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

COMPETENCY BASED CURRICULUM

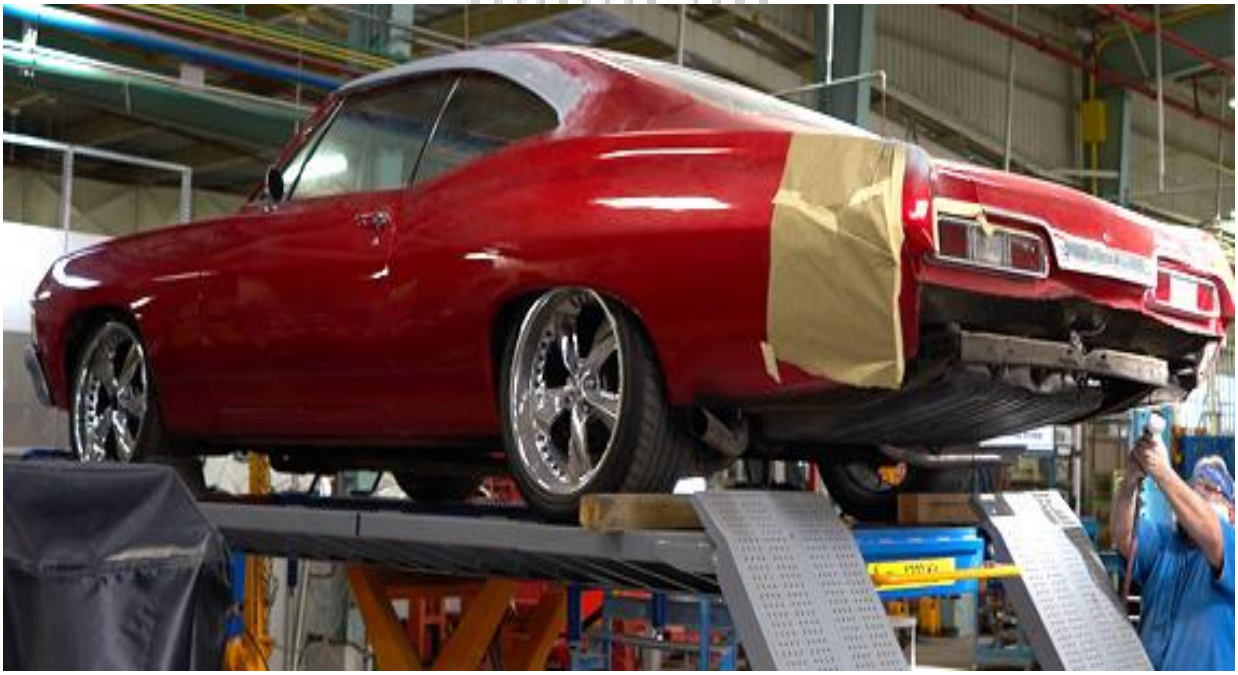
AUTOMOTIVE BODY REPAIR

(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 REPAIR

(Engineering Trade)

(Revised in 2018)

Version: 1.0

CRAFTSMEN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

EN-81, Sector-V, Salt Lake City,

Kolkata – 700 091

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1. COURSE INFORMATION

Flexi- MoU is one of the pioneer programmes under NCVET on the basis of the MoU in between DGET & 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 Science & Calculation 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 dismantle & re-fit all vehicle body panels. The trainee will also be able to perform repair and maintenance of Air compressor and compressed air lines, assist supervisor to assess damage to vehicle and prepare collision (accident) report & identify repair & replacement needs and perform vehicle body repair works using Oxy-acetylene, MIG, Electric resistance welding & Plasma cutting.

In next six months, the trainee will be able analyze & perform minor body damage repairs, plastic parts repairs, servicing & repairs of Hood, Bumpers, Grille, Trunk lid & bed, vehicle glasses, doors, roof panels, passenger compartment items and luggage compartment items. The trainee will also carry out structural collision damage diagnosis & measurements using special purpose measuring devices and perform vehicle frame & structure straightening & realignment using special purpose equipment.

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. DGET 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, DGET 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 CAREER 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 of Industrial 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 40%. For the purposes of determining the overall result, 25% weightage is applied to the result of each yearly examination.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking 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 of internal assessments are to be preserved until forthcoming yearly 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. • Below 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

Welder, Gas; Welder, Gas fuses metal parts together using welding rod and oxygen acetylene flame. Examines parts to be welded, cleans portion to be joined, holds them together by some suitable device and if necessary makes narrow groove to direct flow of molten metal to strengthen joint. Selects correct type and size of welding rod, nozzle etc. and tests welding, torch. Wears dark glasses and other protective devices while welding. Releases and regulates valves of oxygen and acetylene cylinders to control their flow into torch. Ignites torch and regulates flame gradually. Guides flame along joint and heats it to melting point, simultaneously melting welding rod and spreading molten metal along joint shape, size etc. and rectifies defects if any. May join part at various spots to prevent distortion of shape, form dimension etc. May preheat materials like cast iron prior to welding. May also weld by other gases such as argon coal etc.

Welder; Welder is also known as Welding Technician, this role is similar for all types of joining techniques like Gas Discharge Arc Welding (MIG, MAG, TIG), Resistance Welding (Spot Welding, Projection Welding, Butt Welding) and Automatic or Robotic Welding Process. This role is responsible for joining various types of metallic frames, structures, jigs, plates, sheets etc. using heating and melting process created through electrical power and gaseous discharge, maintaining process parameters, conducting quality checks on output product and maintaining a safe and healthy working environment on the shop floor.

Sheet Metal Worker, General/Sheet Metal Worker – Hand Tools and Manually Operated Machines; Sheet Metal Worker, General makes sheet metal articles according to drawing or sample. Studies drawing or sample and records measurements if necessary. Selects sheet of required type, thickness (gauge) and size and marks it with scriber, square, divider, foot rule etc., according to drawing or sample. Shears wherever necessary by machine or hand shears and makes it to required shape and size by bending, seaming, forming, riveting, soldering etc., using mallets, hammers, formers, sets, stakes, etc., or by various machines such as shearing, bending, beading, channelling, circle cutting. Checks work at stages during operations and does soldering, brazing as necessary. May undertake pneumatic and hydraulic tests. May also undertake repair work. May specialize in different metal sheets such as tin, coppe, brass.

Dent Remover/Auto Body Repair Technician/Denter; Dent Remover; Panel Beater removes dents from sheet metal parts such as mudguards, body panels, tanks, containers, trunks by beating with mallets, smoothens surface for painting and other operations. Gets parts dismantled, examines dents caused by stress or accidents and starts beating from highest point on inner side with mallet to bring it back to original shape. Supports outer surface with soft metal-piece, wood or broader mallet to avoid distortion in reverse direction. Manipulates

support and uniformly beats inner portion till damaged portion is reformed to original shape. May engage an assistant to hold support and guide him in manipulating it. May also scrape or lightly file outer surface to remove further defects, if any, for obtaining finer finish.

Auto Body Technician/Denter; Auto Body Technician is responsible for repair of vehicles and for carrying out work on the body and frame of a vehicle following the manufacturer's repair procedures.

Reference NCO-2015:

a) 7212.0100 - Welder, Gas
b) 7212.0301 - Welder
c) 7213.0101 - Sheet Metal Worker, General/Sheet Metal Worker – Hand Tools and Manually Operated Machines
d) 7213.0301 - Dent Remover/Auto Body Repair Technician/ Denter
e) 7213.0302 - Auto Body Technician/ Denter

4. GENERAL INFORMATION

Name of the Trade	Automotive Body Repair (Flexi MoU)
NCO - 2015	7212.0100, 7212.0301, 7213.0101, 7213.0301, 7213.0302
NSQF Level	Level-4
Duration of Craftsmen Training	One year
Entry Qualification	Passed 10th Class examination or its equivalent
Unit Strength (No. Of Student)	20
Space Norms	192 Sq. m.
Power Norms	17 KW
Instructors Qualification for	
1. Automotive Body Repair Trade	Degree in Mechanical Engineering or Automobile Engineering from recognized Engineering College /university with one year experience in the relevant field. **OR** Diploma in Mechanical Engineering or Automobile Engineering from recognized board of technical education with two years' experience in the relevant field. **OR** NTC/NAC in the Trade of "Mechanic Auto Body Repairing" with 3 years' post-qualification experience in the relevant field. **Desirable: -** Preference will be given to a candidate with CIC (Craft Instructor Certificate) in Motor Mechanic trade. ***Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.***
2. Workshop Calculation & Science	Degree in Engineering with one year experience. OR Diploma in Engineering with two years' experience. Desirable: Craft Instructor Certificate in Motor Mechanic Vehicle course under NCVT.
3. Engineering Drawing	Degree in Engineering with one year experience.

	OR Diploma in Engineering with two years' experience. OR NTC / NAC in the Draughtsman (Mechanical) with three years' experience. **Desirable:** Craft Instructor Certificate in Motor Mechanic Vehicle course under NCVT.
4. Employability Skill	MBA OR BBA with two years' experience OR Graduate in Sociology/ Social Welfare/ Economics with Two years' experience OR Graduate/ Diploma with Two years' experience and trained in Employability Skills from DGT institutes. AND Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above. OR **Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.**
List of Tools and Equipment	As per Annexure – I

Distribution of training on Hourly basis: (Indicative only)

Year	Total Hours/Week	Trade Practical	Trade Theory	Workshop Cal. &Sc.	Engineering Drawing	Employability Skills
1st	48 Hours	32 Hours	8 Hours	2 Hours	2 Hours	4 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for **Automotive Body Repair** trade 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 Repair** 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 Skill	Core Skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice	Factual knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment	Responsibility for own work and learning

6. LEARNING OUTCOME

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

6.1 GENERIC LEARNING OUTCOME

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

6.2 SPECIFIC LEARNING OUTCOME

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 in a automobile 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 repair shop.

13. Perform basic fastening & fitting operation by using correct hand tools, power tools & equipment.
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, frame & 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. Assess damage to Vehicle, assist supervisor to prepare collision damage (accident) report and identify repair and replacement needs
21. Explain welding, welding equipment, consumables, safety, tools & tackles, and perform Gas welding & cutting, MIG welding, Electrical resistance welding and Plasma arc cutting processes
22. Analyze minor body damage and perform repair work following sequential procedures involved in metal damages repair using appropriate tools & equipment with utmost safety
23. Evaluate the damages in plastic parts, take advice of seniors for requirements of repair or replacement and perform work on repairable damaged plastic parts or replace the damaged part
24. Plan & organize to perform removal, adjustment, alignment, servicing, repairing & refitting of vehicle Hood, Bumpers, Fenders, Grille, Truck lid, Panels, and Trunk bed as per defined procedures & safely using correct hand & power tools
25. Recognize different type of glasses and perform to remove & reassemble different glasses, doors and roof panels in vehicles.
26. Recognize the different parts or objects of cars passenger compartment and locate & repair air & water leakages, rattle noise and perform to remove, & refit the objects in vehicle passenger compartment
27. Apply knowledge of the procedures for diagnosing structural collision damage and measuring systems to identify location and extent of damage
28. Plan & organize to explain & perform different type of frame straightening and realignment procedures using special purpose equipment along with various anchoring methods and ensuring the structural integrity of the vehicle and occupant safety.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
1. Recognize & comply with general safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store/ dispose of dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ competent authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution and contribute to avoidance of same.
	1.13 Take opportunities to use energy and materials in an environmentally friendly manner.
	1.14 Avoid waste and dispose waste as per procedure.
	1.15 Recognize different components of 5S and apply the same in the working environment.
2. Explain & perform different	2.1 Explain concept of basic science related to the field such

mathematical calculation & science in the field of study including basic electrical and apply in day-to-day work.*[Different mathematical calculation & science-Work, Power &Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*	as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, center of gravity, friction.
	2.2 Measure dimensions as per drawing.
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply with given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material]*	3.1 Read & interpret the information on drawings and apply in executing practical work.
	3.2 Read & analyse the specification to ascertain the material requirement, tools, and machining/ assembly/ maintenance parameters.
	3.3 Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, vernier callipers, dial gauge, bevel protector and height gauge, feeler gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse with the given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain

day-to-day work to improve productivity & quality.	sensitive towards such laws.
	5.3 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, and pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.	7.1 Explain personnel finance and entrepreneurship.
	7.2 Explain role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the Policies/Programmes, procedure and the available scheme.
	7.3 Prepare project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1 Use documents, drawings and recognize hazards in the work site.
	8.2 Plan workplace/ assembly location with due consideration to operational stipulation.
	8.3 Communicate effectively with others and plan project tasks.
	8.4 Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

SPECIFIC LEARNING OUTCOME	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
9. Familiarise with the institute / industry, course, type of work, rules & regulations and machinery used in trade.	9.1 Understand course, general rules pertaining to Institute & Industry, available facilities and time table.
	9.2 Recognise & explain machinery used in trade.
	9.3 Type of work to be done during the course
10. Recognize & comply with Occupational Safety & Health rules, regulations & guidelines to be followed in automobile Body shop.	10.1 Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & personal safety message
	10.2 Safe handling of Fuel Spillage, Fire extinguishers used for Different types of fire
	10.3 First-Aid, nature and causes of injury and utilization of first-aid
	10.4 Safety signs and norms
	10.5 Safe disposal of toxic waste.
	10.6 Safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles
	10.7 Energy conservation-Definition, Energy Conservation Opportunities (ECOs)-Minor ECOs and Medium ECOs, Major ECOs), Safety disposal of Used engine oil, Electrical safety tips
	10.8 Hazard identification, spatter hazard etc and countermeasure to eliminate them & importance of usage of PPEs.
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.	11.1 Check zero error of instruments and adjust to zero
	11.2 Measuring engine components with vernier caliper, micrometer, telescopic gauge, dial bore gauge.
	11.3 Measure clearance gap with feeler gauge
	11.4 Measure threading of nuts & bolts using thread gauge & pitch gauge
	11.5 Check intake air pressure using vacuum gauge
	11.6 Check tires pressure using pressure gauge
	11.7 Set up the measured value with workshop manual and quality concepts and proper safety.
12. Measure & mark by using various Measuring & Marking	12.1 Conduct marking using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel

tools and hand & power tools and equipment used in vehicle body repair shop.	etc.
	12.2 Layout a work piece- for line, circle, arcs and circles
	12.3 Measure wheel base of a vehicle with measuring tape.
	12.4 Remove wheel lug nuts with use of an air impact wrench.
	12.5 Operate all workshop hand tools & power tools.
	12.6 Operate body shop powered equipment as per operating manual with safety.
13. Perform basic fastening & fitting operation by using correct hand tools, power tools & equipments	13.1 Perform general cleaning of vehicle.
	13.2 Fitting of nut, bolts, & studs etc. and checking torque value
	13.3 Removal of stud/bolt from blind hole
	13.4 Remove & refit of lock nuts, circlips, and lock rings
	13.5 Riveting using drilling and Riveting tools
14. Apply basic cutting and grinding operations using correct hand & power tools	14.1 Identify and use PPE for different cutting & grinding works.
	14.2 Define safety precautions during cutting & grinding operations using hand & power tools.
	14.3 Make jobs using cutting tools like Hacksaw, files, chisel & sheet cutting scissors.
	14.4 OFF-hand grinding with sander.
	14.5 Cutting steel metal using hand held power saw.
	14.6 Perform grinding work using pneumatic, electric and battery powered grinder.
15. Perform cutting & grinding operations using powered equipment following standard operating procedures.	15.1 Safety precautions to be observed while using a drilling machine.
	15.2 Marking and Drilling clear and Blind Holes.
	15.3 Sharpening of Twist Drills.
	15.4 Selection of tape drill Size, use of Lubrication and tapping a Clear and Blind Hole.
	15.5 Use of tap extractor for to remove a broken tap.
	15.6 Cutting Threads on a Bolt/ Stud.
	15.7 Adjustment of two piece Die and cutting thread on a

	pipe piece.
	15.8 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.
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.	16.1 Prepare wire connections by joining wires using soldering Iron.
	16.2 Construction of simple electrical circuits and measuring of current voltage and resistance.
	16.3 Verify DC series & parallel circuits and its characteristics.
	16.4 Check out the open and short circuits in the lighting circuits.
	16.5 Using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.
	16.6 Check the voltage drop in the auto electrical system by using multimeter.
	16.7 Trace the auto electrical components by using vehicle wiring circuits.
	16.8 Check the condition of the solenoid switch in the starting system.
	16.9 Verify ohm's law and measure resistance using rheostat.
	16.10 Perform battery charging and check performance.
17. Perform Basics of Automobile industry & automobiles and able to identify & explain different types of vehicles , and service station equipment	17.1 Identify of different type of vehicles.
	17.2 Identify the different vehicle specification data and vehicle information number (VIN)
	17.3 Demonstrate the garage, service station different equipment
	17.4 Operate Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks**,** Stands.
18. Identify & explain various vehicle parts, different types of vehicle body, frame & chassis and sheets used , service information & guides and perform vehicle washing	18.1 Washing of vehicle
	18.2 Identification of different type body, chassis, Drive lines
	18.3 Identify the location of parts and panels
	18.4 Identify the parts of unibody design vehicle
	18.5 Identify the front body structural components of a

	transverse- mounted engine of FWD vehicle
	18.6 Identify the rear body structural components of a unibody sedan..
	18.7 Identify the under body front and rear section structural components of a unibody sedan.
	18.8 Identity the front, rear body structural components of mid-engine vehicle.
	18.9 Identify the parts of a full frame of pickup truck and Sports utility vehicle (SUV)
	18.10 Demonstrate the use of computer-based service information, service manuals, collision repair guides, refinishing guides, vehicle dimension manual, color matching guides, parts interchange guides.
19. Explain air compressors, compressed air line, safety precautions using compressed air and perform simple service and maintenance of compressors.	19.1 Identify the parts of a piston type stationary compressor.
	19.2 Overhauling of Air compressor and Overhauling of service (FRL) unit
	19.3 Drain the air receiver and the moisture separator/regulator or air transformer
	19.4 Check the level of the oil in the crankcase, clean air filter.
	19.5 Clean or blow off fins on cylinders, heads, intercoolers, aftercoolers.
	19.6 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
	19.7 Check the relief valve for exhausting of head pressure each time the motor stops.
	19.8 Tighten belts to prevent slippage.
	19.9 Check and align a loose motor pulley or compressor Flywheel
	19.10 Check for air leaks on the compressor outfit and air piping system
20. Assess damage to Vehicle, assist supervisor to prepare collision damage (accident) report and identify repair and replacement needs	20.1 Assist supervisor in preparation of collision damage report
	20.2 Prepare measurement reports of damaged vehicle
	20.3 List the damages and mark the repairing points in Body

	shop repair sequence procedures.
21. Explain welding, welding equipment, consumables, safety, tools & tackles, and perform Gas welding & cutting, MIG welding, Electrical resistance welding and Plasma arc cutting processes.	21.1 Identify the parts of an oxyacetylene welding and cutting outfit.
	21.2 Join sheet metal parts using Oxyacetylene welding process.
	21.3 Demonstrate torch flame adjustments for brazing and cutting operations
	21.4 Identify the different parts of MIG welding machine, select weld specification as per manual, select MIG wire size, set welding parameter and weld cracked door panel and plug weld hole for body panel.
	21.5 Demonstrate that Spraying anti spatter compound into a MIG nozzle will help protect the tip and prevent the wire from sticking in the gun.
	21.6 Perform on Flat, Horizontal, vertical and overhead welding positions..
	21.7 Perform on continuous, plug, stitch, MIG spot, lap, tack welding techniques.
	21.8 Identify the different parts of Electrical Resistance SPOT welding machine
	21.9 Perform Electrical resistance spot welding process on different thickness materials
	21.10 Conduct tip dressing, tip change, chisel test nugget test for spot welding to ensure the spot weld quality
	21.11 Plan and mark on surface for plasma cutting, select the torch/nozzle size, current and working pressure of gas as per requirement, set the marked plate properly on cutting table.
	21.12 Set the plasma cutting machine and perform the cutting operation by adapting proper techniques and safety aspects.
	21.13 Clean and inspect the cut surface for quality of cutting.
22. Analyze minor body damage and perform repair following sequential procedures involved in metal damages repair using appropriate tools	22.1 Perform using a hammer and dolly to straighten damage on a door
	22.2 Pry out a fender using long spoon and perform hammer straightening
	22.3 Using Pry picks remove small dents in hard-to-reach

& equipment with utmost safety.	areas.
	22.4 Repair minor dents using dent puller along a lip in the fender.
	22.5 Using a spot weld dent puller remove dents in steel Panels.
	22.6 Perform Paint Stripping using single action sander, Abrasive selection.
	22.7 Carry out maintenance of single action sander.
	22.8 Perform Body Filler application & Sanding to ensure body repair quality.
23. Evaluate the damages in plastic parts, take advice of seniors for requirements of repair or replacement and perform work on repairable damaged plastic parts or replace the damaged part.	23.1 Identify the thermoplastics, and thermosetting plastics
	23.2 Identify common automotive plastics used in the industry.
	23.3 Perform plastic parts repairs using chemical adhesive bonding techniques to repair of minor cuts and cracks.
	23.4 Perform reshaping of deformed plastic by using heat
24. Plan & organize to perform removal, adjustment, alignment, servicing, repairing & refitting of vehicle Hood, Bumpers, Fenders, Grille, Truck lid, Panels, and Trunk bed as per defined procedures & safely using correct hand & power tools.	24.1 Remove vehicle Hood as per Procedure, carry out Hood-to-hinge adjustment, hood height adjustment, hood latch adjustments and refit Hood.
	24.2 Remove Fender, service & clean and re-fit Fender.
	24.3 Remove front & rear Bumpers and Grille, clean & service bumpers & grille and re-fit as per procedure
	24.4 Remove Trunk-lid, service trunk bet, carry out adjustment on trunk lid, and re-fit
	24.5 Remove body panels, body trim and adhesive held moldings, and re-install panels and replace adhesive held moldings.
25. Recognize different type of glasses and perform to remove & reassemble different glasses, doors and roof panels in vehicles.	25.1 Recognise different type of glasses.
	25.2 Remove windshield, service windshield rubber gasket, align windshield into position during Installation, apply adhesive using a sealer gun to windshield glass.
	25.3 Identify the basic parts of a door assembly, remove door from vehicle, repair of modern power window regulator, door lock & latch, and service welded door hinges, conduct bolted door hinge adjustment.
	25.4 Perform Door glass adjustment, door trim panel

	installation tailgate glass service, station wagon tailgate adjustment, rear view mirror service, roof panel service.
	25.5 Roof panel service, fastened roof panel service, convertible top service, Sun roof service.
26. Recognize the different parts of cars passenger compartment and locate & repair air & water leakages, rattle noise and perform to remove, & refit the objects in vehicle passenger compartment.	26.1 Identify the different parts of Passenger Compartment.
	26.2 Service & repair Front seat, Rear bench Seat, seat cover, carpe, Head liner.
	26.3 Remove the dash board, console, instrument cluster etc. and refit after inspection & repair of damages.
	26.4 Locate and repair air and water leaks in passenger compartment.
	26.5 Checking drain hoses leaks & repair or replace the same
	26.6 Identify Rattle sound from passenger compartment & Dash board and perform rearing to eliminate rattle sound.
27. Apply knowledge of the procedures for diagnosing structural collision damage and measuring systems to identify location and extent of damage	27.1 Practical use of frame gauge, upper body dimensioning.
	27.2 Measurement of the front body, measurement of the body side panel, measurement of the rear body damages using the Gauge Measuring Systems, Strut Centerline Gauge.
	27.3 Identify the condition of collision, influence of impact on a body-over-frame vehicle, visually determine the extent of impact damage
	27.4 Inspecting for damage from passengers & luggage, Universal Measuring Systems, Computerized Measuring Systems.
28. Plan & organize to explain & perform different type of frame straightening and realignment procedures using special purpose equipment along with various anchoring methods and ensuring the structural integrity of the vehicle and occupant safety.	28.1 Analyze Length damage, Width damage and Height damage.
	28.2 Analyze front-end damage, rear damage, side damage, sag damage, twist damage, diamond damage, straightening strut, and tower damage
	28.3 Decide repair methods in consultation with seniors
	28.4 Service the Straightening equipments viz. Frame straightening equipment, In-floor straightening equipment, Anchor-pot system, Modular rail frame system, Portable body & frame pullers, Rack straightening system, Bench straightening system, and

	Anchoring the vehicle anchors, pulling clamps & chains.
	28.5 Clean & service the other straightening accessories viz. restraint bar, door aligner, engine holder, portable hydraulic rams, strut plate
	28.6 Perform Straightening and realigning techniques and sequence for a total structure realignment procedure on damaged vehicle
	28.7 Relieve stress with heat, stress concentrators
	28.8 Straighten strut tower damage, Frame Straightening Equipment, anchoring the vehicle using pulling clamps and chains
	28.9 Conduct Computerized measuring system procedure for planning the pull, making pull (single pull set-up or multiple pull set-up), execute pulling as per sequence defined in procedure.

8. SYLLABUS

SYLLABUS – AUTOMOTIVE BODY REPAIR (Flexi MoU)			
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)** 1. Familiarisation with institute. 2. Job opportunities in the automobile sector. 3. Introduction to the Course, duration, course content, study of the syllabus. 4. 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)** 1. Basic first aid. 2. Safety signs - for Danger, Warning, caution & personal safety message. 3. Safe handling of Fuel Spillage, Fire extinguishers used for Different types of fire. 4. Safe disposal of toxic dust, safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles. 5. Energy conservation-Definition, Energy Conservation Opportunities (ECOs)-Minor ECOs and Medium ECOs, Major ECOs), Safety disposal of Used engine oil, Electrical safety tips. 6. 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 viz. 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 caliper, 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 mirometer, Micrometer adjustments, measurement method. 2. Vernier calipers, 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 repair 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 power tools as described in operation manual 6. Operate body shop powered equipment as per operating	**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, different type of body

		manual with safety.	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 & equipment	**Fasteners (32 hrs)** 1. Perform general cleaning of vehicle. 2. Fitting of nut, bolts, & studs etc. and checking torque value. 3. Remove stud /bolt from blind hole and install new studs. 4. Remove & refit of lock nuts, circlips, and lock rings. 5. Fit bolts, nuts and different type screws using pneumatic tool 6. 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	**Cutting tools, Limits, Fits & Tolerances (32 hrs)**	**Cutting tools, Limits, Fits & Tolerances (6 hrs)**

	using correct hand & power tools.	1. Identify and use PPE for different cutting & grinding works. 2. Define safety precautions 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.	1. Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and uses, chisel. 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. Sharpening of Twist Drills. 3. Select tap drill Size, drill hole and perform tapping a clear and blind hole with using proper lubrication. 4. Remove a broken tap with the help of tap extractor. 5. Cut Threads on a Bolt/ Stud using thread die. 6. Adjustment of two piece Die and cutting thread on a pipe piece. 7. 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. 8. Carry out Marking on a MS plate, and perform grinding on pedestal grinder and using hand held powered grinder.	**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 & circuits in a vehicle and assemble circuit to ensure functionality of system.	**Basic electricity (32 hrs)** 1. Prepare wire connections by joining wires using soldering Iron. 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 conduct battery performance test.	**Basic electricity (6 hrs)** 1. **Basic electricity,** Electricity principles, Ground connections, Ohm's law, Voltage, Current, 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	**Auto 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.	**Auto 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, frame & chassis and sheets used, service information & guides and perform vehicle washing.	**Vehicle construction Technology (64 hrs)** 1. Conduct Washing of a vehicle. 2. Identify & describe different type body, chassis, Drive lines. 3. Identify the location of parts and panels. 4. Identify the parts of unibody design vehicle. 5. Identify the front body structural components of a transverse- mounted engine of FWD vehicle. 6. Identify the rear body structural components of a unibody sedan. 7. Identify the under body front and rear section structural components of a unibody sedan. 8. Identity the front, rear body structural components of mid-engine vehicle. 9. Identify the parts of a full frame of pickup truck and Sports utility vehicle (SUV). 10. Demonstrate the use of computer-based service information, service manuals, collision repair guides, refinishing guides, vehicle dimension manual, color matching guides, parts interchange guides.	**Vehicle construction Technology (12 hrs)** 1. Definition of collision repair, body shop, classification of body shop-Independent body shop, dealership body shop, specialty body shop. 2. Description of Repair order(RO) 3. Description of vehicle Body and Chassis, Vehicle Frame-definition, Body- overframe (Independent frame) construction, Hydro formed frame, Unibody construction. 4. Major Body Sections-Front, Center, rear section, and vehicle left and right sides. 5. Drive line configuration-Transverse engine, longitudinal engine, front-engine front wheel drive (FWD), front-engine rear wheel drive (RWD), Rear-engine rear wheel drive (RRD), Mid-engine rear wheel drive (MRD), Fourwheel drive (4WD). 6. Body Classifications- Based on Car size, Roof designs. 7. Body panels, Description of Unibody Panels and their parts, Unibody Design Factors, Advantage of Aerodynamic design, General unibody characteristics. 8. Plastic parts and panels,

			composite unibody frame, Aluminium vehicle construction, Body-Over-Frame Considerations - characteristics of body-overframe vehicles. 9. Full frame designs- Ladder frame, Perimeter frame, X-frame (or backbone frame), Crash Testing-Types of crash tests. 10. Service information, Specifications, and Measurements - Study of Service Information, basic steps to using refinishing materials information, Vehicle paint code, study of service symbols, diagnosis charts, wiring diagram,
13-14	Explain air compressors, compressed air line, safety precautions using compressed air and perform simple service and maintenance of compressors.	**Compressor & Air system (64 hrs)** 1. Identify the parts of a piston type stationary compressor. 2. Overhauling of Air compressor, Overhauling of 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, aftercoolers. 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	**Compressor & Air system (12 hrs)** 1. Basic requirement for compressed air systems. 2. Type of Compressor- Description and construction of Diaphragm compressor, piton type 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.

		piping system.	
15-17	Assess damage to Vehicle, assist supervisor to prepare collision damage (accident) report and identify repair and replacement needs	**Damage Assessment & Reports (96 hrs)** 1. Prepare measurement reports of damaged vehicle. 2. Assist supervisor in preparation of collision damage report 3. List the damages and mark on check list the repairing points in Body shop repair sequence procedures.	**Damage Assessment & Reports (18 hrs)** 1. Measurements of vehicle body and frame from service manual. 2. Measurements of damaged vehicle body and frame. 3. Prepare measurement reports. 4. Prepare Collision damage report. 5. Collision Repair Measurements.
18-23	Explain welding, welding equipment, consumables, safety, tools & tackles, and perform Gas welding & cutting, MIG welding, Electrical resistance welding and Plasma arc cutting processes	**Welding (192 hrs)** 1. Identify the parts of an oxyacetylene welding and cutting outfit. 2. Join sheet metal parts using Oxyacetylene welding process. 3. Demonstrate torch flame adjustments for brazing and cutting operations. 4. Identify the different parts of MIG welding machine, select weld specification as per manual, select MIG wire size, set welding parameter and weld cracked door panel and plug weld hole for body panel. 5. Demonstrate that Spraying anti spatter compound into a MIG nozzle will help protect the tip and prevent the wire from sticking in the gun. 6. Perform on Flat, Horizontal, vertical and overhead welding positions. 7. Perform on continuous, plug, stitch, MIG spot, lap, tack welding techniques. 8. Identify the different parts & define the function of Electrical Resistance SPOT	**Welding (36 hrs)** 1. Introduction to joining of metals, Welding characteristics, weld terminology, weld symbols. 2. Common Auto body welding techniques- MIG, TIG, Soft brazing. 3. Factory weld specification, 4. Typical Auto body MIG wire sizes, Typical Auto body shielding gases, Heat affected Zone (HAZ), Auto body MIG welding – Principles & characteristics, MIG welding 5. equipments, Welding lens, MIG operation methods, MIG welding equipment, MIG welding current, MIG Arc voltage, MIG Tip to base metal distance, MIG gun angle and 6. welding direction, MIG shield gas flow volume, MIG welding speed, MIG wire speed, MIG gun nozzle adjustment, Heat buildup penetration, clamping tools for welding, Welding position. 7. Welding Technique- Tack weld, Continuous weld, plug weld, spot weld, lap weld, stitch weld, intermittent weld. 8. Base welding method-Butt welds, lap & flange welding, plug

		welding machine. 9. Perform Electrical resistance spot welding process on different thickness materials. 10. Conduct tip dressing, tip change, chisel test nugget test for spot welding to ensure the spot weld quality. 11. Plan and mark on surface for plasma cutting, select the torch/nozzle size, current and working pressure of gas as per requirement, set the marked plate properly on cutting table. 12. Set the plasma cutting machine and perform the cutting operation by adapting proper techniques and safety aspects. 13. Clean and inspect the cut surface for quality of cutting	weld, stitch weld 9. MIG welding of Galvanized metals & Aluminum, Welding Aluminum. 10. MIG weld defects, Testing the MIG weld. 11. FCAW (Flux cored Arc welding), TIG Welding, Resistance spot welding. 12. Resistance spot welding components, Spot welder adjustments, Operating a squeeze-type resistance spot welder. 13. Other spot welding functions, stud spot welds for dent removal, 14. Oxyacetylene welding, welding & cutting equipment, types of flame and adjustment, welding torch flame adjustment, gas cutting torch flame adjustment, cutting HSS for salvage purposes, Heat crayons, Cleaning with a torch, Probable causes and remedies for flame abnormalities. 15. Brazing, interaction of flux and brazing rods, Brazing joint strength, Brazing operations, Treatment after brazing. 16. Soldering (soft brazing) soldering 17. Procedure. 18. Plasma arc cutting, operating a plasma arc cutter. 19. Advantage and disadvantage over different type of welding methods.
24-26	**Project work, Revision & Mid-Term Exam**		
27-29	Analyze minor body damage and perform repair work following sequential procedures involved in metal	**Sheet metal repair (96 hrs)** **Practice on minor repair of damaged car**. 1. Perform using a hammer and dolly to straighten damage on	**Sheet metal repair (18 hrs)** 1. Automotive sheet metal, basic steps for correcting minor sheet metal damage. 2. Low carbon steel, high strength

	damages repair using appropriate tools & equipment with utmost safety.	a door. 2. Pry out a fender using long spoon and perform hammer straightening. 3. Using Pry picks remove small dents in hard-to-reach areas. 4. Repair minor dents using dent puller along a lip in the fender. 5. Using a spot weld dent puller remove dents in steel Panels. 6. Perform Paint Stripping using single action sander, Abrasive selection. 7. Carry out maintenance of single action sander. 8. Perform Body Filler application & Sanding to ensure body repair quality.	steels (HSS) - Type of HSS, High tensile strength steel (HTSS), Type of loading- Tensile, compress, shear, cleavage, peel. 3. Properties of sheet metal- Yield strength, Compressive strength, shear strength, torsional strength, effect of impact forces (Yield point), elastic deformation, plastic deformation, work hardening. 4. Classifying body damage- direct damage, indirect damage, work hardening, analyzing sheet metal damage, 5. Buckels-simple hinge buckles, pressure forces, single crown panels-door dings. 6. Determining the direction of damage - metal straightening technique- using body hammer. 7. Bumping dent repair with dollies, Hammer-on-dolly method, Hammer-off-dolly method, picking dents, unlocking on a hammer & dolly, straightening with body spoons. 8. Other metal straightening method-paint removal, pulling dents, spot-weld dent pullers, metal shrinking, stress reliving, stretched metal, Principle of shrinking , shrinking steel panel with heat, Kinking, shrinking a gouge, filing the repair area, 9. Working on Aluminum panels, working Aluminum with hammer and dolly, straightening aluminum with hammer, filling and grinding aluminum, straightening aluminum by heat shrinkage. 10. Paint less dent removal method. 11. Introduction to Paint: Primer-sealer, top coats, paint material

			types- Lacquer, enamel, water base, Content of paint-pain pigments, paint binders, paint solvents, Paint additives, Definition of Drying, curing, flash, retarder, accelerator, catalyst, adhesion promoter, blending solvent, Toners, 12. Primers & sealers- selecting primer, UV primer 13. Requirement of body filler, components of body filler (filler & hardner), mixing ratio of filler and hardner, tools used for mixing and application - Spatula, Board, application process, drying of body filler using conventional procedure and infrared drier, scuffing, sanding of body filler, defects in body filler application, final finishing of body panel.
30-31	Evaluate the damages in plastic parts, take advice of seniors for requirements of repair or replacement and perform work on repairable damaged plastic parts or replace the damaged part.	**Repairing Plastics (64 hrs)** 1. Identify the thermoplastics, and thermosetting plastics.. 2. Identify common automotive plastics used in the industry. 3. Perform plastic parts repairs using chemical adhesive bonding techniques to repair of minor cuts and cracks. 4. Perform reshaping of deformed plastic by using heat.	**Repairing Plastics (12 hrs)** 1. Introduction to plastics, Types of Plastics-Thermoplastics, thermosetting plastics. 2. Safety points observed while working with plastic repair. 3. Common automotive plastics-identification, plastic repair, chemical adhesive bonding techniques- repair of minor cuts and cracks, repair of tears, and punctures, using the right adhesive. 4. Flexible part repair- Plastic welding, Hot air plastic welding, High speed plastic welds, plastic welder setup shutdown, and servicing, 5. Airless plastic welding, ultrasonic plastic welding, plastic welding procedures, general plastic welding, techniques, Plastic tack welding, plastic welding

			procedures, airless melt-flow plastic welding, plastic stitch-tamp welding, single-sided plastic welds, two sided plastic welds, repairing vinyl, using heat to reshape plastics, ultrasonic stud welding, reinforced plastic repairs.
32-35	Plan & organize to perform removal, adjustment, alignment, servicing, repairing & refitting of vehicle Hood, Bumpers, Fenders, Grille, Truck lid, Panels, and Trunk bed as per defined procedures & safely using correct hand & power tools.	**Hood, Bumper, Fender, Lid, And Trim Service (128 hrs)** 1. Remove vehicle Hood as per Procedure, carry out Hood-to-hinge adjustment, hood height adjustment, hood latch adjustments and refit Hood. 2. Remove Fender, service & clean and re-fit Fender. 3. Remove front & rear Bumpers and Grille, clean & service bumpers & grille and re-fit as per procedure. 4. Remove Trunk-lid, service trunk bet, carry out adjustment on trunk lid, and re-fit. 5. Remove body panels, body trim and adhesive held moldings, and re-install panels and replace adhesive held moldings.	**Hood, Bumper, Fender, Lid, And Trim Service (24 hrs)** 1. Part removal Sequence, Hood service- Hood removal, Hood adjustment, Hood-to-hinge adjustment, hood height adjustment, hood latch mechanism, hood latch adjustments. 2. Bumper replacements, 3. Fender service- Fender removal, installing fenders, fender adjustments. 4. Grille removal, service and refitting. 5. Trunk lid adjustments, panel alignment, Truck bed service, sound- Deadening pads, custom body panels. 6. Installing body trim and moldings, removing adhesive held moldings, installing adhesive body sine moldings.
36-37	Recognize different type of glasses and perform to remove & reassemble different glasses, doors and roof panels in vehicles.	**Door, roof, and glass Service (64 hrs)** 1. Recognise different type of glasses such as Laminated glass, Toughened glass, Tempered glass, Convex mirror, simple mirror, Concave mirror etc.. 2. Remove windshield, service windshield rubber gasket, align windshield into position during Installation, apply adhesive using a sealer gun to windshield glass.	**Door, roof, and glass Service (12 hrs)** 1. Vehicle Glass Technology- Introduction, type of glass laminated, plate glass, tempered glass. 2. Glass service- removing windshield molding, windshield rubber gasket service, Glass adhesive-full cut-out method, glass adhesive, partial cutout method, windshield wiper service. 3. Rear and quarter window

		3. Identify the basic parts of a door assembly, remove door from vehicle, repair of modern power window regulator, door lock & latch, and service welded door hinges, conduct bolted door hinge adjustment. 4. Perform Door glass adjustment, door trim panel installation tailgate glass service, station wagon tailgate adjustment, rear view mirror service, roof panel service. 5. Roof panel service, fastened roof panel service, convertible top service, Sun roof service	service, service 4. Doors-door construction, manual & power regulators, checking door operation, door removal, door weather strip service, Door inner trim panel Door window regulator service, door lock & latch service, Door reinforcements, panel adhesive technology, Replacing bonded door skins, replacing SMC(Sheet molded compound) Door skins, Door & Door glass adjustments, servicing welded door hinges, bolted door hinge adjustment. 5. Door glass service- Door glass adjustment, door trim panel installation tailgate glass service, station wagon tailgate adjustment, Glass element repairs, rear view mirror service, 6. Roof panel service, fastened roof panel service, convertible top service, Sun roof service
38-40	Recognize the different parts or objects of cars passenger compartment and locate & repair air & water leakages, rattle noise and perform to remove, & refit the objects in vehicle passenger compartment.	**Passenger compartment Service (96 hrs)** 1. Identify the different parts or objects of Passenger Compartment. 2. Service & repair Front seat, Rear bench Seat, seat cover, carpe, Head liner. 3. Remove the dash board, console, instrument cluster etc. and refit after inspection & repair of damages. 4. Locate and repair air and water leaks in passenger compartment. 5. Check drain hoses leaks & repair or replace the same. 6. Identify Rattle sound from passenger compartment & Dash board and perform rearing to eliminate rattle	**Passenger compartment Service (18 hrs)** 1. Major parts of Passenger Compartment - dash assembly, instrument cluster, seat assemblies, interior trim, steering column 2. assembly, headliner assembly, carpeting, weather stripping, Interior trim-pillar trim panels, dash panel, door trim panels, Glass trim panels, sill plates, interior trim service- procedure, roll bars, 3. Seat service- Front seat service, Rear bench seat service, seat cover service, carpeting service. 4. Dash panel service, console service, Instrument cluster service. 5. Headliner service, locating air

		sound.	and water leaks- checking drain hoses, wind noise.
41-43	Apply knowledge of the procedures for diagnosing structural collision damage and measuring systems to identify location and extent of damage	**Major Body/frame damage Measurement (96 hrs)** 1. Explain use and method of measurement of frame gauge, upper body dimensioning. 2. Take measurement of the front body, measurement of the body side panel, measurement of the rear body damages using the Gauge Measuring Systems, Strut Centerline Gauge. 3. Identify the condition of collision, influence of impact on a body-over-frame vehicle, visually determine the extent of impact damage. 4. Inspect for damage from passengers & luggage, 5. Apply Universal Measuring Systems, Computerized Measuring Systems.	**Major Body/frame damage Measurement (18 hrs)** 1. Vehicle measurement-collision repair process, diagnostic procedure for collision damage, 2. impact and its effects on a vehicle- Determining the condition of collision, influence of impact on a body-over-frame vehicle. 3. Frame deformation-sideway damage, sag damage, mash damage, diamond damage, twist damage, impact effect on unibody vehicles- primary damage area, secondary damage area, collision damage sequence, visually determine the extent of impact damage, inspecting for damage from passengers & luggage compartments. 4. Body dimensions- body dimension charts, vehicle measuring basics, measurement importance, 5. Gauge measuring system- frame gauge, upper body dimensioning, measurement of the front body, measurement of the body side panel, measurement of the rear body, digital tram gauges, dimensional references, the centre panel, zero planes. 6. Diagnosing damage, measuring Vehicle Impact and Its Effects on a vehicle, Visually Determining the Extent of Impact Damage. 7. Measurement of Body Dimensions, Gauge Measuring System, Tram Gauges, Digital Tram Gauges, Centering Gauges.
44-49	Plan & organize to explain & perform	**Unibody/frame alignment (192 hrs)**	**Unibody/frame alignment (36 hrs)** 1. Realignment basics-vehicle

	different type of frame straightening and realignment procedures using special purpose equipment along with various anchoring methods and ensuring the structural integrity of the vehicle and occupant safety.	1. Analyze Length damage, Width damage and Height damage. 2. Analyze front-end damage, rear damage, side damage, sag damage, twist damage, diamond damage, straightening strut, and tower damage. 3. Decide repair methods in consultation with seniors. 4. Service the Straightening equipments viz. Frame straightening equipment, In-floor straightening equipment, Anchor-pot system, Modular rail frame system, Portable body & frame pullers, Rack straightening system, Bench straightening system, and Anchoring the vehicle anchors, pulling clamps & chains. 5. Clean & service the other straightening accessories viz. restraint bar, door aligner, engine holder, portable hydraulic rams, strut plate. 6. Perform Straightening and realigning techniques and sequence for a total structure realignment procedure on damaged vehicle. 7. Relieve stress with heat, stress concentrators 8. Straighten strut tower damage, Frame Straightening Equipment, anchoring the vehicle using pulling clamps and chains. 9. Conduct Computerized measuring system procedure for planning the pull, making pull (single pull set-up or multiple pull set-up), execute pulling as per sequence	anchoring and pulling, pulling direction, single-pull method, multiple-pull Method 2. Visualizing front-end Collisions, rear-end collisions, side collision, rollover damage, angled impacts. 3. Unibody/Frame Straightening Equipment, in-floor straightening equipment-anchor-pot system and the modular rail frame system. 4. Portable body and frame pullers, rack (floor) straightening systems, bench straightening systems, anchoring the vehicle using pulling clamps and chains. 5. Other straightening accessories-restraint bar , door aligner, engine holder, portable hydraulic rams, strut plate. 6. Straightening and realigning techniques-sequence for a total structure realignment procedure , unibody/frame realignment safety, Measuring when pulling. 7. Computerized measuring systems, procedure for planning the pull, making pulls-single-pull setup, multiple-pull setups, executing a pulling sequence, purpose of over pulling.

		defined in procedure.	
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 SUV car. c) Prepare models showing structure / pillars of a sedan car frame. d) Prepare model showing different stages of car body repairing process. e) Prepare a working model of lead-acid battery. f) Prepare a chart showing lay out and configuration of vehicle body shop..		
51	**Revision**		
52	**Examination**		

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Duration: One Year		
S No.	**Workshop Calculation (46 hrs) and Science (46 Hrs) (Total 92 Hrs)**	**Engineering Drawing (92 Hours)**
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	**Factorisation and quadratics:** multiply expressions in brackets by a number, symbol or by another expression in a bracket; by extraction of a common factor eg ax + ay, a(x + 2) + b(x + 2) ; by grouping eg ax - ay + bx - by ; quadratic expressions eg a + 2ab + b ; roots of an equation e.g. quadratic equations with real roots by factorisation, 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 monodetail and a multidetail 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,	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.

	Alternate Angle Angles. Supplementary angles, Complementary angles	
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 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	Drawing Block diagram of plastic welding set up and position, Free hand sketching of Intermittent tack weld and shallow continuous tack.
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 138 Hours)	
1. English Literacy	**Duration: 25 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: 25 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: 19 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 effective listening, 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: 17 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 and relation 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 and the available scheme.	
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.	
5. Productivity		**Duration: 14 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: 16 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-acoustic Hazards, 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: 8 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: 14 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 REPAIR (Flexi MoU) (For batch of 20 candidates)			
S No.	**Name of the Tool & Equipments**	**Specification**	**Quantity (Nos.)**
A. TRAINEES TOOL KIT			
1.	Allen Key set	12 pieces (2mm to 14mm)	7
2.	Body hammer (long pick)		7
3.	Body hammer, cross chisel (finishing hammer)		7
4.	Body hammer, utility pick (short pick)		7
5.	Caliper inside	15 cm Spring	7
6.	Calipers outside	15 cm spring	7
7.	Center Punch	10 mm. Dia. x 100 mm.	7
8.	Different type of spoon		7
9.	Dividers 15 cm Spring 6	15 cm Spring	7
10.	Electrician Screw Driver	2500mm	7
11.	General purpose dolly		7
12.	Hammer ball peen	0.5 kg with handle	7
13.	Hands file	20 cm. Second cut flat	7
14.	Pliers combination	20 cm.	7
15.	Safety glasses		7

16.	Screw driver	20cm.X 9mm. Blade	7
17.	Screw driver	30 cm. X 9 mm. Blade	7
18.	Scriber	15 cm	7
19.	Spanner D.E. set	12 pieces (6mm to 32mm)	7
20.	Spanner, ring set	12 metric sizes 6 to 32 mm.	7
21.	Spanners socket with speed handle, T-bar, ratchet and universal upto 32 mm	set of 28 pieces with box	7
22.	Steel rule	30 cm inch and metric	7
23.	Steel tool box with lock and key (folding type)	400x200x150 mm	7
24.	Toe dolly		7
25.	Wire cutter and stripper		7
B. INSTRUMENTS AND GENERAL SHOP OUTFIT - For 2 (1+1) units no additional items are required			
26.	Adjustable spanner	(pipe wrench 350 mm)	2
27.	Air blow gun with standard accessories		1
28.	Air impact wrench with standard accessories		4
29.	Air ratchet with standard accessories		4
30.	Allen Key set	12 pieces (2mm to 14mm)	2
31.	Ammeter	300A/ 60A DC with external shunt	5
32.	Angle plate adjustable	250x150x175	1
33.	Angle plate	size 200x100x200mm	2
34.	Anvil	50 Kgs with Stand	1
35.	Battery –charger		2
36.	Blow Lamp	1 litre	2
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 scrapper, putty mixing board, putty applicator /knife		2 each
114.	Pane l buffing machine	18 cm	2
115.	Philips Screw Driver	set of 5 pieces (100 mm to 300 mm)	2 sets
116.	Pipe cutting tool		2
117.	Pipe flaring tool		2
118.	Plastic feeler gauges		2

119.	Pliers combination 20 cm.	20 cm.	2
120.	Pliers flat nose	15 cm	2
121.	Pliers round nose	15 cm	2
122.	Pliers side cutting	15 cm	2
123.	Portable electric drill Machine		1
124.	Prick Punch	15 cm	4
125.	Punch Letter (Number)	4mm	2 set
126.	Right cut snips 250mm	250mm	4
127.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	4
128.	Scraper flat	25 cm	4
129.	Scraper half round	25 cm	4
130.	Scraper Triangular	25 cm	2
131.	Scriber	15 cm	4
132.	Scriber with scribing black universal		2
133.	Set of stock and dies – Metric		2 set
134.	Shear Tin Man's	450 mm x 600mm	4
135.	Sheet metal cutting pliers-left, right hand and straight –jaw Configuration		1 set
136.	Sheet Metal Gauge		2
137.	Shear Tinman’s	300mm	4
138.	Soldering Copper	Hatchet type 500gms	5
139.	Solid Parallels in pairs (Different size) in Metric		2
140.	Spanner Clyburn	15 cm	1
141.	Spanner D.E.	set of 12 pieces (6mm to 32mm)	4
142.	Spanner T. flocks for screwing up and unscrewing inaccessible		2
143.	Spanner, adjustable 15cm.	15cm.	2
144.	Spanner, ring	set of 12 metric sizes 6 to 32 mm.	2
145.	Spanners socket with speed handle, T-bar, ratchet and universal		2
146.	Spark lighter		2
147.	Spark plug spanner	14mm x 18mm x Size	2
148.	Spirit level	2 V 250, 05 metre	2
149.	Steel measuring tape	10 meter in a case	2
150.	Steel rule	15 cm inch and metric	2
151.	Steel rule	30 cm inch and metric	4
152.	Steel wire Brush	50mmx150mm	4
153.	Straight edge gauge	2 ft.	1
154.	Stud extractor	set of 3	2 sets
155.	Stud remover with socket handle		1

156.	Suction cup		2
157.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm		2
158.	Taps and Dies complete sets (5 types)		1 set
159.	Taps and wrenches - Metric		2 sets
160.	Telescope gauge		4
161.	Thread pitch gauge metric, BSW		1
162.	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
163.	Trammel	30 cm	2
164.	Trim and upholstery tools		1 set
165.	Tyre pressure gauge with holding nipple		2
166.	Universal puller for removing pulleys, bearings		1
167.	V' Block	75 x 38 mm pair with Clamps	2
168.	Vacuum gauge	to read 0 to 760 mm of Hg.	2
169.	Various sanding blocks-soft, hard, speed file & de-nibbling tools		2 sets
170.	Vernier caliper	0-300 mm with least count 0.02mm	4
171.	Vice grip pliers		2
172.	Voltmeter	50V/DC	5
173.	W ire Gauge (metric)		5
174.	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	1
C. GENERAL INSTALLATION/ MACHINERIES			
175.	Angle grinder	(10-12 cm) - for cutting and grinding	2
176.	Arbor press hand operated	2 ton capacity	1
177.	Belt sander (Narrow surface)		1
178.	Bench lever shears	250 mm Blade x 3mm Capacity	1
179.	Body measurement tools- Gunsight, trammel gauge,	2 m straight edge & Measuring tape 2 each	2 each
180.	Body repair hand tools – Various hammers, dollies, spoons, files, line chisel, hacksaw, clamps, & sanding blocks		2 each
181.	Body shell - Light Motor vehicle of different MODELS		4
182.	Bonded auto glass removal &		2

	replacement tools		
183.	Caulking / panel seam sealer / panel adhesive application gun		2
184.	Chassis alignment equipment (incorporating measurement system)		1
185.	Compressed air line -10m (on retractable reel, with high flow connectors) with FRL unit		1
186.	Die Grinding kit		2
187.	Disc sander 18 cm		2
188.	Discrete Component Trainer / Basic Electronics Trainer		1
189.	Drilling machine bench to drill up to 12mm dia along with accessories		1
190.	Dual Magnetization Yoke AC / HWDC, 230 VAC, 50Hz		1 set
191.	Dust extraction connections (Vacuum)		2
192.	Electronic heat shrinking equipment (carbon rod, induction or copper)		1
193.	Gas Welding Table	1220mm x760mm	1
194.	Grinding machine (general purpose)	D.E. pedestal with 300 mm dia wheels rough and smooth	1
195.	Hydraulic jack	HI-LIFT type - 3 ton capacity, 5 ton 1each capacity	1 each
196.	Infrared drying lamp unit		1
197.	MIG welding machine complete set	400Amp	2
198.	Motor Vehicle suitable for Body shop repair -Light Motor vehicle of different Models		2
199.	Oxy-acetylene welding equipment with complete accessories (Low & high)		2
200.	Pipe Bending Machine (Hydraulic type)	12mm to 30mm	1
201.	Plasma cutter		1
202.	Pneumatic rivet gun		2
203.	Power hacksaw kit		2
204.	Random /dual action orbital sander 12-15 cm		2
205.	Spot weld cutter- Drill type, Hole saw type		1
206.	Spot weld removal kit / drill along with accessories		2
207.	Spot welder (single and double sided)		2

208.	Tin smiths bench folder	600 x 1.6mm	1
209.	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
210.	Weld through primer application equipment		2
211.	Welding plant Oxy-Acetylene complete (high pressure)		2
212.	Welding Transformer	200 to 400 Amps	2
213.	Weld-on pin/ ring panel puller kit		2
D. CONSUMABLE			
214.	Battery- SMF		As required
215.	Brake fluids		As required
216.	Chalk. Prussian blue.		As required
217.	Chemical compound for fasteners		As required
218.	Diesel		As required
219.	Different type gasket material		As required
220.	Different type of oil seal		As required
221.	Drill Twist (assorted)		As required
222.	Engine Oil		As required
223.	Engine Coolant		As required
224.	Emery paper - 36-60 grit .	80-120	As required
225.	Gear oils		As required
226.	Hacksaw blade (consumable)		As required
227.	Hand rubber gloves tested for 5000 V		As required
228.	Holders. lamp teakwood boards. Plug sockets.		As required
229.	Hydrometer		As required
230.	Lapping abrasives		As required
231.	Leather Apron		As required
232.	Petrol		As required
233.	Power steering oil		As required
234.	Radiator Coolants		As required
235.	Gloves for Welding (Leather and Asbestos)		As required
236.	Cotton waste/ cloth		As required
237.	Body filler (Consumable)		As required
238.	Body filler (Consumable)		As required
239.	Masking paper / plastic & back-masking tape		As required
240.	Refinishing material (consumable)		As required

E. WORKSHOP FURNITURE			
241.	Book shelf (glass panel)	6V2' x 3' x IV2'	As required
242.	Computer Chair		1+1
243.	Computer Table		1+1
244.	Desktop computer and related MS office software		1+1
245.	Discussion Table 8' x 4' x 21/2 '		2
246.	Fire Extinguishers. first- aid box		As required
247.	Instructional Material – NIMI Books/Ref. books		As required
248.	Internet connection with all accessories		As required
249.	Laser printer		1
250.	LCD projector/ LED /LCD TV 42"		1
251.	Multimedia DVD for Automotive		As required
252.	Online UPS 2KVA		1
253.	Stools		21
254.	Storage Rack 61/2 ' x 3' x W2		As required
255.	Storage shelf 6% ' x 3' x 15'		As required
256.	Suitable class room furniture		As required
257.	Suitable Work Tables with vices		As required
258.	Tool Cabinet	6' x 3' x 1'	2
259.	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):