



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

**COMPETENCY BASED CURRICULUM**

# **MECHANIC AUTO BODY PAINTING**

(Duration: One Year)

**CRAFTSMEN TRAINING SCHEME (CTS)**

**NSQF LEVEL- 4**



**SECTOR –AUTOMOTIVE**



Directorate General of Training

# MECHANIC AUTO BODY PAINTING

(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](http://www.cstaricalcutta.gov.in)

## CONTENTS

Sl. No.	Topics	Page No.
1.	Course Information	1
2.	Training System	2
3.	Job Role	6
4.	General Information	7
5.	Learning Outcome	10
6.	Assessment Criteria	11
7.	Trade Syllabus	14
	Annexure I(List of Trade Tools & Equipment)	30
	Annexure II (List of Trade experts)	41

## 1. COURSE INFORMATION

---

During the one-year duration of “Mechanic Auto Body Painting” trade, a candidate is trained on Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Calculation & Science 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: -

The course will start with the 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. Identify various types of vehicle.

The candidate will be able to perform practice on Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats. Also the trainee will be able to demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection and how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns. Able to achieve correct paint application techniques and be able to identify paint problems along with troubleshooting skills with finishing process. The trainee will demonstrate the use of computer color matching systems and the use of tinting solid and metallic colors and demonstrate how to remove minor paint imperfections.

## 2. TRAINING SYSTEM

---

### 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 Auto Body Painting 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. The Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while Core area (Workshop Calculation science, Engineering Drawing and Employability Skills) imparts requisite core skill & knowledge and life skills. After passing out of the training programme, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

#### **Candidates need broadly to demonstrate that they are able to:**

- Read & interpret technical parameters/documentation, plan work, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job.
- Document the technical parameters 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 Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- 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
	<b>Total</b>	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 have to maintain 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](http://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. The pattern and marking structure is being notified by DGT 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 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 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 and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
<b>(a) Weightage in the range of 60 -75% to be allotted during assessment</b>	
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.	<ul style="list-style-type: none"> <li>• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment</li> <li>• Below 70% accuracy achieved while undertaking different work with those demanded by the component/job/set standards.</li> <li>• A fairly good level of neatness and consistency in the finish</li> <li>• Occasional support in completing the project/job.</li> </ul>
<b>(b)Weightage in the range of above75% - 90% to be allotted during assessment</b>	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has	<ul style="list-style-type: none"> <li>• Good skill levels in the use of hand tools, machine tools and workshop equipment</li> <li>• 70-80% accuracy achieved while</li> </ul>

<p>produced work which demonstrates attainment of a reasonable standard of craftsmanship.</p>	<p>undertaking different work with those demanded by the component/job/set standards.</p> <ul style="list-style-type: none"> <li>• A good level of neatness and consistency in the finish</li> <li>• Little support in completing the project/job</li> </ul>
<p>(c) Weightage in the range of above 90% to be allotted during assessment</p>	
<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"> <li>• High skill levels in the use of hand tools, machine tools and workshop equipment</li> <li>• Above 80% accuracy achieved while undertaking different work with those demanded by the component/job/set standards.</li> <li>• A high level of neatness and consistency in the finish.</li> <li>• Minimal or no support in completing the project.</li> </ul>



### **Brief description of Job roles:**

#### **Painter, Spray / Painting Technician (Spray Painting)**

Painter Spray; Duco Painter applies decorative or protective materials such as paint, enamel or lacquer including synthetic paint on articles of wood, metal etc., using spray painting equipment. Selects and mixes paints to produce desired colour consistency, strains and puts coating liquid into spray-gun tank, couples gun to air-hose and adjusts air pressure valves and nozzle. Presses trigger and directs spray of prime and finish coats of paint over surfaces and ensures smooth and even finish. Covers with tape areas not to be painted or where painting is to be done in second colouring. Cleans gun and hose with solvent before changing colour and on completion of work. May prepare surfaces for painting, using scrapers, abrasives, chemical removers or other means. May be designated according to article coated or material used.

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:**

7132.0201 Painter, Spray / Painting Technician

## 4. GENERAL INFORMATION

<b>Name of the Trade</b>	<b>MECHANIC AUTO BODY PAINTING</b>
<b>Trade Code</b>	DGT/1099
<b>NCO – 2015</b>	7132.0201
<b>NSQF Level</b>	Level – 4
<b>Duration of Craftsmen Training</b>	One year (1600 Hours)
<b>Entry Qualification</b>	Passed 10 <sup>th</sup> class examination or its equivalent.
<b>Minimum Age</b>	14 years as on first day of academic session.
<b>Eligibility for PwD</b>	LD, LC, DW, AA, LV, DEAF
<b>Unit Strength (No. Of Student)</b>	20 (There is no separate provision of supernumerary seats)
<b>Space Norms</b>	210 Sq. m
<b>Power Norms</b>	4.8 KW
<b>Instructors Qualification for</b>	
<b>1. Mechanic Auto Body Painting Trade</b>	<p>B.Voc / Degree in Automobile / Mechanical Engg. (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;"><b>OR</b></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;"><b>OR</b></p> <p>NTC/NAC passed in the trade of "Mechanic Auto Body Painting" with three years' experience in the relevant field.</p> <p><b>Essential Qualification:</b>  Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT.</p> <p><b>NOTE: - Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them must possess NCIC in any of its variants.</b></p>

<p><b>2. Workshop Calculation &amp; Science</b></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;"><b>OR</b></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;"><b>OR</b></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;"><b>OR</b></p> <p>NCIC in RoDA or any of its variants under DGT</p>
<p><b>3. Engineering Drawing</b></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;"><b>OR</b></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;"><b>OR</b></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;"><b>OR</b></p> <p>NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT.</p>
<p><b>4. Employability Skill</b></p>	<p>MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience <b>with short term ToT Course in</b> 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;"><b>OR</b></p> <p><b>Existing Social Studies Instructors in ITIs with short term ToT Course in</b> Employability Skills from DGT institutes.</p>

<b>5. Minimum Age for Instructor</b>	21 Years				
<b>List of Tools and Equipment</b>	As per Annexure – I				
<b>Distribution of training on Hourly basis: (Indicative only)</b>					
<b>Total hours /week</b>	<b>Trade practical</b>	<b>Trade theory</b>	<b>Work shop Cal. &amp;Sc.</b>	<b>Engg. Drawing</b>	<b>Employability skills</b>
40 Hours	25 Hours	7 Hours	2 Hours	2 Hours	4 Hours

## 5. LEARNING OUTCOME

---

*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 OUTCOME (TRADE SPECIFIC)

1. Check & perform Measuring & marking by using various Measuring & Marking tools(Vernier Calliper, Micrometer, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.)following safety precautions.
2. Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & equipments.
3. Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system.
4. Join components by using Arc & Gas welding.
5. Check and Interpret Vehicle Specification data and VIN, Select & operate various Service Station Equipments.
6. Identify various vehicle parts and Service, Repair and Maintenance of Air compressor and Air Lines.
7. Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills
8. Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.
9. Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection.
10. Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.
11. Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills.
12. Demonstrate finishing process.
13. Demonstrate the use of computer color matching systems and the use of tinting solid and metallic colors.
14. Demonstrate how to remove minor paint imperfections.

## 6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Check & perform Measuring & marking by using various Measuring & Marking tools (Vernier Caliper, Micrometer, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.)following safety precautions	Plan the working principles of measuring instruments and special tools required for auto workshop.
	Select, care and use of measuring instrument.
	Set up the measured value with workshop manual and quality concepts and proper safety.
	Carry out decision on whether to replace or not.
2. Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & 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, Dieting)
3. Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system. Charge and test batteries used in vehicle.	Plan and prepare as per procedure and safety methods of soldering the cable ends using an electric soldering iron.
	Use crimping tool to make a circuit joint.
	Explain the connection of an ammeter, voltmeter, and ohmmeter in a circuit trouble shooting.
	State open & short circuit, series and parallel circuits.
	Verify DC series & parallel circuits and its characteristics.
	Check out the open and short circuits in the lighting circuits.
	Verify ohm's law and measure resistance using rheostat.
	Check the voltage drop in the auto electrical system by using multimeter.
	Trace the auto electrical components by using vehicle wiring circuits.
	Check the condition of the solenoid switch in the starting system.
	Determine the forward to reverse resistance ratio of diodes and identify good / bad diodes.
Perform battery charging and check	

4. 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
5. Identify various vehicle parts and Service, Repair and Maintenance of Air compressor and Air Lines.	Ascertain basic working principles and safety aspect of Air Compressor.
	Plan and perform removal of accessories fitted to the Air Compressor.
	Dismantle the cylinder block parts.
	Perform inspection to ascertain the serviceability of the dismantled parts.
	Repair/replace defective parts.
	Comply with safety rules when performing the above operations.
	Assemble and check functionality of the components.
	Service FRL unit and check air leaks on the Air compressor and installed pipelines.
7. Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills	Plan and perform selection of right paint repair materials for a specific job following standards laid down by industries.
	Identify various primers, masking materials, body fillers, etc.
	Clean the panel and perform preconditioning and ED Coating.
	Carryout visual inspection on panel for defects.
8. Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.	Identify various body fillers, hardeners and putties used as per industry standards.
	Apply body filler on a panel.
	Comply with safety rules when performing the above operations.
	Perform hand block sanding to achieve optimal finishing.
9. Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection.	Carryout corrosion treatment on interior and exterior surface.
	Prepare an estimate using estimation guide book.

10. Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.	Refinish a panel by mixing paint and other material using viscosity cup.
	Adjust knobs, test spray and check for heeling and arcing.
	Clean spray Gun, Tank and perform lubrication of Spray Gun.
11. Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills.	Check Air spray pattern for spray defects.
	Plan work in compliance with standard safety norms.
	Carryout the diagnostic procedure for Excessive spray, overspray, paint gun sputters defect, uneven spray pattern and correct the defects.
12. Demonstrate finishing process.	Apply prime coat in accordance to industry standards.
	Refinish plastic part
	Apply single stage paint.
	Perform overall finishing of the panel.
	Remove masking form the panels
	Comply with safety rules when performing the above operations.
13. Demonstrate the use of computer colour matching systems and the use of tinting solid and metallic colours.	Polish the painted panels.
	Evaluate painted panels under sunlight and colour corrected light bulbs.
	Match basic paint colour.
	Spray metallic colour for finish.
	Perform Mica or Pearl finish.
	Comply with safety rules when performing the above operations.
14. Demonstrate how to remove minor paint imperfections.	Evaluate finish under spectrophotometer or electronic colour analyzer.
	Remove foreign matter in wet paint.
	Perform wet sanding between coats.
	Correct orange peel runs and sags.
	Repair paint run and chipped paint.
	Evaluate the painted surface for detailing.
Identify paint defect and area wise defect ranking & tolerance.	



## 7. TRADE SYLLABUS

SYLLABUS FOR MECHANIC AUTO BODY PAINTING TRADE			
DURATION - ONE YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 150Hrs;  Professional Knowledge 42Hrs	Check & perform Measuring & marking by using various Measuring & Marking tools(Vernier Calliper, Micrometer, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.) following safety precautions	<ol style="list-style-type: none"> <li>1. Familiarisation with institute, Job opportunities in the automobile sector.(5 hrs.)</li> <li>2. Machinery used in Trade.(10 hrs.)</li> <li>3. Types of work done by the students in the shop floor.(10hrs.)</li> <li>4. Practical related to Safety and Health.(10hrs.)</li> <li>5. Importance of maintenance and cleanliness of Workshop.(5hrs.)</li> <li>6. Interaction with health center and fire service station to provide demo on First aid and Fire safety.(5hrs.)</li> <li>7. Use of fire extinguishers.(10hrs.)</li> <li>8. Demonstration on safe handling and Periodic testing of lifting equipment.(5hrs.)</li> <li>9. Safety disposal of Used engine oil/Paints etc. (10hrs.)</li> </ol>	<p><b>Admission &amp; introduction to the trade:</b>            Introduction to the Course duration, course content, study of the syllabus. General rule pertaining to the Institute, facilities available- Hostel, Recreation, Medical and Library working hours and time table (07 hrs)</p> <p><b>Occupational Safety &amp; Health</b>            Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution &amp; personal safety message. 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 &amp; road testing vehicles,            Energy conservation-Definition, Energy Conservation Opportunities(ECOs)-Minor ECos and Medium ECos, Major ECos), Safety disposal of Used engine oil, Electrical safety tips.            Hazard identification, spatter hazard etc and countermeasure to</p>

		<p>10. Energy saving Tips/Audit of ITI electricity Usage.(5hrs.)</p>	<p>eliminate them &amp; importance of usage of PPEs. (14 hrs)</p>
		<p>11. Practice using all marking aids, like steel rule with spring calipers, dividers, scribe, punches, Chisel etc.(15hrs.)</p> <p>12. Layout a work piece- for line, circle, arcs and circles.(10hrs.)</p> <p>13. Practice to measure a wheel base of a vehicle with measuring tape.(5 hrs.)</p> <p>14. Practice to remove wheel lug nuts with use of an air impact wrench. (5hrs.)</p> <p>15. Practice on General workshop tools &amp; power tools and equipments (15hrs.)</p>	<p><b>Hand Tools</b></p> <p>Marking scheme, Marking material-chalk, Prussian blue. Cleaning tools- Scraper, wire brush, Emery paper, Description, care and use of Surface plates, steel rule, measuring tape, try square. Calipers-inside and outside. Dividers, surface gauges, scribe, punches-prick punch, center punch, pin punch, hollow punch, number and letter punch. Chisel-flat, cross-cut. Hammer- ball peen, lump, mallet. , Different type of - body hammers, pick hammers, , Bumping hammers, finishing hammers, dolly block, and body spoon, body picks, body pullers and pull rods, suction cup, scratch awl, Screw drivers-blade screwdriver, Phillips screw driver, Ratchet screwdriver. Allen key, bench vice &amp; C-clamps, Spanners- ring spanner, open end spanner &amp; the combination spanner, universal adjustable open end spanner. Sockets &amp; accessories, Pliers - Combination pliers, multi grip, long nose, flat-nose, Nippers or pincer pliers, Metal cutting shears- Tin snips, sheet metal cutting pliers, (Aviation snips), panel cutters, trim and upholstery tools, Door handle tool ( clip pullers), Metal files-reveal file, surform file, sanding</p>

			board, sanding block, spreaders and squeegees. (14 hrs)
		16. Measuring practice on engine components with aid of instrument studied.(25 hrs.)	<b>Systems of measurement:</b> Description, care & use of Micrometers- Outside and depth mirometer, Micrometer adjustments, Vernier calipers, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge. (07 hrs)
Professional Skill 100Hrs;  Professional Knowledge 28Hrs	Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & equipments.	17. Practice on General cleaning, checking and use of nut, bolts, & studs etc.(15 hrs.)	<b>Fasteners-</b> 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. Selection of materials for gaskets and packing, Description of Riveting tools (07 hrs)
		18. Removal of stud/bolt from blind hole.(10 hrs.)	
		19. Practice on cutting tools like Hacksaw, file, chisel, OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding.(25 hrs.)	<b>Cutting tools :-</b> Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and uses., chisel, OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding. <b>Limits, Fits &amp; Tolerances:-</b> Definition of limits, fits & tolerances with examples used in auto components. (14 hrs)
20. Practice on Hacksawing and filing to given dimensions..(25hrs.)			
		21. Practice on Marking and Drilling clear and Blind Holes, Sharpening of	<b>Drilling machine</b> -Description and study of Bench type Drilling machine, Portable electrical Drilling

		<p>Twist Drills.(10 hrs.)</p> <p>22. Safety precautions to be observed while using a drilling machine. (10 hrs.)</p> <p>23. Practice on Tapping a Clear and Blind Hole, Selection of tap drill Size, use of Lubrication. (5 hrs.)</p> <p>24. Use of tap extractor, Cutting Threads on a Bolt/ Stud.(10 hrs.)</p> <p>25. Adjustment of two piece Die.(10 hrs.)</p> <p>26. Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface.(5 hrs.)</p>	<p>machine, drill holding devices, Drill bits.</p> <p><b>Taps and Dies:</b> Hand Taps and wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and Die stock. Screw extractors.</p> <p><b>Hand Reamers</b> - Different Type of hand reamers, Lapping, Lapping abrasives, type of Laps. Function of Gaskets, Selection of materials for gaskets and packing, oil seals. (14 hrs)</p>
<p>Professional Skill 50Hrs;</p> <p>Professional Knowledge 14Hrs</p>	<p>Trace and Test all Electrical &amp; Electronic components &amp; circuits and assemble circuit to ensure functionality of system.</p>	<p>27. Practice in joining wires using soldering Iron. (20 hrs.)</p> <p>28. Construction of simple electrical circuits, Measuring of current, voltage and resistance.(15 hrs.)</p> <p>29. Using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.(15hrs.)</p>	<p><b>Basic electricity,</b> Electricity principles, Ground connections, Ohm's law, Voltage, Current, Resistance, Power, Energy. Voltmeter, ammeter, Ohmmeter Multimeter, Conductors &amp; insulators, Wires, Shielding, Length vs. resistance, Resistor ratings (14 hrs)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Check &amp; Interpret Vehicle Specification data and VIN</p> <p>Select &amp; operate various Service Station Equipments.</p>	<p>30. Identification of different type of Vehicle. (5 hrs.)</p> <p>31. Demonstration of vehicle specification data; (5 hrs.)</p> <p>32. Identification of vehicle information Number</p>	<p>Auto Industry - History, leading manufacturers, development in automobile industry, trends, new product. Brief about Ministry of Road transport &amp; Highways, The Automotive Research Association of India (ARAI), National</p>

		<p>(VIN). (5 hrs.)</p> <p>33. Demonstration of Garage, Service station equipments.(5 hrs.)</p> <p>34. Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.(5 hrs.)</p>	<p>Automotive Testing and R&amp;D Infrastructure Project (NATRIP), &amp; Automobile Association.</p> <p>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 post and four post hoist, Engine hoists, Jacks, <b>Stands.</b> (07 hrs)</p>
<p>Professional Skill 100Hrs;  Professional Knowledge 28 Hrs</p>	<p>Identify various vehicle parts and Service, Repair and Maintenance of Air compressor and Air Lines.</p>	<p>35. Washing of vehicle.(5 hrs.)</p> <p>36. Identification of different type body, chassis, Drive lines. (10hrs.)</p> <p>37. Identify the location of parts and panels. (5hrs.)</p> <p>38. Practice on use of computer-based service information, service manuals, refinishing guides, vehicle dimension manual, color matching guides, parts interchange guides.(30hrs.)</p>	<p><b>Introduction to Engine:</b>  Description of internal &amp; external combustion engines, Classification of IC engines, Principle &amp; working of 2&amp;4-stroke diesel engine (Compression ignition Engine (C.I)), Principle of Spark Ignition Engine(SI), differentiate between 2-stroke and 4 stroke, C.I engine and S.I Engine, Direct injection and Indirect injection, Technical terms used in engine, Engine specification.. Body shop &amp; paint shop safety procedures. <b>Vehicle construction Technology</b>  Definition of body shop, classification of body shop-Independent body shop, dealership body shop, specialty body shop. Description of vehicle Body and Chassis.  <b>Service information, Specifications, and Measurements</b>  Study of Service Information, basic steps to using refinishing materials information, Vehicle paint code,</p>

		<p>study of service symbols, diagnosis charts, wiring diagram. (14 hrs)</p> <p>39. Identify the parts of a piston type stationary compressor. (04hrs.)</p> <p>40. Overhauling of Air compressor, Overhauling of service (FRL) unit. (05 hrs.)</p> <p>41. Drain the air receiver and the moisture separator/regulator or air transformer. (04hrs.)</p> <p>42. Check the level of the oil in the crankcase, clean air filters. (04hrs.)</p> <p>43. Clean or blow off fins on cylinders, heads, intercoolers, After coolers. (04hrs.)</p> <p>44. Check the oil filter in the air line and change the filter element if necessary, Adjust the pressure switch cut-in and cut-out settings if needed. (05hrs.)</p> <p>45. Check the relief valve for exhausting of head pressure each time the motor stops. (04hrs.)</p> <p>46. Tighten belts to prevent slippage. (05 hrs.)</p> <p>47. Check and align a loose motor pulley or compressor Flywheel. (10 hrs.)</p> <p>48. Check for air leaks on the compressor outfit and air</p>	<p><b>Compressor Air system :</b>          Basic requirement for compressed air systems, Type of Compressor- Description and construction of Diaphragm compressor, piston type compressor-single stage and two stage, rotary screw air compressor, Performance of air compressor- Description of Horse power, delivery volume, displacement, Free air delivery, compressor volumetric efficiency, tank size, Air and Fluid Control Equipment - In take air filter, Distribution system, regulator, lubricator, different type air purification method, Compressor Accessories -Hose type, hose size, maintenance of hose, connectors, adapters and couplings, Air System Maintenance . Study the typical piping arrangement found in a body/paint shop, colour coding of airline, water line and fuel line. (14 hrs)</p>
--	--	---	--

<p>Professional Skill 100Hrs;  Professional Knowledge 28 Hrs</p>	<p>Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills</p>	<p>49. Identify the different type of refinishing material- paint binders, paint solvents, Paint additives. (10hrs.)</p> <p>50. Select the right repair materials for a particular job. (5hrs.)</p> <p>51. Select the right type of primer and paint. (10hrs.)</p> <p>52. Identify various type masking material available in body shop. (10hrs.)</p> <p>53. Identify different type of body filler, (10hrs.)</p> <p>54. Identify various type masking material available in body shop. (10hrs.)</p> <p>55. Identify various type of grit rating available in the workshop. (10hrs.)</p> <p>56. Identify the open and closed coat grit. (10hrs.)</p> <p>57. Practice Cleaning, Pre-Treatment, surface conditioning, ED coating of any given panel.(25hrs.)</p>	<p>pipng system. (05 hrs.)</p> <p><b>Refinishing Materials:-</b>  Primer-sealer, top coats, paint material types-Lacquer, enamel, water base, Content of paint-pain pigments, paint binders, paint solvents, Paint additives, Definition of Drying, curing, flash, retarder, accelerator, catalyst, adhesion promoter, blending solvent, Toners, Primers &amp; sealers- self-etching primer, UV primer</p> <p>Primer-surfacer, Epoxy primers, sealers, Other paint materials- prep solvent, flattener, fish-eye eliminator, flex agent, Antichip coating (Vinyl coating), Metal conditioner, Paint stripper, tack cloth, Different type of Body filler- body filler (plastic filler), light body filler, fiberglass reinforced body filler, cream hardeners, Fiberglass resin, Glazing putty, Masking materials- Masking paper, Primer masking paper, paint masking paper, masking plastic, masking tape, Fine line masks, Wheel masks. Abrasives-Abrasive material, grit, grit Ratings, open and closed coat grit, Grinding discs, sand paper- dry and wet type, scuff pads, Compounds-Rubbing compound, polishing compound, Adhesives, Epoxies.</p> <p>Composition of Paints, Paint Types. Impact of paint &amp; paint component on plastic and rubber parts. Latest paint Techniques. (24 hrs)</p>
--	---	--	---

<p>Professional Skill 75 Hrs;  Professional Knowledge 21 Hrs</p>	<p>Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.</p>	<p>58. Identify the different type of body filler, hardeners, and putties, used in industry. (10 hrs.)            59. Practice on a mixing board for applying Body filler. (15 hrs.)            60. Practice on preparation of damaged surface area of sheet metal. (10 hrs.)            61. Practice on applying the body filler on a damaged sheet metal area. (10 hrs.)            62. Using Hand-block sanding to smooth and level a repair area properly. (10 hrs.)            63. Practice repairing paint surface imperfections, (10 hrs.)            64. Perform Repairing of paint scratches, repairing nicks, repairing dings, preparing surface rust free. (10 hrs.).</p>	<p><b>Using Body Fillers</b>            Description of Body Fillers (Plastic filler), Body filler ingredients, Body filler hardeners, Putties, light weight fillers, premium fillers, spot putties, polyester glazing putty, applying body filler, preparation surface for filler, Ingredient, characteristics and application of body filler &amp; putties, Mixing filler, kneading the hardener, mixing filler and hardener, Spreading body filler, Grating and Sanding Body Filler-grating the filler, coarse, sandy filler, blow off sanding dust, checking filler repair, applying second filler coat, feathered giving body filler, applying filler to body lines, applying filler to panel joint, applying filler to body lines, applying lead filler, priming filler area, applying glazing putty, using a guide coat. Rust repair procedures.(21 hrs)</p>
<p>Professional Skill 50 Hrs;  Professional Knowledge 14 Hrs</p>	<p>Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection.</p>	<p>65. Practice on corrosion treatment of sheet metal, interior and exterior surface. (15hrs.)            66. Preparation of repair estimate information by using an estimating guide book. (15hrs.)</p>	<p><b>Corrosion Protection</b>            What Is Corrosion, Causes for Loss of Factory protection, Anticorrosion Materials, Basic Surface Preparation, Corrosion Treatment Areas, Corrosion-Protection Primers, Exposed Joints, Exposed Interior Surfaces,</p>



		67. Identify how an estimating guide gives part pricing and labour time information. (20 hrs.)	Exposed Exterior Surfaces, Exterior Accessories, <b>Estimating Repair Costs</b> Description of estimate, Direct repair programs, Estimate time factor, work orders, Using Estimate Guides, Part prices, Labor costs, Job overlap, and Included operation.(14 hrs)
Professional Skill 75 Hrs;  Professional Knowledge 21 Hrs	Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.	68. Practice on different ways to mix paint or other materials paint mixing sticks, (08hrs.) 69. Practice on use of viscosity cup. (07hrs.) 70. Practice on Adjusting Knobs. (08hrs.) 71. Testing Spray Pattern, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, Gun Direction, Spray Overlap, Gun Handling Problems - Heeling, Arcing. (10hrs.) 72. Practice on spray gun cleaning tank, manual spray gun cleaning, and spray gun lubrication. (08hrs.) 73. Practice on maintains on spray booth. (08hrs.) 74. Practice on use of Air-supplied respirators. (08hrs.)	<b>Refinishing equipment Technology</b> Painting environment variable, Steps to keep dirt from finish during body repairs, Description of spray gun and its parts, basic stages of Atomization, High-Volume, Low-Pressure (HVLP) Spray Gun, Type of air spray gun- Gravity feed, Suction (siphon) feed, Pressure feed, Pressure-assist feed (gravity or suction cup spray guns) and their paint feed method, advantage and disadvantages. Spray gun air supply system, importance of spraying material viscosity, Different ways to mix paint or other materials paint mixing sticks, viscometer, or viscosity cup, effect on finish-material temperature, film thickness, spray gun setup- Air Supply, Adjustments, Distance, Adjustment Knobs, Testing Spray Pattern, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, Gun Direction, Spray Overlap, Gun Handling Problems - Heeling , Arcing , Spray Gun Maintenance-spray gun cleaning tank, manual spray gun cleaning, spray gun lubrication, other spray systems,-

			<p>airless spray gun system, electrostatic spraying system, touch-up guns, airbrushes, spray booths- one- and two-room spray booths, air makeup or air replacement system-Regular flow booth , Reverse flow booth, Cross draft booth, Downdraft booth, Air Filtration Systems- wet filtration system and the dry filtration system, spray booth maintenance, Description of drying room- types of infrared drying equipment- Near drying equipment. Far drying equipment.</p> <p>Description of Air-supplied respirators, type of air-supplied respirators- hood type and the face shield type.</p> <p>Other paint shop equipment and tools- wet sanding stand , Paint hangers, Panel drying ovens, Paint shakers, blade agitator, Churning knives, Paint scales, Paint cabinets, Tack cloths, purpose of strainer, Masking tape.(21 hrs)</p>
<p>Professional Skill 125 Hrs;  Professional Knowledge 35 Hrs</p>	<p>Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills</p>	<p>75. Practice to correcting of an Air Spray Gun- Spray pattern top heavy or bottom heavy, Spray pattern heavy to right or to left, Spray pattern heavy at center, Spray pattern split, Pinholes, Blushing or a whitish coat, Orange peel (surface looks like orange peel), (15 hrs.)</p> <p>76. Troubleshoot Excessive</p>	<p>probable causes and remedies for Spray pattern top heavy or bottom heavy, Spray pattern heavy to right or to left, Spray pattern heavy at center, Spray pattern split, Pinholes, Blushing or a whitish coat, Orange peel (surface looks like orange peel), Excessive spray fog or overspray, No control over size of pattern, Sags or runs, Streaks Gun sputters constantly, Uneven spray pattern, Fluid leaks from spray gun, Fluid</p>

		<p>spray fog or overspray, No control over size of pattern, Sags or runs, (15 hrs.)</p> <p>77. Troubleshoot Streaks  Gun sputters constantly, Uneven spray pattern, Fluid leaks from spray gun, (10 hrs.)</p> <p>78. Troubleshoot Fluid leaks from packing nut, Fluid leaks through fluid tip when trigger is released, (05 hrs.)</p> <p>79. Troubleshoot Excessive fluid, Fluid will not come from spray gun, Fluid will not come from fluid tank or canister, (05 hrs.)</p> <p>80. Troubleshoot Sprayed coat short of liquid material, Spotty, uneven pattern, slow to build, Unable to get round spray, Dripping from fluid tip, (05 hrs.)</p> <p>81. Troubleshoot Excessive overspray, Excessive fog, Will not spray on pressure feed, Will not spray on suction feed, (05 hrs.)</p> <p>82. Troubleshoot Air continues to flow through gun when trigger has been released (on non bleeder guns only), (05</p>	<p>leaks from packing nut, Fluid leaks through fluid tip when trigger is released, Excessive fluid, Fluid will not come from spray gun, Fluid will not come from fluid tank or canister, Sprayed coat short of liquid material, Spotty, uneven pattern, slow to build, Unable to get round spray, Dripping from fluid tip, Excessive overspray, Excessive fog, Will not spray on pressure feed, Will not spray on suction feed, Air continues to flow through gun when trigger has been released (on non bleeder guns only), Air leak at canister gasket, Leak at setscrew in canister top, Leak between top of canister cover and gun body.(14 hrs)</p>
--	--	---	--

		<p>hrs.)</p> <p>83. Troubleshoot Air leak at canister gasket, (05 hrs.)</p> <p>84. Troubleshoot Leak at setscrew in canister top, Leak between top of canister cover and gun body. (05 hrs.)</p>	
		<p>85. Practice on Checking Paint Thickness, (10hrs.)</p> <p>86. Practice on paint removal using chemical stripping, (15hrs.)</p> <p>87. Practice Media blasting, Practice on Preparing Bare Metal using metal conditioners, preparing hard chrome Surfaces, preparing metal Replacement parts, (10hrs.)</p> <p>88. Practice on applying spot putty, or glazing putty. (10hrs.)</p> <p>89. Practice on final sanding, using the right grit, power sanding, hand sanding, dry sanding, wet sanding, (10hrs.)</p> <p>90. Carry out Surface Cleaning. (10hrs.)</p> <p>91. Practice to mask the parts of a vehicle by using different masking techniques. (10hrs.)</p>	<p><b>Vehicle surface preparation and masking</b></p> <p>Importance of surface preparation, Evaluate Surface Condition, Checking Paint Thickness, Paint Removal method- Chemical stripping, Media blasting- procedure for operating a blaster, type of grit and numbering system. Sanding or grinding, Importance of Preparing Bare Metal-using metal conditioners, preparing hard chrome Surfaces, preparing metal Replacement parts, using self-etch primer, apply seam sealer Primecoat Selection, applying primecoats applying spot putty, or glazing putty. final sanding, using the right grit, Masking, surface sanding methods, power sanding, hand sanding, dry sanding, wet sanding, comparison between wet and dry sanding, surface scuffing, Surface Cleaning. Masking, basic ways to mask the parts of a vehicle, liquid masking material, liquid masking system, Procedure, plastic sheet masking. masking paper and tape, masking aids-wheel masks, masking panel gaps, masking openings, Reverse masking, or</p>

			blend masking, Masking rope, (aperture tape), surface cleaning, using wax-and-grease remover.(21 hrs)
Professional Skill 50 Hrs;  Professional Knowledge 14 Hrs	Demonstrate finishing process.	<p>92. Identify different type of paint for topcoat refinishing, paint used for refinishing. (10 hrs.)</p> <p>93. Practice on applying Prime coats, Refinishing Plastic Parts, Basecoat/ Clearcoat Repairs. (10hrs.)</p> <p>94. Practice on applying Single Stage Paints, Panel Repairs, Overall Refinishing. (10hrs.)</p> <p>95. Removal of Masking Materials. (05 hrs.)</p> <p>96. Practice paint polishing. (15 hrs.)</p>	<b>Refinishing Procedures:</b> Functions of paint, OEM paint finishes procedures, different between OEM and refinish painting types of paint for topcoat refinishing, properties of paint used for refinishing. Topcoats, Prime coats, Preparing Refinish Materials, Pre-painting Preparations, Applying Prime coats, Refinishing Plastic Parts, Flash Times, Basic Spray Coats, Methods of Refinishing, Basecoat/Clearcoat Repairs, Applying Single Stage Paints, Panel Repairs, Overall Refinishing, Removal of Masking Materials.(14 hrs)
Professional Skill 50 Hrs;  Professional Knowledge 14 Hrs	Demonstrate the use of computer color matching systems and the use of tinting solid and metallic colors.	<p>97. Practice on colour evaluations using sunlight &amp; colour corrected light bulb. (10 hrs.)</p> <p>98. Practice on matching Basic Paint Colors. (10 hrs.)</p> <p>99. Practice on Spraying Metallic Colours, Practice on let-down test panel for a three-stage finish. (10 hrs.)</p> <p>100. Practice on a repair with a multistage mica or pearl finish. (10 hrs.)</p> <p>101. Practice on use of Spectrophotometer or</p>	<b>Color matching and Customized painting</b> Introduction, Color Theory, Lighting-colour evaluations using sunlight & colour corrected light bulb, dimensions of colour-Value—lightness or darkness, Hue—color, cast, or tint, Chroma saturation, richness, intensity, or muddiness, standard colour chips, variance colour chips, Matching Basic Paint Colors- use of colour test panel, spray-out test panel procedure, color spraying variables in the shop, positive and Negative variable, matching solid colors and metallic finishes, Spraying Metallic Colours- Wet

		<p>electronic colour Analyzer, use of Computerized Paint Matching Custom. (10 hrs.)</p>	<p>Coats of Metallic Colour, Dry Coats of Metallic Colour, importance of metallic colour mixed, Metallic Colour Variables to darken &amp; lighten, steps for spot repair with a fluorine clearcoat system, procedure for a letdown test panel for a three-stage finish, method for a spot or partial repair on a three-stage paint system, steps for a panel repair with a multistage mica or pearl finish, mica mid-coat blending procedure for a three-stage paint, Tinting, basic reasons for tinting a paint colour, three angles to determine whether a colour adjustment is necessary, Spectrophotometer or electronic colour Analyzer, Computerized Paint Matching Custom Painting.(14 hrs)</p>
<p>Professional Skill 50 Hrs;  Professional Knowledge 14 Hrs</p>	<p>Demonstrate how to remove minor paint imperfections.</p>	<p>102. Practice on removing foreign matter in wet paint, wet sanding between coats. (05 hrs.)  103. Practice to correcting of - paint colour mismatch, orange peel, runs and sags, sand scratch swelling, bull's-eye featheredge , featheredge splitting, water spotting, chemical spotting, curing or drying failure, paint fish-eyes, blushing, bleeding, prime coat show-through, blistering,</p>	<p><b>Paint Problems and Final Detailing</b>  Repairing Paint Problems- problems in wet paint, removing foreign matter in wet paint, wet sanding between coats, Causes, prevention and correcting of - paint colour mismatch, orange peel, runs and sags, sand scratch swelling, bull's-eye featheredge , featheredge splitting, water spotting, chemical spotting, curing or drying failure, paint fish-eyes, blushing, bleeding, prime coat show-through, blistering, solvent popping, paint cracking, line checking, crazing, micro checking, lifting, paint wrinkling, mottling, pin holing, peeling, chalking, paint</p>

		<p>solvent popping, paint cracking, line checking, crazing, micro checking, lifting, paint wrinkling, mottling, pin holing, peeling, chalking, paint colour fade, dulled finish, debris in the finish, rust under the finish. (20 hrs.)</p> <p>104. Repairing paint runs, repairing chipped paint, panel detail sanding. (10 hrs.)</p> <p>105. Practice on visualising of painted surface in three different angles for final detailing. (10 hrs.).</p> <p>106. Practice Paint defect identification and area wise defect ranking and tolerance. (5 hrs.)</p>	<p>colour fade, dulled finish, debris in the finish, rust under the finish.</p> <p><b>Final detailing-</b> Detail sanding procedure, Repairing paint runs, repairing chipped paint, panel detail sanding procedure, Paint compounding- purpose, rubbing compound, machine compounding, using buffers and polishers, avoiding paint burn-through, machine buffing procedures, hand and machine Glazing and polishing procedure, Final cleaning, steps for caring for a new finish.(14 hrs)</p>
--	--	---	---

<b>SYLLABUS FOR CORE SKILLS</b>
1. Workshop Calculation & Science (Common for one year course) (80 hrs)
2. Engineering Drawing (80 hrs)
3. Employability Skills (Common for all CTS trades) (160 Hrs)

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](http://www.bharatskills.gov.in)



<b>LIST OF TOOLS AND EQUIPMENT</b>			
<b>MECHANIC AUTO BODY PAINTING(For batch of 20 candidates)</b>			
<b>A. TRAINEES TOOL KIT</b>			
<b>Sl. No.</b>	<b>Name of the Tool &amp;Equipment</b>	<b>Specification</b>	<b>Quantity</b>
1.	Allen Key set	12 pieces (2mm to 14mm)	7 Nos.
2.	Bucket, sponge, squeegee, chamois & tack rags		7 Nos.
3.	Caliper inside	15 cm Spring	7 Nos.
4.	Calipers outside	15 cm spring	7 Nos.
5.	Center Punch	10 mm. Dia. x 100 mm.	7 Nos.
6.	Different type of spoon		7 Nos.
7.	Dividers	15 cm Spring	7 Nos.
8.	Electrician Screw Driver	250mm	7 Nos.
9.	General purpose dolly		7 Nos.
10.	Hammer ball peen	0.5 kg with handle	7 Nos.
11.	Hands file	20 cm. Second cut flat	7 Nos.
12.	Paint scrapper, putty mixing board, putty applicator /knife		7 Nos.
13.	Pliers combination	20 cm.	7 Nos.
14.	Safety glasses		7 Nos.
15.	Screw driver	20cm.X 9mm. Blade	7 Nos.
16.	Screw driver	30 cm. X 9 mm. Blade	7 Nos.
17.	Scriber	15 cm	7 Nos.
18.	Spanner D.E. set	12 pieces (6mm to 32mm)	7 Nos.
19.	Spanner, ring set	12 metric sizes 6 to 32 mm.	7 Nos.
20.	Spanners socket with speed handle, T-bar, ratchet and universal	upto 32 mm set of 28 pieces with box	7 Nos.
21.	Steel rule	30 cm inch and metric	7 Nos.
22.	Steel tool box with lock and key (folding type)	400x200x150 mm	7 Nos.

23.	Toe dolly		7 Nos.
24.	Wire cutter and stripper		7 Nos.
<b>B. INSTRUMENTS AND GENERAL SHOP OUTFIT</b>			
<b>TOOLS &amp; EQUIPMENT</b>			
25.	Adjustable spanner	(pipe wrench 350 mm)	2 Nos.
26.	Air blow gun with standard accessories		1 No.
27.	Air impact wrench with standard accessories		4 Nos.
28.	Air ratchet with standard accessories		4 Nos.
29.	Allen Key set	12 pieces (2mm to 14mm)	2 Nos.
30.	Ammeter	300A/ 60A DC with external shunt	5 Nos.
31.	Angle plate adjustable	250x150x175	1 No.
32.	Angle plate	size 200x100x200mm	2 Nos.
33.	Anvil	50 Kgs with Stand	1 No.
34.	Battery –charger		2 Nos.
35.	Blow Lamp	1 litre	2 Nos.
36.	Bucket, sponge, squeegee, chamois & tack rags		2 Nos. each
37.	Caliper inside	15 cm Spring	4 Nos.
38.	Calipers outside	15 cm spring	2 Nos.
39.	Car Jet washer with standard accessories		1 No.
40.	Chain Pulley Block	3 ton capacity with tripod stand	1 No.
41.	Chisel	10 cm flat	4 Nos.
42.	Chisels cross cut	200 mm X 6mm	4 Nos.
43.	Circlip pliers Expanding and contracting type	15cm and 20cm each	2 Nos.
44.	Clamps C	100mm	2 Nos.
45.	Clamps C	150mm	2 Nos.
46.	Clamps C	200mm	2 Nos.
47.	Cleaning tray	45x30 cm.	4 Nos.
48.	Collapsible panel stands		2 Nos.
49.	Colour matching cards /panels (Magnetic, chromalux card or		10 Nos.

	primed metal)		
50.	Copper bit soldering iron	0.25 Kg	5 Nos.
51.	Cylinder bore gauge capacity	20 to 160 mm	2 Nos.
52.	DC Ohmmeter	0 to 300 Ohms, mid scales at 20 Ohms	2 Nos.
53.	Depth micrometer	0-25mm	4 Nos.
54.	Dial gauge type 1 Gr. A (complete with clamping devices and stand)		4 Nos.
55.	Different type of Bumping hammers		1 set
56.	Different type of -body hammers		1 set
57.	Different type of body picks		1 set
58.	Different type of body spoon		1 set
59.	Different type of dolly block		1 set
60.	Different type of finishing hammers		1 set
61.	Different type of pick hammers		1 set
62.	Digital thermometer		2 Nos.
63.	Dividers	15 cm Spring	4 Nos.
64.	Door handle tool (clip pullers)		1 Nos.
65.	Drift Punch Copper	15 cm	4 Nos.
66.	Drill point angle gauge		1 No.
67.	Drill twist	1.5 mm to 15 mm (various sizes) by 0.5 mm	4 Nos.
68.	Electric Soldering Iron	230 V 60 watts 230 V 25 watts	2 each
69.	Electric testing screw driver		2 Nos.
70.	Engineer's square	15 cm. Blade	2 Nos.
71.	Feeler gauge	20 blades (metric)	2 Nos.
72.	File flat	20 cm bastard	4 Nos.
73.	File, half round	20 cm second cut	4 Nos.
74.	File, Square	20 cm second cut	4 Nos.
75.	File, Square	30 cm round	4 Nos.
76.	File, triangular	15 cm second cut	4 Nos.
77.	Files assorted sizes and types		2 set

	including safe edge file (20 Nos)		
78.	Flat File	25 cm second cut	4 Nos.
79.	Flat File	35 cm bastard	4 Nos.
80.	Garage rack		2 Nos.
81.	Gloves for Welding (Leather and Asbestos)		5 sets
82.	Granite surface plate	1600 x 1000 with stand and cover	1 No.
83.	Grease Gun		2 Nos.
84.	Grip Wrench	200mm	2 Nos.
85.	Growler		1 No.
86.	Hacksaw frame adjustable	20-30 cm	10 Nos.
87.	Hammer Ball Peen	0.75 Kg	4 Nos.
88.	Hammer Chipping	0.25 Kg	5 Nos.
89.	Hammer copper	1 Kg with handle	4 Nos.
90.	Hammer Mallet		4 Nos.
91.	Hammer Plastic		4 Nos.
92.	Hand operated crimping tool	(i) for crimping up to 4mm and (ii) for crimping up to 10mm	2 Nos.
93.	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
94.	Hand Shear Universal	250mm	2 Nos.
95.	Hand vice	37 mm	2 Nos.
96.	Hollow Punch	set of seven pieces 6mm to 15mm	2 sets each
97.	Insulated Screw driver	20 cm x 9mm blade	2 Nos.
98.	Insulated Screw driver	30 cm x 9mm blade	2 Nos.
99.	Interchangeable driver set		1 set
100.	Lead light		2 Nos.
101.	Left cut snips	250mm	4 Nos.
102.	Lifting jack screw type	3 ton capacity	4 Nos.
103.	Magneto spanner	set with 8 spanners	1 set
104.	Magnifying glass	75mm	2 Nos.
105.	Marking out table	90X60X90 cm.	1 Nos.
106.	Multimeter digital		5 Nos.

107.	Oil can	0.5/0.25 liter capacity	2 Nos.
108.	Oil Stone	15 cm x 5 cm x 2.5 cm	1 No.
109.	Outside micrometer	0 to 25 mm	4 Nos.
110.	Outside micrometer	25 to 50 mm	4 Nos.
111.	Outside micrometer	50 to 75 mm	1 No.
112.	Outside micrometer	75 to 100 mm	1 No.
113.	Paint measuring / mixing stick & jug sets		4 each
114.	Paint scrapper, putty mixing board, putty applicator /knife		2 each
115.	Panel buffing machine	18 cm	2 Nos.
116.	Philips Screw Driver	set of 5 pieces (100 mm to 300 mm)	2 sets
117.	Pipe cutting tool		2 Nos.
118.	Pipe flaring tool		2 Nos.
119.	plastic feeler gauges		2 Nos.
120.	Pliers combination	20 cm.	2 Nos.
121.	Pliers flat nose	15 cm	2 Nos.
122.	Pliers round nose	15 cm	2 Nos.
123.	Pliers side cutting	15 cm	2 Nos.
124.	Portable electric drill Machine		1 No.
125.	Prick Punch	15 cm	4 Nos.
126.	Punch Letter (Number)	4mm	2 set
127.	Right cut snips	250mm	4 Nos.
128.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4 Nos.
129.	Scraper flat	25 cm	4 Nos.
130.	Scraper half round	25 cm	4 Nos.
131.	Scraper Triangular	25 cm	2 Nos.
132.	Scriber	15 cm	4 Nos.
133.	Scriber with scribing black universal		2 Nos.
134.	Set of stock and dies - Metric		2 sets
135.	Shear Tin Man's	450 mm x 600mm	4 Nos.
136.	Sheet metal cutting pliers-left , right		1 set

	hand and straight - jaw Configuration		
137.	Sheet Metal Gauge		2 Nos.
138.	SherTinmans	300mm	4 Nos.
139.	Soldering Copper Hatchet type	500gms	5 Nos.
140.	Solid Parallels in pairs (Different size) in Metric		2 Nos.
141.	Spanner Clyburn	15 cm	1 No.
142.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	4 Nos.
143.	Spanner T. flocks for screwing up and up-screwing inaccessible		2 Nos.
144.	Spanner, adjustable	15cm.	2 Nos.
145.	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	2 Nos.
146.	Spanners socket	with speed handle, T-bar, and ratchet	2 Nos.
147.	Spark lighter		2 Nos.
148.	Spark plug spanner	14mm x 18mm x Size	2 Nos.
149.	Spirit level	2 V 250, 05 metre	2 Nos.
150.			
151.	Steel measuring tape	10 meter in a case	2 Nos.
152.	Steel rule	15 cm inch and metric	4 Nos.
153.	Steel rule	30 cm inch and metric	4 Nos.
154.	Steel wire Brush	50mmx150mm	4 Nos.
155.	Straight edge gauge	2 ft.	1 No.
156.	Stud extractor	set of 3	2 sets
157.	Stud remover with socket handle		1 No.
158.	Suction cup		2 Nos.
159.	Surface gauge	with dial test indicator plunger type i.e. 0.01 mm	2 Nos.
160.	Taps and Dies complete	sets (5 types)	1 set
161.	Taps and wrenches - Metric		2 sets
162.	Telescope gauge		4 Nos.
163.	Thread pitch gauge metric, BSW		1 No.

164.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
165.	Trammel	30 cm	2 Nos.
166.	Trim and upholstery tools		1 set
167.	Tyre pressure gauge with holding nipple		2 Nos.
168.	Universal puller for removing pulleys, bearings		1 No.
169.	V' Block	75 x 38 mm pair with Clamps	2 Nos.
170.	Vacuum gauge to read	0 to 760 mm of Hg.	2 Nos.
171.	Various sanding blocks-soft, hard, speed file & de-nibbling tools		2 set
172.	Verniercaliper	0-300 mm with least count 0.02mm	4 Nos.
173.	Vice grip pliers		2 Nos.
174.	Voltmeter	50V/DC	5 Nos.
175.	Wire Gauge (metric)		5 Nos.
176.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	1 No.
<b>C. GENERAL INSTALLATION/ MACHINERIES</b>			
177.	Angle grinder	(10-12 cm) - for cutting and grinding	2 Nos.
178.	Arbor press hand operated	2 ton capacity	1 No.
179.	Belt sander (Narrow surface)		2 Nos.
180.	Bench lever shears	250mm Blade x 3mm Capacity	1 No.
181.	Body shell for painting - Light Motor vehicle of different Manufactures		4 Nos.
182.	compressed air line	10m (on retractable reel, with high flow connectors) with FRL unit	2 Nos.
183.	Computerised colour retrieval unit (Spectrophotometer)		1 No.
184.	Die Grinding kit		2 Nos.
185.	Disc sander	18 cm	2 Nos.
186.	Discrete Component Trainer / Basic Electronics Trainer		1 No.
187.	Down draft spray booth	( 7.5 X 5 m, combi spray/oven or separate spray /oven	1 No.
188.	Drilling machinebenchtodrill up to 12mm dia along with		1 No.

	accessories		
189.	Dual Magnetization Yoke	AC / HWDC. 230 VAC. 50Hz	1 set
190.	Dust extraction connections (Vacuum)		2 Nos.
191.	Electronic paint mixing scales (accurate to 0.1 grams. explosion proof)		1 No.
192.	Grinding machine (generalpurpose) D.E. pedestal with 300 mm dia wheels rough and smooth		1 No.
193.	High pressure hot / cold water blasting unit		1 No.
194.	Hydraulic jack	HI-LIFT type -3 ton capacity. & % ton capacity	1 each
195.	Infrared drying lamp unit		1 No.
196.	Liquid penetrant Inspection kit		1 set
197.	Motor Vehicle suitable for Body painting -Light Motor vehicle of different		2 Nos.
198.	Paint surface film thickness gauge (electronic)		2 Nos.
199.	Paint tinting system mixing machine (exposition proof)		1 No.
200.	Parts spray booth cabin	(ventilated to 30 cubic m / minute)	1 No.
201.	Pipe Bending Machine (Hydraulic type)	12mm to 30mm	1 No.
202.	Pneumatic rivet gun		2 Nos.
203.	Random /dual action orbital sander	(12-15 cm)	2 Nos.
204.	Spray gun & mixing equipment cleaning machine(explosion proof) & bench		2 each
205.	Spray guns (gravity feed primer	COB/2K colour & clear coat. touch-up set)	4 Nos.
206.	Tin smiths bench folder	600 x 1.6mm	1 No.
207.	Trolley type portable air compressor single cylinder	with 45 liters capacity Air tank. along with accessories & with working pressure 6.5 kg/sq cm	1 No.
208.	Underbody sealer & corrosion proofing materials & spray units		2 each



209.	Ventilated preparation bays ( fully illuminated. down or end draught		1 No.
210.	Water & oil separation system		1 No.
211.	Weld through primer application equipment		2 Nos.
<b>D. CONSUMABLE</b>			
212.	Battery- SMF		As required
213.	Brake fluids		As required
214.	Chalk. Prussian blue.		As required
215.	Chemical compound for fasteners		As required
216.	Diesel		As required
217.	Different type gasket material		As required
218.	Different type of oil seal		As required
219.	Drill Twist (assorted)		As required
220.	Engine Oil		As required
221.	Engine Coolant		As required
222.	Emery paper - 36-60 grit . 80-120		As required
223.	Gear oils		As required
224.	Hacksaw blade (consumable)		As required
225.	Hand rubber gloves tested for 5000 V		As required
226.	Holdings. lamp teakwood boards. plug sockets.		As required
227.	Hydrometer		As required
228.	Lapping abrasives		As required
229.	Leather Apron		As required
230.	Petrol		As required
231.	Power steering oil		As required
232.	Radiator Coolants		As required
233.	Safety glasses		As required
234.	Steel wire Brush 50mmx150mm		As required
235.	Gloves for Welding (Leather and Asbestos)		As required

236.	Cotton waste/ cloth		As required
237.	Body filler (Consumable)		As required
238.	Body filler (Consumable)		As required
239.	Masking paper / plastic & back-masking tape		As required
240.	Refinishing material (consumable)		As required
<b>WORKSHOP FURNITURE</b>			
241.	Book shelf (glass panel)	6V2' x 3' x 1V 2'	As required
242.	Computer Chair		1+1
243.	Computer Table		1+1
244.	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.	1+1
245.	Discussion Table	8' x 4' x 2 <sup>1</sup> / <sub>2</sub> '	2 Nos.
246.	Fire Extinguishers. first- aid box		As required
247.	Internet connection with all accessories		As required
248.	Laser printer		1 No.
249.	LCD projector/ LED /LCD TV	42"	1 No.
250.	Multimedia DVD for Automotive		As required
251.	application/subjects		
252.	Online UPS 2KVA		As required
253.	Stools		21 Nos.
254.	Storage Rack	6 <sup>1</sup> / <sub>2</sub> ' x 3' x W2	As required
255.	Storage shelf	6% ' x 3' x 1%'	As required.
256.	Suitable class room furniture		As required
257.	Suitable Work Tables with vices		As required
258.	Tool Cabinet	6% ' x 3' x 1%'	2 Nos.



259.	Trainees locker	6% ' x 3' x 1%'	2 Nos. to accommodate 20 Lockers
------	-----------------	-----------------	----------------------------------

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.

<b>List of Expert members participated for finalizing the course curricula of Mechanic Auto Body Painting trade held on 20.02.18 at Advanced Training Institute-Chennai</b>			
<b>S No.</b>	<b>Name &amp; Designation Shri/Mr./Ms.</b>	<b>Organization</b>	<b>Remarks</b>
1.	P. Thangapazham, AGM-HR, Training	Daimler India Commercial Vehicles Pvt. Ltd., Chennai	Chairman
2.	A. Duraichamy, ATO/ MMV	DET- Chennai Govt. ITI, Salem	Member
3.	W. Nirmal Kumar Israel, TO	Gov. ITI, Manikandam, Trichy-12	Member
4.	S. Venkata Krishna, Dy. Manager	Maruti Suzuki India Ltd., Chennai	Member
5.	S. Karthikeyan, Regional Training Manager	MARuti Suzuki India Ltd., Tamilnadu	Member
6.	N. Balasubramaniam	ASDC	Member
7.	P. Murugesan,	TVS TS Ltd., Ambattur Industrial Estate, Chennai-58	Member
8.	R. Jayaprakash	Ashok Leyland Driver Training Institute, Namakkal	Member
9.	Mr. Veerasany, GM, E. Sakthivel	Maruti Suzuki India Ltd.	Member
10.	M. Madasaniy, Principal	Ramco ITI, Rajapalayam, Tamil Nadu	Member
11.	Sankar S., TO	ATI-Chennai	Member
12.	K. Thaniyaraju, Principal I/C	Gov. ITI, ViraliMalai, DET- Chennai	Member
13.	S. Mathivanan, Jt. Director	ATI, Chennai-32	Member
14.	R. Rajesh Kanna, T.O	ATI, Guindy, Chennai- 32	Member
15.	Dinesh Babu K.K., Chief Instructor	Carriage & Wagon Works, Southern Railway	Member
16.	Suresh Awaji, Manager- Service Training	Ashok Leyland Ltd, Chennai- 57	Member
17.	N. Ramesh Kumar, TO	ATI, Chennai	Member
18.	R. Senthil Kumar, Director	ATI/MSDE/CTI Campus, DGT, Guindy, Chennai-600032	Member
19.	C. Yuvraj	ATI- Chennai	Member

20.	Balajirao. S, Body shop In charge	CUU romotors, 15/16, Thiruvika Industrial Estate, Guindy, Chennai-32	Member
21.	Nirmalya Nath, Asst. Director	CSTARI, Kolkata	Coordinator/ Member
22.	Akhilesh Pandey, Training Officer	CSTARI, Kolkata	Coordinator/ Member

## 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

