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

COMPETENCY BASED CURRICULUM

AUTOMOTIVE BODY PAINTER

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL- 4

SECTOR –AUTOMOTIVE

Directorate General of Training

Skill India
कौशल भारत - कुशल भारत

AUTOMOTIVE BODY PAINTER

(Engineering Trade)

(Revised in 2019)

Version: 1.1

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(Flexi MoU)

NSQF LEVEL - 4

Developed By

Government of India
Ministry of Skill Development and Entrepreneurship

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1. COURSE INFORMATION

Flexi- MoU is one of the pioneer programmes under DGT on the basis of the MoU in between DGT & Maruti Suzuki India Limited for propagating vocational training to allow industries to take advantage of various schemes for conducting training programme in higher employment potential courses according to needs of industries. The concept of Flexi-MoUs was introduced in June-July 2014.DGT and Maruti Suzuki India Limited have decided to sign this memorandum of understanding to provide an opportunity to the youth to acquire skills related to Automobile and Manufacturing industry through specially designed "Learn and Earn" approach consisting a mix of theoretical and On-the-Job Training (OJT) components and hence improve their employability potential& to contribute in the overall growth of Automobile and manufacturing industry by creating a pool of skilled resources.

During the one-year duration, a candidate is trained on subjects Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Calculation &Science and Employability Skills. In addition to this, a candidate is entrusted to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task.

The content broadly covers skills in manufacturing process of automobiles components and automobiles in today's automobile industry. The year wise course coverage is categorized as below:

In first six months, the trainee will be able to Check & perform measuring & marking by using various Measuring & Marking tools. Plan & perform basic fastening & fitting operation by using correct hand tools, machine tools & equipments, drilling, cutting, grinding equipment & operations, trace and test all electrical &electronic components & circuits and assemble circuit to ensure functionality of system, and surface preparation &refinishing materials viz. abrasives, filler materials, primers, intermediate coats & finish coat paints . The trainee will also be able to perform body fillers application using hand and power tools, about corrosion, causes & identification, methods of corrosion protection, basic surface preparation using hand & power tools, application & maintenance of refinishing equipment and service, repair and maintenance of Air compressor and compressed air lines.

In next six months, the trainee will learn to perform painting techniques using different types of painting methods, application of surface preparation & masking, application of solvent base paints, plastic paints & polishing, color theory, colour matching & tinting or color mixing and color evaluations. The trainee will also learn about paint defects, causes of defects, paint defect trouble shooting and final detailing of repairing of paints.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. DGT is futuristic in preparing the prospective Indian workforce in building skills and capabilities as per the needs of the industry. In this quest, it has changed the paradigm of growth to a job oriented growth by partnering with industry to be an enabler of responsible, sustainable and inclusive growth. Towards this end, DGT signed this MoU with the Maruti Suzuki India Limited.

Maruti Suzuki India Limited shall conduct courses pan-India locations leveraging the facilities and services available at ITIs, regional training centers, training centers of training partners, vendors and dealers associated with Maruti Suzuki. Maruti Suzuki will ensure that not less than 50% of trainees are placed with Maruti Suzuki or its business partners for not less than six month duration. It will also ensure the eligible trainees take up Apprenticeship / higher education in suitable streams and shall also guide the students to become Entrepreneurs. Maruti Suzuki India Limited will strictly follow the policy guidelines for Flexi - MoU as in place from time to time. No deviation for the same would be permitted. Every Alternate Month Admission and Exam for trades run under Flexi MoU at training locations of Maruti. Theory content to be 30% and practical content to be 70%.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools.
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job and maintenance work.
- Check the task/job for functioning, identify and rectify errors in task/job.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join as skilled worker in the industry and can reach up to Body Shop Head position
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the relevant trade after which they will be employed in ITI/ Vocational Training Institute as instructor.

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)	1472
2	Professional Knowledge (Trade Theory)	276
3	Workshop Calculation & Science	80
4	Engineering Drawing	80
5	Employability Skills	160
6	Revision &Project work	40
7	Examination	92
	Total	**2200**

2.4 ASSESSMENT & CERTIFICATION

I. Conducting training of selected candidates is the sole responsibility ofIndustrial Training Partner (ITP).
II. Assessment will be jointly done by ITP and DGT. Practical and formative assessment shall be conducted by ITP, and Computer Based theoretical exams shall be conducted by DGT.
III. ITP must refer to the latest examination reform guidelines issued by DGT dated 4thOctober 2018 any changes or revisions to the same shall be applicable to flexi-MoU scheme.
IV. Maximum attempts for clearing the exam and obtaining NTC shall be in line with CTS.
V. For practical examination and formative assessment, ITP has been given flexibility to design the questions, assess the candidates and upload their marks in the scheme portal.
VI. ITP shall develop a comprehensive Question Bank (in English and Hindi) of minimum 1000 questions, grouped by chapters and difficulty level. The same shall be vetted by NIMI experts and then be handed over to DGT for conducting theory exams. DGT may add some questions to the same before conducting actual exams.
VII. Theoretical exams shall be conducted by DGT in Computer Based Test format. Upon completion of course and payment of requisite examination fee by ITP, admit cards shall be generated by scheme portal.
VIII. DGT shall arrange for conduct of computer based theory exam at designated examination centres & certify the successful trainees with e-NTC under flexi-MoU scheme with mention of ITP name in the Certificate.

IX. Students, who have successfully appeared in the final exam after completion of course, are eligible to register as apprentices.

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time. The employability skills will be tested in the first year itself.

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 has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure –II).

The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage for practical is 60% & minimum pass percentage of theory 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 the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

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

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

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

3. JOB ROLE

Auto Spray Painter/Painter; Auto Spray Painter prepares body surfaces on motor vehicles, and applies paint and other coatings.

Auto Body Painting Technician-Surface Treatment; Auto Body Painting Technician paints, does the touch up and inspection of the body. A Painting Technician does the final painting, touch up and inspection of the body of the vehicle being painted.

Automotive Body Painting Technician; Automotive Body Painting Technician paints, does the touch up and inspection of the body. A Painting Technician does the final painting, touch up and inspection of the body of the vehicle being painted.

Painter, Sign and Letter; Painter, Sign or Letter; Letter Writer; Sign Writer plans, lays out and paints in one or more languages letters, signs, figures and monograms on wooden boards, metal plates, walls etc. using pencil brushes and palette. Prepares layout for sign writing, coats back-ground with paint, using paint brushes and allows it to dry. Sketches out lines with free hand in chalk or pencil or gets them marked by dusting on stencils. Mixes paints and pigments to get desired colour consistency and fills in marked out lines of letters and designs with paintusing pencil brushes of various sizes. May make signs by cutting out and sticking gold lead lettering to surfaces. May cut stencils and paint signs by brushing and spraying paint over them. May make signs of metal or wood. May transfer designs and monograms and to gliding, silvering, graining etc.

Painter, Brush;Painter, Brush applies decorative or protective materials such as paint, enamel, varnish, lacquer etc., on metal articles, wood, building boards and other materials using hand brush. Selects correct type of paint and brush, taking into consideration suitability, durability,ease of application and cost or mixes pigments, oils and other ingredients to paint material, as required, to obtain desired colour, shade and consistency. Cleans surfaces with brush, cloth orabrasive material. Removes dirt, grease or rough spots and irregularities by scrapers, chemicals etc. and patches cracks and holes with putty or filler to provide smooth clean surface. Rubs or covers surfaces with appropriate prime coat to have suitable base or surface for painting. Brushes with hand one or more coats of paint material on it to required finish. Cleans brushes on completion of work and maintains them. May be designated according to object painted or material used.

Reference NCO-2015:

a) 7132.0202 - Auto Spray Painter/Painter
b) 7132.0203 - Auto Body Painting Technician – Surface Treatment
c) 7132.0204 - Automotive Body Painting Technician
d) 7132.0400 - Painter, Sign and Letter
e) 7132.0500 - Painter, Brush

4. GENERAL INFORMATION

Name of the Trade	**Automotive Body Painter**
NCO - 2015	7132.0202,7132.0203, 7132.0204, 7132.0400, 7132.0500
NSQF Level	Level – 4
Duration of Craftsmen Training	One year
Entry Qualification	Passed 10th Class examination or its equivalent
Minimum Age	14 years as on first day of academic session.
Unit Strength (No. Of Student)	20
Space Norms	192 Sq. m
Power Norms	17 KW
Instructors Qualification for	
1. Automotive Body Painter 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 National Craft Instructor Certificate (NCIC) in any of the variants 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

	3 years Diploma in Engineering from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. OR NTC/ NAC in any one of the engineering trades with three years' experience. **<u>Essential Qualification:</u>** National Craft Instructor Certificate (NCIC) in relevant trade OR 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 3 years Diploma in Engineering from AICTE /recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. OR NTC/ NAC in any one of the Electrical trades categorized under Engg. Drawing'/ D'man Mechanical / D'man Civil' with three years' experience. **<u>Essential Qualification:</u>** National Craft Instructor Certificate (NCIC) in relevant trade OR NCIC in RoDA /D'man (Mech /civil) or any of its variants under DGT.
4. Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) OR Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT institutes.
5. Minimum Age for	21 Years

Instructor	
List of Tools and Equipment	As per Annexure – I

Distribution of training on Hourly basis: (Indicative only)

Total Hours/Week	Trade Practical	Trade Theory	Workshop Cal. &Sc.	Engineering Drawing	Employability Skills
48 Hours	32 Hours	6 Hours	3 Hours	3 Hours	4 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for **Automotive Body Painter** trade under CTS **(Flexi MoU)**: **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
e. Responsibility

The broad learning outcome of **Automotive Body Painter** trade under CTS **(Flexi MoU)** mostly matches with the Level descriptor at Level- 4.

The NSQF Level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skills	Core Skills	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 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 OUTCOMES

1. Apply safe working practices.
2. Comply with environment regulation and housekeeping.
3. Interpret & use formal and technical communication.
4. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.
5. List and interpret various acts of labour welfare legislation.
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. Utilize computer applications and internet to take benefit of IT developments in the industry.
9. Demonstrate mathematical concept and principles to perform practical operations.
10. Understand and explain science in the field of study including simple machine.
11. Read and apply engineering drawing for different application in the field of work.

6.2 SPECIFIC LEARNING OUTCOMES

9. Familiarise with the institute / industry, course, type of work, rules & regulations and machinery used in trade.
10. Recognize & comply with Occupational Health, Safety & Environmental practices to be followed in automobile Paint shop / Body shop.
11. Check & perform Measuring & marking by using various Measuring & Marking tools viz. Vernier Calliper, Micrometer, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.
12. Measure& mark by using various Measuring & Marking tools and hand & power tools and equipment used in vehicle body paint shop.
13. Perform basic fastening & fitting operation by using correct hand tools, power tools & equipments.
14. Apply basic cutting and grinding operations using correct hand power tools.
15. Perform cutting & grinding operations using powered equipment following standard operating procedures.

16. Explain basic electricity and perform to Trace and Test all electrical & electronic components & circuits in a vehicle and assemble circuit to ensure functionality of system.
17. Perform Basics of Automobile industry & automobiles and able to identify & explain different types of vehicles, and service station equipment.
18. Identify & explain various vehicle parts, different types of vehicle body & chassis and sheets used, service information & guides and perform vehicle washing.
19. Explain air compressors, compressed air line, safety precautions using compressed air and perform simple service and maintenance of compressors.
20. Identify & explain different types of Refinishing materials such as Sealers &Paints, Abrasives, Adhesives, Epoxies and perform basic refinishing jobs.
21. Identify & select body fillers & ingredients and perform surface preparation, body filler mixing, body filler application and finishing filled surface for primer after curing using appropriate hand & power tools.
22. Explain corrosion, causes & effects, anti-corrosion materials, identify area for corrosion treatment and analyze & estimate paint repair direct & indirect cost estimate with Supervisor & estimating guide book.
23. Identify painting environment variables and perform to mix paints using viscosity y cup, use different painting tools and equipment including disassemble, assemble, and clean paint guns.
24. Identify & select correct paint spray techniques, paint problems and apply troubleshooting skills.
25. Plan & organize to explain & perform surface preparation and masking jobs using hand & power tools for carrying out automotive body paint works.
26. Identify functions of paint, OEM paint finishing & refinishing procedures, identify different types of paints and perform application of solvent based & plastic paints & polishing jobs.
27. Explain color theory & color evaluations in different lights, identify color adjustments, perform color mixing (tinting) using computerized color matching systems, spraying Metallic colours and conduct color analyzing.
28. Identify paint defects &minor imperfections, explain causes of defects and perform troubleshooting & final detailing of paint defects.

7. LEARNING OUTCOMES WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
EMPLOYBILITY SKILLS	
1. Apply safe working practices.	1. 1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	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 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 Protective 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.
2. Comply with environment regulation and housekeeping	2.1 Identify environmental pollution & contribute to the avoidance of instances of environmental pollution.
	2.2 Deploy environmental protection legislation & regulations
	2.3 Take opportunities to use energy and materials in an environmentally friendly manner.
	2.4 Avoid waste and dispose waste as per procedure
	2.5 Recognize different components of 5S and apply the same in the working environment.

3. Interpret & use formal and technical communication.	3.1 Obtain sources of information and recognize information.
	3.2 Use and draw up technical drawings and documents.
	3.3 Use documents and technical regulations and occupationally related provisions.
	3.4 Conduct appropriate and target oriented discussions with higher authority and within the team.
	3.5 Present facts and circumstances, possible solutions &use English special terminology.
	3.6 Resolve disputes within the team.
	3.7 Conduct written communication.
4. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	4.1 Explain the concept of productivity and apply during execution of job.
	4.2 Explain the concept of quality tools and apply during execution of job.
5. List and interpret various acts of labour welfare legislation.	5.1 Explain basic concept of labour welfare legislation, adhere to responsibilities and remain sensitive towards such laws.
	5.2 Knows benefits guaranteed under various acts.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution.
	6.2 Explain standard procedure for disposal of waste.
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 familiarize with the policies/ programmes, procedure & the available scheme.
	7.3 Prepare a report to become an entrepreneur for submission to financial institutions.
8. Utilize computer applications and internet to take benefit of IT developments in the industry.	8.1 Explain the hardware of personal computer.
	8.2 Use common application software viz., word, excel, power point etc., in day to day work.
	8.3 Awareness about useful internet websites, search

	relevant information pertaining to the assigned tasks.
WORKSHOP CALCULATION & SCIENCE	
9. Demonstrate mathematical concept and principles to perform practical operations.	9.1 Solve different problems like phase angle, etc. with the help of a calculator.
	9.2 Demonstrate conversion of Fraction to Decimal and vice versa.
	9.3 Explain BCD code, conversion from decimal to binary and vice-versa, all other conversions.
10. Understand and explain science in the field of study including simple machine.	10.1 Explain concept of science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
	10.2 Explain levers and its types.
	10.3 Explain relationship between Efficiency, velocity ratio and Mechanical Advantage.
	10.4 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	10.5 Solve simple problems on lifting tackles like crane-Solution of problems with the aid of vectors.
ENGINEERING DRAWING	
11. Read and apply engineering drawing for different application in the field of work.	11.1 Read & interpret the information on drawings and apply in executing practical work.
	11.2 Read & analyse the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	11.3 Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
SPECIFIC LEARNING OUTCOME	
12. Familiarise with the institute / industry, course, type of work, rules & regulations and machinery used in trade.	12.1 Understand course, general rules pertaining to Institute & Industry, available facilities and time table.
	12.2 Recognise & explain machinery used in trade.
	12.3 Identify type of work to be done during the course.
13. Recognize & comply with Occupational Safety & Health rules, regulations	13.1 Identifyimportance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & personal safety message.

&guidelines to be followed in automobile Paint shop / Body shop.	13.2 RecognizeSafe handling of Fuel Spillage, Fire extinguishers used for Different types of fire.
	13.3 IdentifyFirst-Aid, nature and causes of injury and utilization of first-aid.
	13.4 Comply with Safety signs and norms.
	13.5 Perform Safe disposal of toxic waste.
	13.6 Comply with safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles.
	13.7 RecognizeEnergy saving Tips/Audit of institute/body shop electricity Usage.
	13.8 Perform Hazard identification, dust, thinner & paint (chemical) hazard etc and countermeasure to eliminate them & usage of specified PPEs.
14. Check& perform Measuring & marking by using various Measuring & Marking tools viz. Vernier Calliper, Micrometer, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.	14.1 Check zero error of instruments and adjust to zero.
	14.2 Select, care and use of measuring instrument.
	14.3 Measuring engine components with verniercaliper, micrometer, telescopic gauge, dial bore gauge.
	14.4 Measure clearance gap with feeler gauge.
	14.5 Measure threading of nuts & bolts using thread gauge & pitch gauge.
	14.6 Check intake air pressure using vacuum gauge.
	14.7 Set up the measured value with workshop manual and quality concepts and proper safety.
15. Measure& mark by using various Measuring & Marking tools and hand & power tools and equipment used in vehicle body paint shop.	15.1 Conduct marking using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc.
	15.2 Layout a work piece- for line, circle, arcs and circles.
	15.3 Measure wheel base of a vehicle with measuring tape.
	15.4 Remove wheel lug nuts with use of an air impact wrench.
	15.5 Operate all workshop hand tools & power tools.
	15.6 Operate body shop powered equipment as per operating manual with safety.
16. Perform basic fastening &fitting operation by using correct hand tools, power tools & equipment.	16.1 Perform general cleaning of vehicle.
	16.2 Fit nut, bolts, & studs etc. and check torque value.
	16.3 Remove stud/bolt from blind hole.
	16.4 Remove & refit of lock nuts, circlips, and lock rings.
	16.5 Perform riveting using drilling and Riveting tools.

17. Apply basic cutting and grinding operations using correct hand&power tools.	17.1 Identify and use PPE for different cutting & grinding works.
	17.2 Define safety precautions during cutting & grinding operations using hand & power tools.
	17.3 Make jobs using cutting tools like Hacksaw, files, chisel & sheet cutting scissors.
	17.4 Perform OFF-hand grinding with sander.
	17.5 Cut steel metal using hand held power saw.
	17.6 Perform grinding work using pneumatic, electric and battery powered grinder.
18. Perform cutting & grinding operations using powered equipment following standard operating procedures.	18.1 Identify safety precautions to be observed while using a drilling machine.
	18.2 Mark and Drill clear and Blind Holes.
	18.3 Sharpen Twist Drills.
	18.4 Select tape drill Size, use Lubrication and tap a Clear and Blind Hole.
	18.5 Usetap extractor to remove a broken tap.
	18.6 Apply cutting Threads on a Bolt/ Stud.
	18.7 Perform adjustment of two piece Die and cutting thread on a pipe piece.
	18.8 Perform reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface and prepare seat of a drilled hole using hand reamer.
19. Explain basic electricity and perform to Trace and Test all electrical & electronic components & circuits in a vehicle and assemble circuit to ensure functionality of system.	19.1 Prepare wire connections by joining wires using soldering Iron.
	19.2 Construct simple electrical circuits and measuring of current voltage and resistance.
	19.3 Verify DC series & parallel circuits and its characteristics.
	19.4 Check out the open and short circuits in the lighting circuits.
	19.5 Use digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.
	19.6 Check the voltage drop in the auto electrical system by using multimeter.
	19.7 Trace the auto electrical components by using vehicle wiring circuits.
	19.8 Check the condition of the solenoid switch in the starting system.
	19.9 Verify ohm's law and measure resistance using rheostat.

	19.10 Perform battery charging and check performance.
20. Perform Basics of Automobile industry & automobiles and able to identify & explain different types of vehicles, and service station equipment.	20.1 Identify of different type of vehicles.
	20.2 Identify the different vehicle specification data and and vehicle information number (VIN).
	20.3 Demonstrate the garage, service station different equipment.
	20.4 Operate Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.
21. Identify & explain various vehicle parts, different types of vehicle body & chassis and sheets used, service information & guides and perform vehicle washing.	21.1 Perform washing of vehicle.
	21.2 Identify different type body, chassis, Drive lines.
	21.3 Identify the location of parts and panels.
	21.4 Find periodic service information using of computer-based service information & Service manuals.
	21.5 Refer refinishing guides and find information on type of paints used in OEM painting.
	21.6 Take dimensions of vehicle using vehicle dimension manual.
	21.7 Identify different final coat colors from color matching guides.
	21.8 Identify parts from different models of vehicle from parts interchange guides.
22. Explain air compressors, compressed air line, safety precautions using compressed air and perform simple service and maintenance of compressors.	22.1 Identify the parts of a piston type stationary compressor.
	22.2 Overhaul Air compressor and Overhauling of service (FRL) unit.
	22.3 Drain the air receiver and the moisture separator/regulator or air transformer.
	22.4 Check the level of the oil in the crankcase, clean air filter.
	22.5 Clean or blow off fins on cylinders, heads, intercoolers, aftercoolers.
	22.6 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.
	22.7 Check the relief valve for exhausting of head pressure each time the motor stops.
	22.8 Tighten belts to prevent slippage.
	22.9 Check and align a loose motor pulley or compressor Flywheel.
	22.10 Check for air leaks on the compressor outfit and air piping system.

23. Identify & explain different types of Refinishing materials such as Sealers &Paints, Abrasives, Adhesives, Epoxies and perform basic refinishing jobs.	23.1 Identify the different type of refinishing material- paint binders, paint solvents, Paint additives.
	23.2 Select the right repair materials for a particular job.
	23.3 Select the right type of primer and paint.
	23.4 Identify various type of masking material available in body shop.
	23.5 Identify different type of body filler.
	23.6 Identify various type of abrasive materials i.e. grit rating available in the workshop.
	23.7 Identify the open and closed coat grit.
	23.8 Cleaning, Pre- Treatment, surface conditioning, ED coating of any given panel.
24. Identify & select body fillers & ingredients, and perform surface preparation, body filler mixing, body filler application and finishing filled surface for primer after curing using appropriate hand & power tools.	24.1 Identify the different type of body filler, hardeners, and putties, used in industry.
	24.2 Mix body filler compounds on a mixing board for applying Body filler.
	24.3 Prepare damaged surface area of sheet metal.
	24.4 Apply the body filler on a damaged sheet metal area.
	24.5 Use Hand-block sanding to smoothening and levelling a repair area properly after body filler curing.
	24.6 Repair paint surface imperfections.
	24.7 Perform Repairing of paint scratches, repairing nicks, repairing dings, preparing surface rust free.
25. Explain corrosion, causes & effects, anti-corrosion materials, identify area for corrosion treatment and analyze & estimate paint repair direct & indirect cost estimate with Supervisor & estimating guide book.	25.1 Carryout corrosion treatment on interior and exterior surface.
	25.2 Identify how an estimating guide gives part pricing and labour time information.
	25.3 Prepare repair estimate information with supervisor by using an estimating guide book.
26. Identify Painting environment variables and perform to mix paints using viscosity y cup, use different painting tools and equipment including disassemble, assemble, and clean paint guns.	26.1 Mix paint in different ways using viscosity cup, mixing sticks or other ways.
	26.2 Test Spray Pattern, Practice on Adjusting Knobs, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, Gun Direction, Spray Overlap.
	26.3 Identify gun Handling Problems - Heeling, Arcing.
	26.4 Spray gun cleaning tank, manual spray gun cleaning and spray gun lubrication.
	26.5 Maintain spray booth.
	26.6 Use Air-supplied respirators.

27. Identify & select correct paint spray techniques, paint problems and apply troubleshooting skills.	27.1 Ensure perfection on an Air Spray Gun to achieve different spray patterns viz. top heavy or bottom heavy, heavy to right or to left, heavy at centre.
	27.2 Spray avoiding split, pinholes, blushing or a whitish coat, orange peel (surface looks like orange peel).
	27.3 Troubleshoot Excessive spray fog or overspray, No-control over size of pattern, Sags or runs.
	27.4 Troubleshoot Streaks Gun sputters constantly, uneven spray pattern, fluid leaks from spray gun.
	27.5 Troubleshoot fluid leaks from packing nut, fluid leaks through fluid tip when trigger is released.
	27.6 Troubleshoot excessive fluid, fluid not coming out from spray gun, fluid not coming out from fluid tank or canister.
	27.7 Troubleshoot Sprayed coat short of Liquid material, spotty, uneven pattern, slow to build, unable to get round spray, dripping from fluid tip.
	27.8 Troubleshoot Sprayed coat short of Liquid material, spotty, uneven pattern, slow to build, unable to get round spray, dripping from fluid tip.
	27.9 Troubleshoot Excessive overspray, excessive fog, not spraying on pressure feed, not spraying on suction feed.
	27.10 Troubleshoot Air leak at canister gasket.
	27.11 Troubleshoot Leak at set screw in canister top, Leak between top of canister cover and gun body.
28. Plan & organize to explain & perform surface preparation and masking jobs using hand & power tools for carrying out automotive body paint works.	28.1 Check Paint Thickness (DFT) at different locations.
	28.2 Paint removal using chemical stripping, and media blasting.
	28.3 Prepare Bare Metal using metal conditioners.
	28.4 Prepare hard chrome Surfaces.
	28.5 Prepare metal for Replacement parts.
	28.6 Apply spot putty, or glazing putty.
	28.7 Perform final sanding, using the right grit, power sanding, hand sanding, dry sanding, wet sanding
	28.8 Carry out Surface Cleaning.
	28.9 Mask the parts of a vehicle by using different masking techniques.
29. Identify functions of paint, OEM paint finishing & refinishing procedures,	29.1 Identify different type of paint for topcoat refinishing, paint used for refinishing.
	29.2 Apply Prime coats.

identify different types of paints and perform application of solvent based & plastic paints & polishing jobs	29.3 Perform refinishing/ painting /repairing of plastic part by applying Basecoat/ Clearcoat.
	29.4 Apply single stage paint.
	29.5 Perform overall refinishing of the panel.
	29.6 Removal of masking materials.
	29.7 Polish the painted panels
	29.8 Comply with safety rules when performing the above operations.
30. Explain colour theory &colour evaluations in different lights, identify colour adjustments, perform colour mixing (tinting) using computerized colour matching systems, spraying Metallic colours and conduct colour analyzing	30.1 Evaluate painted panels under sunlight and colour corrected light bulbs.
	30.2 Match basic paint colour.
	30.3 Spray metallic colour for finish.
	30.4 Perform on let-down test panel for a three-stage finish
	30.5 Perform a repair with a multistage mica or pearl finish.
	30.6 Comply with safety rules when performing the above operations.
	30.7 Evaluate paint finish under spectrophotometer or electronic colour analyzer.
31. Identify paint defects & minor imperfections, explain causes of defects and perform troubleshooting & final detailing of paint defects	31.1 Remove foreign matter from wet paint.
	31.2 Perform wet sanding between coats.
	31.3 Correct 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 fisheyes, 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.
	31.4 Repair paint run and chipped paint.
	31.5 Evaluate the painted surface for detailing
	31.6 Visualise painted surface in three different angles for final detailing.
	31.7 Perform paint defect identification and area wise defect ranking and tolerance.

8. SYLLABUS

SYLLABUS – AUTOMOTIVE BODY PAINTER			
Week No.	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1	Familiarize with the institute / industry, course, type of work, rules & regulations and machinery used in trade.	**Admission & introduction to the trade (32 hrs)** 1. Understand course, general rules pertaining to Institute & Industry, available facilities and time table 2. Recognise & explain machinery used in trade. 3. Type of work to be done during the course.	**Admission & introduction to the trade (6 hrs)** • Familiarisation with institute. • Job opportunities in the automobile sector. • 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.
2	Recognize & comply with Occupational Health, Safety & Environmental practices in a automobile Body shop.	**Practical related to Safety and Health (32 hrs)** 1. Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & personal safety message 2. Safe handling of Fuel Spillage, Fire extinguishers used for Different types of fire 3. First-Aid, nature and causes of injury and utilization of first-aid 4. Safety signs and norms 5. Safe disposal of toxic waste 6. Safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles 7. Energy saving Tips/Audit of institute / body shop electricity Usage 8. Hazard identification, dust,	**Occupational Safety & Health (6 hrs)** • 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. • Hazard identification, spatter hazard etc and countermeasure to eliminate them & importance of usage of PPEs

		thinner & paint (chemical) hazard etc and countermeasure to eliminate them & usage of specified PPEs	
3	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.)	**Systems of measurement: (32 hrs)** 1. Check zero error of instruments and adjust to zero. 2. Measuring engine components with vernier calliper, micrometer, telescopic gauge, dial bore gauge. 3. Measure clearance gap with feeler gauge. 4. Measure threading of nuts & bolts using thread gauge & pitch gauge. 5. Check intake air pressure using vacuum gauge. 6. Check tires pressure using pressure gauge. 7. Set up the measured value with workshop manual and quality concepts and proper safety	**Systems of measurement: (6 hrs)** 1. Description, care & use of Micrometers- Outside and depth micrometer, Micrometer adjustments, measurement method. 2. Vernier callipers, Least count, measurement method. 3. Telescope gauges, Dial bore gauges, Dial indicators, measurement methods. 4. Straightedge, feeler gauge, thread pitch gauge, 5. Vacuum gauge, tire pressure gauge, inspection methods.
4-5	Measure & mark by using various Measuring & Marking tools and hand & power tools and equipment used in vehicle body paint shop	**Hand Tools (64 hrs)** 1. Conduct marking using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc. 2. Layout a work piece- for line, circle, arcs and circles. 3. Measure wheel base of a vehicle with measuring tape. 4. Remove wheel lug nuts with use of an air impact wrench. 5. Operate all workshop hand tools & power tools	**Hand Tools (12 hrs)** 1. Marking scheme, Marking material- chalk, Prussian blue. 2. Cleaning tools- Scrapper, wire brush, Emery paper. 3. Description, care and use of Surface plates, steel rule, measuring tape, try square. 4. Calipers-inside and outside. 5. Dividers, surface gauges, scriber, 6. Punches- prick punch, center punch, pin punch, hollow punch, number and letter punch. 7. Chisel-flat, crosscut. 8. Hammer- ball peen, lump, mallet,

		6. Operate body shop powered equipment as per operating manual with safety.	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. 9. Screw drivers-blade screwdriver, Phillips screw driver, Ratchet screwdriver. Allen key. 10. Bench vice & C-clamps, 11. Spanners & Sockets- ring spanner, open end spanner & the combination spanner, universal adjustable open end spanner, Sockets & accessories. 12. Pliers - Combination pliers, multi grip, long nose, flat-nose, Nippers or pincer pliers. 13. Metal cutting shears- Tin snips, sheet metal cutting pliers, (Aviation snips), panel cutters. 14. Trim and upholstery tools, Door handle tool (clip pullers), 15. Metal files reveal file, surform file, sanding board, sanding block, spreaders and squeegees.
6	Perform basic fastening & fitting operation by using correct hand tools, power tools & equipments	**Fasteners (32 hrs)** 1. Perform general cleaning of vehicle. 2. Fitting of nut, bolts, & studs etc. and checking torque value. 3. Removal of stud/bolt from blind hole. 4. Remove & refit of lock nuts, circlips, and lock rings. 5. Riveting using drilling and Riveting tools.	**Fasteners (6 hrs)** 1. Study of different types of screws, nuts, studs & bolts, rivets, and 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. 2. Selection of materials for gaskets and packing, 3. Description of Riveting tools
7	Apply basic cutting and grinding operations using correct hand & power tools.	**Cutting tools & Limit, Fit & Tolerances (32 hrs)** 1. Identify and use PPE for different cutting & grinding works. 2. Define safety precautions	**Cutting tools & Limit, Fit & Tolerances (6 hrs)** 1. Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and

		during cutting & grinding operations using hand & power tools. 3. Make jobs using cutting tools like Hacksaw, files, chisel & sheet cutting scissors. 4. OFF-hand grinding with sander. 5. Cutting steel metal using hand held power saw. 6. Perform grinding work using pneumatic, electric and battery powered grinder.	uses, chisel. 2. OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding. 3. **Limits, Fits & Tolerances**:- Definition of limits, fits & tolerances with examples used in auto components.
8	Perform cutting & grinding operations using powered equipment following standard operating procedures	**Drilling machine, Taps and Dies, Hand Reamers (32 hrs)** 1. Safety precautions to be observed while using a drilling machine 2. Marking and Drilling clear and Blind Holes 3. Sharpening of Twist Drills. 4. Selection of tape drill Size, use of Lubrication and tapping a Clear and Blind Hole. 5. Use of tap extractor for to remove a broken tap. 6. Cutting Threads on a Bolt/ Stud. 7. Adjustment of two piece Die and cutting thread on a pipe piece. 8. Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface and prepare seat of a drilled hole using hand reamer.	**Drilling machine, Taps and Dies, Hand Reamers (6 hrs)** 1. **Drilling machine** -Description and study of Bench type Drilling machine, Portable electrical Drilling machine, drill holding devices, Drill bits. 2. **Taps and Dies:** Hand Taps and wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and Die stock. Screw extractors. 3. **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
9	Explain basic electricity and perform to Trace and Test all electrical & electronic components	**Basic electricity (32 hrs)** 1. Prepare wire connections by joining wires using soldering Iron.	**Basic electricity (6 hrs)** 1. **Basic electricity,** Electricity principles, Ground connections, Ohm's law, Voltage, Current,

	& circuits in a vehicle and assemble circuit to ensure functionality of system.	2. Construction of simple electrical circuits and measuring of current voltage and resistance. 3. Verify DC series & parallel circuits and its characteristics 4. Check out the open and short circuits in the lighting circuits 5. Using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers. 6. Check the voltage drop in the auto electrical system by using multimeter. 7. Trace the auto electrical components by using vehicle wiring circuits 8. Check the condition of the solenoid switch in the starting system 9. Verify ohm's law and measure resistance using rheostat. 10. Perform battery charging and check performance	Resistance, Power, Energy. 2. Voltmeter, ammeter, Ohmmeter Mulitmeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor ratings
10	Perform Basics of Automobile industry & automobiles and able to identify & explain different types of vehicles , and service station equipment	**Automobile Industry & Authorities (32 hrs)** 1. Identification of different type of Vehicles. 2. Identify the different vehicle specification data and vehicle information number (VIN) 3. Demonstration of Garage, Service station equipments. 4. Operate Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks**,** Stands.	**Automobile Industry & Authorities (6 hrs)** 1. Auto Industry - History, leading manufacturers, development in automobile industry, trends, new product. 2. 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. 3. 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. 4. Brief description and uses of Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.
11-12	Identify & explain various vehicle parts, different types of vehicle body & chassis and sheets used, service information & guides and perform vehicle washing.	**Engine, Vehicle Construction & Vehicle Service (64 hrs)** 1. Washing of vehicle. 2. Identification of different type body, chassis, Drive lines. 3. Identify the location of parts and panels. 4. Find periodic service information using of computer-based service information & Service manuals. 5. Refer refinishing guides and find information on type of paints used in OEM painting, 6. Take dimensions of vehicle using vehicle dimension manual. 7. Identify different final coat colors from color matching guides. 8. Identify parts from different models of vehicle from parts interchange guides.	**Engine, Vehicle Construction & Vehicle Service (12 hrs)** **Introduction to Engine:** 1. Description of internal & external combustion engines, Classification of IC engines, 2. 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 3. Direct injection and Indirect injection. Technical terms used in engine, Engine specification. 4. Body shop & paint shop safety procedures. **Vehicle construction Technology** 5. 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** 6. Study of Service Information, basic steps to using refinishing materials information, Vehicle paint code, study of service symbols, diagnosis charts, wiring diagram.
13-14	Explain air compressors, compressed air line, safety precautions using compressed air and perform simple	**Compressor & Air system (64 hrs)** 1. Identify the parts of a piston type stationary compressor. 2. Overhauling of Air compressor, Overhauling of	**Compressor & Air system (12 hrs)** 1. Basic requirement for compressed air systems. 2. Type of Compressor- Description and construction of Diaphragm compressor, piton type

	service and maintenance of compressors.	service (FRL) unit. 3. Drain the air receiver and the moisture separator/ regulator or air transformer. 4. Check the level of the oil in the crankcase, clean air filters. 5. Clean or blow off fins on cylinders, heads, intercoolers, after coolers. 6. 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. 7. Check the relief valve for exhausting of head pressure each time the motor stops. 8. Tighten belts to prevent slippage. 9. Check and align a loose motor pulley or compressor Flywheel. 10. Check for air leaks on the compressor outfit and air piping system.	compressor-single stage and two stage, rotary screw air compressor. 3. Performance of air compressor- Description of Horse power, delivery volume, displacement, Free air delivery, compressor volumetric efficiency, tank size. 4. Air and Fluid Control Equipment - In take air filter, Distribution system, regulator, lubricator, different type air purification method. 5. Compressor Accessories -Hose type, hose size, maintenance of hose, connectors, adapters and couplings. 6. Air System Maintenance- Study the typical piping arrangement found in a body/paint shop, colour coding of airline, water line and fuel line.
15-16	Identify & explain different types of Refinishing materials such as Sealers &Paints, Abrasives, Adhesives, Epoxies and perform basic refinishing jobs.	**Refinishing Materials (64 hrs)** 1. Identify the different type of refinishing material- paint binders, paint solvents, Paint additives. 2. Select the right repair materials for a particular job. 3. Select the right type of primer and paint. 4. Identify various type of masking material available in body shop. 5. Identify different type of body filler. 6. Identify various type of abrasive materials i.e. grit rating available in the	**Refinishing Materials (12 hrs)** 1. Primer-sealer, top coats. 2. Paint material types-Lacquer, enamel, water base, Content of paint-pain pigments, paint binders, paint solvents, Paint additives, 3. Definition of Drying, curing, flash, retarder, accelerator, catalyst, adhesion promoter, blending solvent, Toners. 4. Primers & sealers- self-etching primer, UV primer Primer-surfacer, Epoxy primers, sealers, 5. Other paint materials- prep solvent, flattener, fish-eye eliminator, flex agent, Antichip coating (Vinyl coating), Metal conditioner, Paint stripper, tack

		workshop. 7. Identify the open and closed coat grit. 8. Cleaning, Pre- Treatment, surface conditioning, ED coating of any given panel.	cloth. 6. Different type of Body filler body filler (plastic filler), light body filler, fiber glass reinforced body filler, cream hardeners, Fiber glass resin, Glazing putty, 7. Masking materials- Masking paper, Primer masking paper, paint masking paper, masking plastic, masking tape, Fine line masks, Wheel masks. 8. 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, 9. Adhesives, 10. Epoxies- Composition of Paints, Paint Types. 11. Impact of paint & paint component on plastic andrubber parts. 12. Latest paint Techniques.
17-19	Identify & select body fillers & ingredients, and perform surface preparation, body filler mixing, body filler application and finishing filled surface for primer after curing using appropriate hand & power tools.	**Using Body Fillers (96 hrs)** 1. Identify the different type of body filler, hardeners, and putties, used in industry. 2. Mixing of body filler compounds on a mixing board for applying Body filler. 3. Preparation of damaged surface area of sheet metal. 4. Applying the body filler on a damaged sheet metal area. 5. Using Hand-block sanding to smooth and level a repair area properly after body filler curing. 6. Repairing of paint surface imperfections. 7. Perform Repairing of paint scratches, repairing nicks, repairing dings, preparing	**Using Body Fillers (18 hrs)** 1. 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. 2. Preparation surface for filler, Ingredient, characteristics and application of body filler & putties, 3. Mixing filler, kneading the hardener, mixing filler and hardener, 4. Spreading body filler, 5. Grating and Sanding Body Filler- grating the filler, coarse, sandy filler, blow off sanding dust, 6. 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,

		surface rust free.	applying lead filler, priming filler area, applying glazing putty, using a guide coat. 7. Rust repair procedures.
20-21	Explain corrosion, causes & effects, anti-corrosion materials, identify area for corrosion treatment and analyze & estimate paint repair direct & indirect cost estimate with Supervisor & estimating guide book.	**Corrosion Protection& Repair Estimates (64 hrs)** 1. Carryout corrosion treatment on interior and exterior surface 2. Identify how an estimating guide gives part pricing and labour time information. 3. Preparation of repair estimate information with supervisor by using an estimating guide book.	**Corrosion Protection& Repair Estimates (12 hrs)** 1. 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 Repair Costs** 2. Description of estimate, Direct repair programs, Estimate time factor, work orders, Using Estimate Guides, Part prices, Labor costs, Job overlap, and Included operation.
22-23	Identify Painting environment variables and perform to mix paints using viscosity y cup, use different painting tools and equipment including disassemble, assemble, and clean paint guns.	**Refinishing equipment Technology (64 hrs)** 1. Mixing paint in different ways using viscosity cup, mixing sticks or other ways. 2. Testing Spray Pattern, Practice on Adjusting Knobs, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, Gun Direction, Spray Overlap. 3. Gun Handling Problems - Heeling, Arcing. 4. Spray gun cleaning tank, manual spray gun cleaning, and spray gun lubrication. 5. Maintaining spray booth. 6. Using Air-supplied respirators.	**Refinishing equipment Technology (12 hrs)** 1. Painting environment variable, Steps to keep dirt from finish during body repairs. 2. Description of spray gun and its parts, basics tages of Atomization, High- 3. Volume, Low-Pressure (HVLP)Spray Gun. 4. 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. 5. Spray gun air supply system, 6. Importance of spraying material viscosity, Different ways to mix paint or other materials paint mixing sticks, viscometer, or viscosity cup, 7. Effect on finish material temperature, film thickness,

			8. Spray gun setup- Air Supply, Adjustments, Distance, Adjustment Knobs, 9. Testing Spray Pattern, Effect of Spray on Gun stroke, Gun Speed, Gun Triggering, 10. Gun Direction, Spray Overlap, Gun Handling Problems - Heeling ,Arcing. 11. Spray Gun Maintenance spraygun cleaning tank, manual spray gun cleaning, spray gun lubrication, 12. Other spray systems,-airless spray gun system, electrostatic spraying system, touch-up guns, airbrushes, 13. 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. 14. Description of drying room- types of infrared drying equipment- Near drying equipment. Far drying equipment. 15. Description of Air-supplied respirators, type of air-supplied respirators- hood type and the face shield type. 16. 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.
24-26	**Project work, Revision & Mid-Term Exam**		
27-31	Identify & select correct paint spray techniques, paint problems and apply troubleshooting skills.	**Paint spray technique, problems & troubleshooting (160 hrs)** 1. Perfection on an Air Spray Gun to achieve different	**Paint spray technique, problems & troubleshooting (30 hrs)** 1. Probable causes and remedies for 2. Spray pattern top heavy or bottom heavy, Spray pattern heavy to right

		spray patterns viz. top heavy or bottom heavy, heavy to right or to left, heavy at center. 2. Able to spray avoiding split, pinholes, blushing or a whitish coat, orange peel (surface looks like orange peel). 3. Troubleshoot Excessive spray fog or overspray, No-control over size of pattern, Sags or runs. 4. Troubleshoot Streaks Gun sputters constantly, uneven spray pattern, fluid leaks from spray gun. 5. Troubleshoot fluid leaks from packing nut, fluid leaks through fluid tip when trigger is released. 6. Troubleshoot excessive fluid, fluid not coming out from spray gun, fluid not coming out from fluid tank or canister. 7. Troubleshoot Sprayed coat short of Liquid material, spotty, uneven pattern, slow to build, unable to get round spray, dripping from fluid tip. 8. Troubleshoot Excessive overspray, excessive fog, not spraying on pressure feed, not spraying on suction feed. 9. Troubleshoot Air continues to flow through gun when trigger has been released (on non bleeder guns only). 10. Troubleshoot Air leak at canister gasket. 11. Troubleshoot Leak at set screw in canister top,	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, 3. 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, 4. 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, 5. 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.

		Leak between top of canister cover and gun body.	
32-35	Plan & organize to explain & perform surface preparation and masking jobs using hand & power tools for carrying out automotive body paint works.	**Vehicle surface preparation and masking (128 hrs)** 1. Checking of Paint Thickness (DFT) at different locations. 2. Paint removal using chemical stripping, and media blasting, 3. Preparing of Bare Metal using metal conditioners 4. Preparing of hard chrome Surfaces. 5. Preparation of metal for Replacement parts. 6. Apply spot putty, or glazing putty. 7. Perform final sanding, using the right grit, power sanding, hand sanding, dry sanding, wet sanding, 8. Carry out Surface Cleaning. 9. Mask the parts of a vehicle by using different masking techniques.	**Vehicle surface preparation and masking (24 hrs)** 1. 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. 2. 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 3. Prime coat Selection, applying primecoats 4. Applying spot putty, or glazing putty. 5. 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, 6. 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.
36-40	Identify functions of paint, OEM paint finishing procedures, identify different types of paints and perform application of solvent	**Refinishing Procedures (160 hrs)** 1. Identify different type of paint for topcoat refinishing, paint used for refinishing.	**Refinishing Procedures (30 hrs)** 1. Functions of paint 2. OEM paint finishes procedures, different between OEM and refinish painting types of paint for topcoat refinishing,

	based & plastic paints & polishing jobs.	2. Applying of Prime coats 3. Refinishing / Painting / repairing of plastic parts by applying Basecoat/ Clear coat. 4. Apply Single Stage Paints 5. Perform overall refinishing of panels 6. Removal of Masking Materials. 7. Polish the painted panels. 8. Comply with safety rules when performing the above operations	3. Propertiesof paint used for refinishing. 4. Topcoats, Prime coats, Preparing Refinish Materials, 5. Pre-painting Preparations, Applying Prime coats, 6. Refinishing Plastic Parts, Flash Times, Basic Spray Coats, 7. Methods of Refinishing, Basecoat/ Clear coat Repairs, 8. Applying Single Stage Paints, Panel Repairs, 9. Overall Refinishing, Removal of Masking Materials.
41-44	Explain color theory & color evaluations in different lights, identify color adjustments, perform color mixing (tinting) using computerized color matching systems, spraying Metallic colours and conduct color analyzing.	**Color matching and Customized painting (128 hrs)** 1. Evaluate painted panels under sunlight and colour corrected light bulbs. 2. Match basic paint colour. 3. Spray metallic colour for finish, 4. Perform on let-down test panel for a three-stage finish. 5. Perform a repair with a multistage mica or pearl finish. 6. Comply with safety rules when performing the above operations 7. Evaluate paint finish under spectrophotometer or electronic colour analyzer.	**Color matching and Customized painting (24 hrs)** 1. Introduction, Color Theory, Lighting-colour evaluations using sunlight& colour corrected light bulb. 2. Dimensions of colour Value-lightness or darkness, Hue-color, cast, or tint, Chroma-saturation, richness, intensity, or muddiness, standard colour chips, variance colour chips, 3. Matching Basic Paint Colors- use of colour test panel, spray-out test panel procedure. 4. Ccolor spraying variables in the shop, positive and negative variable, matching solid colors and metallic finishes, 5. 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 clear coat system, 6. Procedure for a letdown test panel for a three-stage finish, method for a spot or partial repair on a three-stage paint system, 7. Steps for a panel repair with a

			multistage mica or pearl finish, mica mid-coat blending procedure for a three-stage paint, 8. Tinting, basic reasons for tinting a paint colour, three angles to determine whether a colour adjustment is necessary 9. Spectrophotometer or electronic colour Analyzer, Computerized Paint Matching Custom Painting.
45-49	Identify paint defects, explain causes of defects and perform troubleshooting & final detailing of paint defects.	**Paint Problems and Final Detailing (160 hrs)** 1. Remove foreign matter from wet paint. 2. Perform wet sanding between coats. 3. 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 fisheyes, 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. 4. Repairing paint runs and chipped paint. 5. Evaluate the painted surface for detailing. 6. Visualising of painted surface in three different angles for final detailing. 7. Paint defect identification and area wise defect ranking and tolerance.	**Paint Problems and Final Detailing (30 hrs)** 1. Repairing Paint Problems- problems in wet paint, removing foreign matter in wet paint, wet sanding between coats, 2. 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. 3. **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.

50	**Project work** a) Make a chart showing different types of vehicles body / automobiles. b) Make chart explaining panels of car body shell of hatchback and saloon car. c) Prepare models showing design of nature and lettering on car panels. d) Prepare model showing different stages of car body painting / refinishing. e) Prepare a working model of lead-acid battery. f) Prepare a chart showing different types of paint spray patterns..
51	**Revision**
52	**Examination**

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Duration: One Year		
S No.	**Workshop Calculation (40hrs) and Science (40Hrs) Total 80Hrs**	**Engineering Drawing (80Hours)**
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.	----------
17	**Factorization 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 + 2ab + b ;roots of an equation e.g. quadratic equations with real roots by factorization, and by the use of formula.	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 mono detail and a multi detail drawing.
18	**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	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.
19	**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.	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.

20	Formulae for Perimeter and Area of Plane figure - Rectangle, Square, Parallelogram, Triangle, Hexagon, any regular polygon, Trapezium, Circle, sector, Fillet, Ellipse, 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.	Layout of an automobile chassis. Drawing the layout of body shop. Free hand sketching of major outer body
21	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, mode.	Free hand sketching of symbols are used in service information
22	**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.	Free hand sketching of block diagram compressor and its parts
23	**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.	Colour sketching of single stage and double stage paint sectional view.
24	**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	Drawing Block diagram of plastic welding setup and position, Free hand sketching of Intermittent tack weld and shallow continuous tack.

	speed, Specific fuel consumption vs. engine speed, Brake power, torque and sfc(Specific fuel consumption) compared, Brake mean effective pressure, Thermal efficiency, Indicated thermal efficiency, Brake thermal efficiency petrol vs. Diesel	
25	**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 diagram of air spray gun, Gravity feed, Suction (siphon) feed, Pressure feed Pressure-assist feed (gravity or suction cup spray guns).
26	----------	Lay out of downdraft spray booth.
27	----------	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.
28	----------	Drawing of different type of paint defect using colouring aids (sketch pen/ colour pencil)

9.2 EMPLOYABILITY SKILLS

Duration: One Year (Total 160 Hours)	
1. English Literacy	**Duration: 30 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 happenings, 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: 30 hrs.** **Marks : 09**
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, the user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc., Use of Common applications.
Word Processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and

	use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cybercrimes.
3. Communication Skills	**Duration: 22 hrs.** **Marks : 07**
Introduction to Communication Skills	Communication and its importance Principles of effective communication Types of communication - verbal, non-verbal, written, email, talking on phone. Non-verbal communication-characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effectivelistening, guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active listening skills.
Motivational Training	Characteristics essential to achieving success. The power of positive attitude. Self-awareness Importance of commitment Ethics and values Ways to motivate oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
4. Entrepreneurship Skills	**Duration: 18 hrs.** **Marks : 06**
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise andrelation to the economy, Source of business ideas, Entrepreneurial opportunities, and the process of setting up a business.
Project Preparation & Marketing Analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. 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/Programmed, procedure andthe available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity	**Duration: 15 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: 20 hrs.** **Marks : 06**
Safety & Health	Introduction to Occupational Safety and Health, importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibro-acousticHazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident &Safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured &sick at the workplaces, First-Aid and 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. Labor Welfare Legislation		**Duration: 10 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, Workmen' Compensation Act.	
8. Quality Tools		**Duration: 15 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.	

ANNEXURE-I

LIST OF TOOLS AND EQUIPMENT			
AUTOMOTIVE BODY PAINTER (For batch of 20 candidates)			
S No.	**Name of the Tool & Equipment**	**Specification**	**Quantity (Nos.)**
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-24 is requiredadditionally)			
1.	Allen Key set	12 pieces (2mm to 14mm)	7
2.	Bucket, sponge, squeegee, chamois & tack Rags		7
3.	Caliper inside	15 cm Spring	7
4.	Calipers outside	15 cm spring	7
5.	Center Punch	10 mm. Dia. x 100 mm.	7
6.	Different type of spoon		7
7.	Dividers 15 cm Spring 6	15 cm Spring	7
8.	Electrician Screw Driver	2500mm	7
9.	General purpose dolly		7
10.	Hammer ball peen	0.5 kg with handle	7
11.	Hands file	20 cm. Second cut flat	7
12.	Paint scrapper, putty mixing board, putty applicator /knife		7
13.	Pliers combination	20 cm.	7
14.	Safety glasses		7
15.	Screw driver	20cm.X 9mm. Blade	7
16.	Screw driver	30 cm. X 9 mm. Blade	7
17.	Scriber	15 cm	7
18.	Spanner D.E. set	12 pieces (6mm to 32mm)	7
19.	Spanner, ring set	12 metric sizes 6 to 32 mm.	7
20.	Spanners socket with speed handle, T-bar, ratchet and universal upto 32 mm	set of 28 pieces with box	7
21.	Steel rule	30 cm inch and metric	7
22.	Steel tool box with lock and key (folding type)	400x200x150 mm	7
23.	Toe dolly		7
24.	Wire cutter and stripper		7
B. INSTRUMENTS AND GENERAL SHOP OUTFIT - For 2 (1+1) units no additional items are required			
25.	Adjustable spanner	(pipe wrench 350 mm)	2
26.	Air blow gun with standard		1

	accessories		
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	2
38.	Caliper 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 cover	1
83.	Grease Gun		2
84.	Grip Wrench	200mm	2
85.	Growler		2
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	2 sets

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		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		2
107.	Oil can	0.5/0.25 liter capacity	1
108.	Oil Stone	15 cm x 5 cm x 2.5 cm	4
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.	Pane l 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.	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	250mm	4
128.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4
129.	Scraper flat	25 cm	4
130.	Scraper half round	25 cm	4
131.	Scraper Triangular	25 cm	2
132.	Scriber	15 cm	4
133.	Scriber with scribing black universal		2

134.	Set of stock and dies – Metric		2 set
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.	Shear Tinman's	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 unscrewing inaccessible		2
144.	Spanner, adjustable 15cm.	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		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.	Steel measuring tape	10 meter in a case	2
151.	Steel rule	15 cm inch and metric	2
152.	Steel rule	30 cm inch and metric	4
153.	Steel wire Brush	50mmx150mm	4
154.	Straight edge gauge	2 ft.	1
155.	Stud extractor	set of 3	2 sets
156.	Stud remover with socket handle		1
157.	Suction cup		2
158.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm		2
159.	Taps and Dies complete sets (5 types)		1 set
160.	Taps and wrenches - Metric		2 sets
161.	Telescope gauge		4
162.	Thread pitch gauge metric, BSW		1
163.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
164.	Trammel	30 cm	2
165.	Trim and upholstery tools		1 set
166.	Tyre pressure gauge with holding nipple		2
167.	Universal puller for removing pulleys, bearings		1

168.	V' Block	75 x 38 mm pair with Clamps	2
169.	Vacuum gauge	to read 0 to 760 mm of Hg.	2
170.	Various sanding blocks-soft, hard, speed file & de-nibbling tools		2 sets
171.	Vernier caliper	0-300 mm with least count 0.02mm	4
172.	Vice grip pliers		2
173.	Voltmeter	50V/DC	5
174.	W ire Gauge (metric)		5
175.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	1
C. GENERAL INSTALLATION/ MACHINERIES			
176.	Angle grinder	10-12 cm for cutting and grinding	2
177.	Arbor press hand operated	2 ton capacity	1
178.	Belt sander (Narrow surface)		2
179.	Bench lever shears	250mm Blade x 3mm Capacity	1
180.	Body shell and panels for painting - Light Motor vehicle of different Models		4
181.	Compressed air line 10m (on retractable reel, with high flow connectors) with FRL unit		2
182.	Computerisedcolour retrieval unit (Spectrophotometer)		1
183.	Die Grinding kit		2
184.	Disc sander	18 cm	2
185.	Discrete Component Trainer / Basic Electronics Trainer		1
186.	Down draft spray booth (7.5 X 5 m, combi-spray/oven or separate spray /oven		1
187.	Drilling machine bench to drill up to 12mm dia along with accessories		1
188.	Dual Magnetization Yoke	AC / HWDC. 230 VAC. 50Hz	1 set
189.	Dust extraction connections (Vacuum)		2
190.	Electronic paint mixing scales	(accurate to 0.1 grams.) explosion proof	1
191.	Grinding machine (generalpurpose) D.E. pedestal with 300 mm dia wheels rough and smooth		1
192.	High pressure hot / cold water		1

	blasting unit		
193.	Hydraulic jack	HI-LIFT type -3 ton capacity. & 5 ton capacity	1 each
194.	Infrared drying lamp unit		1
195.	Liquid penetrate Inspection kit		1 set
196.	Motor Vehicle suitable for Body painting -Light Motor vehicle of different models		2
197.	Paint surface film thickness gauge (electronic)		2
198.	Paint tinting system mixing machine (exposition proof)		1
199.	Parts spray booth cabin (ventilated to 30 cubic m /minute)		1
200.	Pipe Bending Machine	(Hydraulic type) 12mm to 30mm	1
201.	Pneumatic rivet gun		2
202.	Random /dual action orbital sander	(12-15 cm)	2
203.	Spray gun & mixing equipment cleaning machine (explosion proof) & bench		2 each
204.	Spray guns (gravity feed primer COB/2K colour& clear coat. touch-up set)		4
205.	Tin smiths bench folder	600 x 1.6mm	1
206.	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
207.	Underbody sealer & corrosion proofing materials & spray units		2 each
208.	Ventilated preparation bays (fully illuminated. down or end draught		1
209.	Water & oil separation system		1
210.	Weld through primer application equipment		2
D. CONSUMABLE			
211.	Battery- SMF		As required
212.	Brake fluids		As required
213.	Chalk. Prussian blue.		As required
214.	Chemical compound for fasteners		As required
215.	Diesel		As required
216.	Different type gasket material		As required

217.	Different type of oil seal		As required
218.	Drill Twist (assorted)		As required
219.	Engine Oil		As required
220.	Engine Coolant		As required
221.	Emery paper - 36-60 grit .	80-120	As required
222.	Gear oils		As required
223.	Hacksaw blade (consumable)		As required
224.	Hand rubber gloves tested for 5000 V		As required
225.	Holders. lamp teakwood boards. Plug sockets.		As required
226.	Hydrometer		As required
227.	Lapping abrasives		As required
228.	Leather Apron		As required
229.	Petrol		As required
230.	Power steering oil		As required
231.	Radiator Coolants		As required
232.	Gloves for Welding (Leather and Asbestos)		As required
233.	Cotton waste/ cloth		As required
234.	Body filler (Consumable)		As required
235.	Body filler (Consumable)		As required
236.	Masking paper / plastic & back-masking tape		As required
237.	Refinishing material (consumable)		As required
E. WORKSHOP FURNITURE			
238.	Book shelf (glass panel)	6V2' x 3' x IV2'	As required
239.	Computer Chair		1+1
240.	Computer Table		1+1
241.	Desktop computer and related MS office software		1+1
242.	Discussion Table 8' x 4' x 21/2 '		2
243.	Fire Extinguishers. first- aid box		As required
244.	Instructional Material – NIMI Books/Ref. books		As required
245.	Internet connection with all accessories		As required
246.	Laser printer		1
247.	LCD projector/ LED /LCD TV 42"		1
248.	Multimedia DVD for Automotive		As required
249.	Online UPS 2KVA		1
250.	Stools		21
251.	Storage Rack 61/2 ' x 3' x W2		As required
252.	Storage shelf 6% ' x 3' x 15'		As required

253.	Suitable class room furniture		As required
254.	Suitable Work Tables with vices		As required
255.	Tool Cabinet	6' x 3' x 1'	2
256.	Trainees locker 6% ' x 3' x 1%' 2 Nos. to accommodate 20 Lockers		As required

Tools &Equipment 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	30 no.
2	UPS - 500VA	10 no.
3	Scanner cum Printer	1 no.
4	Computer Tables	30 no.
5	Computer Chairs	30 no.
6	LCD Projector – One in each class room	One in each class room
7	White Board 1200mm x 900mm	One in each class room

ANNEXURE - II

MSIL - Maruti Suzuki Training Academy

Trainee Internal Assessment Report

Name :		**Batch No:**	
Card ID No :		**Dept:**	
Attendance % :			

Quarters	Month	Attend %	Month	Attend %	Month	Attend %	Quarterly Average Attend. %
Qtr-1							
Qtr-2							
Qtr-3							
Qtr-4							

General Assessment **Assessment Period :**

S.No	ATTRIBUTES		Score Qtr-1	Score Qtr-2	Score Qtr-3	Score Qtr-4	Score Sum of 4-Qtrs
1	**Safety**	Knowledge, follow safety precautions and rules					
2	**Sense of Responsibility**	Does he obey Sup/Line i/c instructions					
		Does he attend shift start meetings regularly					
		Does he take supervisors feedback properly					
		Whether he takes planned leaves					
		Does he participates in new drives					
		Does he take care in handling tools					
		Is Punctual					
		Positive, Behaviour, response, learning					
		Maintain 5S at his work station					
		Co-operation - Consider team work, willingness to work with and for others					
		Able to identify and report irregularities at his work place					
3	**Method**	Follow WIS/MOS					
		Able to check faults of previous station					
		Understands tools/equipment functions and its different parts					
		Able to perform the job independently					
4	**Speed**	Able to match line "TACT" time					
		Willingness to learn/flexibility for alternate job					
		Work completion/target achievement					
5	**Quality**	Able to contain defects					
		Awareness about GCA/PDI					
		Skill acquired during "On job training"					
		Total Score					
		Max. Marks					

(Fill score in relevant box) **Excellent : 4, Very Good : 3, Good : 2, Fair : 1, Need Improvement : 0**

Remarks (Supervisor): (Mention achievement/Critical incidents)				
Remarks (Shift Incharge/Dept, Manager):				
Remarks (MSTA Training Coordinator):				