



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

MECHANIC AUTO BODY PAINTING

(Engineering Trade)

(Revised in 2018)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

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Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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Mechanic Auto Body Painting

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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. 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 related to the trade are categorized in two semesters each of six months duration. The semester wise course coverage is categorized as below: -

Semester-I: - This semester will cover the safety aspect in general and specific to the trade, identification of tools & equipment, raw materials used. In this semester 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.

Semester-II: - In this semester 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.

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2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of Labour market. The vocational training programmes are running under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes under NCVT for propagating 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 (02 semester) duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory & Practical) impart professional skills and knowledge, while Core area (Workshop Calculation science, Engineering Drawing and Employability Skills) impart requisite core skill & knowledge and life skills. After passing out of the training programme, the trainee is awarded National Trade Certificate (NTC) by NCVT 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.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).

2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of one year (02 semesters):

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	1075
2	Professional Knowledge (Trade Theory)	258
3	Workshop Calculation & Science	86
4	Engineering Drawing	129
5	Employability Skills	110
6	Library & Extracurricular activities	62
7	Project work	80
8	Revision & Examination	280
	Total	2080

2.4 ASSESSMENT & CERTIFICATION

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

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

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

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. For the purposes of determining the overall result, 50% weightage is applied to the result of each semester examination.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while

undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

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

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

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



(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	<ul style="list-style-type: none">• High skill levels in the use of hand tools, machine tools and workshop equipment• Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards.• A high level of neatness and consistency in the finish.• Minimal or no support in completing the project.



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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. Sensitive to environment, self-learning and productivity.

Reference NCO-2015: 7132.0201

4. GENERAL INFORMATION

Name of the Trade	Mechanic Auto Body Painting
NCO - 2015	7132.0201
NSQF Level	Level – 4
Duration of Craftsmen Training	One year (Two semesters each of six months duration).
Entry Qualification	Passed 10 th class examination under 10+2 system of education or its equivalent
Unit Strength (No. Of Student)	16 (Max. supernumeraries seats: 5)
Space Norms	210 Sq. mtr.
Power Norms	4.8 KW
Instructors Qualification for	
1. Mechanic Auto Body Painting Trade	<p>Degree in Automobile/ Mechanical Engg. (with specialization in Automobile) from recognized college/University with one year experience in the automobile Body/painting industry and should possess valid LMV driving license.</p> <p style="text-align: center;">OR</p> <p>Diploma in Automobile/Mechanical (specialization in automobile) from recognized board of technical education with two years experience in the automobile Body/painting industry and should possess valid LMV driving license</p> <p style="text-align: center;">OR</p> <p>NTC/NAC in the Trade of "Mechanic Auto Body Painting" with 3 years post qualification experience in the relevant field and should possess valid LMV driving license</p> <p>Desirable: - Preference will be given to a candidate with CIC (Craft Instructor Certificate) in Mechanic Auto Body Painting trade.</p> <p><i>Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.</i></p>
2. Workshop Calculation & Science	<p>Degree in Engineering with one year experience.</p> <p style="text-align: center;">OR</p> <p>Diploma in Engineering with two years experience.</p> <p>Desirable: Craft Instructor Certificate in RoD & A course under NCVT.</p>



3. Engineering Drawing	Degree in Engineering with one year experience. OR Diploma in Engineering with two years experience. OR NTC/ NAC in the Draughtsman (Mechanical) with three years experience. Desirable: Craft Instructor Certificate in RoD & A course under NCVT.					
4. Employability Skill	MBA OR BBA with two years experience OR Graduate in Sociology/ Social Welfare/ Economics with Two years experience OR Graduate/ Diploma with Two years experience and trained in Employability Skills from DGT institutes. AND Must have studied English/ Communication Skills and Basic Computer at 12 th / Diploma level and above. OR Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.					
List of Tools and Equipment	As per Annexure – I					
Distribution of training on Hourly basis: (Indicative only)						
Total hours /week	Trade practical	Trade theory	Work shop Cal. &Sc.	Engg. Drawing	Employability skills	Extra-curricular activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for **Mechanic Auto Body Painting** trade under CTS: **Level 4**

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

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

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

- a. Process
- b. professional knowledge
- c. professional skill
- d. Core skill and
- e. Responsibility

The Broad Learning outcome of **Mechanic Auto Body Painting** trade under CTS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	work in familiar, predictable, routine, situation of clear choice	factual knowledge of field of knowledge or study	recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment	Responsibility for own work and learning.

6. LEARNING/ ASSESSABLE OUTCOME

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

6.1. GENERIC LEARNING OUTCOME

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

6.2 SPECIFIC LEARNING OUTCOME

Semester – I

9. 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.)
10. Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & equipments.
11. Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system.
12. Join components by using Arc & Gas welding.

13. Check and Interpret Vehicle Specification data and VIN, Select & operate various Service Station Equipments.
14. Identify various vehicle parts and Service, Repair and Maintenance of Air compressor and Air Lines.
15. Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills

Semester – II

16. Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.
17. Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection.
18. Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.
19. Demonstrate knowledge of correct paint application techniques and be able to identify paint problems along with troubleshooting skills.
20. Demonstrate finishing process.
21. Demonstrate the use of computer color matching systems and the use of tinting solid and metallic colors.
22. Demonstrate how to remove minor paint imperfections.

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7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

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



<p>of study including basic electrical. <i>[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry, Mensuration, Trigonometry, Heat & Temperature, elasticity]</i></p>	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
<p>3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing- Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, Different Projections, Assembly drawing, Sectional views, Estimation of material]</i></p>	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
<p>4. Select and measure dimension of components and record data.</p>	4.1 Select appropriate measuring scale/tape/gauges.
	4.2 Measure dimension of the components/assembly & compare with given drawing/measurement.
<p>5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.</p>	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts
<p>6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.</p>	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.



	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and execute the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Execute the task effectively.



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SPECIFIC LEARNING/ ASSESSABLE OUTCOMES	
LEARNING/ ASSESSABLE OUTCOME	ASSESSMENT CRITERIA
SEMESTER-I	
9. 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.)	9. 1. Plan the working principles of measuring instruments and special tools required for auto workshop.
	9. 2. Select, care and use of measuring instrument.
	9. 3. Set up the measured value with workshop manual and quality concepts and proper safety.
	9. 4. Carry out decision on whether to replace or not.
10. Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & equipments.	10.1 Describe the purpose, use of auto hand tools.
	10.2 List the safety rules for hand tools.
	10.3 Select the correct tool for the job.
	10.4 Set up the tacked pieces in specific position.
	10.5 Joint components by Brazing, Soldering, Riveting as per given drawing.
	10.6 Produce components by different operation (Drilling, Reaming, Taping, Dieting)
11. Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system. Charge and test batteries used in vehicle.	11.1 Plan and prepare as per procedure and safety methods of soldering the cable ends using an electric soldering iron.
	11.2 Use crimping tool to make a circuit joint.
	11.3 Explain the connection of an ammeter, voltmeter, and ohmmeter in a circuit trouble shooting.
	11.4 State open & short circuit, series and parallel circuits.
	11.5 Verify DC series & parallel circuits and its characteristics.
	11.6 Check out the open and short circuits in the lighting circuits.
	11.7 Verify ohm's law and measure resistance using rheostat.
	11.8 Check the voltage drop in the auto electrical system by using multimeter.
	11.9 Trace the auto electrical components by using vehicle wiring circuits.
	11.10 Check the condition of the solenoid switch in the starting system.



	11.11 Determine the forward to reverse resistance ratio of diodes and identify good / bad diodes.
	11.12 Perform battery charging and check
12. Join components by using Arc & Gas welding.	12.1 Determine the principles, process of different welding process applicable in automobile industry.
	12.2 Demonstrate the edge preparation for butt and fillets welds.
	12.3 Select the type and size of filler rod and flux/electrode, size of nozzle and gas pressure/welding current, preheating method and temperature as per requirement.
	12.4 Set and tack metals as per drawing.
	12.5 Deposit the weld maintaining appropriate technique and safety aspects.
	12.6 Cool the welded joint by observing appropriate cooling method. Use post heating, peening etc. as per requirement.
	12.7 Clean the joint and inspect the weld for its uniformity and different types of surface defects.
13. Check & Interpret Vehicle Specification data and VIN. Select & operate various Service Station Equipments	13. 1. Identify of different type of vehicle.
	13. 2. Identify the different vehicle specification data and information
	13. 3. Demonstrate the garage, service station different equipment
14. Identify various vehicle parts and Service, Repair and Maintenance of Air compressor and Air Lines.	14.1 Ascertain basic working principles and safety aspect of Air Compressor.
	14.2. Plan and perform removal of accessories fitted to the Air Compressor.
	14.3. Dismantle the cylinder block parts.
	14.4. Perform inspection to ascertain the serviceability of the dismantled parts.
	14.5. Repair/replace defective parts.
	14.6. Comply with safety rules when performing the above operations.



	14.7. Assemble and check functionality of the components.
	14.8. Service FRL unit and check air leaks on the Air compressor and installed pipelines.
15. Demonstrate proper paint shop equipment and pre-paint preparation steps such as proper final sanding, masking, buffing, and detailing skills	15.1. Plan and perform selection of right paint repair materials for a specific job following standards laid down by industries.
	15.2. Identify various primers, masking materials, body fillers, etc.
	15.3. Clean the panel and perform preconditioning and ED Coating.
	15.4. Carryout visual inspection on panel for defects.
SEMESTER-II	
16. Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.	16.1. Identify various body fillers, hardeners and putties used as per industry standards.
	16.2. Apply body filler on a panel.
	16.3. Comply with safety rules when performing the above operations.
	16.4. Perform hand block sanding to achieve optimal finishing.
17. Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection.	17.1. Carryout corrosion treatment on interior and exterior surface.
	17.2. Prepare an estimate using estimation guide book.
18. Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.	18.1. Refinish a panel by mixing paint and other material using viscosity cup.
	18.2. Adjust knobs, test spray and check for heeling and arcing.
	18.3. Clean spray Gun, Tank and perform lubrication of Spray Gun.
19. Demonstrate knowledge of	19.1. Check Air spray pattern for spray defects.



correct paint application techniques and be able to identify paint problems along with troubleshooting skills.	19.2. Plan work in compliance with standard safety norms.
	19.3. Carryout the diagnostic procedure for Excessive spray, overspray, paint gun sputters defect, uneven spray pattern and correct the defects.
20. Demonstrate finishing process.	20.1. Apply prime coat in accordance to industry standards.
	20.2. Refinish plastic part
	20.3. Apply single stage paint.
	20.4. Perform overall finishing of the panel.
	20.5. Remove masking form the panels
	20.6. Comply with safety rules when performing the above operations.
	20.7. Polish the painted panels.
21. Demonstrate the use of computer color matching systems and the use of tinting solid and metallic colors.	21.1. Evaluate painted panels under sunlight and colour corrected light bulbs.
	21.2. Match basic paint colour.
	21.3. Spray metallic colour for finish.
	21.4. Perform Mica or Pearl finish.
	21.5. Comply with safety rules when performing the above operations.
	21.6. Evaluate finish under spectrophotometer or electronic colour analyzer.
22. Demonstrate how to remove minor paint imperfections.	22.1. Remove foreign matter in wet paint.
	22.2. Perform wet sanding between coats.
	23.3. Correct orange peel runs and sags.
	23.4. Repair paint run and chipped paint.
	23.5. Evaluate the painted surface for detailing.
	23.6. Identify paint defect and area wise defect ranking & tolerance.

SYLLABUS FOR MECHANIC AUTO BODY PAINTING

First Semester - Six Months

Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
1	Recognize & comply safe working practices, environment regulation and housekeeping	<ol style="list-style-type: none"> 1. Familiarisation with institute, Job opportunities in the automobile sector.(5 hrs) 2. Machinery used in Trade.(10 hrs) 3. Types of work done by the students in the shop floor.(10hrs) 	<p>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</p>
2-3	-do-	<ol style="list-style-type: none"> 4. Practical related to Safety and Health.(10 hrs) 5. Importance of maintenance and cleanliness of Workshop. (5 hrs) 6. Interaction with health center and fire service station to provide demo on First aid and Fire safety. (5 hrs) 7. Use of fire extinguishers. (10 hrs) 8. Demonstration on safe handling and Periodic testing of lifting equipment. (5 hrs) 9. Safety disposal of Used engine oil/Paints etc. (10 hrs) 10. Energy saving Tips/Audit of ITI electricity Usage. (5 hrs) 	<p>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, Authorization of Moving & 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.</p> <p>Hazard identification, spatter hazard etc and countermeasure to eliminate them & importance of</p>

4-5	<p>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.)</p>	<p>11. Practice using all marking aids, like steel rule with spring calipers, dividers, scribe, punches, Chisel etc. (15 hrs)</p> <p>12. Layout a work piece- for line, circle, arcs and circles. (10 hrs)</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. (5 hrs)</p> <p>15. Practice on General workshop tools & power tools and equipments (15 hrs)</p>	<p>usage of PPEs.</p> <p>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, 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 & 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.</p>
6	<p>Check & perform Measuring & marking by using various Measuring</p>	<p>16. Measuring practice on engine components with aid of instrument studied.(25 hrs)</p>	<p>Systems of measurement: Description, care & use of Micrometers- Outside and depth</p>

	& Marking tools(Vernier Calliper, Micrometer, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.)		mirometer, Micrometer adjustments, Vernier calipers, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.
7	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) 18. Removal of stud/bolt from blind hole.(10 hrs)	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. Selection of materials for gaskets and packing, Description of Riveting tools
8-9	-do-	19. Practice on cutting tools like Hacksaw, file, chisel, OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding.(25 hrs) 20. Practice on Hacksawing and filing to given dimensions..(25 hrs)	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, bench and pedestal grinders, safety precautions while grinding. Limits, Fits & Tolerances:- Definition of limits, fits & tolerances with examples used in auto components.
10-11	-do-	21. Practice on Marking and Drilling clear and Blind Holes, Sharpening of Twist Drills.(10 hrs) 22. Safety precautions to be observed while using a drilling machine. (10 hrs)	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



		<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>wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and Die stock. Screw extractors.</p> <p>Hand Reamers - Different Type of hand reamers, Lapping, Lapping abrasives, type of Laps. Function of Gaskets, Selection of materials for gaskets and packing, oil seals.</p>
12-13	Trace and Test all Electrical & Electronic components & circuits and assemble circuit to ensure functionality of system.	<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.(15 hrs)</p>	<p>Basic electricity, Electricity principles, Ground connections, Ohm's law, Voltage, Current, Resistance, Power, Energy. Voltmeter, ammeter, Ohmmeter Multimeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor ratings</p>
14	<p>Check & Interpret Vehicle Specification data and VIN</p> <p>Select & 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 (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>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.</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, Stands.</p>
15-16	Identify various vehicle parts and Service, Repair and	<p>35. Washing of vehicle. (5 hrs)</p> <p>36. Identification of different type body, chassis, Drive lines. (10</p>	<p>Introduction to Engine: Description of internal & external combustion engines, Classification</p>

	<p>Maintenance of Air compressor and Air Lines.</p>	<p>hrs)</p> <p>37. Identify the location of parts and panels. (5 hrs)</p> <p>38. Practice on use of computer-based service information, service manuals, refinishing guides, vehicle dimension manual, color matching guides, parts interchange guides.(30 hrs)</p> 	<p>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, Direct injection and Indirect injection, Technical terms used in engine, Engine specification.. Body shop & paint shop safety procedures. Vehicle construction Technology Definition of body shop, classification of body shop-Independent body shop, dealership body shop, specialty 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, wiring diagram.</p>
<p>17-18</p>	<p>-do-</p>	<p>39. Identify the parts of a piston type stationary compressor. (04 hrs)</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. (04 hrs)</p> <p>42. Check the level of the oil in the crankcase, clean air filters. (04 hrs)</p> <p>43. Clean or blow off fins on cylinders, heads, intercoolers, Aftercoolers. (04 hrs)</p> <p>44. Check the oil filter in the air line and change the filter element if</p>	<p>Compressor Air system : 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,</p>

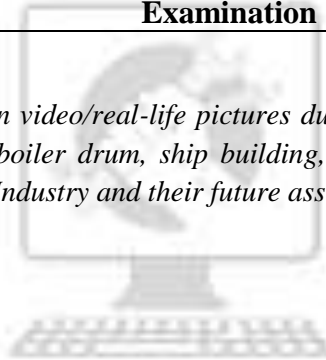


		<p>necessary, Adjust the pressure switch cut-in and cut-out settings if needed. (05 hrs)</p> <p>45. Check the relief valve for exhausting of head pressure each time the motor stops. (04 hrs)</p> <p>46. Tighten belts to prevent slippage. (05 hrs)</p> <p>47. Check and align a loose motor pulley or compressor Flywheel. (10 hrs)</p> <p>48. Check for air leaks on the compressor outfit and air piping system. (05 hrs)</p>	<p>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.</p>
<p>19-22</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. (10 hrs)</p> <p>50. Select the right repair materials for a particular job. (5 hrs)</p> <p>51. Select the right type of primer and paint. (10 hrs)</p> <p>52. Identify various type masking material available in body shop. (10 hrs)</p> <p>53. Identify different type of body filler, (10 hrs)</p> <p>54. Identify various type masking material available in body shop. (10 hrs)</p> <p>55. Identify various type of grit rating available in the workshop. (10 hrs)</p> <p>56. Identify the open and closed coat grit. (10 hrs)</p> <p>57. Practice Cleaning, Pre-Treatment, surface conditioning, ED coating of any given panel.(25hrs)</p>	<p>Refinishing Materials:- 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 & sealers- self-etching primer, UV primer 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</p>



			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 component on plastic and rubber parts. Latest paint Techniques.
23-25	Revision		
26	Examination		

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of welded items like boiler drum, ship building, heavy welded structures etc., may be shown to the trainees to give a feel of Industry and their future assignment.*



Skill India

कौशल भारत - कुशल भारत

SYLLABUS FOR MECHANIC AUTO BODY PAINTING

Second Semester - Six Months

Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
27-29	Acquire skills on the use of basic auto body hand and power tools and application and finishing of body filler materials and undercoats.	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).	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, 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.
30-31	Demonstrate understanding of the causes and effects of corrosion on automobile bodies and methods of corrosion protection	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) 67. Identify how an estimating guide gives part pricing and labour time information. (20 hrs)	Corrosion Protection 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, Exposed Exterior Surfaces, Exterior Accessories, Estimating



			<p>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.</p>
<p>32-34</p>	<p>Demonstrate how to use different painting tools and equipment including how to disassemble, assemble, and clean paint guns.</p>	<p>68. Practice on different ways to mix paint or other materials paint mixing sticks, (10 hrs) 69. Practice on use of viscosity cup. (10 hrs) 70. Practice on Adjusting Knobs. (10 hrs) 71. Testing Spray Pattern, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, Gun Direction, Spray Overlap, Gun Handling Problems - Heeling, Arcing. (15 hrs) 72. Practice on spray gun cleaning tank, manual spray gun cleaning, and spray gun lubrication. (10 hrs) 73. Practice on maintains on spray booth. (10 hrs) 74. Practice on use of Air-supplied respirators. (10 hrs)</p>	<p>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, 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,- airless spray gun system, electrostatic spraying system, touch-up guns, airbrushes, spray</p>



			<p>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.</p>
<p>35-37</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 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</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,</p> <p>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</p>



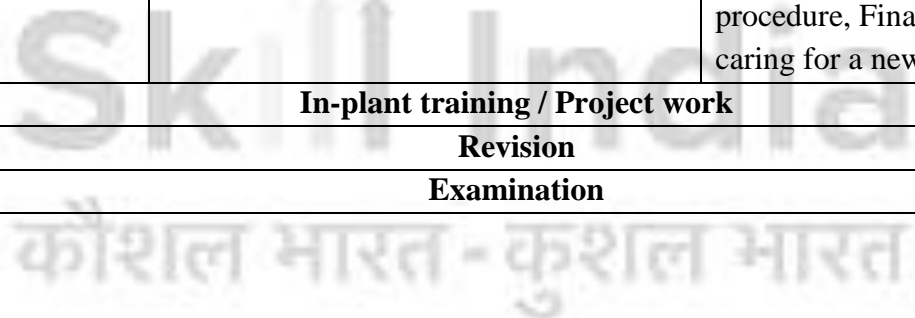
		<p>fluid tip when trigger is released, (05 hrs)</p> <p>79. Troubleshoot Excessive fluid, Fluid will not come from spray gun, Fluid will not come from fluid tank or canister, (05 hrs)</p> <p>80. Troubleshoot Sprayed coat short of liquid material, Spotty, uneven pattern, slow to build, Unable to get round 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 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>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.</p>
<p>38-40</p>	<p>-do-</p>	<p>85. Practice on Checking Paint Thickness, (10 hrs)</p> <p>86. Practice on paint removal using Chemical stripping, (15 hrs)</p> <p>87. Practice Media blasting, Practice on Preparing Bare Metal using metal conditioners, preparing hard chrome Surfaces, preparing metal Replacement parts, (10 hrs)</p> <p>88. Practice on applying spot putty, or glazing putty. (10 hrs)</p> <p>89. Practice on final sanding, using the right grit, power sanding, hand sanding, dry sanding, wet sanding, (10 hrs)</p> <p>90. Carry out Surface Cleaning. (10</p>	<p>Vehicle surface preparation and masking</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</p>

		<p>hrs) 91. Practice to mask the parts of a vehicle by using different masking techniques. (10 hrs)</p>	<p>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 blend masking, Masking rope, (aperture tape), surface cleaning, using wax-and-grease remover.</p>
41-43	Demonstrate finishing process.	<p>92. Identify different type of paint for topcoat refinishing, paint used for refinishing. (10 hrs) 93. Practice on applying Prime coats, Refinishing Plastic Parts, Basecoat/ Clearcoat Repairs. (25 hrs) 94. Practice on applying Single Stage Paints, Panel Repairs, Overall Refinishing. (15 hrs) 95. Removal of Masking Materials. (05 hrs) 96. Practice paint polishing. (25 hrs)</p>	<p>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.</p>
44& 45	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 & colour corrected light bulb. (10 hrs) 98. Practice on matching Basic Paint Colors. (10 hrs) 99. Practice on Spraying Metallic</p>	<p>Color matching and Customized painting Introduction, Color Theory, Lighting-colour evaluations using sunlight & colour corrected light bulb, dimensions of colour-</p>

		<p>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 electronic colour Analyzer, use of Computerized Paint Matching Custom. (10 hrs)</p> 	<p>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 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.</p>
46-47	Demonstrate how to remove minor paint imperfections.	<p>102. Practice on removing foreign matter in wet paint, wet sanding between coats. (05 hrs)</p> <p>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,</p>	<p>Paint Problems and Final Detailing</p> <p>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,</p>



		<p>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. (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>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.</p> <p>Final 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.</p>
48-49	In-plant training / Project work		
50-51	Revision		
52	Examination		



9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

First Semester Duration: Six Month		
S No.	Workshop Calculation and Science	Engineering Drawing
1.	Units, Derived and fundamental, types of system FPS, CGS, MKS and their conversion. Metric weights and measurements, units conversion factors	Importance of engineering drawing as a communication medium, different types of drawing - Machine Drawing, Production Drawing, Part Drawing, Assembly Drawing, Drawing instruments, equipment and materials and their uses
2.	Fractions- Addition and subtraction, Fractions and whole numbers, Combined addition and subtraction, Multiplication and division of fractions. Operations in problems involving fractions.	Scales - Recommended scales, reduced & enlarged Drawing Sheet sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheet, sizes of title block and its contents. Using drawing instruments to draw straight lines, rectangles, squares, circles, polygons.
3.	Order of performing (BODMAS) Mathematical operators , Integers - Rules for dealing with integers, Addition, subtraction, Multiplication and division.	Lettering and Dimensioning - Types of Lettering, Guide Lines for lettering, Recommended sizes of letters and numbers, Single stroke letters, Dimensioning -rules and systems of dimensioning - dimensioning a given drawing.
4.	Ratio and proportion. Percentages, Examples of ratios in Automotive technology	Identify the alphabet of lines- Read and Interpret the meaning of various line types with examples- Object Lines, Hidden Lines, Center Lines, Phantom Lines, Dimension Lines, Extension Lines, Leaders, Break Lines -Long-break Line, Round, Solid, Hollow Cross Section, Section Lines - Common Manufacturing Materials, Cutting Plane Lines
5.	profit and loss, Discount .	Geometric Construction - Bisecting a line - perpendiculars - parallel lines - division of a line; Angles - bisection, trisection, Tangent lines touching circles internally and externally Polygons - Regular polygons - circumscribed and inscribed in circles. Conic sections - Definitions of focus, directrix, eccentricity, Construction of Ellipse by Concentric circles method, Construction of parabola by rectangular method.
6.	simple interest and compound interest	Orthographic Projection - Definition - Planes of Projection - Four quadrants - Reference Line, First angle projection - Third angle projection.



7.	depreciation calculation	Isometric Projection - Definition - Isometric axes, lines and planes, Isometric Scale - Isometric view. Drawing of isometric views of plane figures, Drawing of isometric views of prisms and pyramids, Drawing of isometric view of cylinders and cones
8.	Time and work problem , Time and distance, clocks and calendar,	Development of Surfaces - Need for preparing development of surface, Concept of true length - Principal methods of development, Development of simple solids like cubes, prisms, cylinders, pyramids, cones.
9.	Brief description of manufacturing process of steel, and aluminum	-
10.	Meaning of elasticity, malleability, brittleness, hardness, compressibility & ductility and their examples , Properties and uses of cast iron, ferrous metal, gray cast iron, white cast iron, wrought iron, and plain carbon steel, high speed steel and alloy steel.	-
11.	Properties and uses in automobile industries- copper, zinc, lead, tin, aluminum, brass, bronze, solder bearing metals, timber and rubber. Nylon, P.V.C., PP (poly prop line, polymer).	-
12.	Materials - Stress, strain,- Definition of Stress, Types of stress- Tensile, compressive, shear , Examples of the three basic stresses in automotive components , calculation of stress and strain in automotive application, Stress raisers, Strain-, Tensile, compressive, Shear strain, Tensile strength, Factor of safety, Torsional stress, Strain energy.	-
13.	Definition of cold working and Hot working and its properties on sheet metal. Advantage of Deep drawing material. Importance of Iron- carbon diagram in heat treatment process.	-
14.	Different Type of cutting fluids and their properties. Calculation of cutting speed, feed and drilling time.	-
15.	Forces - Definition of Force, Types of force -examples,- Direct forces, Attractive forces, Explosive forces, Describing forces, Graphical	-



	representation of a force, Addition of forces, Parallelogram of forces ,Triangle of forces, Resolution of forces, Mass, Equilibrium, Pressure, Pressure in hydraulic systems, Hooke's law, Practical applications.	
16.	Work energy, power- Definition and calculation of Work, Power and Work done by a torque, Definition and calculation of Energy -Potential energy, Chemical energy, Conservation of energy, Energy equation, Kinetic energy, Energy of a falling body, Kinetic energy of rotation.	-



Skill India

कौशल भारत - कुशल भारत



Second Semester		
Duration: Six Month		
S No.	Workshop Calculation and Science	Engineering Drawing
1.	<p>Factorisation and quadratics: multiply expressions in brackets by a number, symbol or by another expression in a bracket; by extraction of a common factor eg $ax + ay$, $a(x + 2) + b(x + 2)$; by grouping eg $ax - ay + bx - by$; quadratic expressions eg $a^2 + 2ab + b^2$; roots of an equation eg quadratic equations with real roots by factorisation, and by the use of formula</p>	Read and interpret drawings- Determine information from the title block, Read and interpret industrial prints, Read and interpret detailed and assembly drawings, Identify casting drawings and machining drawings, Read and interpret diagrams, Distinguish between a monodetail and a multidetail drawing.
2.	<p>Geometry- Use of scientific calculator,/logarithmic table Angles - Angular measurement, Angles and rotation, Examples of angles in automotive work, Adding and subtracting angles. Types of angle- Adjacent angles, Opposite angles, Corresponding angles, Alternate angle Angles. Supplementary angles, Complementary angles,</p>	Identify different drawing projections - Interpret pictorial and multi-view drawings. Interpret auxiliary and section views, Determine views in a drawing and the significance of the view being shown. Identify missing lines and missing views.
3.	<p>Trigonometry- Types of triangle - Acute angled triangle, Obtuse angled triangle, Equilateral triangle, Isosceles triangle, Scalene triangle, Right angled triangle, Labelling sides and angles of a triangle, Sum of the three angles of a triangle. Pythagoras' theorem, Circles, Ratio of diameter and circumference, Length of arc, Timing marks, Wheel revolutions and distance travelled, Valve opening area. Trigonometry- Using sines, cosines and tangents to solve vehicle problems.</p>	Free hand sketching of key and screw threads. Read and interpret three Types of screw thread representation: pictorial, schematic and simplified presentation. Terms used in describing a threaded Part, Designation of Thread Specifications, Left-Hand Thread Notations, read and interpret the different type of Finish Symbols, Fillets and Rounds and Machine Slots
4.	Formulae for Perimeter and Area of Plane figure - Rectangle, Square, Parallelogram, Triangle, Hexagon, any regular polygon, Trapezium, Circle, sector, Fillet, Ellipse,	Layout of an automobile chassis. Drawing the layout of body shop. Free hand sketching of major outer body

	<p>segment of a circle; Formulae for Volume and surface area of solids- Rectangular solid, Prism, cylinder, pyramids and cones, Frustum of pyramid and cones, sphere, Hollow sphere, segment of sphere, circular ring, spherical sector, Calculation of volume and weight of simple solid bodies such as cubes, square and hexagonal prism-shop problem.</p>	<p>panels, viewed from outside.</p>
5.	<p>Statistics - Collecting and sorting raw data, Definition of Discrete variable, continuous variable with Shop examples. Constructing pictographs-pie chart, Bar chart. Frequency and tally Charts. Importance of the shape of a frequency distribution- histogram, frequency polygon, Cumulative frequency plot. Interpreting statistics- sampling, arithmetic mean, median,</p>	<p>Free hand sketching of symbols are used in service information</p>
6.	<p>Heat and temperature -Temperature- Thermodynamic temperature scale (Kelvin), Cooling system temperature; Standard temperature and pressure (STP); Thermal expansion with calculation; Heat- Sensible heat, Latent heat, Specific latent heat, Specific heat capacity, Quantity of heat with calculation; Heat transfer - Conduction, Convection, Radiation ;</p>	<p>Free hand sketching of block diagram compressor and its parts.</p>
7.	<p>Heating, expansion and compression of gases - Absolute pressure, Absolute temperature; Laws relating to the compression and expansion of gases - Heating a gas at constant volume, Heating a gas at constant pressure, Charles' law. Expansion or compression at constant temperature - isothermal</p>	<p>Colour sketching of single stage and double stage paint sectional view.</p>
8.	<p>Internal combustion engines- Engine power-Brake power, Horsepower, PS - the DIN, Indicated power, Mean effective pressure, Calculation of indicated power, Cylinder pressure vs. crank angle, Mechanical efficiency of an engine, Volumetric efficiency, Torque vs. engine speed, Specific fuel consumption vs. engine speed, Brake power, torque and sfc(Specific fuel consumption) compared,</p>	<p>Drawing Block diagram of plastic welding set up and position, Free hand sketching of Intermittent tack weld and shallow continuous tack.</p>



	Brake mean effective pressure, Thermal efficiency, Indicated thermal efficiency, Brake thermal efficiency petrol vs. Diesel.	
9.	Fuels and combustion- Calorific value, Combustion-Products of combustion, Relevant combustion equations. Air–fuel ratio-Petrol engine combustion, Detonation, Pre-ignition, Octane rating, Diesel fuel, Flash point , Pour point, Cloud point, Biofuels, Liquefied petroleum gas (LPG) ,Hydrogen, Zero emissions vehicles (ZEVs)	Block Block diagram of air spray gun, Gravity feed, Suction (siphon) feed, Pressure feed Pressure-assist feed (gravity or suction cup spray guns).
10.		Lay out of downdraft spray booth.
11.		Free hand sketching of Compare how light reflects off solid color paints and metallic paints. Free hand sketching of colours of the spectrum. When white light shines through a glass prism.
12.		Drawing of different type of paint defect using colouring aids (sketch pen/ colour pencil)

9.2 EMPLOYABILITY SKILLS

CORE SKILL – EMPLOYABILITY SKILL	
First Semester	
1. English Literacy	
Duration : 20 hrs	
Marks : 09	
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, voice change, change of tense, spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, picture reading, gain confidence through role- playing and discussions on current happening, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing on messages and filling in message forms, greeting and introductions, office hospitality, resumes or curriculum vitae essential parts, letters of application reference to previous communication.
2. IT Literacy	
Duration : 20 hrs	
Marks : 09	
Basics of Computer	Introduction, computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down computer.
Computer Operating System	Basics of Operating System, WINDOWS, User interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc., Use of common applications.
Word Processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing documents, Use of shortcuts, Creating and Editing Text, Formatting the text, Insertion & creation of tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks),

	<p>Meaning of World Wide Web (WWW), Web browser, Website, Web page and Search Engines. Accessing the Internet using web browser, Downloading and printing web pages, Opening an email account and use of email. Social media sites and its implication.</p> <p>Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.</p>
Duration : 15 hrs	
Marks : 07	
3. Communication Skills	
Introduction to Communication Skills	<p>Communication and its importance</p> <p>Principles of effective communication</p> <p>Types of communication - verbal, non-verbal, written, email, talking on phone.</p> <p>Non-verbal communication- characteristics, components-Para-language</p> <p>Body language</p> <p>Barriers to communication and dealing with barriers.</p> <p>Handling nervousness/ discomfort.</p>
Listening Skills	<p>Listening-hearing and listening, effective listening, barriers to effective listening, guidelines for effective listening.</p> <p>Triple- A Listening - Attitude, Attention & Adjustment.</p> <p>Active listening skills.</p>
Motivational Training	<p>Characteristics essential to achieving success.</p> <p>The power of positive attitude.</p> <p>Self-awareness</p> <p>Importance of commitment</p> <p>Ethics and values</p> <p>Ways to motivate oneself.</p> <p>Personal goal setting and employability planning.</p>
Facing Interviews	<p>Manners, etiquettes, dress code for an interview.</p> <p>Do's & Don'ts for an interview.</p>
Behavioral Skills	<p>Problem solving, confidence building, attitude.</p>
Second Semester	
Duration : 15 hrs	
Marks : 06	
4. Entrepreneurship Skills	
Concept of Entrepreneurship	<p>Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue</p> <p>Entrepreneurship vs. management, Entrepreneurial motivation.</p> <p>Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, and the process of setting up a business.</p>

Project Preparation & Marketing Analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution management. Difference between small scale & large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's Support	Preparation of project. Role of various schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the Policies/ Programmes & procedure & the available scheme.
Investment Procurement	Project formation, feasibility, Legal formalities i.e., Shop Act, Estimation & costing, Investment procedure - Loan procurement - Banking processes.
5. Productivity	Duration : 10 hrs Marks : 05
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How it improves or slows down productivity.
Comparison with Developed Countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, Safe cash handling, Personal risk and insurance.
6. Occupational Safety, Health and Environment Education	Duration : 15 hrs Marks : 06
Safety & Health	Introduction to occupational safety and health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygiene, Occupational Diseases/ Disorders & its prevention.
Accident & Safety	Basic principles for protective equipment. Accident prevention techniques - control of accidents and safety measures.
First-Aid	Care of injured & sick at the workplaces, First-Aid & Transportation of sick person.



Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between society and environment, Ecosystem and factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of energy, re-use and recycle.
Global Warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, Ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	
	Duration : 05 hrs Marks : 03
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act.
8. Quality Tools	
	Duration : 10 hrs Marks : 05
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, Objectives of quality circle, Roles and function of quality circles in organization, Operation of quality circle. Approaches to starting quality circles, Steps for continuation quality circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, practice of good housekeeping.
Quality Tools	Basic quality tools with a few examples.

LIST OF TOOLS AND EQUIPMENT			
MECHANIC AUTO BODY PAINTING (For batch of 16 candidates)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-24 is required additionally)			
S No.	Name of the Tool & Equipments	Specification	Quantity (Nos.)
1.	Allen Key set	12 pieces (2mm to 14mm)	6
2.	Bucket, sponge, squeegee, chamois & tack rags		6
3.	Caliper inside	15 cm Spring	6
4.	Calipers outside	15 cm spring	6
5.	Center Punch	10 mm. Dia. x 100 mm.	6
6.	Different type of spoon		6
7.	Dividers	15 cm Spring	6
8.	Electrician Screw Driver	250mm	6
9.	General purpose dolly		6
10.	Hammer ball peen	0.5 kg with handle	6
11.	Hands file	20 cm. Second cut flat	6
12.	Paint scrapper, putty mixing board, putty applicator /knife		6
13.	Pliers combination	20 cm.	6
14.	Safety glasses		6
15.	Screw driver	20cm.X 9mm. Blade	6
16.	Screw driver	30 cm. X 9 mm. Blade	6
17.	Scriber	15 cm	6
18.	Spanner D.E. set	12 pieces (6mm to 32mm)	6
19.	Spanner, ring set	12 metric sizes 6 to 32 mm.	6
20.	Spanners socket with speed handle, T-bar, ratchet and universal	upto 32 mm set of 28 pieces with box	6
21.	Steel rule	30 cm inch and metric	6
22.	Steel tool box with lock and key (folding type)	400x200x150 mm	6



23.	Toe dolly		6
24.	Wire cutter and stripper		6
B. INSTRUMENTS AND GENERAL SHOP OUTFIT - For 2 (1+1) units no additional items are required			
TOOLS & EQUIPMENT			
25.	Adjustable spanner	(pipe wrench 350 mm)	2
26.	Air blow gun with standard accessories		1
27.	Air impact wrench with standard accessories		4
28.	Air ratchet with standard accessories		4
29.	Allen Key set	12 pieces (2mm to 14mm)	2
30.	Ammeter	300A/ 60A DC with external shunt	5
31.	Angle plate adjustable	250x150x175	1
32.	Angle plate	size 200x100x200mm	2
33.	Anvil	50 Kgs with Stand	1
34.	Battery –charger		2
35.	Blow Lamp	1 litre	2
36.	Bucket, sponge, squeegee, chamois & tack rags		2 each
37.	Caliper inside	15 cm Spring	4
38.	Calipers outside	15 cm spring	2
39.	Car Jet washer with standard accessories		1
40.	Chain Pulley Block	3 ton capacity with tripod stand	1
41.	Chisel	10 cm flat	4
42.	Chisels cross cut	200 mm X 6mm	4
43.	Circlip pliers Expanding and contracting type	15cm and 20cm each	2
44.	Clamps C	100mm	2
45.	Clamps C	150mm	2
46.	Clamps C	200mm	2
47.	Cleaning tray	45x30 cm.	4
48.	Collapsible panel stands		2
49.	Colour matching cards /panels (Magnetic, chromalux card or primed metal)		10
50.	Copper bit soldering iron	0.25 Kg	5
51.	Cylinder bore gauge capacity	20 to 160 mm	2



52.	DC Ohmmeter	0 to 300 Ohms, mid scales at 20 Ohms	2
53.	Depth micrometer	0-25mm	4
54.	Dial gauge type 1 Gr. A (complete with clamping devices and stand)		4
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
63.	Dividers	15 cm Spring	4
64.	Door handle tool (clip pullers)		1
65.	Drift Punch Copper	15 cm	4
66.	Drill point angle gauge		1
67.	Drill twist	1.5 mm to 15 mm (various sizes) by 0.5 mm	4
68.	Electric Soldering Iron	230 V 60 watts 230 V 25 watts	2 each
69.	Electric testing screw driver		2
70.	Engineer's square	15 cm. Blade	2
71.	Feeler gauge	20 blades (metric)	2
72.	File flat	20 cm bastard	4
73.	File, half round	20 cm second cut	4
74.	File, Square	20 cm second cut	4
75.	File, Square	30 cm round	4
76.	File, triangular	15 cm second cut	4
77.	Files assorted sizes and types including safe edge file (20 Nos)		2 set
78.	Flat File	25 cm second cut	4
79.	Flat File	35 cm bastard	4
80.	Garage rack		2
81.	Gloves for Welding (Leather and Asbestos)		5 sets
82.	Granite surface plate	1600 x 1000 with stand and	1



		cover	
83.	Grease Gun		2
84.	Grip Wrench	200mm	2
85.	Growler		1
86.	Hacksaw frame adjustable	20-30 cm	10
87.	Hammer Ball Peen	0.75 Kg	4
88.	Hammer Chipping	0.25 Kg	5
89.	Hammer copper	1 Kg with handle	4
90.	Hammer Mallet		4
91.	Hammer Plastic		4
92.	Hand operated crimping tool	(i) for crimping up to 4mm and (ii) for crimping up to 10mm	2
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
95.	Hand vice	37 mm	2
96.	Hollow Punch	set of seven pieces 6mm to 15mm	2 sets each
97.	Insulated Screw driver	20 cm x 9mm blade	2
98.	Insulated Screw driver	30 cm x 9mm blade	2
99.	Interchangeable driver set		1 set
100.	Lead light		2
101.	Left cut snips	250mm	4
102.	Lifting jack screw type	3 ton capacity	4
103.	Magneto spanner	set with 8 spanners	1 set
104.	Magnifying glass	75mm	2
105.	Marking out table	90X60X90 cm.	1
106.	Multimeter digital		5
107.	Oil can	0.5/0.25 liter capacity	2
108.	Oil Stone	15 cm x 5 cm x 2.5 cm	1
109.	Outside micrometer	0 to 25 mm	4
110.	Outside micrometer	25 to 50 mm	4
111.	Outside micrometer	50 to 75 mm	1



112.	Outside micrometer	75 to 100 mm	1
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
116.	Philips Screw Driver	set of 5 pieces (100 mm to 300 mm)	2 sets
117.	Pipe cutting tool		2
118.	Pipe flaring tool		2
119.	plastic feeler gauges		2
120.	Pliers combination	20 cm.	2
121.	Pliers flat nose	15 cm	2
122.	Pliers round nose	15 cm	2
123.	Pliers side cutting	15 cm	2
124.	Portable electric drill Machine		1
125.	Prick Punch	15 cm	4
126.	Punch Letter (Number)	4mm	2 set
127.	Right cut snips	250mm	4
128.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4
129.	Scrapper flat	25 cm	4
130.	Scrapper half round	25 cm	4
131.	Scrapper Triangular	25 cm	2
132.	Scriber	15 cm	4
133.	Scriber with scribing black universal		2
134.	Set of stock and dies - Metric		2 sets
135.	Shear Tin Man's	450 mm x 600mm	4
136.	Sheet metal cutting pliers-left , right hand and straight -jaw Configuration		1 set
137.	Sheet Metal Gauge		2
138.	Sher Tinmans	300mm	4
139.	Soldering Copper Hatchet type	500gms	5
140.	Solid Parallels in pairs (Different size) in Metric		2
141.	Spanner Clyburn	15 cm	1



142.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	4
143.	Spanner T. flocks for screwing up and up-screwing inaccessible		2
144.	Spanner, adjustable	15cm.	2
145.	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	2
146.	Spanners socket	with speed handle, T-bar, ratchet and universal upto	2
147.	Spark lighter		2
148.	Spark plug spanner	14mm x 18mm x Size	2
149.	Spirit level	2 V 250, 05 metre	2
150.			
151.	Steel measuring tape	10 meter in a case	2
152.	Steel rule	15 cm inch and metric	4
153.	Steel rule	30 cm inch and metric	4
154.	Steel wire Brush	50mmx150mm	4
155.	Straight edge gauge	2 ft.	1
156.	Stud extractor	set of 3	2 sets
157.	Stud remover with socket handle		1
158.	Suction cup		2
159.	Surface gauge	with dial test indicator plunger type i.e. 0.01 mm	2
160.	Taps and Dies complete	sets (5 types)	1 set
161.	Taps and wrenches - Metric		2 sets
162.	Telescope gauge		4
163.	Thread pitch gauge metric, BSW		1
164.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
165.	Trammel	30 cm	2
166.	Trim and upholstery tools		1 set
167.	Tyre pressure gauge with holding nipple		2
168.	Universal puller for removing pulleys, bearings		1
169.	V' Block	75 x 38 mm pair with Clamps	2
170.	Vacuum gauge to read	0 to 760 mm of Hg.	2



171.	Various sanding blocks-soft, hard, speed file & de-nibbling tools		2 set
172.	vernier caliper	0-300 mm with least count 0.02mm	4
173.	Vice grip pliers		2
174.	Voltmeter	50V/DC	5
175.	Wire Gauge (metric)		5
176.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	1
C. GENERAL INSTALLATION/ MACHINERIES			
177.	Angle grinder	(10-12 cm) - for cutting and grinding	2
178.	Arbor press hand operated	2 ton capacity	1
179.	Belt sander (Narrow surface)		2
180.	Bench lever shears	250mm Blade x 3mm Capacity	1
181.	Body shell for painting - Light Motor vehicle of different Manufactures		4
182.	compressed air line	10m (on retractable reel, with high flow connectors) with FRL unit	2
183.	Computerised colour retrieval unit (Spectrophotometer)		1
184.	Die Grinding kit		2
185.	Disc sander	18 cm	2
186.	Discrete Component Trainer / Basic Electronics Trainer		1
187.	Down draft spray booth	(7.5 X 5 m, combi spray/oven or separate spray /oven	1
188.	Drilling machinebench todrill up to 12mm dia along with accessories		1
189.	Dual Magnetization Yoke	AC / HWDC. 230 VAC. 50Hz	1 set
190.	Dust extraction connections (Vacumm)		2
191.	Electronic paint mixing scales (accurate to 0.1 grams. explosion proof		1
192.	Grinding machine (generalpurpose) D.E. pedestal with 300 mm dia wheels rough and smooth		1
193.	High pressure hot / cold water blasting unit		1



194.	Hydraulic jack	HI-LIFT type -3 ton capacity. & % ton capacity	1 each
195.	Infrared drying lamp unit		1
196.	Liquid penetrant Inspection kit		1 set
197.	Motor Vehicle suitable for Body painting -Light Motor vehicle of different		2
198.	Paint surface film thickness gauge (electronic)		2
199.	Paint tinting system mixing machine (exposition proof)		1
200.	Parts spray booth cabin	(ventilated to 30 cubic m / minute)	1
201.	Pipe Bending Machine (Hydraulic type)	12mm to 30mm	1
202.	Pneumatic rivet gun		2
203.	Random /dual action orbital sander	(12-15 cm)	2
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
206.	Tin smiths bench folder	600 x 1.6mm	1
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
208.	Underbody sealer & corrosion proofing materials & spray units		2 each
209.	Ventilated preparation bays (fully illuminated. down or end draught		1
210.	Water & oil separation system		1
211.	Weld through primer application equipment		2

D. CONSUMABLE

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.	Holder. 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
WORKSHOP FURNITURE			
241.	Book shelf (glass panel)	6V2' x 3' x IV 2'	As required
242.	Computer Chair		1+1
243.	Computer Table		1+1
244.	Desktop computer and related MS office software		1+1
245.	Discussion Table	8' x 4' x 2 ¹ / ₂ '	2
246.	Fire Extinguishers. first- aid box		As required
247.	Instructional Material - NIMI Books/Ref.books		As required
248.	Internet connection with all accessories		As required
249.	Laser printer		1



250.	LCD projector/ LED /LCD TV	42"	1
251.	Multimedia DVD for Automotive		As required
252.	application/subjects		
253.	Online UPS 2KVA		1
254.	Stools		21
255.	Storage Rack	6½' x 3' x W2	As required
256.	Storage shelf	6% ' x 3' x 1%'	As required.
257.	Suitable class room furniture		As required
258.	Suitable Work Tables with vices		As required
259.	Tool Cabinet	6% ' x 3' x 1%'	2
260.	Trainees locker	6% ' x 3' x 1%'	2 Nos. to accommodate 20 Lockers

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS

S No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.

Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor:			Year of Enrollment:											
Name & Address of ITI (Govt./Pvt.):			Date of Assessment:											
Name & Address of the Industry:			Assessment location: Industry / ITI											
Trade Name:		Semester:		Duration of the Trade/course:										
Learning Outcome:														
S No.	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total Internal Assessment Marks	Result (Y/N)
	Candidate Name	Father's/Mother's Name	Safety Consciousness	Workplace Hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written Instructions	Application of Knowledge	Skills to Handle Tools & Equipment	Economical use of Materials	Speed in Doing Work	Quality in Workmanship	VIVA		
1														
2														