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- 3.5

SECTOR –AUTOMOTIVE

Directorate General of Training

MECHANIC AUTO BODY PAINTING

(Engineering Trade)

(Revised in March 2023)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL – 3.5

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the one-year duration of “Mechanic Auto Body Painting” 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: -

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 Paining 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 (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)	840
2	Professional Knowledge (Trade Theory)	240
3	Employability Skills	120
	Total	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory.

4	On the Job Training (OJT)/ Group Project	150
5	Optional Courses (10th/ 12th class certificate along with ITI certification or add on short term courses)	240

Trainees of one-year or two-year trade can also opt for optional courses ofup to 240 hours in each year for 10th/ 12th class certificate along with ITI certification, or, add on short term courses.

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 DGTfrom 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

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, DGTas 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%.

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 teamwork, 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 some of 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
- Computer based multiple choice question examination
- Practical Examination

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 for formative assessment:

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

3. JOB ROLE

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 airpressure 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. Sensitiveto environment, self-learning and productivity.

Reference NCO-2015:

i) 7132.0201 - Painter, Spray/Painting Technician

Reference NOS:

i) ASC/N1418
ii) ASC/N1412
iii) ASC/N1406
iv) ASC/N1417
v) ASC/N9415
vi) ASC/N1419
vii) CSC/N9401
viii) CSC/N9402

4. GENERAL INFORMATION

Name of the Trade	**MECHANIC AUTO BODY PAINTING**
NCO – 2015	7132.0201
NOS Covered	ASC/N1418, ASC/N1412, ASC/N1406, ASC/N1417, ASC/N9415, ASC/N1419, CSC/N9401, CSC/N9402
NSQF Level	Level – 3.5
Duration of Craftsmen Training	One year (1200 hours + 150 hours OJT/Group Project)
Entry Qualification	Passed 10th class examination
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	210 Sq. m
Power Norms	4.8 KW
Instructors Qualification for	
1. Mechanic Auto Body Painting Trade	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. **OR** 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. **OR** NTC/NAC passed in the trade of "Mechanic Auto Body Painting" with three years' experience in the relevant field. **Essential Qualification:** Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) under DGT. ***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.***
2. Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the

	relevant field. **OR** 03 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. **OR** NTC/ NAC in any one of the engineering trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade **OR** Regular / RPL variants NCIC in RoDA or any of its variants under DGT
3. Engineering Drawing	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 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. **OR** NTC/ NAC in any one of the engineering/ Draughtsman group of trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade OR Regular/RPL variants NCIC in RoDA or any of its variants under DGT
4. Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience **w**ith **short term ToT Course in** Employability Skills. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** **Existing Social Studies Instructors in ITIs withshort term ToT Course in** Employability Skills.
3. Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

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.

5.1LEARNING OUTCOME

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. (NOS: ASC/N1418)
2. Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools &equipment. (NOS: ASC/N1412)
3. Test various electrical/ electronic components using proper measuring instruments and compare the data using standard parameters. (NOS: ASC/N1406)
4. Check and Interpret Vehicle Specification data and VIN, Select & operate various Service Station Equipment. (NOS: ASC/N1417)
5. Perform service, repair and maintenance Air Compressor Air lines. (NOS: ASC/N9415)
6. Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills. (NOS: ASC/N1417)
7. Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats. (NOS: ASC/N1419, ASC/N1412)
8. Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection. (NOS: ASC/N1417,ASC/N1412)
9. Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns. (NOS: ASC/N1417)
10. Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills. (NOS: ASC/N1417)
11. Demonstrate finishing process. (NOS: ASC/N1417)
12. Demonstrate the use of computer colour matching systems and the use of tinting solid and metallic colours. (NOS: ASC/N1417)
13. Demonstrate how to remove minor paint imperfections. (NOS: ASC/N1417)
14. Read and apply engineering drawing for different application in the field of work. (NOS: CSC/N9401)
15. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study (NOS:CSC/N9402)

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. (NOS: ASC/N1418)	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 &equipment. (NOS: ASC/N1412)	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. Test various electrical/ electronic components using proper measuring instruments and compare the data using standard parameters. Charge and test batteries used in vehicle. (NOS: ASC/N1406)	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 Equipment. (NOS: ASC/N1417)	Identify of different type of vehicle.
	Identify the different vehicle specification data and information
	Demonstrate the garage, service station different equipment
5. Perform service, repair and maintenance Air Compressor Air lines. (NOS: ASC/N9415)	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.
6. Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills. (NOS: ASC/N1417)	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.
7. Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats. (NOS: ASC/N1419, ASC/N1412)	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.
8. Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection. (NOS: ASC/N1417, ASC/N1412)	Carryout corrosion treatment on interior and exterior surface.
	Prepare an estimate using estimation guide book.

9. Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns. (NOS: ASC/N1417)	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.
10. Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills. (NOS: ASC/N1417)	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.
11. Demonstrate finishing process. (NOS: ASC/N1417)	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.
	Polish the painted panels.
12. Demonstrate the use of computer colour matching systems and the use of tinting solid and metallic colours. (NOS: ASC/N1417)	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.
	Evaluate finish under spectrophotometer or electronic colour analyzer.
13. Demonstrate how to remove minor paint imperfections. (NOS: ASC/N1417)	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.
14. Read and apply engineering drawing for different application in the field of	Read & interpret the information on drawings and apply in executing practical work.
	Read &analyze the specification to ascertain the material

work. (NOS: CSC/N9401)	requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
15. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: CSC/N9402)	Solve different mathematical problems
	Explain concept of basic science related to the field of study

7. TRADE SYLLABUS

SYLLABUS FOR MECHANIC AUTO BODY PAINTING TRADE			
DURATION - ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
Professional Skill 105Hrs; Professional Knowledge 25Hrs	Check & perform Measuring & marking by using various Measuring & Marking tools (Vernier Caliper, Micrometer, following safety precautions.	1. Familiarization with institute, Job opportunities in the automobile sector. 2. Machinery used in Trade. 3. Types of work done by the students in the shop floor.	**Admission & introduction to the trade:** 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
		4. Practical related to Safety and Health. 5. Importance of maintenance and cleanliness of Workshop. 6. Use of fire extinguishers. 7. Demonstration on safe handling and Periodic testing of lifting equipment. 8. Safety disposal of Used engine oil/Paints etc. 9. Energy saving Tips Usage.	**Occupational Safety & Health** Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & 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, Safety disposal of Used engine oil, Electrical safety tips. Hazard identification, spatter hazard etc. and countermeasure to eliminate them & importance of usage of PPEs.
		10. Practice using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc. 11. Practice on General workshop tools & power tools and equipments	**Hand Tools** 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,

			scriber, punches-prick punch, center punch, pin punch, hollow punch, number and letter punch. Chisel-flat, cross-cut. Hammer-ball pein, 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 & 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, 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 board, sanding block, spreaders and squeegees.
		12. Measuring practice on engine components with aid of instrument studied.	**Systems of measurement:** Description, care & use of Micrometers- Outside and depth mirometer, Micrometer adjustments, Vernier calipers
Professional Skill 70 Hrs; Professional Knowledge 15Hrs	Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools &equipment.	13. Practice on General cleaning, checking and use of nut, bolts, & studs etc.	**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. Description of Riveting tools

		14. Practice on cutting tools like Hacksaw, file,chisel, OFF-hand grinding with sander, safety precautions while grinding. 15. Practice on Hacksawing and filing to given dimensions.	**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., chisel, OFF-hand grinding with sander, safety precautions while grinding.
		16. Practice on Marking and Drilling clear and Blind Holes. 17. Safety precautions to be observed while using a drilling machine. 18. Practice on Tapping a Clear and Blind Hole. 19. Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface.	**Drilling machine** -Description and study of Bench type Drilling machine, Portable electrical Drilling machine, drill holding devices, Drill bits. **Taps and Dies:** Hand Taps and wrenches, Different type of Die and Die stock. Screw extractors. **Hand Reamers** - Different Type of hand reamers,
Professional Skill 20Hrs; Professional Knowledge 05 Hrs	Test various electrical/ electronic components using proper measuring instruments and compare the data using standard parameters.	20. Measuring of current, voltage and resistance. 21. Using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.	**Basic electricity,** Electricity principles, Ohm's law, Voltage, Current, Resistance, Power, Energy. Voltmeter, ammeter, Ohmmeter, Multimeter
Professional Skill 25 Hrs; Professional Knowledge 05Hrs	Check & Interpret Vehicle Specification data and VIN Select & operate various Service Station Equipment.	22. Identification of different type of Vehicle. 23. Demonstration of vehicle specification data; 24. Identification of vehicle information Number (VIN). 25. Demonstration of Garage, Service station equipment. 26. Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks**,** Stands.	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 post and four post hoist, Engine hoists, Jacks**, Stands.**
Professional Skill 70 Hrs; Professional Knowledge 12 Hrs	Perform service, repair and maintenance Air Compressor Air lines.	27. Washing of vehicle. 28. Identification of different type body, chassis, Drive lines. 29. Identify the location of parts and panels. 30. Practice on use of computer-based service information, service manuals, refinishing guides, vehicle dimension manual, color matching guides, parts interchange guides.	**Introduction to Engine:** Description of internal & external combustion engines, Classification of IC engines, Principle & working of 2&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, Technical terms used in engine, Engine specification. Body shop & paint shop safety procedures. **Vehicle construction Technology** Definition of body shop, classification of body shop, Description of vehicle Body and Chassis. **Service information, Specifications, and Measurements** Study of Service Information, basic steps to using refinishing materials information, Vehicle paint code, study of service symbols, diagnosis charts.
		31. Identify the parts of a piston type stationary compressor. 32. Overhauling of service (FRL) unit. 33. Drain the air receiver and the moisture separator/regulator or air transformer. 34. Check the level of the oil in the crankcase, replace of compressor oil, clean air filters. 35. Clean or blow off fins on	**Compressor Air system:** Basic requirement for compressed air systems, Type of Compressor- Description and construction of Diaphragm compressor, piton 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

		cylinders, heads, intercoolers, After coolers. 36. 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. 37. Check the relief valve for exhausting of head pressure each time the motor stops. 38. Tighten belts to prevent slippage. 39. Check and align a loose motor pulley or compressor Flywheel. 40. Check for air leaks on the compressor outfit and air piping system.	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.
Professional Skill 100Hrs; Professional Knowledge 17 Hrs	Demonstrate proper paint shop equipment and pre-paint preparation steps.	41. Identify the different type of refinishing material-paint binders, paint solvents, Paint additives. 42. Select the right repair materials for a particular job. 43. Select the right type of primer and paint. 44. Identify various type masking material available in body shop. 45. Identify different type of body filler, 46. Identify various type masking material available in body shop. 47. Identify various type of grit rating available in the workshop. 48. Identify the open and closed coat grit. 49. Practice Cleaning, Pre-	**Refinishing Materials:-** Merge with using body filters 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 & sealers- self-etching primer, UV primer Primer-surfacer, Epoxy primers, Other paint materials- prep solvent, flattener, fish-eye eliminator, flex agent, Antichip coating (Vinyl coating), Metal conditioner, Paint stripper, tack cloth, Masking materials-Masking paper, Primer masking paper, paint masking paper, masking plastic, masking tape, Fine line masks, Wheel masks.

		Treatment, surface conditioning, ED coating of any given panel.	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. Composition of Paints, Paint Types. Impact of paint & paint paint component on plastic and rubber parts. Latest paint Techniques.
Professional Skill 75 Hrs; Professional Knowledge 10 Hrs	Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.	50. Identify the different type of body filler, hardeners, and putties, used in industry. 51. Practice on a mixing board for applying Body filler. 52. Practice on preparation of damaged surface area of sheet metal. 53. Practice on applying the body filler on a damaged sheet metal area. 54. Using Hand-block sanding to smooth and level a repair area properly. 55. Practice repairing paint surface imperfections, 56. Perform Repairing of paint scratches, repairing nicks, repairing dings, preparing surface rust free.	**Using Body Fillers** 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 & putties, Rust repair procedures.
Professional Skill 45 Hrs; Professional Knowledge 06 Hrs	Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection.	57. Practice on corrosion treatment of sheet metal, interior and exterior surface. 58. Preparation of repair estimate information by using an estimating	**Corrosion Protection** What Is Corrosion, Causes for Loss of Factory protection, Anticorrosion Materials, Basic Surface Preparation, Corrosion Treatment Areas, Exposed Exterior Surfaces,

		guide book. 59. Identify how an estimating guide gives part pricing and labour time information.	Exterior Accessories, **Estimating Repair Costs** Description of estimate, Direct repair programs, Estimate time factor, work orders, Using Estimate Guides, Part prices, Labor costs, Job overlap, and Included operation.
Professional Skill 65 Hrs; Professional Knowledge 15 Hrs	Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.	60. Practice on different ways to mix paint or other materials paint mixing sticks, 61. Practice on use of viscosity cup. 62. Testing Spray Pattern, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, Gun Direction, Spray Overlap, Gun Handling Problems - Heeling, Arcing. 63. Practice on spray gun cleaning tank, manual spray gun cleaning, and spray gun lubrication. Practice on paint spray and spray gun handling on Paint Simulator. 64. Practice on maintains on spray booth. 65. Practice on use of Air-supplied respirators.	**Refinishing equipment Technology** 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, Other spray systems,- 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. Description of Air-supplied respirators, type of air-supplied respirators- hood type and the

			face shield type. 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.
Professional Skill 115 Hrs; Professional Knowledge 20 Hrs	Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills.	66. 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), 67. Troubleshoot Excessive spray fog or overspray, No control over size of pattern, Sags or runs, 68. Troubleshoot Streaks Gun sputters constantly, Uneven spray pattern, Fluid leaks from spray gun, 69. Troubleshoot Fluid leaks from packing nut, Fluid leaks through fluid tip when trigger is released, 70. Troubleshoot Excessive fluid, Fluid will not come from spray gun, Fluid will not come from fluid tank or canister, 71. Troubleshoot Sprayed coat short of liquid material, Spotty, uneven pattern, slow to build, Unable to get round spray, Dripping from	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 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.

		fluid tip, 72. Troubleshoot Excessive overspray, Excessive fog, will not spray on pressure feed, will not spray on suction feed, 73. Troubleshoot Air continues to flow through gun when trigger has been released (on non-bleeder guns only), 74. Troubleshoot Air leak at canister gasket, 75. Troubleshoot Leak at setscrew in canister top, Leak between top of canister cover and gun body.	
		76. Practice on Checking Paint Thickness, 77. Practice on paint removal using chemical stripping, 78. Practice Media blasting, Practice on Preparing Bare Metal using metal conditioners, preparing hard chrome Surfaces, preparing metal Replacement parts, 79. Practice on applying spot putty, or glazing putty. 80. Practice on final sanding, using the right grit, power sanding, hand sanding, dry sanding, wet sanding, 81. Carry out Surface Cleaning. 82. Practice to mask the parts of a vehicle by using different masking techniques.	**Vehicle surface preparation and masking** 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 Prime coat Selection, applying prime coats 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 blend masking, Masking rope, (aperture tape), surface cleaning, using wax-and-grease remover.
Professional Skill 50 Hrs; Professional Knowledge 10 Hrs	Demonstrate finishing process.	83. Identify different type of paint for topcoat refinishing, paint used for refinishing. 84. Practice on applying Prime coats, Refinishing Plastic Parts, Basecoat/ Clearcoat Repairs. 85. Practice on applying Single Stage Paints, Panel Repairs, Overall Refinishing. 86. Removal of Masking Materials. 87. Practice paint polishing.	**Refinishing Procedures:** 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.
Professional Skill 50 Hrs; Professional Knowledge 10Hrs	Demonstrate the use of computer color matching systems and the use of tinting solid and metallic colors.	88. Practice on colour evaluations using sunlight & colour corrected light bulb. 89. Practice on matching Basic Paint Colors. 90. Practice on Spraying Metallic Colours, Practice on let-down test panel for a three-stage finish. 91. Practice on a repair with a multistage mica or pearl finish. 92. Practice on use of Spectrophotometer or electronic colour	**Color matching and Customized painting** Introduction, ColorTheory, 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

		Analyzer, use of Computerized Paint Matching Custom.	metallic finishes, Spraying Metallic Colours- Wet Coats of Metallic Colour, Dry Coats of Metallic Colour, importance of metallic colour mixed, Metallic Colour Variables to darken & 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.
Professional Skill 50 Hrs; Professional Knowledge 10 Hrs	Demonstrate how to remove minor paint imperfections.	93. Practice on removing foreign matter in wet paint, wet sanding between coats. 94. 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, solvent popping, paint cracking, line checking, crazing, micro checking, lifting, paint wrinkling,	**Paint Problems and Final Detailing** 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 colour fade, dulled finish, debris in the finish, rust under the finish. **Final**

		mottling, pin holing, peeling, chalking, paint colour fade, dulled finish, debris in the finish, rust under the finish. 95. Repairing paint runs, repairing chipped paint, panel detail sanding. 96. Practice on visualizing of painted surface in three different angles for final detailing. 97. Practice Paint defect identification and area wise defect ranking and tolerance.	**detailing-** 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.
ENGINEERING DRAWING: (40 Hrs.)			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work.	**ENGINEERING DRAWING:** **Introduction to Engineering Drawing and Drawing Instruments –** • Conventions • Sizes and layout of drawing sheets • Title Block, its position and content • Drawing Instrument **Free hand drawing of –** • Geometrical figures and blocks with dimension • Transferring measurement from the given object to the free hand sketches. • Free hand drawing of hand tools and measuring tools. **Drawing of Geometrical figures:** • Angle, Triangle, Circle, Rectangle, Square, Parallelogram. • Lettering & Numbering – Single Stroke, double stroke, Inclined **Dimensioning** • Types of arrowhead **Symbolic representation** – • Different symbols used in the related trade.	
WORKSHOP CALCULATION & SCIENCE: (40 Hrs)			
Professional Knowledge WCS- 40 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations.	**WORKSHOP CALCULATION & SCIENCE:** **Unit, Fractions** Classification of unit system Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units Measurement units and conversion	

	Understand and explain basic science in the field of study.	Factors, HCF, LCM and problems Fractions - Addition, substraction, multiplication & division Decimal fractions - Addition, subtraction, multiplication& division Solving problems by using calculator **Square root, Ratio and Proportions, Percentage** Square and square root Simple problems using calculator Applications of Pythagoras theorem and related problems Ratio and proportion Ratio and proportion - Direct and indirect proportions Percentage Percentage - Changing percentage to decimal and fraction **MaterialScience** Types metals, types of ferrous and nonferrous metals Physical and mechanical properties of metals Introduction of iron and cast iron Difference between iron & steel, alloy steel and carbon steel Properties and uses of rubber, timber and insulating materials **Mass, Weight, Volume and Density** Mass, volume, density, weight and specific gravity. **Heat & Temperature and Pressure** Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature Heat &Temperature - Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation Thermal conductivity and insulators Concept of pressure - Units of pressure, gauge pressure and gauges used for measuring pressure **Basic Electricity** Introduction and uses of electricity, electric current AC,DC their comparison, voltage, resistance and their units Conductor, insulator, types of connections - series and parallel Ohm's law, relation between V.I.R & related problems Electrical power, energy and their units, calculation with assignments **Levers and Simple machines** Lever & Simple machines - Lever and its types **Trigonometry** Measurement of angles Trigono metrical ratios Trigono metrical tables

Project work / Industrial visit

Broad Areas:

a) Overload protection of electrical equipment
b) Automatic control of streetlight/night lamp
c) Fuse and power failure indicator using relays
d) Door alarm/indicator
e) Decorative light with electrical flasher

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (120 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/ dgt.gov.in

ANNEXURE-I

LIST OF TOOLS AND EQUIPMENT			
MECHANIC AUTO BODY PAINTING(For batch of 20 candidates)			
A. TRAINEES TOOL KIT			
Sl. No.	**Name of the Tool &Equipment**	**Specification**	**Quantity**
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. INSTRUMENTS AND GENERAL SHOP OUTFIT			
TOOLS & EQUIPMENT			
25.	Adjustable spanner	pipe wrench 350 mm	2 Nos.
26.	Air blow gun with standard		1 No.

	accessories		
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 primed metal)		10 Nos.
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 including safe edge file (20 Nos)		2 set
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	2sets

		15.75 mm	
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.	Plastic feeler gauges		2 Nos.
119.	Pliers combination	20 cm.	2 Nos.
120.	Pliers flat nose	15 cm	2 Nos.
121.	Pliers round nose	15 cm	2 Nos.
122.	Pliers side cutting	15 cm	2 Nos.
123.	Portable electric drill Machine		1 No.
124.	Prick Punch	15 cm	4 Nos.
125.	Punch Letter(Number)	4mm	2 set
126.	Right cut snips	250mm	4 Nos.
127.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4 Nos.
128.	Scraper flat	25 cm	4 Nos.
129.	Scraper half round	25 cm	4 Nos.
130.	Scraper Triangular	25 cm	2 Nos.
131.	Scriber	15 cm	4 Nos.
132.	Scriber with scribing black		2 Nos.

	universal		
133.	Set of stock and dies - Metric		2 sets
134.	Shear Tin Man's	450 mm x 600mm	4 Nos.
135.	Sheet metal cutting pliers-left , right hand and straight - jaw Configuration		1 set
136.	Sheet Metal Gauge		2 Nos.
137.	SherTinmans	300mm	4 Nos.
138.	Soldering Copper Hatchet type	500gms	5 Nos.
139.	Solid Parallels in pairs (Different size) in Metric		2 Nos.
140.	Spanner Clyburn	15 cm	1 No.
141.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	4 Nos.
142.	Spanner T. flocks for screwing up and up-screwing inaccessible		2 Nos.
143.	Spanner, adjustable	15cm.	2 Nos.
144.	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	2 Nos.
145.	Spanners socket	with speed handle, T-bar, and ratchet	2 Nos.
146.	Spark lighter		2 Nos.
147.	Spark plug spanner	14mm x 18mm x Size	2 Nos.
148.	Spirit level	2 V 250, 05 metre	2 Nos.
149.			
150.	Steel measuring tape	10 meter in a case	2 Nos.
151.	Steel rule	15 cm inch and metric	4 Nos.
152.	Steel rule	30 cm inch and metric	4 Nos.
153.	Steel wire Brush	50mmx150mm	4 Nos.
154.	Stud extractor	set of 3	2 sets
155.	Suction cup		2 Nos.
156.	Taps and Dies complete	sets (5 types)	1 set
157.	Taps and wrenches - Metric		2 sets
158.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
159.	Trammel	30 cm	2 Nos.
160.	Trim and upholstery tools		1 set
161.	Tyre pressure gauge with holding nipple		2 Nos.
162.	Universal puller for removing pulleys, bearings		1 No.
163.	V' Block	75 x 38 mm pair with Clamps	2 Nos.
164.	Vacuum gauge to read	0 to 760 mm of Hg.	2 Nos.
165.	Various sanding blocks-soft, hard, speed file & de-nibbling tools		2 set

166.	Verniercaliper	0-300 mm with least count 0.02mm	4 Nos.
167.	Vice grip pliers		2 Nos.
168.	Voltmeter	50V/DC	5 Nos.
169.	Wire Gauge (metric)		5 Nos.
170.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	1 No.
C. GENERAL INSTALLATION/ MACHINERIES			
171.	Angle grinder	(10-12 cm) - for cutting and grinding	2 Nos.
172.	Arbor press hand operated	2 ton capacity	1 No.
173.	Belt sander (Narrow surface)		2 Nos.
174.	Bench lever shears	250mm Blade x 3mm Capacity	1 No.
175.	Body shell for painting - Light Motor vehicle of different Manufactures		4 Nos.
176.	compressed air line	10m (on retractable reel, with high flow connectors) with FRL unit	2 Nos.
177.	Computerized colour retrieval unit (Spectrophotometer)		1 No.
178.	Die Grinding kit		2 Nos.
179.	Disc sander	18 cm	2 Nos.
180.	Discrete Component Trainer / Basic Electronics Trainer		1 No.
181.	Down draft spray booth	(7.5 X 5 m, combi spray/oven or separate spray /oven	1 No.
182.	Drilling machine benchtodrill up to 12mm dia along with accessories		1 No.
183.	Dual Magnetization Yoke	AC / HWDC. 230 VAC. 50Hz	1 set
184.	Dust extraction connections (Vacuum)		2 Nos.
185.	Electronic paint mixing scales (accurate to 0.1 grams. explosion proof		1 No.
186.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth		1 No.
187.	High pressure hot / cold water blasting unit		1 No.
188.	Hydraulic jack	HI-LIFT type -3 ton capacity. & % ton capacity	1 each
189.	Infrared drying lamp unit		1 No.
190.	Liquid penetrant Inspection kit		1 set
191.	Motor Vehicle suitable for		2 Nos.

	Body painting -Light Motor vehicle of different		
192.	Paint surface film thickness gauge (electronic)		2 Nos.
193.	Paint tinting system mixing machine (exposition proof)		1 No.
194.	Parts spray booth cabin	(ventilated to 30 cubic m / minute)	1 No.
195.	Pipe Bending Machine (Hydraulic type)	12mm to 30mm	1 No.
196.	Pneumatic rivet gun		2 Nos.
197.	Random /dual action orbital sander	(12-15 cm)	2 Nos.
198.	Spray gun & mixing equipment cleaning machine(explosion proof) & bench		2 each
199.	Spray guns (gravity feed primer	COB/2K colour & clear coat. touch-up set)	4 Nos.
200.	Tin smiths bench folder	600 x 1.6mm	1 No.
201.	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.
202.	Underbody sealer & corrosion proofing materials & spray units		2 each
203.	Ventilated preparation bays (fully illuminated. down or end draught		1 No.
204.	Water &oil separation system		1 No.
205.	Weld through primer application equipment		2 Nos.
206.	Paint simulator (for spray paint and gun handling practice)		1 No.
D. CONSUMABLE			
207.	Battery- SMF		As required
208.	Brake fluids		As required
209.	Chalk. Prussian blue.		As required
210.	Chemical compound for fasteners		As required
211.	Diesel		As required
212.	Drill Twist (assorted)		As required
213.	Emery paper - 36-60 grit. 80-120		As required

214.	Gear oils		As required
215.	Hacksaw blade (consumable)		As required
216.	Hand rubber gloves tested for 5000 V		As required
217.	Holders. lamp teakwood boards. plug sockets.		As required
218.	Hydrometer		As required
219.	Lapping abrasives		As required
220.	Leather Apron		As required
221.	Petrol		As required
222.	Power steering oil		As required
223.	Radiator Coolants		As required
224.	Safety glasses		As required
225.	Steel wire Brush 50mmx150mm		As required
226.	Gloves for Welding (Leather and Asbestos)		As required
227.	Cotton waste/ cloth		As required
228.	Body filler (Consumable)		As required
229.	Body filler (Consumable)		As required
230.	Masking paper / plastic & back-masking tape		As required
231.	Refinishing material (consumable)		As required
WORKSHOP FURNITURE			
232.	Book shelf (glass panel)	6V2' x 3' x I V 2'	As required
233.	Computer Chair		1+1
234.	Computer Table		1+1
235.	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
236.	Discussion Table	8' x 4' x $2\frac{1}{2}$'	2 Nos.
237.	Fire Extinguishers. First- aid box	Arrange all proper NOCs and equipment from Municipal/Competent authorities.	
238.	Internet connection with all accessories		As required
239.	Laser printer		1 No.
240.	LCD projector/ LCD TV	42"	1 No.

	/Interactive smart board		
241.	Online UPS 2KVA		As required
242.	Stools		21 Nos.
243.	Storage Rack	$6^1/_2$ ' x 3' x $1^1/_2$'	As required
244.	Storage shelf	$6^1/_2$ ' x 3' x $1^1/_2$'	As required.
245.	Suitable class room furniture		As required
246.	Suitable Work Tables with vices		As required
247.	Tool Cabinet	$6^1/_2$ ' x 3' x $1^1/_2$'	2 Nos.
248.	Trainees locker	$6^1/_2$ ' x 3' x $1^1/_2$'	2 Nos.

ANNEXURE -II

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 participated for finalizing the course curricula of Mechanic Auto Body Painting trade held on 20.02.18 at Advanced Training Institute-Chennai			
S No.	**Name & Designation Shri/Mr./Ms.**	**Organization**	**Remarks**
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


कौशलं बलम्