abnormal noise. |
| | |
| 17. Carry out Servicing of fuel tank. | Select tools, equipment's, measuring instruments and material required for servicing of fuel tank. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Remove fuel tank and check for leakage and flow. |
| | Remove petrol tap, clean and refit the strainer. |
| | Refit the tank and check for proper functioning. |
| | Check fuel tank cap breathing function. |
| | |
| 18. Carry out overhauling of steering and suspension system. | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Identify the parts of steering and suspension system. |

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| | Overhaul steering system. |
| | Overhaul suspension system. |
| | Check shock absorber for proper functioning and replace if necessary. |
| | |
| 19. Overhauling front and rear wheels, brake. | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Remove front and rear wheel, dismantle and check for truing, alignment. |
| | Inspect the brake drum, chain sprocket, rubber pad for worn out and replace if necessary. |
| | Check tire for wear and tube for puncture. |
| | Check and inflate tire for correct pressure as per specification. |
| | Check wheel bearing and grease it. (Understand specific grease requirement) |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Check and adjust front and rear brake lever free play as per manual. |
| | Inspect the brake shoe, drum and replace if necessary. |
| | Overhaul hydraulic disc brake. |
| | |
| 20. Overhaul automatic/manual transmission of two and three wheeler. | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Remove, dismantle, check parts, replace worn out parts if necessary of automatic transmission. |
| | Reassemble automatic transmission and check for proper functioning. (Torque requirement , soft / hard joint knowledge / understanding |
| | Remove and inspect crank shaft, timing sprocket replace if necessary. |
| | Overhaul kick start assembly. |
| | Overhaul gear shift mechanism. |
| | Identify and overhaul the oil pump assembly. |
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| 21. Overhaul AC generator. | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when |

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| | performing job. |
| | Identify the parts of AC Generators. Remove AC Generator, dismantle, check components, replace if necessary. |
| | Trace the ac /dc circuit in three wheelers. |
| | Measure volt, amp, resistance and leakage in a circuit. |
| | Check pulse generator for proper functioning. |
| | |
| 22. Check ignition circuit for proper functioning. | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Identify the parts of ignition circuits. |
| | Measure resistance in primary and secondary winding replace if faulty. |
| | Check ignition system components for proper functioning. |
| | Inspect and adjust ignition timing. |
| | Set and check emission as per standard |
| | |
| 23. Overhaul the LPG/ CNG fuel supply system and check exhaust smoke | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Identify the parts of LPG/CNG fuel system in three wheelers. |
| | Service the LPG/CNG kit. |
| | Start the engine tune for slow speed. |
| | Identify the parts of smoke meter/ exhaust gas analyzer. |
| | Check diesel engine smoke with the help of smoke meter. |
| | Check petrol/LPG/CNG engine smoke with the help of gas analyzer and compare with standard emission level. |
| | Tune the vehicle for recommended emission level. |
| | |
| 24. Carry out servicing and maintenance of Electric two and three wheeler. | Select tools, equipment's, and material required for the job. |
| | Plan, organize work and Comply with safety rules when performing job. |
| | Identify the parts of Electric vehicle to be service and maintain. |
| | Carry out servicing and maintenance of vehicle as per mfg.'s schedule. |
| | |

| SYLLABUS FOR MECHANIC TWO & THREE WHEELER | | | |
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| Duration: One Year | | | |
| Duration | Reference Learning Outcome | Professional Skills (Trade Practical) With Indicative Hours | Professional Knowledge (Trade Theory) |
| Professional Skill 50Hrs.; | Comply environment regulations and housekeeping in the workshop following safety precautions. | 1. Demonstration of Machinery used in the trade. (09 hrs.) | - Importance of trade Training. |
| Professional Knowledge 14Hrs. | | 2. Identification to safety equipment and their use etc. (05 hrs.) | - General discipline in the Institute |
| | | 3. Importance of maintenance and cleanliness of Workshop. (05 hrs.) | - Elementary First Aid. |
| | | 4. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of used engine oil. (10 hrs.) | - Importance of Mechanic diesel in Industry |
| | | 5. Demonstration with health centre. (05 hrs.) | - Safety precautions in handling Diesel machine |
| | | 6. Demonstration fire service station to provide demo on First aid and Fire safety. (05 hrs.) | - Energy conservation |
| | | 7. Perform use of fire extinguishers. (05 hrs.) | - Safety disposal of used engine oil, Electrical safety tips. |
| | | 8. Energy saving Tips of ITI electricity Usage. (06 hrs.) | - 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. (14 Hrs.) |
| Professional Skill 125 Hrs.; | Check & perform Measuring & marking by using various Measuring & Marking tools | 9. Perform practice using all marking aids, like steel rule with spring calipers, dividers, scribe, punches, Chisel etc. (25 hrs.) | Hand & Power Tools: - |
| Professional Knowledge | | | - Marking scheme, marking material-chalk, Prussian blue. |
| | | | - Cleaning tools- Scraper, wire |

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| 35 Hrs. | | <p>10. Perform layout a work piece- for line, circle, arcs and circles. (10 hrs.)</p> <p>11. Perform to measure a wheel base of bike & auto with measuring tape. (05 hrs.)</p> <p>12. Perform to measure valve spring tension using spring tension tester. (05 hrs.)</p> <p>13. Perform to remove wheel lug nuts with use of an air impact wrench. (10 hrs.)</p> <p>14. Perform Practice on General workshop tools & power tools. (20 hrs.)</p> | <p>brush, Emery paper,</p> <ul style="list-style-type: none"> - Description, care and use of Surface plates, steel rule, measuring tape, try square. Calipers-inside and outside. Dividers, surface gauges, scriber, - Punches-prick punch, centre punch, pin punch, hollow punch, number and letter punch. - Chisel-flat, cross-cut. Hammer- ball pein, lump, mallet. Screwdrivers blade screwdriver, Phillips screw driver, Ratchet screwdriver. - Allen key, bench vice & C clamps, - Spanners- ring spanner, open end spanner & the combination spanner, universal adjustable open end spanner. - Sockets & accessories, - Pliers ,Combination pliers, multi grip, long nose, flat-nose, - Nippers or pincer pliers, Side cutters, Tin snips, Circlip pliers, external circlips pliers. - Air impact wrench, air ratchet, wrenches- Torque wrenches, pipe wrenches, car jet washers Pipe flaring & cutting tool, pullers - Gear and bearing. (21 Hrs.) |
| | | <p>15. Perform measuring practice on Cam height, Camshaft</p> | <p>Systems of measurement,</p> |

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| | | <p>Journal dia, crankshaft journal dia, Valve stem dia, piston diameter, and piston pin dia with outside Micrometers. (05 hrs.)</p> <p>16. Perform measuring practice on the height of the rotor of an oil pump from the surface of the housing or any other auto component measurement with depth micrometer. (05 hrs.)</p> <p>17. Perform measuring practice on valve spring free length.(05 hrs.)</p> <p>18. Perform measuring practice on cylinder bore, Connecting rod bore, inside diameter (ID) of a camshaft bearing with Telescope gauges.(05 hrs.)</p> <p>19. Perform measuring practice on cylinder bore for taper and out-of-round with Dial bore gauges.(05 hrs.)</p> <p>20. Perform measuring practice to measure wear on crankshaft end play, crankshaft run out, and valve guide with dial indicator. (05 hrs.)</p> <p>21. Perform measuring practice to check the flatness of the cylinder head is warped or twisted with straightedge is used with a feeler gauge.(05 hrs.)</p> <p>22. Perform measuring practice</p> | <p>Description, care & use of</p> <ul style="list-style-type: none"> - Micrometers - Outside and depth micrometer, - Micrometer adjustments, - Vernier calipers, Telescope gauges - Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, - Vacuum gauge, tire pressure gauge. (14 Hrs.) |
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| | | <p>to check the end gap of a piston ring, piston to cylinder wall clearance with feeler gauge.(05 hrs.)</p> <p>23. Perform check engine manifold vacuum with vacuum gauge. (05 hrs.)</p> <p>24. Perform check the air pressure inside the vehicle tires is maintained at the recommended setting. (05 hrs.)</p> | |
| <p>Professional Skill 100 Hrs.;</p> <p>Professional Knowledge 28 Hrs.</p> | <p>Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & equipments.</p> | <p>25. Perform general cleaning, checking and use of nut, bolts, & studs etc. (05 hrs.)</p> <p>26. Perform of removal of stud/bolt from blind hole. (05 hrs.)</p> <p>27. Perform cutting tools like Hacksaw, file, chisel, Sharpening of Chisels, center punch, safety precautions while grinding. (15 hrs.)</p> <p>28. Perform hacksawing and filing to given dimensions. (25 hrs.)</p> | <ul style="list-style-type: none"> - Fasteners- Study of different types of screws, nuts, studs & bolts, locking devices, such as lock nuts, cotter, split pins, keys, circlips, lock rings, lock washers and locating where they are used. - Washers& chemical compounds can be used to help secure these fasteners. Function of Gaskets - Selection of materials for gaskets and packing, oil seals. - Cutting tools:- Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and uses., - OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding. |

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| | | | <ul style="list-style-type: none"> - Limits, Fits & tolerances:- Definition of limits, fits & tolerances with examples used in auto components (14 Hrs.) |
| | | <p>29. Perform marking and drilling clear and Blind Holes, Sharpening of Twist Drills. (10 hrs.)</p> <p>30. Check safety precautions to be observed while using a drilling machine. (05 hrs.)</p> <p>31. Perform tapping a Clear and Blind Hole, Selection of tape drill Size. (15 hrs.)</p> <p>32. Use of stud-extractor. Cutting Threads on a Bolt/ Stud. (05 hrs.)</p> <p>33. Adjustment of two piece Die, Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface. (15 hrs.)</p> | <p>Drilling machine</p> <ul style="list-style-type: none"> - Description and study of Bench type drilling machine, Portable electrical Drilling machine, drill holding devices, - Work Holding devices, Drill bits. Taps and Dies: Hand Taps and wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and Die stock. - Screw extractors. Hand Reamers, different Type of hand reamers, Drill size for reaming, Lapping, Lapping abrasives and type of Laps. (14 Hrs.) |
| <p>Professional Skill 25 Hrs.;</p> <p>Professional Knowledge 07 Hrs.</p> | <p>Perform surface finishing operation in the given job.</p> | <p>34. Practice on making Rectangular Tray. (10 hrs.)</p> <p>35. Perform pipe bending, fitting nipples unions in pipes. Soldering and Brazing of Pipes. (15 hrs.)</p> | <p>Sheet metal</p> <ul style="list-style-type: none"> - State the various common metal Sheets used in Sheet Metal shop - Sheet metal operations - Shearing, bending, Drawing, Squeezing - Sheet metal joints - Hem & Seam Joints - Fastening Methods - Riveting, soldering, brazing. Fluxes used on common joints. |

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| | | | <ul style="list-style-type: none"> - Sheet and wire-gauges. - The blow lamp- its uses and pipe fittings. (07 Hrs.) |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Construct electrical circuits and test its parameters by using electrical measuring instrument. | <p>36. Perform joining wires using soldering Iron. (05 hrs..)</p> <p>37. Construction of simple electrical circuits. (05 hrs.)</p> <p>38. Perform measure of current, voltage and resistance using digital multimeter. (05 hrs.)</p> <p>39. Perform continuity test for fuses, jumper wires, fusible links and circuit breakers. (10 hrs.)</p> | <ul style="list-style-type: none"> - Basic electricity, Electricity principles, Ground connections, Ohm's law, Voltage, Current, Resistance, Power, Energy. - Voltmeter, ammeter, Ohmmeter Multimeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor ratings. (07 Hrs.) |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Perform basic electrical testing in two and three wheelers. | <p>40. Perform series, parallel, series parallel circuits using Ohm's law, (10 hrs..)</p> <p>41. 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. (15 hrs.)</p> | <ul style="list-style-type: none"> - Fuses & circuit breakers, Ballast resistor, - Stripping wire insulation, cable colour codes and sizes, Resistors in Series circuits , Parallel circuits and Series-parallel circuits, - Electrostatic effects, Capacitors and its applications, Capacitors in seriesand parallel. (07 Hrs.) |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Perform battery testing and charging operation | <p>42. Cleaning and topping up of a lead acid battery, testing battery with hydrometer. (05 hrs.)</p> <p>43. Perform connection battery to a charger for battery charging, Inspecting & testing a battery after charging. (10 hrs.)</p> <p>44. Measure and troubleshoot the cause(s) of excessive Key-off battery drain</p> | <ul style="list-style-type: none"> - Description of Chemical effects, Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF) batteries, - Magnetic effects, Heating effects, Thermoelectric energy, Thermistors, Thermo couples, - Electrochemical energy, photo-voltaic energy, Piezo electric energy, |

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| | | (parasitic draw) and do corrective action. Testing of relay and solenoids and its circuit. (10 hrs.) | <ul style="list-style-type: none"> - Electromagnetic induction, Relays, Solenoids, Primary & Secondary windings, - Transformers, stator and rotor coils. (07 Hrs.) |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Construct basic electronic circuits and testing | <p>45. Identify and test power and signal connectors for continuity. (05 hrs.)</p> <p>46. Identify and test different type of Diodes. (05 hrs.)</p> <p>47. Perform regulator /rectifier, inspection, and assembling. (05 hrs.)</p> <p>48. Check NPN&PNP Transistors for its functionality, Construct and test simple logic circuits OR, AND & NOT Logic gates using as switches. (10 hrs.)</p> | <ul style="list-style-type: none"> - Basic electronics: Description of Semiconductors, - Solid state devices- Diodes, transistors, Thyristors, Uni Junction Transistors (UJT), Metal Oxide Field Effect Transistors (MOSFETs), - Logic gates-OR, AND & NOT and Logic gates using switches. (07 Hrs.) |
| Professional Skill 50 Hrs.; Professional Knowledge 14 Hrs. | Join components by using Arc & Gas welding. | <p>49. Practice to make straight beads and Butt, Lap & T joints Manual Metal Arc Welding. (20 hrs.)</p> <p>50. Setting of Gas welding flames, practice to make a straight beads and joints Oxy- Acetylene welding. (25hrs.)</p> <p>51. Film on Heat treatment process. (05 hrs.)</p> | <ul style="list-style-type: none"> - Introduction to welding and Heat treatment - Welding processes – Principles of Arc welding, brief description, classification and applications. - Manual Metal Arc welding - principles, power sources, electrodes, welding parameters, edge preparation & fit up and welding techniques; - Oxy – Acetylene welding, principles, equipment, welding parameters, edge preparation & fit up and welding techniques. - Heat Treatment Process– |

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| | | | <p>Introduction, Definition of heat treatment, Definition of Annealing,</p> <ul style="list-style-type: none"> - Normalizing, Hardening and tempering. Case hardening, Nitriding, - Induction hardening and Flame Hardening process used in auto components with examples. (14 Hrs.) |
| <p>Professional Skill 50 Hrs.;</p> <p>Professional Knowledge 14 Hrs.</p> | <p>Inspect the auto component using nondestructive testing method.</p> <p>Identify the hydraulic and pneumatic components in a vehicle.</p> | <p>52. Perform liquid penetrant testing method and Magnetic particle testing method. (05 hrs.)</p> <p>53. Identify the Hydraulic and pneumatic components used in vehicle. (25 hrs.)</p> <p>54. Tracing of hydraulic circuit on hydraulic jack, hydraulic power steering, brake circuit. (15 hrs.)</p> <p>55. Identify components in Air brake systems. (05 hrs.)</p> | <ul style="list-style-type: none"> - Non-destructive Testing Methods- Importance of Non-Destructive Testing In Automotive Industry, - Definition of NDT, Liquid penetrant and Magnetic particle testing method, Portable Yoke method - Introduction to Hydraulics & Pneumatics: -Definition of Pascal law, pressure, Force, viscosity. - Description, symbols and application in automobile of Gear pump-Internal & External, single acting, double acting & Double ended cylinder - Directional control valves- 2/2, 3/2, 4/2, 4/3 way valve, Pressure relief valve, Non return valve, Flow control valve used in automobile. - Pneumatic Symbols, Description and function of air Reciprocating Compressor. Function of Air service unit (FRL-Filter, |

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| | | | Regulator & Lubricator). (14 Hrs.) |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Check & Interpret Vehicle Specification data and VIN, Select & operate various Service Station Equipments. | 56. Identify of different type of Vehicle. (05 hrs.) 57. Demonstrate of vehicle specification data; Identification of vehicle information Number (VIN). (05 hrs.) 58. Demonstrate of Garage, Service station equipments.- Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands. (15 hrs.) | - Auto Industry - history, leading manufacturers, development in 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. Definition: - Classification of vehicles on the basis of load as per central motor vehicle rule, wheels, final drive, and fuel used, axles, position of engine and steering transmission, body and load. - Brief description and uses of Vehicle hoists – Two posts and four post hoist, Engine hoists, Jacks, Stands. (07 Hrs.) |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Carry out the general servicing of two & three wheelers | 59. Identify the parts &general servicing of Two Wheeler and Three wheeler, washing, cleaning, oiling, greasing and lubricating. (05 hrs.) 60. Dismantle the two wheeler SI engine, cleaning and inspecting the parts, checking engine bore, piston rings, connecting rod, | - Two wheelers and three wheelers auto Industry in India - Leading manufacturers, new product. Introduction to Engine: - Description of internal & external combustion engines, Classification of IC engines, Principle & working |

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| | | <p>bearings, crankshaft. (05 hrs.)</p> <p>61. Assemble all the parts after assembling inspect Engine oil level, clutch cable free play. (08 hrs.)</p> <p>62. Adjust Drive chain tension, check performance of electrical system. (07 hrs.)</p> | <p>of 2&4-strokediesel engine Compression ignition Engine(C.I), - Principle of Spark Ignition Engine(SI), differentiate between 2-strokeand 4 stroke, C.I engine and S.I Engine, - Direct injection and Indirect injection, - Technical terms used in engine, Engine specification. - Study of various gauges/instrument on a dash board of a vehicle- Speedometer, Tachometer, Odometer and Fuel gauge, and Indicators such as gearshift position. (07 hrs.)</p> |
| <p>Professional Skill 25 Hrs.;</p> <p>Professional Knowledge 07 Hrs.</p> | <p>Carryout engine overhaul of two wheeler& three wheelers</p> | <p>63. Perform dismantling three wheeler engine and inspection of cylinder head, piston, piston ring, connecting rod. (05 hrs.)</p> <p>64. Perform measurement of piston ring gap, the piston ring to groove clearance, piston OD, cylinder to piston clearance, piston pin OD, piston pin hole ID in an X and Y axis, piston to pin clearance connecting rod small end ID, connecting rod small end to piston pin clearance and compare the measurements with service manual. (10 hrs.)</p> <p>65. Perform trouble shooting of</p> | <p>- Basic engine components Engine cams & Description & functions of pistons, piston rings, connecting rod and piston pins and materials. Used recommended clearances for the rings and its necessity, precautions while fitting rings, common troubles and remedies of piston.</p> <p>- Description and function of Crank shaft, Engine bearings.</p> <p>- Trouble shooting procedure for low compression, High compression, Excessive noise, and poor idling. (07 hrs.)</p> |

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| | | low compression, High compression, Excessive noise, and poor idling. (10 hrs.) | |
| Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs. | Overhauling of cylinder head assembly. | 66. Identify valves and condition of valve and seat. Inspection of rocker arm and rocker arm shaft, camshaft, valve spring, valve guide, valve guide replacement, valve seat inspection and replacing. (05 hrs.) 67. Perform cylinder head assembly. (05hrs.) 68. Perform inspection of valve clearance and Ignition timing and setting. (05 hrs.) 69. Perform trouble shooting of Excessive smoke, overheating, knocking or abnormal noise. Troubleshooting of cam chain noise and cam chain slack excessively. (10 hrs.) | Valves & Valve Trains - Function of Engine Valves, different types, materials, Type of valve operating mechanism, Importance of Valve seats, Valve-timing setting. - Description of Camshafts & drives, importance of Cam lobes, Timing belts & chains. - Trouble shooting procedure for Excessive smoke, overheating, knocking or abnormal noise. Troubleshooting procedure for cam chain noise, and cam chain slack excessively. (06 hrs.) |
| Professional Skill 50Hrs.; Professional Knowledge 14 Hrs. | Diagnose and troubleshoot for excessive smoke, engine overheating and abnormal noise. | 70. Perform checking the throttle cable for deterioration, damage or kinks, measure the throttle grip free play, and adjustments. Check the carburetor idle speed and adjust as per manual. (10 hrs.) 71. Perform compression test. Practice on throttle valve disassembly, check the throttle valve and jet needle surfaces for presence of dirt, | Intake & exhaust systems - Carbureted systems, - Principle of Carburetor, type of carburetor working of constant velocity type carburetor, - Carburetor operation- Carburetion, carburetor systems, - Metering jets, Accelerating, Carburetor barrels, Carburetor filter Diesel fuel Injection system, Tanks & lines, Fuel lines. Idle speed |

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| | | <p>scratches or wear and assemble the throttle valve. (10 hrs.)</p> <p>72. Perform removal of carburetor, float, float valve, jet clean, inspect and adjust the flat level as per manual and assemble the carburetor. (10 hrs.)</p> <p>73. Adjust the throttle grip free play and carburetor as per manual. (10 hrs.)</p> <p>74. Perform removing and cleaning of air cleaner, Checking of Engine oil level, oil filter screen cleaning. Inspection of fuel lines, Spark plug. (10 hrs.)</p> | <p>circuit, slow speed circuit, high speed circuit, air cleaners, Intake manifolds.</p> <p>Importance of Cooling systems & Lubrication system.</p> <ul style="list-style-type: none"> - Function of engine oil, Grades of oil, Lubrication points. - Trouble shooting procedure for Oil level too low and Oil contamination. (14 hrs.) |
| <p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs.</p> | <p>Carry out servicing of fuel tank.</p> | <p>75. Perform removal of fuel tank; check that fuel flow freely from the petrol tap. (05 hr.s)</p> <p>76. Perform removal of petrol tap and clean the strainer and assemble. (05 hrs)</p> <p>77. Diagnose - causes and remedy for engine not starting, high fuel consumption, Practice on engine tune. (15 hrs..)</p> | <p>Gasoline /Diesel Fuel Systems:</p> <ul style="list-style-type: none"> - Gasoline fuel characteristics, Diesel fuel characteristics, Difference between Gasoline and diesel fuel. - Controlling fuel burn, Stoichiometric ratio (air-fuel ratio), Air density, Fuel supply system, Pressure & vacuum. - Trouble shooting procedure for Engine cranks but would not start, Lean mixture, Engine idles roughly, stalls or turns poorly, and Rich mixture. (07 hrs.) |
| <p>Professional Skill 50 Hrs.;</p> | <p>Carryout overhauling of steering and</p> | <p>78. Identify steering system components in two and three wheelers. (05 hrs.)</p> | <ul style="list-style-type: none"> - Introduction to steering Principles of steering: Description of different |

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| <p>Professional Knowledge 14 Hrs.</p> | <p>suspension system.</p> | <p>79. Practice on handle bar removal, inspection and assembling of handlebar. (05 hrs.)</p> <p>80. Perform removal of front fork, inspection of front fork spring, fork tube, piston, slider and assembling of front fork. (5hrs)</p> <p>81. Practice on steering stem removal, steering stem adjustment. (05 hrs.)</p> <p>82. Inspect condition of fork and adjust rake of front fork, dismantle trailing link, adjust and service of heavy duty thrust races. (05 hrs..)</p> | <p>types of steering & handle, fork mounted over races.</p> <ul style="list-style-type: none"> - Description, construction and function of steering stem. - Troubleshooting Procedure for Hard steering Steers to one side or does not track strain, front wheel wobbling, Soft suspension, Hard suspension, Front suspension noise. (07 hrs.) |
| | | <p>83. Identify suspension system components in two and three wheelers. (05 hrs.)</p> <p>84. Practice on rear shock absorber removal, inspection of shock absorber spring and assembling of shock absorber. (05 hrs.)</p> <p>85. Perform removal of swing arm, inspection of pivot bolt, swing arm. (10 hrs.)</p> <p>86. Inspect condition of shock absorbers. Servicing of suspension, changing bush. (05 hrs.)</p> | <p>Suspension Systems</p> <ul style="list-style-type: none"> - Principles of suspension, Suspension force, Description, location, suspension-description, construction and working principle of telescopic front suspension, suspension oil, oil seal installation, <p>Shock absorber types</p> <ul style="list-style-type: none"> - Hydraulic shock absorbers, Gas-pressurized shock absorbers, Load-adjustable shock absorbers, - Manual adjustable rate shock absorbers, Electronic adjustable-rate shock absorbers, Automatic load-adjustable shock absorbers. (07 hrs.) |

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| <p>Professional Skill 100 Hrs.;</p> <p>Professional Knowledge 28 Hrs.</p> | <p>Overhauling front and rear wheels, brake.</p> | <p>87. Perform removal of front wheel from vehicle, inspection of front wheel axle run-out, front wheel bearing inspection, front wheel rim run-out, brake drum inspection, and assembling of front wheel. (15 hrs.)</p> <p>88. Practice on removing rear wheel from vehicle, inspection of rear wheel axle run-out, rear wheel bearing inspection, rear wheel rim run-out, brake drum inspection, driven sprocket inspection, driven sprocket removal, and assembling of rear wheel, driven sprocket installation. Check the chains lack and adjust as per manual. (20 hrs.)</p> <p>89. Dismantle tyres and tubes checking puncture. Assembling inflating to correct pressure. Checking & adjusting tire pressure by use of air or by Nitrogen Wheel truing, alignment. (10 hrs.)</p> <p>90. Analyze tyre wear patterns. Checking the wheel bearings and greasing. (05 hrs.)</p> <p>91. Perform following practical on Two and three wheelers.- Measure the front brake lever free play and adjust as per manual, Measure the</p> | <p>Wheels & Tyres</p> <ul style="list-style-type: none"> - Function of wheel and construction, Wheel types- spoke, cast wheel & sizes, Wheel balancing, Rim sizes & designations, Tyre function and structure, size and designation, Radial ply tyres, Tubeless tyre, Center of gravity, Relation between tyre pressure and life, Tube size, TUFFUP tube. Aspect ratio of tyre, - Puncture procedure, Repair of TUFFUP tube. <p>Tyre construction</p> <ul style="list-style-type: none"> - Types of tyre construction, Tyre materials, Tyre sizes & designations, Tyre information, Tyre tread designs, Effects of air pressure and uneven wear pattern. - Descriptions Tire wear Patterns and causes, Nitrogen vs atmospheric air in tyres. (14 hrs.) <p>Braking Systems</p> <ul style="list-style-type: none"> - Braking fundamentals Principles of braking, description, construction and operation of Drum & |
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| | | <p>rear brake pedal free play and adjust as per manual. (20 hrs.)</p> <p>92. Perform Servicing of brake system, cleaning, checking, greasing and assembling. (15 hrs.)</p> <p>93. Inspect the shoes and wheel drums, changing of brake lining. Repairing and maintenance of hydraulic disc brake used in Motorcycles. (15 hrs.)</p> | <p>disc brakes, advantage over drum brake,</p> <ul style="list-style-type: none"> - Description and working principle of master cylinder, Hydraulic pressure & force, Brake fade - Braking system components- Brake pedal/lever , Brake fluid hose, Brake fluid, - Bleeding, Applying brakes, Brake force, Brake light switch - Disc brakes & components - Disc brake system, Disc brake operation, Disc brake rotors, Disc brake pads, Disc brake calipers, Brake friction materials, - Comparison of Drum brake and Disc brake. ABS Drum brakes & components. (14 hrs.) |
| <p>Professional Skill 50 Hrs.;</p> <p>Professional Knowledge 14 Hrs.</p> | <p>Overhaul automatic/manual transmission of two and three wheelers.</p> | <p>94. Adjust clutch lever free play and adjust as per manual, removing clutch assembly from Two-wheeler and three wheeler cleaning and inspecting parts. (05 hrs.)</p> <p>95. Replace defective parts. Fitting clutch assembly. (05 hrs.)</p> <p>96. Inspect and repair work of Automatic clutch and automatic transmission used in two wheeler and three wheeler. (10 hrs.)</p> <p>97. Practice on removal of crankshaft, inspection of</p> | <p>Clutches & Transmission:-</p> <ul style="list-style-type: none"> - Clutch principles, Wet & dry clutches Single plate clutches, Multi-plate clutches, Operating mechanisms, Description of cam chain mechanism. Automatic clutch - Gearbox layout & operation Gearbox layouts, description of gear shift mechanism, gear ratio, Gearbox operation, Gear drive position – Neutral, 1st to 5th position. - Trouble shooting procedure |

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| | | | <p>crank shaft, timing sprocket replacement and installation, (05 hrs.)</p> <p>98. Practice on kick starter disassembly, inspection and assembly. (05 hrs.)</p> <p>99. Perform disassembly of transmission, inspection of main shaft, counter shaft, gearshift drum, shift fork, guide pin and gears and assembly of transmission. (10 hrs.)</p> <p>100. Removal of oil pump and inspection and assembly of oil pump. (05 hrs.)</p> <p>101. Gearshift linkage disassembly, inspection and assembly of gearshift linkage. (05 hrs.)</p> | <p>for Clutch slip when accelerating, clutch will not disengage, motor cycle creeps with clutch disengaged,</p> <ul style="list-style-type: none"> - Excessive lever pressure, clutch lever pressure, clutch operation feels rough, Hard to shift, Gearshift pedal does not return, and Transmission jumps out of gears. - Automatic transmission used in two wheeler and three wheeler. (14 hrs.) |
| <p>Professional Skill 50 Hrs.;</p> <p>Professional Knowledge 14 Hrs.</p> | <p>Overhaul generator.</p> <p>AC</p> | <p>102. Practice on A.C. Generator removal, inspection and installation. (05 hrs.)</p> <p>103. Perform removal of cam chain tensioner, inspection of tensioner spring and pushrod, installation. (10 hrs.)</p> <p>104. Trace the A.C /D.C electrical circuit in a two wheeler and three wheeler. (05 hrs.)</p> <p>105. Perform measurement of Resistance, DC voltage measurement, DC Current measurement, pulse generator,(5hrs.)</p> <p>106. Inspect leakage current,</p> | <p>Auto electrical</p> <ul style="list-style-type: none"> - Thermistor, Description and function of ignition switch, alternator, Regulator/rectifier, Ignition principles, Ignition components, - Battery power source, Ignition coil, DC/AC CDI, TCI Contact breaker, capacitor /condenser, Distributors, Distributor types, - High-tension leads, Spark plugs, Spark plug components, Principal of electronic ignition, advantage of electronic ignition. | |

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| | | <p>measurement of charging voltage. (05 hrs.)</p> <p>107. Practice on headlight removal, headlight bulb replacement and installation. (05 hrs.)</p> <p>108. Practice on removal of speedometer, indicator lamp replacement. (05 hrs.)</p> <p>109. Check horn, head light and indicator and rectify the circuit. (05 hrs.)</p> <p>110. Practice on adjusting head light focus. Identifying wiring harness. (05 hrs.)</p> | <ul style="list-style-type: none"> - Starter motor, Fuse, throttle position switch, source coil & pulser coil Power relay, Silicon rectifier, - Description of Charging system, starting system, Lighting system, Lamps/light bulbs, Lamp/light bulb information, Indicators, Headlights, Circuit diagrams. (14 hrs.) |
| <p>Professional Skill 25 Hrs.;</p> <p>Professional Knowledge 07 Hrs.</p> | <p>Check ignition circuit for proper functioning.</p> | <p>111. Inspection of spark plug gap and adjustments. (05 hrs)</p> <p>112. Measurement the resistance of the ignition primary and secondary coil. (02 hrs.)</p> <p>113. Perform checking the performance of ignition coil, (03 hrs.)</p> <p>114. Inspect of A.C generator, practice on removal of C.D.I unit (Capacitive Discharge Ignition), inspection of C.D.I unit and assembling. (05 hrs.)</p> <p>115. Servicing of electronic Ignition system, Inspection of ignition timing and adjustment. (05hrs.)</p> <p>116. Inspect ignition switch, handlebar switches, front</p> | <p>Troubleshooting procedure</p> <ul style="list-style-type: none"> - for No sparks at plugs, Engine starts but runs poorly, - No lights come on when ignition switch is turned ON, - All lights come on but dimly when ignition switch is turned ON - Headlight beams do not shift when HI-LO switch is operated. Misfiring. (07 hrs.) |

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| | | brake & rear brake stoplight light switch. (05 hrs.) | |
| Professional Skill 25 Hrs.; | Overhaul the LPG/CNG fuel system and check exhausts smoke. | 117. Identify the various parts of LPG/ CNG kit and Troubleshooting of the same. (10 hrs.) 118. Practice on Starting engine, tuning for slow speed, perform exhaust emission test using gas analyzer/smoke tester and tuning the vehicle for recommended emission levels. (15 hrs.) | - Study about LPG / CNG powered engines used in Three Wheelers. Safety while handling gas units. Emission Control- - Sources of emission, Combustion, Hydrocarbons, Hydrocarbons in exhaust gases, Oxides of nitrogen, Particulates, Carbon monoxide, Carbon dioxide, Sulphur content in fuels, crankcase emission control system, Evaporative emission control, - Catalytic converter Regulated emissions standard. (07 hrs.) |
| Professional Knowledge 07 Hrs. | | | |

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| <p>Professional Skill 25 Hrs.;</p> <p>Professional Knowledge 07 Hrs.</p> | <p>Carryout servicing and maintenance of electric two and three wheelers.</p> | <p>Electric 2 & 3 Wheeler Maintenance</p> <p>119. Operate equipment according to safety protocols and identify tools, tests equipment and service procedures used in the servicing of EV . (02hrs.)</p> <p>120. Identify basic propulsion systems and power transfer systems including AC and DC motor technology used in EV(03hrs.)</p> <p>121. Diagnose, repair, and test power electronic circuitry for electric drive systems. (05hrs.)</p> <p>122. Diagnose, repair, and test motor control electronic hardware. (05hrs.)</p> <p>123. Diagnose, repair, and test high voltage battery systems. (05hrs.)</p> <p>124. Perform safe storage, handle, and dispose of high voltage battery systems and Check Inverter Assembly variable voltage system. (05hrs.)</p> | <p>Introduction: Electric Vehicle</p> <p>Electric Vehicle Architecture Design</p> <p>Electric Drive and controller</p> <p>Energy Storage Solutions (ESS)</p> <p>Battery Management System (BMS)/Energy Management System (EMS)</p> <p>Control Unit: Function of CU, Development Process. (07 hrs.)</p> |
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| <p>Project Work/ Industrial Visit-</p> <p>Broad area:</p> <ul style="list-style-type: none"> a) Overhauling of valve train b) Overhauling of cylinder head c) Maintenance of Electrical/ Electronics systems. d) Brake system (Hydraulic & Air) & Hydraulic Power Steering |
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| SYLLABUS FOR CORE SKILLS |
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| 1. Workshop Calculation & Science(Common for one year course) (80Hrs.) |
| 2. Engineering Drawing(80Hrs.) |
| 3. Employability Skills(Common for all CTS trades) (160Hrs.) |

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

| List of Tools and Equipment | | | |
|--|---|--------------------------|-----------------|
| MECHANIC TWO & THREE WHEELER (For the batch of 20 candidates) | | | |
| S No. | Name of the Tool & Equipment | Specification | Quantity |
| A. TRAINEES TOOL KIT per 4 Trainees | | | |
| 1. | Allen Key set of 12 pieces | 2mm to 14mm | (5 +1) Nos. |
| 2. | Caliper inside Spring | 15 cm | (5 +1) Nos. |
| 3. | Calipers outside spring | 15 cm | (5 +1) Nos. |
| 4. | Center Punch | 10 mm. Dia. x 100 mm. | (5 +1) Nos. |
| 5. | Dividers Spring | 15 cm | (5 +1) Nos. |
| 6. | Electrician Screw Driver | 250mm | (5 +1) Nos. |
| 7. | Hammer ball peen with handle | 0.5 kg | (5 +1) Nos. |
| 8. | Hands file, Second cut flat | 20 cm. | (5 +1) Nos. |
| 9. | Philips Screw Driver set of 5 pieces | 100 mm to 300 mm | (5 +1) Nos. |
| 10. | Pliers combination | 20 cm | (5 +1) Nos. |
| 11. | Screw driver | 20cm.X 9mm. Blade | (5 +1) Nos. |
| 12. | Screw driver | 30 cm. X 9 mm. Blade | (5 +1) Nos. |
| 13. | Scriber | 15 cm | (5 +1) Nos. |
| 14. | Spanner D.E. set of 12 | Metric sizes 6mm to 32mm | (5 +1) Nos. |
| 15. | Spanner, ring set of 12 | Metric sizes 6 to 32 mm. | (5 +1) Nos. |
| 16. | Spanners socket with speed handle, T-bar, ratchet and universal of 28 pieces with box | up to 32 mm set | (5 +1) Nos. |
| 17. | Steel rule | 30 cm inch and metric | (5 +1) Nos. |
| 18. | Steel tool box with lock and key (folding type) | 400x200x150 mm | (5 +1) Nos. |
| 19. | Wire cutter and stripper | | (5 +1) Nos. |
| B. TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS | | | |
| 20. | Adjustable spanner | pipe wrench 350 mm | 2 Nos. |
| 21. | Air blow gun with standard accessories | | 1 No. |
| 22. | Air impact wrench with standard accessories | | 4 Nos. |
| 23. | Air ratchet with standard accessories | | 4 Nos. |

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| 24. | Allen Key set of 12 pieces | 2mm to 14mm | 4 Nos. |
| 25. | Ammeter DC with external shunt | 300A/ 60A | 4 Nos. |
| 26. | Angle plate adjustable | 250x150x175 mm | 1 No. |
| 27. | Angle plate size | 200x100x200mm | 2 Nos. |
| 28. | Anvil with Stand | 50 Kgs | 1 No. |
| 29. | Auto Electrical test bench | | 1 No. |
| 30. | Battery –charger | | 2 Nos. |
| 31. | Blow Lamp | 1 litre | 2 Nos. |
| 32. | Caliper inside Spring | 15 cm | 4 Nos. |
| 33. | Calipers outside spring | 15 cm | 4 Nos. |
| 34. | Car Jet washer with standard accessories | | 1 No. |
| 35. | Chisel flat | 10 cm | 4 Nos. |
| 36. | Chisels cross cut | 200 mm X 6mm | 4 Nos. |
| 37. | Circlip pliers Expanding and contracting type | 15cm and 20cm | 4 Nos. |
| 38. | Clamps C | 100mm | 2 Nos. |
| 39. | Clamps C | 150mm | 2 Nos. |
| 40. | Clamps C | 200mm | 2 Nos. |
| 41. | Cleaning tray 45x30 cm. | | 4 Nos. |
| 42. | Compression testing gauge suitable for petrol engine. with standard accessories | | 2 Nos. |
| 43. | Copper bit soldering iron | 0.25 Kg | 4 Nos. |
| 44. | Cylinder bore gauge | 20 to 160 mm capacity | 2 Nos. |
| 45. | Cylinder bore gauge | capacity 20 to 160 mm | 2 Nos. |
| 46. | Depth micrometer | 0-25mm | 4 Nos. |
| 47. | Dial gauge type 1 Gr. A (complete with clamping devices and stand) | | 4 Nos. |
| 48. | Dividers Spring | 15 cm | 4 Nos. |
| 49. | Drift Punch Copper | 15 Cm | 4 Nos. |
| 50. | Drill point angle gauge | | 1 No. |
| 51. | Drill twist | 1.5 mm to 15 mm (various sizes) by 0.5 mm | 4 Nos. |
| 52. | Electric Soldering Iron | 230 V 60 watts 230 V 25 watts | 2 each |
| 53. | Electric testing screw driver | | 4 Nos. |
| 54. | Engineer's square Blade | 15 cm. | 4 Nos. |

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| 55. | Feeler gauge 20 blades (metric) | | 4 Nos. |
| 56. | File flat bastard | 20 cm | 4 Nos. |
| 57. | File, half round second cut | 20 cm | 4 Nos. |
| 58. | File, Square second cut | 20 cm | 4 Nos. |
| 59. | File, Square round | 30 cm | 4 Nos. |
| 60. | File, triangular second cut | 15 cm | 4 Nos. |
| 61. | Files assorted sizes and types including safe edge file (20 No's) | | 2 sets |
| 62. | Flat File second cut | 25 cm | 4 Nos. |
| 63. | Flat File bastard | 35 cm | 4 Nos. |
| 64. | Granite surface plate with stand and cover | 1600 x 1000mm | 1 No. |
| 65. | Grease Gun | | 2 Nos. |
| 66. | Growler | | 1 No. |
| 67. | Hacksaw frame adjustable | 20-30 cm | 10 Nos. |
| 68. | Hammer Ball Peen | 0.75 Kg | 4 Nos. |
| 69. | Hammer Chipping | 0.25 Kg | 5 Nos. |
| 70. | Hammer copper 1 Kg with handle | | 4 Nos. |
| 71. | Hammer Mallet | | 3 Nos. |
| 72. | Hammer Plastic | | 4 Nos. |
| 73. | Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm | | 2 Nos. |
| 74. | 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 | 2 sets |
| 75. | Hand Shear Universal | 250mm | 2 Nos. |
| 76. | Hand vice | 37 mm | 2 Nos. |
| 77. | Hollow Punch set of seven pieces | 6mm to 15mm | 2 sets each |
| 78. | Insulated Screw driver | 20 cm x 9mm blade | 4 Nos. |
| 79. | Insulated Screw driver | 30 cm x 9mm blade | 4 Nos. |
| 80. | Left cut snips | 250mm | 4 Nos. |
| 81. | Magneto spanner set with 8 spanners | | 1 set |
| 82. | Magnifying glass | 75mm | 2 Nos. |
| 83. | Marking out table | 90X60X90 cm. | 1 No. |

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| 84. | Multimeter digital | | 5 Nos. |
| 85. | Oil can | 0.5/0.25-liter capacity | 4 Nos. |
| 86. | Oil Stone | 15 cm x 5 cm x 2.5 cm | 1 No. |
| 87. | Outside micrometer | 0 to 25 mm | 4 Nos. |
| 88. | Outside micrometer | 25 to 50 mm | 4 Nos. |
| 89. | Outside micrometer 50 to 75 mm | | 1 Nos. |
| 90. | Outside micrometer | 75 to 100 mm | 1 Nos. |
| 91. | Philips Screw Driver set of 5 pieces | (100 mm to 300 mm) | 2 sets |
| 92. | Pipe cutting tool | | 2 Nos. |
| 93. | Pipe flaring tool | | 2 Nos. |
| 94. | Piston ring compressor | | 2 Nos. |
| 95. | Piston Ring expander and remover. | | 2 Nos. |
| 96. | Piston Ring groove cleaner. | | 2 Nos. |
| 97. | Pliers combination 20 cm. | | 2 Nos. |
| 98. | Pliers flat nose 15 cm | | 2 Nos. |
| 99. | Pliers round nose 15 cm | | 2 Nos. |
| 100. | Pliers side cutting 15 cm | | 2 Nos. |
| 101. | Portable electric drill Machine | | 1 No. |
| 102. | Power Supply 0-12 v, lamp | | 1 No. |
| 103. | Prick Punch 15 cm | | 4 Nos. |
| 104. | Punch Letter 4mm (Number) | | 2 sets |
| 105. | Right cut snips 250mm | | 2 Nos. |
| 106. | Rivet sets snap and Dolly combined | 3mm, 4mm, 6mm | 2 Nos. |
| 107. | Scooter / Motor cycle repairing stand | | 2 Nos. |
| 108. | Scraper flat | 25 cm | 2 Nos. |
| 109. | Scraper half round | 25 cm | 2 Nos. |
| 110. | Scraper Triangular | 25 cm | 2 Nos. |
| 111. | Scriber | 15 cm | 2 Nos. |
| 112. | Scriber with scribing black universal | | 2 Nos. |
| 113. | Set of stock and dies - UNC, UNF and metric | | 2 sets |
| 114. | Shear Tin Man's | 450 mm x 600mm | 2 Nos. |
| 115. | Sheet Metal Gauge | | 2 Nos. |

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| 116. | Shear Tinnman's | 300mm | 4 Nos. |
| 117. | Soldering Copper Hatchet type | 500gms | 2 Nos. |
| 118. | Solid Parallels in pairs (Different size) in Metric | | 2 Nos. |
| 119. | Spanner Clyburn | 15 cm | 1 No. |
| 120. | Spanner D.E. set of 12 pieces | 6mm to 32mm | 4 Nos. |
| 121. | Spanner T. flocks for screwing up and up-screwing inaccessible positions | | 2 Nos. |
| 122. | Spanner, adjustable 15cm. | | 2 Nos. |
| 123. | Spanner, ring set of 12 metric sizes 6 to 32 mm. | | 4 Nos. |
| 124. | Spanners socket with speed handle, T-bar, ratchet and universal up to 32 mm set of 28 pieces with box | | 2 Nos. |
| 125. | Spark lighter | | 2 Nos. |
| 126. | Spark plug spanner | | 2 Nos. |
| 127. | Steel measuring tape 10 meter in a case | | 4 Nos. |
| 128. | Steel rule 15 cm inch and metric | | 4 Nos. |
| 129. | Steel rule 30 cm inch and metric | | 4 Nos. |
| 130. | Straight edge gauge 2 | | 2 Nos. |
| 131. | Stud extractor set of 3 | | 2 sets |
| 132. | Stud remover with socket handle | | 1 No. |
| 133. | Surface gauge with dial test indicator plunger type i.e. 0.01 mm | | 4 Nos. |
| 134. | Tachometer (Counting type) | | 1 No. |
| 135. | Taps and Dies complete sets BSF | | 1 set |
| 136. | Taps and wrenches - Metric | | 2 sets |
| 137. | Telescope gauge | | 4 Nos. |
| 138. | Temperature gauge 0-100 deg c | | 2 Nos. |
| 139. | Thread pitch gauge metric, BSW | | 2 Nos. |
| 140. | Torque wrenches | | 1 each |
| 141. | Trammel 30 cm | | 2 Nos. |

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| 142. | Tyre pressure gauge with holding nipple | | 2 Nos. |
| 143. | Universal puller for removing pulleys, bearings | | 1 No. |
| 144. | V' Block with Clamps | 75 x 38 mm pair | 2 Nos. |
| 145. | Vacuum gauge | 0 to 760 mm of Hg | 2 Nos. |
| 146. | Valve Lifter | | 1 No. |
| 147. | Valve spring compressor universal. | | 2 Nos. |
| 148. | Vernier caliper | 0-300 mm with least count 0.02mm | 4 Nos. |
| 149. | Vice grip pliers | | 2 Nos. |
| 150. | Voltmeter 50V/DC | | 2 Nos. |
| 151. | Wire Gauge (metric) | | 2 Nos. |
| 152. | Work bench with 4 vices 12cm Jaw | 250 x 120 x 60 cm | 4 Nos. |
| C. GENERAL INSTALLATION/ MACHINERIES | | | |
| 153. | Arbor press hand operated 2-ton capacity | | 1 No. |
| 154. | Automotive exhaust 5 gas analyzer (petrol & Diesel) or Diesel Smoke Meter | | 1 No. |
| 155. | Battery tester to test 12V/ 24V | | 2 Nos. |
| 156. | Bench lever shears 250mm Blade x 3mm capacity | | 1 No. |
| 157. | Cut section working model of Continuous variable transmission | | 1 No. |
| 158. | Cut Section working model of Rotary clutch assembly of two wheeler | | 1 No. |
| 159. | Demonstration board of magneto ignition system of a two wheeler | | 1 No. |
| 160. | Discrete Component Trainer / Basic Electronics Trainer | | 1 No. |
| 161. | Drilling machine bench to drill up to 12mm dia along with accessories | | 1 No. |
| 162. | Dual Magnetization Yoke | AC / HWDC, 230 VAC, 50Hz | 1set |

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| 163. | Gas Welding Table | 1220mm x760mm | 2 Nos. |
| 164. | Grinding machine (general purpose) D.E. pedestal with wheels rough and smooth | 300 mm dia | 1 No. |
| 165. | Ignition coil and CDI unit of four different make | | 1each |
| 166. | Layout of working model 12 V automobile electrical systems | | 1 each |
| 167. | Liquid penetrant Inspection kit | | 1 set |
| 168. | Motor cycle (four stroke engine) with Digital twin spark | | 1 No. |
| 169. | Motor cycle (two stroke engine) | | 1 No. |
| 170. | Motor vehicle (3 wheeler) | | 1 No. |
| 171. | Pipe Bending Machine (Hydraulic type) 12mm to 30mm | | 1 No. |
| 172. | Pneumatic rivet gun | | 2 Nos. |
| 173. | Ridge cutter | | 1 No. |
| 174. | Scooter (four stroke engine) | | 1 No. |
| 175. | Scooter (two stroke engine) | | 1 No. |
| 176. | shock absorber for two wheeler four different type | | 2 Nos. |
| 177. | Spring tension tester | | 1 No. |
| 178. | Three wheeler chassis frame & power transmission system. | | 1 No. |
| 179. | Three wheeler Engine for dismantling and assembling | | 2 Nos. |
| 180. | Three wheeler gear box for dismantling and assembling | | 2 Nos. |
| 181. | Three wheeler steering system for dismantling and assembling | | 2 Nos. |
| 182. | Tin smiths bench folder 600 x 1.6mm | | 1 No. |
| 183. | Trolley type portable air compressor single cylinder with 45 | | 1 No. |
| 184. | capacity Air tank, along with accessories & with working | | 2 Nos. |
| 185. | Welding Transformer | 150-300 Amps | 1 No. |
| 186. | Working model of electronic ignition system of three | | 1 No. |

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| | wheeler | | |
| 187. | Working model of electronic ignition system of two wheeler | | 1 No. |
| D. LIST OF CONSUMABLE: | | | |
| 188. | Automatic Transmission oils | | As required |
| 189. | Battery- SMF | | As required |
| 190. | Brake fluids | | As required |
| 191. | Chalk, Prussian blue. | | As required |
| 192. | Chemical compound for fasteners | | As required |
| 193. | Diesel | | As required |
| 194. | Different type gasket material | | As required |
| 195. | Different type of oil seal | | As required |
| 196. | Drill Twist (assorted) | | As required |
| 197. | Emery paper - | 36–60 grit , 80–120 grit | As required |
| 198. | Engine coolant | | As required |
| 199. | Engine oil | | As required |
| 200. | Gear oils | | As required |
| 201. | Gloves for Welding (Leather and Asbestos) | | 5 sets |
| 202. | Hacksaw blade (consumable) | | As required |
| 203. | Hand rubber gloves tested for 5000 V | | 5 pairs |
| 204. | Holder, lamp teakwood boards, plug sockets, solders, flux wires and cables batteries round consumable blocks and other consumables as required | | As required |
| 205. | Hydrometer | | 4 Nos. |
| 206. | Lapping abrasives | | As required |
| 207. | Leather Apron | | 5 Nos. |
| 208. | Petrol | | As required |
| 209. | Power steering oil | | As required |
| 210. | Radiator Coolants | | As required |
| 211. | Safety goggles | | As required |
| 212. | Steel wire Brush 50mmx150mm | | 5 Nos. |
| E. WORKSHOP FURNITURE | | | |
| 213. | Book shelf (glass panel) | 6½ ' x 3' x 1½' | As required |

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| 214. | Computer Chair | | 2 Nos. |
| 215. | Computer Table | | 2 Nos. |
| 216. | Desktop Computer | CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software. | 2 Nos. |
| 217. | Discussion Table | 8' x 4' x 2½' | 2 Nos. |
| 218. | Fire Extinguishers, first- aid box | | As required |
| 219. | Instructional Material – NIMI Books/Ref.books | | As required |
| 220. | Internet connection with all accessories | | As required |
| 221. | Laser printer | | 1 No. |
| 222. | LCD projector/ LED /LCD TV | 42" | 1 No. |
| 223. | Multimedia DVD for Automotive application / subjects | | As required |
| 224. | Online UPS 2KVA | | As required |
| 225. | Stools | | 21(20 +1) Nos. |
| 226. | Storage Rack | 6½' x 3' x 1½' | As required |
| 227. | Storage shelf | 6½' x 3' x 1½' | As required |
| 228. | Suitable class room furniture | | As required |
| 229. | Suitable Work Tables with vices | | As required |
| 230. | Tool Cabinet | 6½' x 3' x 1½' | 2 Nos. |
| 231. | Trainees locker (20 lockers) | 6½' x 3' x 1½' | 2 Nos. |
| Note: - | | | |
| 1. Internet facility is desired to be provided in the class room. | | | |

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

| List of Expert members contributed/ participated for finalizing the course curriculum of Mechanic Two and Three Wheeler trade held on 16.05.17 at Govt. ITI- Aundh, Pune | | | |
|---|---|---|----------------|
| S No. | Name & Designation Shri/Mr./Ms. | Organization | Remarks |
| Industry Experts | | | |
| 1. | Dr. K C Vora, Sr. Dy. Director & Head Arai Academy | The Automotive Research Association Of India. S.No.102, Vetal Hill, Off Paud Road, Kothrud, Pune | Chairman |
| 2. | Jayanta Patra, Sr. Manager | Micromatic Machine Tools (P) Ltd. 240/241, 11th Main, 3rd Phase, Peenya Industrial Area, Bangalore. | Member |
| 3. | Kashinath M. Patnasetty, Head - Application Support Group | Ace Designers Ltd. Plot No. 7&8, li Phase Peenya Industrial Area, Bangalore | Member |
| 4. | Suyog Fulbadave, Executive HR | Piaggio Vehicles Pvt. Ltd, Pune | Member |
| 5. | Sunil Khodke, Training Manager | Bobst India Pvt Ltd Pirangut, Mulashi, Pune | Member |
| 6. | Lokesh Kumar, Manger Training Academy | Volkswagen India Pvt Ltd Pune | Member |
| 7. | Shriram Tatyaba Khaire, Executive Engineering. | Sulzer India Pvt Ltd. Kondhapuri, Shirur, Pune | Member |
| 8. | Milind P Desai, Sr. Shift Engineer | Atlas Copco (I) Ltd Dapodi, Pune | Member |
| 9. | Shrikant Mujumdar, DGM | John Deere India Pvt Ltd. Pune - Nagar Road, Sanaswadi, Pune | Member |
| 10. | Milind Sanghai, Team Manager | Alfa Laval India Ltd. Dapodi, Pune. | Member |
| 11. | Rajesh Menon, Unit Manager | Alfa Laval India Ltd. Dapodi, Pune. | Member |
| 12. | N K A Madhuubalan, DGM - QC, QA & SMPS | Sandvik Asia Pvt.Ltd. Dapodi, Pune. | Member |
| 13. | Irkar Balaji, Sr. Engineer Mfg. | Premium Transmission Ltd. Chinchwad, Pune. | Member |
| 14. | Rajendra Shelke, Sr. Engineer Mfg. | Premium Transmission Ltd. Chinchwad, Pune - 19 | Member |
| 15. | Bhagirath Kulkarni, Manager | Tata Ficosa Auto Sys Ltd Hinjawadi, | Member |

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|-------------------------------------|---|--|---------------------------|
| | Maintenance | Pune | |
| 16. | Rohan More, HR & Admin | Tata Ficosa Auto Sys Ltd Hinjawadi, Pune | Member |
| 17. | G. Venkateshwaran | Cummins India Ltd | Member |
| 18. | Mahesh Dhokale, Engineer | Tata Toyo Radiator Ltd | Member |
| 19. | Pankaj Gupta, DGM- HR & IR | Tata Toyo Radiator Ltd | Member |
| 20. | S K Joshi, Head - Business Development. | Radheya Machining Ltd Pune- Nagar Road, Sanaswadi, Pune. | Member |
| 21. | A L Kulkarni, DGM Mfg. | Pmt Machines Ltd Pimpri, Pune | Member |
| 22. | S V Karkhanis, DGM Planning | Pmt Machines Ltd Pimpri, Pune | Member |
| 23. | KiranShirsath, Asso. Manager M.E. | Burckhardt CompressionPvt Ltd, Ranjangaon, Pune | Member |
| 24. | Ajay Dhuri, Manager | Tata Motors Ltd Pimpri, Pune | Member |
| 25. | Arnold Martin | Godrej & Boyce Mfg Co Ltd, Mumbai | Member |
| 26. | Ravindra L. More | Mahindra CIE Automotive Ind. Ltd. Ursc-Pune | Member |
| 27. | Kushagra P. Patel | NRB Bearings Ltd., Chiklthana, Aurongabad | Member |
| 28. | M. M. Kulkarni | NRB Bearings Ltd., Chiklthana, Aurongabad | Member |
| DGT & Training Institute | | | |
| 29. | Nirmalya Nath, Asst. Director of Trg. | CSTARI, Kolkata | Member cum Co-coordinator |
| 30. | Akhilesh Pandey | ATI, Mumbai | Expert |
| 31. | Amar Prabhu, Principal | Don Bosco, Mumbai | Expert |
| 32. | Indranil Mukherjee, Instructor | ITI, Tollygaunj | Expert |

ABBREVIATIONS

| | |
|------|--|
| CTS | Craftsmen Training Scheme |
| ATS | Apprenticeship Training Scheme |
| CITS | Craft Instructor Training Scheme |
| DGT | Directorate General of Training |
| MSDE | Ministry of Skill Development and Entrepreneurship |
| NTC | National Trade Certificate |
| NAC | National Apprenticeship Certificate |
| NCIC | National Craft Instructor Certificate |
| LD | Locomotor Disability |
| CP | Cerebral Palsy |
| MD | Multiple Disabilities |
| LV | Low Vision |
| HH | Hard of Hearing |
| ID | Intellectual Disabilities |
| LC | Leprosy Cured |
| SLD | Specific Learning Disabilities |
| DW | Dwarfism |
| MI | Mental Illness |
| AA | Acid Attack |
| PwD | Person with disabilities |

