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

COMPETENCY BASED CURRICULUM

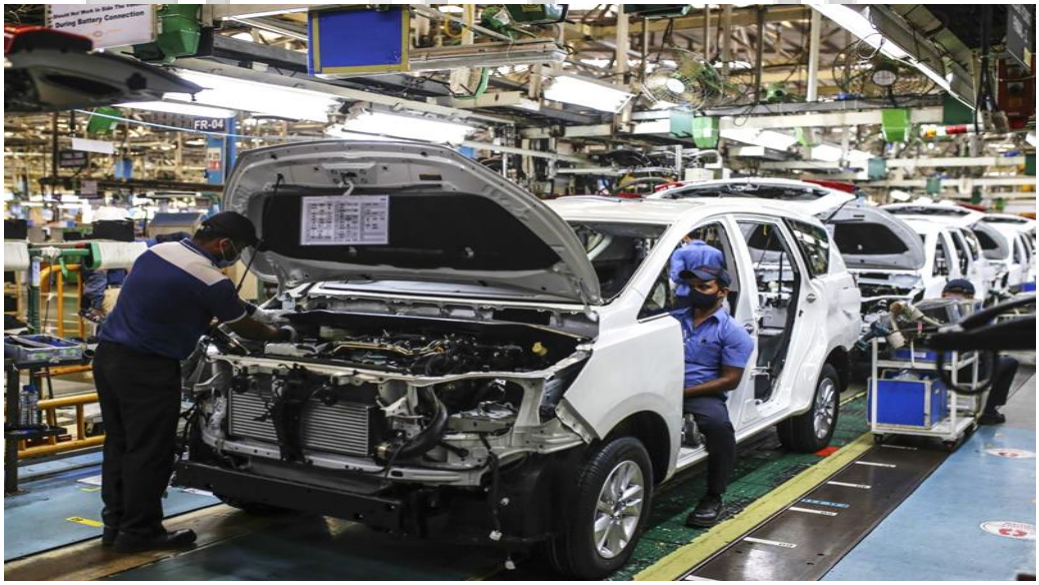
ASSEMBLY TECHNICIAN (AUTOMOTIVE)

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL- 4



SECTOR – AUTOMOTIVE

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

ASSEMBLY TECHNICIAN (AUTOMOTIVE)

(Engineering Trade)

(Designed in 2022)

Version: 1.0

CRAFTSMEN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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CONTENTS

1. COURSE INFORMATION

Flexi- MoU is one of the pioneer program under DGT on the basis of the MoU in between DGT & Industry Training Partner (ITP) for propagating vocational training to allow industries to take advantage of various schemes for conducting training program in higher employment potential courses according to needs of industries. The concept of Flexi- MoU was introduced in June-July 2014. DGT and Industry Training Partner (ITP) shall decide to sign the 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 two-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:

FIRST YEAR - In the first year, the contents covered are safety aspects related to trade, familiarization with automobile systems and components, vehicle engine components, classification of engines, comparison between petrol & diesel engine, VVT system, and valve clearance adjustment, theory & practical knowledge of Petrol engine, in take & exhaust systems, gasoline fuel characteristics, fuel supply system, electronic fuel injection(EFI), & their working and basic automobile manufacturing skills & process such as basic fitting operation(Tightening, connection, filling, drilling tapping & Insertion), theory & practical knowledge of 2-stroke & 4-stroke SI & CIengines, compression ratio, stoichio metricatio, vehicle assembly process through plant visit, basic vehicle assembly and basic vehicle in section & testing process. This year also covers practical training starting with practice with tools & measuring instruments viz. Vernier caliper, micrometer, height gauge, dial gauge, slip gauge, feeler gauge, go-no go gauges etc. This year's syllabus also covers theory & practical knowledge required for assembler, like engine, steering system, transmission system, differential, suspension system, different types of belts in vehicle, under bonnet components, wheel alignment, battery function. This is followed by on job training in practice in different assembly lines including line of automation in manufacturing & automation components.

SECOND YEAR- In this year, the job covers. Installation of vehicle interior components and assembling engine, power train components, suspension, and brake assembly. This is followed by installation of final line assembly and underbody components, The final year course also covers automobile pollution, and harmful effect of pollution, Trainee also learns the Quality control and inspection & testing process in an automobile company which includes on-line stage inspection to final inspection & testing of completely assembled vehicles.

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 the Labour market. The vocational training programmes are running under aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes under DGT for propagating vocational training.

The best outcome from the ITP 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 Industry Training Partner (ITP). They will ensure that not less than 50% of trainees are placed with Industry Training Partner (ITP) or its business partners for not less than Two years 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. Industry Training Partner (ITP) 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 Industry Training Partner (ITP). 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 work, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job.
- Check the survey drawing and data and rectify errors.
- Document the technical parameters related to the task undertaken. Process data recorded during field measurements and make relevant conclusions.

2.2 PROGRESSION PATHWAYS

- Can take admission in diploma course in notified branches of Engineering by lateral entry.
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of two years:

S No.	Course Element	Notional Training Hours	
		1st Year	2nd Year
1	Professional Skill (Trade Practical)	1680	1680
2	Professional Knowledge (Trade Theory)	180	180
3	Workshop Calculation Science & Engineering Drawing	150	150
5	Employability Skills	120	60
	Total Hours	**4200**	

2.4 ASSESSMENT & CERTIFICATION

I. Conducting training of selected candidates is the sole responsibility ofIndustrial Training Partner (ITP).

II. Assessment will be jointly done by ITP and DGT. Practical and formative assessment shall be conducted by ITP, and Computer Based theoretical exams shall be conducted by DGT.

III. ITP must refer to the latest examination reform guidelines issued by DGT dated 4thOctober 2018 any changes or revisions to the same shall be applicable to flexi-MoU scheme.

IV. Maximum attempts for clearing the exam and obtaining NTC shall be in line with CTS.

V. For practical examination and formative assessment, ITP has been given flexibility to design the questions, assess the candidates and upload their marks in the scheme portal.

VI. ITP shall develop a comprehensive Question Bank (in English and Hindi) of minimum 1000 questions, grouped by chapters and difficulty level. The same shall be vetted by NIMI experts and then be handed over to DGT for conducting theory exams. DGT may add some questions to the same before conducting actual exams.

VII. Theoretical exams shall be conducted by DGT in Computer Based Test format. Upon completion of course and payment of requisite examination fee by ITP, admit cards shall be generated by scheme portal.

VIII. DGT shall arrange for conduct of computer-based theory exam at designated examination centres & certify the successful trainees with e-NTC under flexi-MoU scheme with mention of ITP name in the Certificate.

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

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

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

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

2.4.1 PASS REGULATION

The minimum pass percentage for practical is 60% & minimum pass percentage of theory subjects is 33%.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

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

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

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while

due regard for safety procedures and practices	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

Automotive Assembly: ASSEMBLY TECHNICIAN (AUTOMOTIVE)trainees assembles the mechanical sub systems. The individual at work is responsible for assembling mechanical modules from molded, welded or forged components to produce the final mechanical sub assembly of the product.

Assembler, Automobile; Assembler (Automobile) assembles different parts and units of automobile, installs them on frame and makes necessary connections, adjustment, settings etc. according to specifications. Assembles engine, gear box, front and rear axles etc. individually according to specifications and ensures heirstipulated performance. Places body frames, side members, supporting frames etc. in special jigs and secures them tightly by fixing bolts and nuts to different parts. Fits front and rear axle to body and tightens with nuts and bolts. Collects various components and parts from sub assembly or from nearby bins and fits them to body or chassis as appropriate. Lifts assembled engine manually or using hoisting equipment carefully, places it over engine frame of chassis and secures it in position with bolts and nuts. Fits clutch, gear box propeller shaft, etc. and makes necessary settings and adjustments. Gathers such parts like radiator, alternator, water pump, hydraulic/vacuum brakes etc. from nearby sub-assembly line and fits them to vehicle. Makes necessary adjustments, connections and alterations to fittings as directed. Checks for wheel alignment using special equipment and makes necessary adjustments to brakes. Delivers assembled vehicle to trim line for fitting of upholstery, door and window glasses, door locks and other fittings. Lubricates various moving parts of vehicle with grease or oil. May assemble only engine, gear boxes, axles, hydraulic brake system etc. in sub-assembly line and be designated accordingly.

Assembler, Stationary Petrol Engine; Assembler, Stationary Petrol Engine assembles stationary petrol engine with finished components, tunes engine and tests performance. Checks condition and cleaning of various engine parts such as crankshaft, camshaft, connecting rod, pistons, tappets, valves, valve guides, spring etc. and measures appropriate parts to assess service ability, recondition ingorre placement as necessary. Scrapes bearings, grinds valves, files piston rings, assembles pistons with connecting rods and fits camshaft, crankshaft, flywheel, cylinder block, piston assemblies, valves etc. according to design in order of sequence using hoisting device, stand, special service tools and other implements ensuring necessary movement and clearances as specified. Sets valve timing, meshes timing wheels on cam and crankshafts and fastens cylinder head with gasket on cylinder block. Assembles and fits fuel pumps lubrication and fuel pipes, sparking plugs etc. Fits distributor according to ignition timing and makes electrical connections with battery, ignition coil, plugs cutout, etc. Fits radiator, fan pulleys, water pump, etc. Sets tappets and starts engine. Tunes engine and runs it for prescribed number of hours. May test engine horse power, necessary hose connection etc. May suggest alterations in fittings.

Assembler, Stationary Diesel Engine; Assembler, Stationary Diesel Engine assembles stationary

diesel engine from finished components, makes adjustments, sets alignments, clearances etc. and ensures stipulated performance. Fits or assembles various parts to engine

Block such as crankshaft, camshaft, main bearing, connecting rods, timing gears pistons, fuel pump, atomizer, automatic timing mechanism, exhaust manifold suspension, etc. using spanners, wrenches, screwdrivers and other special tools and devices. Collects various parts like nuts,
bolts, washers etc. from nearby bins and fits or screws them to cylinder head. Checks assembled units or parts at every stage for prescribed accuracy, alignment, tolerance etc. using special tools. Records part number fitted or assembled to engine block and notes factual details or position regarding clearances, adjustments etc. made. Assembles other sub-assemblies like starter, alternator timing chain, heater assembly switch, radiator etc. Places assembled engine at central places for engine test. May conduct engine test.

Assembler, Electrical Accessories; Assembler, Electrical Accessories assembles mechanical parts of electrical equipment, such as light sockets, switches, terminal boards, and plugging devices: Fits together parts, such as socket bases, shafts, contact fingers, and springs, in specified sequence, using fixtures, screwdrivers, and air nut runners. Tests actions of moving parts and listens for unusual sounds to detect defective parts for faulty operation. Verifies completed assembly against pictorial drawings.

Fitter Automobile; Fitter, Automobile attends to minor repairs to motor vehicles under guidance of Mechanic Automobile. Receives instruction from mechanic, Automobile about tasks to attend. Jacks up vehicle to required height for repair in convenient position where necessary. Does minor repairs, replacements and adjustments and performs simple fitting operation such as dismantling, tightening, lubricates joints etc. May work in workshops or garage. May drive vehicle on road after receiving license. May be designated as assembler.

In summary the "Automotive Assembly Technician will be able to explain & comply with Health Safety & Environment procedures, part of the team of manufacturing technicians of four wheelers in a vehicle manufacturing plant or in other manufacturing industry and performing jobs viz. machine operating, and Assembling electrical and mechanical components using appropriate and & power tools to produce a vehicle.

Reference NCO-2015:

a) 8211.0101- Automotive Assembly Technician
b) 8211.1200- Assembler, Automobile
c) 8211.0500- Assembler, Stationary Petrol Engine
d) 8211.0600- Assembler, Stationary Diesel Engine
e) 8212.0400- Assembler, Electrical Accessories
f) 7231.0400:–Fitter Automobile

4. GENERAL INFORMATION

Name of the Trade	**Assembly Technician (Automotive)**
Course code:	DGT/7024
NCO – 2015	8211.0101, 8211.1200, 8211.0500, 8211.0600, 8212.0400, 7231.0400
NSQF Level	Level 4
Duration of Craftsmen Training	Two Years
Entry Qualification	Pass in 10th Examination or its Equivalent
Minimum Age	18 years
Unit Strength (No. Of Student)	20
Space Norms	192 Sq M
Power Norms	17 KW
Instructors Qualification for	
1. Assembly Technician (Automotive)Trade	B.Voc/ Degree in Automobile / Mechanical Engg. (with specialization in Automobile) from AICTE/ UGC recognized Engineering College/ university with one-year experience in the relevant field. OR 3 years Diploma in Automobile/ Mechanical (specialization in automobile) from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. OR NTC/NAC in the related trades with 3 years' experience in the relevant field. Essential Qualification: Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT. *NOTE: - Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them must possess NCIC in any of its variants.*
2. Workshop Calculation & Science	B Degree in Engineering with one-year experience. OR Diploma in Engineering with two years' experience. **Essential Qualification:** Craft Instructor Certificate in RoD& A course under DGT.
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. Essential Qualification: Craft Instructor Certificate in RoD& A course under DGT.
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

5. NSQF LEVEL COMPLIANCE

NSQF level for **Assembly Technician (Automotive)** 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 trade under CTS (Flexi MoU) mostly matches with the Level descriptor at Level- 4.

The NSQF Level-4 descriptor is given below:

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

6. LEARNING OUTCOME

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

6.1 GENERIC LEARNING OUTCOME

1. Identify & comply with general safe working practices, environment regulation and housekeeping
2. Explain & perform different mathematical calculation & science in the field of study including basic electrical/ Mechanical. [Different mathematical calculation & science – Arthematics, graph, Statistics, Algebra, Geometry & Mensuration, Trigonometry, Work, Power & Energy, Heat & Temperature, Levers & Simple machine, 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 find out measuring instrument and measure dimension of components and record data.
5. Explain entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
6. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
7. Explain occupational health, energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
8. Explain & perform basic computer skills and TPS in day to day work to improve the productivity & quality
9. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

FIRST YEAR

10. Recognize & comply Health, Safety & Environment practices in a vehicle manufacturing plant & Industry Orientation
11. Identify & explain about automobile industry in India, Automobile Process basics skills, different types of vehicles, vehicle Id. Nos. of different components of vehicles, 2-stroke & 4- stroke etc.
12. Illustrate Engine Classification & Recognize types of engine (2- stroke & 4- stroke etc).
13. Illustrate Petrol engine and components. Test petrol engine and take readings of various instruments fitted in vehicle. Perform dismantling of engine, inspecting the condition of components and assembling the engine.

14. Illustrate Diesel engine and components. Test diesel engine for compression and lube oil pressure and take readings of various instruments fitted in vehicle. Perform dismantling of engine, inspecting the condition of components, lubricating & servicing of components and assembling the engine.
15. Illustrate Steering system & its geometry. Perform removal, service & repairing of faults, repair electronic and hydraulic power system faults of steering wheels, and re-fitting of steering system assembly.
16. Explain the transmission importance and process & perform transmission dismantle and re- assemble.
17. Illustrate the brake system and defects in a vehicle.
18. Define suspension system & components, can conduct inspection.
19. Explain vehicle Heating Ventilation Air- Conditioning (HVAC) system, components & functioning
20. Illustrate related to Wheel balancing & alignment in a vehicle and perform wheel balancing and alignment.
21. Remove Battery from Vehicle, Inspect for defect & Re-fit. Explain basic function.
22. Recognize & explain all the components of vehicle fitted under bonnet & Under body components.
23. Explain traffic rules and Regulation & safety signs.
24. Explain, perform & maintain hand & power tools and equipment used in a workshop & vehicle manufacturing plant and develop skills to assemble components using fasteners on conveyor line.
25. Recognize vehicle body parts & components, their functions and assembles components on actual manufacturing lines.
26. Plan & prepare for assembling vehicle components and perform components assembly work in different assembly processes

SECOND YEAR

27. Plan and organize work illustrate vehicle manufacture process & Perform on job training in various shops & conveyor systems.
28. Plan & organize work and assemble vehicle interior components viz. electrical harness, internal wiring, dash board, instruments, switches, seats, fire wall, ducts, headliner, weather strip, shock absorbers etc. on different type of conveyor system lines.
29. Plan & organize to perform work and assemble Final line assembly components related to Running, Turning & Breaking. Suspension & its components, Rear pillar trim, trunk lid latch, radiator, hoses, seat belt, steering shaft, air conditioning system, parking brake, glove box, , garnish, battery cable, silencer, front grille, molding, console box, head & back lights, turn signals, front & rear glass, etc. using appropriate hand & power tools.
30. Select proper tools and Explain & perform installation of electrical and electronics components in vehicle. Check functionality after installation and recognize the function of automation in vehicle assemble and material handling
31. Recognize the harmful effect of pollution in general & pollution generated by automobiles. Explain & assemble the components designed to control pollution in vehicle, like ECM and Catalytic convertor. Conduct Emission test as per standard procedure.

32. Explain & perform different types of quality control & inspection. Tests on Assembly line, Testing Line & conduct Final Inspection & Testing.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERAL LEARNING OUTCOMES		
LEARNING OUTCOMES		**ASSESSMENT CRITERIA**
1. Identify &comply with general safe working practices, environment regulation and housekeeping & Industry orientation.	1.1	Follow and maintain procedures to achieve safe working environment in line with occupational health and safety regulations and requirements
	1.2	Recognize and report all unsafe situations/conditions according to workplace policy.
	1.3	Identify and take necessary precautions on fire and safety hazard sander portac cording to work place policy and procedures.
	1.4	Identify different fire extinguisher and use the same as per requirement.
	1.5	Identify& observe safety alarms accurately & Evacuation procedures according to workplace policy.
	1.6	Identify and observe work place policies and procedures in regard to illness or accident.
	1.7	Report supervisor/competent authority in the event of accident or sickness of any staff and record accident details correctly according to work place accident/injury procedures.
	1.8	Identify basic fir staid and use the munder different circumstances.
	1.9	Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10	Identify environmental pollution and contribute to avoidance of same.
	1.11	Take opportunities to use energy and materials inan environment all y friendly manner.
	1.12	Identify, handle and store/ dispose of dangerous/unsalvageable goods and substances according to workplace policy and dispose waste as per procedures following safety regulations and requirements.
	1.13	Recognizedifferentcomponentsof5Sandapplythe same in the working environment.
2. Explain & perform different mathematic calculation & science in the field of study including basic electrical/ Mechanical.*[Different mathematical calculation & science– Arthematics,*	2.1	Solve the basic mathematical calculations related to statistics, Geometry & mensuration accurately
	2.2	Read & Interpret the given drawing and calculate the unknown terms
	2.3	Measure dimensions as per drawing & use of appropriate tools
	2.4	Ensure dimensional accuracy of parts/objects by using different instruments/gauges.

graph, Statistics, Algebra, Geometry & Mensuration, Trigonometry, Work, Power & Energy, Heat & Temperature, Levers& Simple machine, Centre of gravity, Power transmission, Pressure]	2.5	Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, center of gravity, friction & solve the problems related to it .
	2.6	Explain basic Electricity, Insulation, earthing & electrical devices OR Explain the basic concepts of drilling, milling, grinding
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, Sectionalviews, Estimation of material]*	3.1	Read & interpret the information on drawings and apply in executing practical work.
	3.2	Read & analyze the specification to ascertain the material requirement, tools, and machining/assembly/ maintenance parameters & dimensions.
	3.3	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
	3.4	Practice & use ISOCPEUR (Engineering script) in day to day writing activities
	3.5	Analyze and draw the drawings from Isometric to orthographic projection & vice versa
	3.6	Practice & draw the free hand sketches related to their trade tools.
4. Select and ascertain measuring instrument and measure dimension of components and record data	4.1	Select appropriate measuring instruments suchas micrometers, Vernier calipers and height gauge(as per tool list).
	4.2	Ascertain the functionality & correctness of the instrument.
	4.3	Measure dimension of the components & record data to analyses with the given drawing/measurement.
5. Explain entrepreneurship and manage/organize related task in day to day work for personal & societal growth	5.1	Explain the need & scope of entrepreneurship.
	5.2	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.
	5.3	Explain the concept of SWOT analysis & risk management
	5.4	Explain and understand the qualities of entrepreneurship
6. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	6.1	Explain the concept of productivity, quality tools & its necessity and apply during execution of job
	6.2	Explain the concept how to enhance the productivity through working aids, automation etc. at workplace
	6.3	Explain the concept of comparative productivity in the development of countries
	6.4	Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	6.5	Knows benefits guaranteed under various acts.

7. Explain occupational health, energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	7.1	Explain the concept of occupational hygiene, first aid, accident preventions technique at workplace.
	7.2	Explain the concept of energy conservation, global warming, and pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution.
	7.3	Dispose waste following standard procedure.
8. Explain & perform basic computer skills and TPS in day to day work to improve the productivity & quality	8.1	Recognize the parts of computer & its functions and how to apply in day to day usage
	8.2	Explain about the operating systems & management of files in windows [new versions] – Excel, Word & Power point
	8.3	Create & format the word documents as per the requirements
	8.4	Create a worksheet, apply simple formulae & graphs
	8.5	Explain the concept of computer network in daily life [LAN,WAN]
	8.6	Explain the concept of TPS and apply in executing practical work/ workplace.
9. Plan and organize the work related to the occupation.	9.1	Use documents, drawings and recognize hazards in the work site.
	9.2	Plan workplace/assembly location with due consideration to operational stipulation.
	9.3	Communicate effectively with others and plan project tasks.
	9.4	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**
FIRST YEAR	
10. Recognize & comply Health, Safety & Environment practices in a vehicle manufacturing plant.	10.1 Practice and understand precautions to be followed while working in assembly line. 10.2 Safe use of equipment generally used in assembly line with operating standard. 10.3 Understand class of fire and be able to operate fire extinguishers. 10.4 Practical use and understanding of PPEs.
11.Identify & explain about automobile industry in India, Automobile Process basics skills, different types of vehicles, vehicle Id. Nos. of different components of vehicles, 2-stroke & 4- stroke etc.	11.1 Identification of different types of vehicle.
	11.2 Identification of Vehicle Identification Number, Chassis No. & Engine no.
	11.3 Identification of different types of vehicle and engine components.
	11.4 Identify the different vehicle specification data and information.
	11.5 Demonstrate the garage, service station different equipment.
	11.6 Demonstrate safe handling of lifting equipment's.
	11.7 Demonstrate safe assembly basic skills
12. Illustrate Engine Classification & Recognize types of engine. (2-stroke & 4- stroke etc.)	12.1 Recognize Engine series. (Petrol and Diesel)
	12.2 Recognize Engine types with respect to; ii) Type of fuel iii) Cycle of operation iv) Number of strokes per cycle v) Type of ignition vi) Number of cylinders vii) Arrangement of cylinders viii) Valve arrangement ix) Type of cooling
13. Illustrate Petrol engine and components. Test petrol engine and take readings of various instruments fitted in vehicle. Perform dismantling of engine, inspecting the condition of components and assembling the engine.	13.1 Identification of petrol engine Components. 13.2 Study on Procedure of Dismantling and assembling Petrol engines. 13.3 Removing a petrol engine parts. Dismantling cylinder head for inspection. 13.4 Removing of piston and Connecting rods from engine. Check Piston rings and piston condition as per service manual. 13.5 Checking cylinder bore wear for Ovality and taper. 13.6 Checking valves and valve springs 13.7 Assembling valves and cylinder head and adjusting tappet clearance in engine.
14. Illustrate Diesel engine and components. Test diesel engine for compression and lube oil pressure and take readings of	14.1 Dismantle complete engine and their components. 14.2 Check / test cylinder head & block war page, valve leak, bearing (oil) clearance, measure bore & take decision for further action, replace – liner, valve guide, piston

various instruments fitted in vehicle. Perform dismantling of engine, inspecting the condition of components, lubricating & servicing of components and assembling the engine.	rings, check ring end gap& side clearance, check cam & crank shaft bend & valve timing. 14.3 Overhauling of cylinder head assembly, use of service manual for clearance and other parameters, practice on removing rocker arm assembly manifolds 14.4 Remove the valves and its parts from the cylinder head, cleaning. 14.5 Inspection of cylinder head and manifold surfaces for warping, cracks and flatness. Checking valve seats & valve guide –replacing the valve if necessary. Testing leaks of valve seats for leakage –dismantle rocker shaft assembly -clean & check rocker shaft-and levers, for wear and cracks and reassemble. Check valve springs, tappets, push rods, tappet screws and valve stem cap. Reassembling valve parts in sequence, cylinder head and manifold & rocker arm assembly, adjustable valve clearances, starting engine after adjustments.
15. Illustrate Steering system & its geometry. Perform removal, service & repairing of faults, repair electronic and hydraulic power system faults of steering wheels, and re- fitting of steering system assembly.	15.1 Check and correct the Steering Geometry with instruments. 15.2 Remove and refit steering boxes assembly. 15.3 Check and top-up oil & its specification in Steering box.
16. Explain the transmission importance and process & perform transmission dismantle and re- assemble.	16.1 State the Purpose of a Transmission system.
	16.2 Identification of different types Transmission system.
	16.3 Identification & draw a layout of the power transmission in a vehicle
	16.4 Importance and grades of Transmission oil.
	16.5 Remove & clean Manual transmission and understand the different gear mechanism and structure of shafts.
	16.6 Define transmission system and carry out inspection for wear & tear.
17. Illustrate the brake system and defects in a vehicle.	17.1 State the Purpose of a brake
	17.2 Identification of different types of Brake System.
	17.3 State the Principle of a hydraulic brake and function of Master cylinder
	17.4 List out the various types of power assisted hydraulic brakes
	17.5 Remove & clean brake drums. Check disc/drum run-out, Fit new cups and brake hoses / pipes assemble, adjust all wheel brakes and test for brake concern.
18. Define suspension system & components, can conduct inspection.	18.1 Define the need of the suspension system
	18.2 List out the different types of suspension system and their arrangements
	18.3 Explain on parts and system.

	18.4 States the various types of front axles and coil spring suspension
	18.5 States the need of a shock absorber and different types of shock absorbers
19. Explain vehicle Heating Ventilation Air- Conditioning (HVAC) system, components & functioning	19.1 Identification of Air Conditioning components, performance test on A/C unit. 19.2 Checking charged state of Refrigerant, inspecting, adjusting an engine drive belt, replacing an Engine drive belt. 19.3 Checking a heating system, compressor rotation test, air gap check, Refrigerant recovery evacuating. 19.4 Charging of A/C system. Replacing compressor oil level. 19.5 Abnormal noise from Compressor, Magnetic clutch, Condenser, Evaporator, Blower motor.
20. Illustrate related to Wheel balancing & alignment in a vehicle and perform wheel balancing and alignment.	20.1 Identify faults in Wheel Alignment faults viz. Camber, Caster & Toe-in / Toe-out. 20.2 Perform Toe adjustment of front & rear wheels.
21. Remove Battery from Vehicle, Inspect for defect & Re-fit. Explain basic function.	21.1 Explain the construction of a lead acid battery
	21.2 Remove battery from vehicle, inspect body condition, checking electrolyte level.
	21.3 Battery electrolyte level (top up).
	21.4 Test battery performance.
	21.5 Clean & service battery and re-fit.
22. Recognize & explain all the components of vehicle fitted under bonnet & Under body components.	22.1 Under body & engine room Components location and importance and torque.
	22.2 Explain underbody and Under bonnet parts
	22.3 Remove and re-fit under bonnet & under body components.
23. Explain traffic rules and Regulation & safety signs.	23.1 Four wheel vehicle driving lessons theory.
	23.2 Basic details about Regional Transport Office & Vehicle Documents
	23.3 Identify Traffic sign and traffic rules.
24. Explain, perform & maintain hand & power tools and equipment used in a workshop & vehicle manufacturing plant and develop skills to assemble components using fasteners on conveyor line.	24.1 Working with tools used in vehicle assembly.
	24.2 Use of Vernier Caliper, Micrometer and height gauge, Bore dial gauge etc.
	24.3 Working with Electric & pneumatic powered tools.
	24.4 Using wrench, screwdriver and pliers.
	24.5 Use of spanners, Allen key, Special tools.
	24.6 Understanding of types and sizes of fasteners and picking of defined number of fasteners.
	24.7 Gap setting and checking with feeler Gauge.
	24.8 Operating of Impactors and supporting machines.
	24.9 Practice on different types of Conveyor
25. Recognize vehicle body parts & components, their functions and	25 On the job training on the actual manufacturing lines and identifying various components their function assembly and fitment procedure.

assembles components on actual manufacturing lines.	
26. Plan & prepare for assembling vehicle components and perform components assembly work in different assembly processes	26.1 Basic understanding of automotive Assembly process in plant.
	26.2 Hands On training on different Assembly processes in workshop Installation of following components in the vehicle
	26.3 Production system, CCR, SPS, Harigomi, Kanban, Andon board, Tack time, SOP, Cycle time. Gentene, Pitch, different parts supply method to line.
27. Plan and organize work illustrate vehicle manufacture process & Perform on job training in various shops & conveyor systems.	27.1 Brief Vehicle manufacturing process.
	27.2 Plant visit to vehicle manufacturing industry in following departments; • Press shop shearing of sheets and stamping. • Welding shop manufacturing frames & body shell • Painting shop different types of coating • Assembly lines assembling different components to produce a car (Trim line, Chassis assembly line, Final assembly line) • Inspection shop conducting final inspection & testing of car
28. Plan & organize work and assemble vehicle interior components viz. electrical harness, internal wiring, dash board, instruments, switches, seats, fire wall, ducts, headliner, weather strip, shock absorbers etc. on different type of conveyor system lines.	28.1 Harness & controls and other electrical items viz. Junction box, Switches, Relays, Dash board instruments and complete all internal wiring.
	28.2 Pedal Assembly and Insulator or Fire wall
	28.3 Air duct, heater duct, heater.
	28.4 Head liner.
	28.5 Weather-strip,
	28.6 Horn and Stop switch
	28.7 Front/ rear shock absorber, shift cable
	28.8 Washer tank
	28.9 Front/ rear seat belt
	28.10 Installation of components in the vehicle along with familiarization of tools conveyor system and automation.
29. Plan & organize to perform work and assemble Final line assembly components related to Running, Turning & Breaking. Suspension & its components, Rear pillar trim, trunk lid latch, radiator, hoses, seat belt, steering shaft, air conditioning system, parking brake, glove box, , garnish, battery cable, silencer, front grille, molding, console box, head & back lights, turn	29.1 Rear pillar trim, trunk lid latch.
	29.2 Console bracket, carpet, trunk room trim.
	29.3 License plate lamp, radiator, hose
	29.4 Seat belt, center pillar trim
	29.5 Heat hose, steering shaft
	29.6 Air-conditioner components, A/c gas
	29.7 Parking brake, garnish
	29.8 Glove box, battery tray, seat belt, anchor cover, garnish
	29.9 Rear combination lamp, sun visor
	29.10 Air cleaner, front/rear seat
	29.11 Battery cable, silencer
	29.12 Front grille, drip molding

signals, front & rear glass, etc. using appropriate hand & power tools.	29.13 Front turn signal lamp, console box
	29.14 Front/rear glass, roof molding
	29.15 Combination meter
	29.16 Familiarization of tools, conveyor systems and automation
30. Select proper tools and Explain & perform installation of electrical and electronics components in vehicle. Check functionality after installation and recognize the function of automation in vehicle assemble and material handling	30.1 Installation of electrical components in vehicle assembly line.
	30.2 Installation of electronic components in vehicle assembly line.
	30.3 Function of automation equipment in vehicle assembly line.
	30.4 Function of automation equipment in material handling.
	30.5 Function of automation equipment in testing
31. Recognize the harmful effect of pollution in general & pollution generated by automobiles. Explain & assemble the components designed to control pollution in vehicle, like ECM and Catalytic convertor. Conduct Emission test as per standard procedure.	31.1 Installation of components in the vehicle along with familiarization of tools, conveyor systems and automation.
	31.2 Electronic control systems.
	31.3 Catalytic convertors.
	31.4 Measurement techniques and hands on training on measurement.
	31.5 Test procedures.
32. Explain & perform different types of quality control & inspection tests on assembly lineand tester line and conduct final inspection & testing.	32.1 Vehicle testing on plant tester line.
	32.2 Wheel alignment.
	32.3 Toe in adjustment.
	32.4 Head lamp beam adjustment.
	32.5 Drum test.
	32.6 Brake test.
	32.7 Emission test.
	32.8 Shower test.
	32.9 Road test.
	32.10 Final Inspection.
	32.11 VIN plate punching.

8. SYLLABUS

SYLLABUS – ASSEMBLY TECHNICIAN (AUTOMOTIVE)			
WEEK	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
		First Year	
1	Recognize & comply Health, Safety & Environment practices in a vehicle manufacturing plant.	**Workshop Safety (35hrs)** 1. Importance of trade training, List of tools & Machinery used in the trade. 2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE). 3. First Aid Method and basic training. 4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. 5. Hazard identification and avoidance. 6. Safety signs for Danger, Warning, caution & personal safety message. 7. Preventive measures for electrical accidents & steps to be taken in such accidents. 8. Use of Fire extinguishers. 9. Practice and understand precautions to be followed while working in fitting jobs. 10. Safe use of tools and equipment used in the trade.	**Workshop Safety (5 hrs.)** • All necessary guidance to be provided to the newcomers to become familiar with the working of Industrial Training Institute system including stores procedures. • Soft Skills, its importance and Job area after completion of training. • Importance of safety and general precautions observed in the in the industry/shop floor. • Introduction of First aid. Operation of electrical mains and electrical safety. Introduction of PPEs. • Response to emergencies e.g.; power failure, fire, and system failure. • Importance of Housekeeping & good shop floor practices. Introduction to 5S concept & its application. • Occupational Safety & Health: Health, Safety and Environment guidelines, legislations & regulations as applicable.
2		**Health and safety in Manufacturing Environment (35 hrs.)** 1. Practice and understand precautions to be followed while working in assembly line 2. Safe use of equipment generally used in assembly line with operating standard. 3. Understand class of fire and be able to operate fire extinguishers. 4. Practical use and understanding of PPEs. 5. Plant and personal safety demonstration.	**Health and safety in Manufacturing Environment (5 hrs.)** • Precautions to be followed while working in assembly Line • Safe use of equipment generally used in assembly line • Maintaining health and safety for workers in assembly line • Emergency and evacuation procedures to be followed in the assembly line • First-Aid, nature and causes of injury and utilization of first-aid.

			• Safety: - its importance, classification, personal, general, workshop and machine safety. • Safety signs and norms. • Fires: - types, causes, classes • Use of personal protective Equipment (PPE), standardization
3-5	Identify & explain about automobile industry in India, Automobile Process basics skills , different types of vehicles, vehicle Id. Nos. of different components of vehicles, 2- stroke & 4- stroke etc.	**Basics of Automobile and Manufacturing Process (105 hrs.)** 1. Identification of different types of Automobile 2. Automobile assembly process basic 3. Identification of Vehicle Identification Number, Chassis No. & Engine no 4. Identification of different types of vehicle and engine components. 5. Familiarization with different components in the vehicle	**Manufacturing Process (12 hrs.)** • Knowledge about automobile industry • Basic automotive terms and familiarization to various types of vehicles • Basics of Vehicle manufacturing process • Basics of Stamping process • Basics of Welding process • Basics of Painting process • Basics of Assembly process • Basics of Vehicle Inspection and testing process • Knowledge of vehicle assembly and Plant visit
6-7	Illustrate Engine Classification & Recognize types of engine.(2- stroke & 4- stroke etc).	**Engine (70 hrs.)** 1. Recognize Engine series 2. Recognize Engine types with respect to; • Type of fuel • Cycle of operation • Number of strokes per cycle • Type of ignition • No. of cylinders • Arrangement of cylinders • Valve arrangement • Type of cooling	**Engine (10 hrs.)** • Engine series such as ZZ series, and KD series, GD. • Engine types with respect to; - Type of fuel - Cycle of operation - Number of strokes per cycle - Type of ignition - No. of cylinders - Arrangement of cylinders - Valve arrangement - Type of cooling
8-9	Illustrate Petrol engine and components. Test petrol engine and take readings of various instruments fitted in vehicle. Perform dismantling of engine, inspecting the condition of components and assembling the engine.	**Petrol engine (70hrs.)** 1. Identification of petrol engine Components. 2. Study on Procedure of Dismantling and assembling Petrol engines 3. Removing a petrol engine from a Motor vehicle. Dismantling cylinder head for inspection. 4. Removing of piston and Connecting rods from engine. Check Piston rings and piston condition as per service manual	**Petrol engine (10 hrs.)** • 4-stroke spark-ignition engines- basic, 4-stroke principles. • Spark-ignition engine components basic engine components, engine cams & cam shaft, engine power transfer, and engine components. • Intake & exhaust systems – carbureted systems, electronic fuel injection systems, exhaust systems. Intake system components, air cleaners,

		5. Checking cylinder bore wear for Oval-T and taper 6. Checking valves and valve springs, 7. Assembling valves and cylinder head and adjusting tappet clearance in engine	• Carburetor, / MPFI self-starting system components and sensors. • Gasoline fuel systems: description of Gasoline fuel, gasoline fuel characteristics, stoichiometric ratio, fuel supply system.
10 - 12	Illustrate Diesel engine and components. Test diesel engine for compression and lube oil pressure and take readings of various instruments fitted in vehicle. Perform dismantling of engine, inspecting the condition of components, lubricating & servicing of components and assembling the engine.	**Diesel engine (105 hrs.)** 1. Dismantle complete engine and their components 2. Check / test cylinder head & block warpage, valve leak, bearing (oil) clearance, measure bore & take decision for further action, replace – liner, valve guide, piston rings, check ring end gap& side clearance, check cam &crank shaft bend & valve timing 3. Overhauling of cylinder head assembly, use of service manual for clearance and other parameters, practice on removing rocker arm assembly manifolds. 4. Remove the valves and its parts from the cylinder head, cleaning. 5. Inspection of cylinder head and manifold surfaces for warping, cracks, and flatness. Checking valve seats & valve guide – replacing the valve if necessary. Testing leaks of valve seats for leakage –dismantle rocker shaft assembly -clean & check rocker shaft-and levers, for wear and cracks and reassemble. Check valve springs, tappets, push rods, tappet screws and valve stem cap. Reassembling valve parts in sequence, cylinder head and manifold & rocker arm assembly, adjustable valve clearances, starting engine after adjustments.	**Diesel engine (12 hrs.)** • Description and constructional feature of cylinder head, importance of cylinder head design, type of diesel combustion chambers, effect on size of intake & exhaust passages, head gaskets. • Importance of turbulence. Turbocharger & oil cooler • Valves & valve trains- description and Function of engine valves, different types, materials, type valve operating mechanism, importance of valve seats, valve seats inserts in cylinder heads, importance of valve rotation, valve stem oil seals, size of intake valves, valve trains, valve- timing diagram, concept of variable valve timing. Description of camshafts & drives, description of overhead camshaft, importance of cam lobes, timing belts &chains, timing belts & tensioners. • Procedure for – dismantling, checking, • Assembling & testing of diesel engines

13 - 14	Illustrate Steering system & its geometry. Perform removal, service & repairing of faults, repair electronic and hydraulic power system faults of steering wheels, and re- fitting of steering system assembly.	**Steering System (70 hrs.)** 1. Check and correct the steering geometry with instruments 2. Remove and refit steering boxes from vehicle 3. Check and top-up oil in steering of gear box	**Steering System (10 hrs.)** • Steering system Inspection &adjustment process • Introduction, basic types of steering, Steering geometry (necessity, types &effects), steering characters(over steer, under steer &neutral steer) & steering linkage. • Types of steering gear, power assisted steering (hydraulic & electronic) • Checks on steering system and fault diagnosis
15 - 16	Explain the transmission importance and process & perform transmission dismantle and re-assemble	**Transmission System (70 hrs.)** 1. Define Transmission system 2. Types of Transmission 3. Dismantle of transmission and re-assemble transmission	**Transmission System (10 hrs.)** 1. Transmission system and inspection explanation on parts and system. 2. Types of transmission [manual transmission & transaxle].
17 - 19	Illustrate the brake system and defects in a vehicle.	**Brake system (105 hrs.)** 1. Check and adjust parking brake, and service brakes. Dismantle wheel brake assembly– remove old lining and fit new one 2. Remove and refit vacuum boosters 3. Overhaul – master cylinder, Wheel cylinder & caliper pistons, wheel drum 4. Bleed vacuum assisted hydraulic brakes 5. Overhaul – Wheel cylinders & Drum brake/disc brakes 6. Check fail safe system & rectify defects 7. Remove & clean brake drums. Check disc/drum run out, Fit new cups and brake hoses / pipes assemble, adjust all wheel brakes and test for brake concern	**Brake system (12 hrs.)** • Forces & momentum acting on vehicle, brake slip, braking force co-efficient, time element of braking operation. • Classification of brake systems, factors affecting the braking distance • Comparison between hydraulic drum brake & disc brake system. • Working Principle of brake components brake booster, and master cylinder, caliper assembly, wheel cylinder & different braking force control valves • Brake linings & pads • Brake Faults diagnostics and adjustments • Introduction to Anti-lock braking system (ABS).

20 - 22	Define suspension system & components, can conduct inspection.	**Suspension system (105 hrs.)** 1. Define Suspension system and carry out inspection for wear & tear. 2. Explain on parts and system 3. Overhauling of independent suspension and rigid suspension 4. Differential working and dismantling and re-fit	**Suspension system (10 hrs.)** • Suspension system and inspection, explanation on parts and system * Define sprung and unsprung weight * Define live and dead axle * Define rigid and independent axle
23 - 25	Explain vehicle Heating Ventilation Air- Conditioning (HVAC) system, components & functioning	**Heating Ventilation Air Conditioning (HVAC) (60 hrs.)** 1. Identification of Air Conditioning components, performance test on A/c unit 2. Checking charged state of 3. Refrigerant, inspecting, adjusting an engine drive belt, replacing an Engine drive belt. 4. Checking a heating system, compressor rotation test, air gap check, Refrigerant recovery evacuating 5. Charging of a/c system. Replenishing compressor oil level. 6. HVAC troubleshooting, diagnosis and repair for No cooling or warm air, Cool air comes out only intermittently, Insufficient cooling,	**Heating Ventilation Air Conditioning (HVAC) (7 hrs.)** • AC system layout & components explanation • Location of various AC components in Vehicle • Auto AC Diagnosis & repair of ac system • Recharging ac refrigerant using recovery machine • Compressor oil (lubricant)property and quantity • Ac system performance inspection • HVAC legislation • Vehicle heating, Ventilation & cooling systems, basic air-conditioning principles, air-conditioning capacity, air-conditioning refrigerant, Humidity • Description and function of fixed orifice, Control devices,
26- 27	Illustrate related to Wheel balancing & alignment in a vehicle and perform wheel balancing and alignment.	**Wheel Alignment (70 hrs.)** 1. Identify faults in Wheel Alignment faults viz. Camber, Caster & Toe-in / Toe-out 2. Perform Toe adjustment of front & rear wheels. 3. Caster, Camber & Toe Adjusting 4. Tyre specification	**Wheel Alignment (7 hrs.)** • Understand Wheel Alignment faults viz. Camber, Caster & Toe-in / Toe-out. Turning Radius. Steering angle inclination and suspension height. • Power flow from engine to wheels
		5. Wheel Balancing, Hopping & shiming.	

28	Remove Battery from Vehicle, Inspect for defect & Re-fit. Explain basic function.	**Battery (35 hrs.)** 1. Remove battery from vehicle, inspect body condition, check electrolyte level 2. Battery electrolyte level (top up). 3. Test battery performance. 4. Clean & service battery and re-fit.	**Battery (5 hrs.)** • Battery – Description, Function & Testing * Battery specification
29 - 30	Recognize & explain all the components of vehicle fitted under bonnet & Under body components.	**Under bonnet / Under Body Components (70 hrs.)** 1. Under body & engine room Components location and importance and torque. 2. Remove and re-fit under bonnet & under body components 3. Exhaust system components, Dismantling. 4. Fuel tank and its types. 5. Fuel lines and brake tubes. 6. Fuel cooler and return tubes 7. Guard and protects	**Under bonnet / Under Body Components (10 hrs.)** • Explain under body & Engine area (under bonnet) components& their assembly diagrams. • Explain fluid area in engine area, windshield washer, brake oil reservoirs and battery.
31 - 32	Explain traffic rules and Regulation & safety signs.	**Vehicle Driving (70 hrs.)** 1. Four-wheel vehicle driving lessons theory. 2. Identify Traffic sign and traffic rules	**Vehicle Driving (10 hrs.)** • Four-wheel vehicle driving lessons theory. • RTO details and basic vehicle documents, Name plates and colour coding of name plates Traffic sign and traffic rules.
33 - 36	Explain, perform & maintain hand & power tools and equipment used in a workshop & vehicle manufacturing plant and develop skills to assemble components using fasteners on conveyor line.	**Tools and Workshop Equipment (128 hrs.)** 1. Practice working with tools used in vehicle assembly 2. Practice working with pneumatic tools, 3. Working with hand drill, hammer punches and chisel 4. Practical with drill reamer and tap 5. Practical with wrench screwdriver and pliers 6. Use of Allen key 7. Understanding of types and sizes of fasteners and picking of defined number of fasteners 8. Gap setting and checking with feeler Gauge	**Tools and Workshop Equipment (20 hrs.)** Common tools and material used in assembly Process • Types and sizes of spanners and screw drivers and Allen keys Taps wrenches and dies • Gauges • Files • Drilling machines and drills • Cutting machines • Pneumatic guns • Measuring instruments • Special purpose tools • Fasteners • General equipment in assembly shop • Hydraulic presses and screw jack

		9. Operating of spot-welding guns and other welding machines 10. Precision measuring instruments, Vernier caliper, bore gauge, DTI, feeler gauge, outside micrometer. Caliper types. 11. Practice on different types of Conveyor 12. Overhauling and measuring engine component.	• Special purpose machines
37 - 40	Recognize vehicle body parts & components, their functions and assembles components on actual manufacturing lines.	**Structure of Vehicle Body (112 hrs.)** 1. On the job training on the actual manufacturing lines and identifying various components their function assembly and fitment procedure	**Structure of Vehicle Body (20 hrs.)** • Structure of car vehicle body • Component installation in power train and its explanation • Engine classification, mountings, transmission, driveshaft, propeller shaft, Differential, Clutch and Various joints • Suspension components Construction of various components in power train
41 - 51	Plan & prepare for assembling vehicle components and perform components assembly work in different assembly processes	**Assembly (385 hrs.)** 1. Basic understanding of automotive Assembly process in plant 2. Hands On training on different Assembly processes in workshop 3. Production system, CCR, SPS, Harigomi, Kanban, Andon board, Tack time, SOP, Cycle time. Gentene, Pitch, different parts supply method to line.	**Assembly (25 hrs.)** • Various assembly processes • Pneumatic tools and electrical tools • Torque wrenches • Types of assembly conveyors • Filling and testing equipment • Vehicle Inspection and testing • Tester line equipment Testing parameters and its importance
52-53	**Revision (15 Hrs.)**		
	Project work – 1 (10 Hrs.) **a) Make a chart showing different types of vehicles/ automobiles& power train in a vehicle** **b) Prepare models of different types of chassis or frames of vehicles.** **c) Prepare chart explaining about Traffic rules and regulation& model of steering system**		
	Examination (40 Hrs.)		

54 - 57	Plan and organize work illustrate vehicle manufacture process & Perform on job training in various shops & conveyor systems.	**Basics of Automobile and Manufacturing Process (140 hrs.)** 1. On the job training in various production shops to get acquainted to the vehicle manufacturing process 2. Hands on training on conveyor line and sub assembly	**Basics of Automobile and Manufacturing Process (26 hrs.)** • Introduction to Tools and equipment used in vehicle manufacturing • Conveyors types • Spot Welding guns • Stamping presses • Pneumatic tools • Electric tools • Sealant application guns • Special tools and equipment
58 - 68	Plan & organize work and assemble vehicle interior components viz. electrical harness, internal wiring, dashboard, instruments, switches, seats, fire wall, ducts, headliner, weather strip, shock absorbers etc. on different type of conveyor system lines.	**Vehicle interior assembly (385hrs.)** Installation of following components in the vehicle; 1. Harness & controls and other electrical items viz. Junction box, Switches, Relays, Dashboard instruments and complete all internal wiring. 2. Pedal Assembly, 3. Insulator or Fire wall 4. Air duct, heater duct, heater, 5. Head liner 6. Weather-strip, 7. Horn, 8. Stop switch 9. Front/ rear shock absorber, shift cable 10. Washer tank 11. Front/ rear seat belt 12. Installation of components in the vehicle along with familiarization of tools conveyor system and automation	**Vehicle interior assembly (42 hrs.)** Understanding the function and construction of the following components and system • Harness & controls and other electrical items viz. Junction box, Switches, Relays, Dashboard instruments and complete all internal wiring. • Pedal Assembly, • Insulator or Fire wall • Air duct, heater duct, heater, • Head liner • Weather-strip, • Horn, • Stop switch • Front/ rear shock absorber, shift cable • Washer tank • Front/ rear seat belt • Installation of components in the vehicle along with familiarization of tools conveyor system and automation
69 - 79	Plan & Organize to Perform work and assemble in Chassis, Final line related to Running, Turning & Braking. Suspension components & its functions, Rear Pillar trim, trunk lid Latch, radiator, hoses, seat belt, steering shaft, Air Conditioning	**Power train, suspension, and Brake Assembly (385 hrs.)** Installation of following components in the vehicle; 1. Brake tube 2. filler neck 3. Fuel pipe, fuel tank, canister 4. Rear axle, stabilizer bar 5. Knuckle, tie rod 6. Exhaust System 7. Tire, 8. front/rear seat	**Power train, suspension, and Brake Assembly (42 hrs.)** Understanding the function and construction of the following components and system • Brake tube • filler neck • Fuel pipe, fuel tank, canister • Rear axle, stabilizer bar • Knuckle, tie rod • Exhaust System • Tire,

	System, Parking brake, glove box, Garnish, Battery Cable, Silencer, Front Grille, Molding, Console	9. Front/ rear bumper 10. Familiarization of tools, conveyor systems and automation	• front/rear seat • Front/ rear bumper • Installation of components in the vehicle along with familiarization of tools, conveyor systems and automation
80 - 90	Box, Head & Back lights, Turn Signals Front & Rear Glass etc using appropriate hand & Power Tools.	**Final line assembly (385 hrs.)** Installation of following components in the vehicle; 1. Rear pillar trim, trunk lid latch 2. Console bracket, carpet, trunk room trim 3. License plate lamp, radiator, hose 4. Seat belt, center pillar trim 5. Heat hose, steering shaft 6. Air-conditioner components, A/c gas 7. Parking brake, garnish 8. Glove box, battery tray, seat belt, anchor cover, garnish 9. Rear combination lamp, sun visor 10. Air cleaner, front/rear seat 11. Battery cable, silencer 12. Front grille, drip moulding 13. Front turn signal lamp, console box 14. Front/rear glass, roof molding 15. Combination meter 16. Familiarization of tools, conveyor systems and automation	**Final line assembly (35 hrs.)** Understanding the function and construction of the following components and system • Rear pillar trim, trunk lid latch • Console bracket, carpet, trunk room trim • License plate lamp, radiator, hose • Seat belt, center pillar trim • Heat hose, steering shaft • Air-conditioner components, A/c gas • Parking brake, garnish • Glove box, battery tray, seat belt, anchor cover, garnish • Rear combination lamp, sun visor • Air cleaner, front/rear seat • Battery cable, silencer • Front turn console box • Front/rear molding * Combination meter • Installation of components in the vehicle along with familiarization of tools, conveyor systems and automation
91 - 93	Select proper tools and Explain & perform installation of electricals sand electronics components in vehicle. Check functionality after installation and recognize the function of automation in vehicle assemble and material handling	**Automotive Electrical and Electronics (105 hrs.)** 1. Installation of electrical components in vehicle assembly line. 2. Installation of electronic components in vehicle assembly line 3. Function of automation equipment in vehicle assembly line. 4. Function of automation equipment in material handling 5. Function of automation equipment in testing	**Automotive Electrical and Electronics (21 hrs.)** • Basics of Electrical and Electronic Engineering • Current voltage and resistance • Ohm's Law • Types of Electrical Materials • Direct Current and Alternating current • Function of current • Heat generation action • Chemical Action • Magnetic Action • Parallel and Series connections

			• Function and working principal of electrical components in vehicle assembly line • Alternator • Distributor • Wiper Motor • Wiring Harness and Connectors • Function and working principle of electronic components in vehicle assembly line • Electronic Control Module • Sensors and actuators • Air Bags • ABS & EBD • Electronic power steering •Function of automation equipment in vehicle assembly line • Function of automation equipment in material handling • Function of automation equipment in testing
94 - 96	Recognize the harmful effect of pollution in general & pollution generated by automobiles. Explain & assemble the components designed to control pollution in vehicle, like ECM and Catalytic convertor. Conduct Emission test as per standard procedure.	**Automotive Pollution & Control & Emission Measurements (105 hrs.)** 1. Installation of components in the vehicle along with familiarization of tools, conveyor systems and automation 2. Electronic control systems 3. Catalytic convertors 4. Measurement techniques and hands on training on measurement 5. Emission standards & Test procedures	**Automotive Pollution & Control & Emission Measurements (21hrs.)** • Understanding the function and construction of the following components and system • Importance of pollution and emission control in automobile Vehicular emission • Factors influencing motor vehicle emission • Electronic control systems • Catalytic convertors • Evaporative emission control • Influence of engine variables on emissions • Pollutant formation in SI & CI Engines • Control of Emissions from SI & CI Engines • Measurement techniques • Emission standards & Test procedures

97 - 102	Explain & perform different types of quality control & inspection tests on assembly line and tester line and conduct final inspection & testing.	**Quality Control and Inspection (195 hrs.)** a) Trim Inspection, b) Functional line, c) Receiving Inspection, d) In process audit & Shipping quality audit. 1. Vehicle testing on plant tester line 2. Wheel alignment 3. Toe in adjustment 4. Head lamp beam adjustment 5. Drum test 6. Brake test 7. Emission test 8. Shower test 9. Road test 10. Final Inspection 11. ID plate punching	**Quality Control and Inspection (23 hrs.)** • Different types of quality control processes used in automotive manufacturing shop • Statistical Process Control (SPC) • Functions of various departments in quality control procedures • Product development department • Production department • Quality Department • Marketing Department • Inspection Process • Final Audit Tests • Vehicle Identification Number (VIN)
103-104	**Revision (15 Hrs.)**		
	Project work – 2 (10 Hrs.) **a) Prepare charts showing interior components of a vehicle & inspection process of vehicles** **b) Make electrical circuit diagrams with load calculations.** **c) Prepare model of side indicator lights or parking lights.**		
	Examination (40 Hrs.)		

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION &SCIENCE

S No.	Workshop Calculation	Workshop Science
FIRST YEAR – 75 Hr		
1.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	**Material Science**: properties - Physical & Mechanical, Types – Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non- Ferrous Alloys.
2.	**Fractions:** Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.
3.	**Square Root:** Square and Square Root, method of finding out square roots, Simple problem using calculator.	**Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.
4.	**Ratio & Proportion**: Simple calculation on related problems.	**Work, Power and Energy**: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.
5.	**Percentage:** Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	
6.	**Algebra**: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	**Heat & Temperature**: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.
7.	**Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.	**Basic Electricity**: Introduction, use of electricity, how electricity is produced, Types of current - AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy.
8.	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables	**Levers and Simple Machines:** levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency,

		velocity ratio and Mechanical Advantage.
SECOND YEAR – 75 Hr		
1.	Geometrical construction & theorem: division of line segment, parallel lines, similar angles, perpendicular lines, isosceles triangle and right angled triangle.	- Forces definition. - Compressive, tensile, shear forces and simple problems. - Stress, strain, ultimate strength, factor of safety. - Basic study of stress-strain curve for MS.
2.	- Area of cut-out regular surfaces: circle and segment and sector of circle.	- Temperature measuring instruments. - Specific heats of solids & liquids.
3.	- Area of irregular surfaces. - Application related to shop problems.	- Thermal Conductivity, Heat loss and heat gain.
4.	- Volume of cut-out solids: hollow cylinders, frustum of cone, block section. - Volume of simple machine blocks.	- Average Velocity, Acceleration &Retardation. - Related problems.
5.	- Material weight and cost problems related to trade.	- Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force
6.	- Finding the value of unknown sides and angles of a triangle by Trigonometrical method.	- Friction- co-efficient of friction, application and effects of friction in Workshop practice. - Centre of gravity and its practical application.
7.	- Finding height and distance by trigonometry.	- Magnetic substances- natural and artificial magnets. - Method of magnetization. Use of magnets.
8.	Application of trigonometry in shop problems. (viz. taper angle calculation).	- Electrical insulating materials. - Basic concept of earthing.
9.	**Graph:** - Read images, graphs, diagrams bar chart, pie chart. - Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.	- Transmission of power by belt, pulleys & gear drive. - Calculation of Transmission of power by belt pulley and gear drive.
10.	Simple problem on Statistics: - Frequency distribution table - Calculation of Mean value. - Examples on mass scale productions. - Cumulative frequency - Arithmetic mean	- Heat treatment and advantages.
11.	Acceptance of lot by sampling method (within specified limit size) with simple examples (not more than 20 samples).	Concept of pressure – units of pressure, atmospheric pressure, absolute pressure, gauge pressure –gauges used for measuring pressure Introduction to pneumatics &hydraulics systems.

Syllabus – Engineering Drawing

Engineering Drawing (For First and Second year) Under CRAFTSMAN TRAINING SCHEME (CTS) (For all Engineering Trades duration) will be followed.

9.2 EMPLOYABILITY SKILLS

First Year- 120 Hr.		
Module	**Topics**	
1. Behavioral Skills		**Duration:10 Hr. Marks:**
Expectation Setting	Creating a focused and responsible learning environment	
Personal Strength Analysis/ Strength Blindness	Self –awareness and confidence building	
Perception Management	Display Professionalism at the institute and workplace	
Ethics, Values & Etiquette	Increased social initiations relationships and networks Acceptance of peers from different cultures and social groups and work with them. Collaboration with team to prioritize the common goal and compromise individual priorities.	
Social Etiquette	Characteristic of a responsible citizen- Display the same by respecting self, others, environment, care for duty and value for time.	
Role Modeling	Adopting best practices and aspire to follow success stories of individual for personal development.	
2. English Literacy		**Duration: 20 Hr. Marks:**
Functional English	Importance of Learning English Different Naming words, Words used for replacing names, Action words, Describing people, place and their use. Introduction to punctuation -Comma, Full stop, Question mark. Singular plural Change of tense- Simple present, past; present, past progressive Construction of simple sentences-Kinds of sentences Usage of appropriate words to express themselves Greetings & Self Introduction Asking & responding to questions Sharing information with others Formal & Informal communication Speak and provide information about workplace Discussions on current happenings.	
Reading	Reading simple sentences about:	

	a) Self b)Work c)Environment	
Written English	Simple writing skill	
3. Communication Skills		**Duration: 10 Hr.** **Marks:**
Self-Introduction	Interview Skills/Confidence Building	
Perception Management	Professionalism and Display of same at the institute and workplace	
a. Verbal Communication	Understand the usage of appropriate words to express themselves Communicate effectively on telephone.	
b. Non-Verbal Communication	Manage Personal Hygiene and Presentation	
	Positive body language: adopt and use it appropriately to build a positive Impression	
	Different spatial zones: Understanding and need to maintain it, create safe zones for communication	
	Maintaining appropriate eye-contact in building trust and confidence	
	Impact of touch in a formal environment. Acceptable and unacceptable touch.	
	Role of tone in any communication.	
Campus to Work	Time Management and Planning Skills	
	Interview skills- its phases & ways to crack interview.	
	Handling setbacks/rejection and recover from it with an action plan.	
	Developing strong professional contacts/network to gain support in learning Process and career as a whole.	
4. I.T. Literacy		**Duration: 20 Hr.** **Marks:**
Basics of Computers	Introduction to Computers and its applications. Hardware and peripherals. Starting and shutting down of computer. Basic of computer Networks.	
Operating System	Basics of Operating System. Types of Operating Systems. User interface of Windows 10 OS/latest. Create, Copy, Move and delete Files and Folders. Use of External memory like pen drive, CD, DVD etc, Introduction to in built windows apps, Tools and features.	

MS-Word	Basic operating of Word Processing. Creating, opening and closing Documents. Use of shortcuts, Creating and Editing of Text, Formatting the Text. Creating simple document like-resume, letter writing, job application etc., Printing document.	
MS-Excel	Basics of Excel worksheet & its importance. Creating simple worksheets. Adding and average functions. Printing of simple excel sheets.	
Web browsers & Search Engines	Introduction to world wide web (WWW), Useful websites, web browser- usage, search engine etc. Using popular sites like Bharat Skills, Skill Training related Government portals, naukri.com and other job portals, CITS applications, Apprenticeship portal (NAPS), resize images, signing up, Online fund transfer using UPI gateway.	
Email	Creating & using an email account–like Gmail or any other. Usage of CC & BCC. Attaching documents Checking email and composing Email.	
Mobile application	Scanning QR/AR code, Sharing best practices and downloading trade related videos using Wi-Fi, Fund transfer through App like BHIM	
5. Entrepreneurship Skills		**Duration:10Hr.** **Marks:**
Entrepreneur	Need of becoming entrepreneur.	
	Ways to become a good entrepreneur.	
	Enabling environment available to become an entrepreneur. Different Govt. institutions/schemes promoting Entrepreneur viz., Gram in banks, PMMY-MUDRA loans, DIC, SIDA, SISI, NSIC, SIDO. Ways to set up an enterprise and different aspects involved viz., legal compliances, Marketing aspect, Budgeting, etc. Day to day monitoring mechanism for Maintaining an enterprise. Different Government schemes supporting entrepreneurship. Examples of successful and unsuccessful entrepreneurs.	
6. Maintaining Efficiency at Workplace		**Duration: 10Hr.** **Marks:**
Maintaining Efficiency at Workplace	Factors affecting productivity	
	Improving Productivity	
	Personal finance literacy Planning, Saving, Tax, Govt. schemes for financial safety e.g. Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY), etc.	

7. Occupational Safety, Health and Environment Education		**Duration: 10 Hr.** **Marks:**
Safety and Health	Introduction to Occupational Safety & health at workplace, Occupational Hygiene	
Occupational Hazards	Basic Hazards. Chemical, Physical (Electrical, Temperature, Illumination) Ergonomic, Biological, Vibro acoustic, Mechanical, Psychosocial Hazards, Prevention of hazards	
Accident and Safety	Different types of Personal Protective Equipment (PPE). Accident Prevention techniques.	
First-aid	Care of injured & Sick at the workplace. First-Aid & Transportation of sick person.	
Basic provisions on safety And Health	Basic provisions of safety & health	
Environmental Issues	Introduction to Environment, ecosystem and factors causing imbalance Pollution and pollutants include liquid, gaseous, solid and hazardous waste Protecting the environment-Energy Conservation, groundwater, global warming. Responsibility about the environment Segregation and disposal of waste	
Environmental ethics	Different actions people that affect others and the environment.	
Disaster Management	Types, causes & effects, are as in India that are prone to be affected, preparedness & mitigation, dos and don'ts-Before, During and After any Disaster, how to reduce man-made disasters.	
8. Essential skills for success		**Duration: 10Hr.** **Marks:**
Essential skills for success	Building basic skills to navigate life and career. Self-Awareness, articulating personal values, Value-based decision making, Dilemma situations. Identify sources and types of stress (positive/negative stress), Managing stress (long-term/ short-term), Handling rejection and building resilience, Identify day wasters.	
9. Labour Welfare Legislation		**Duration: 05Hr.** **Marks:**

Labour Welfare Legislation	Benefits guaranteed under various acts-Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act, POSH. Interpret applicable labour and industrial laws.	
10.Quality Management		**Duration: 05Hr. Marks:**
Quality Concept and Consciousness	Create awareness on introduction of quality Concepts.	
Concept of Quality Management(QMS)& PDCA	Concept of Quality Management (QMS), PDCA, Fishbone, 5S, 5D, KAIZEN	
Concept of ISO	Introduction of ISO	
11. Preparation to the world of work		**Duration: 05 Hr. Marks:**
Career Plan	Identify the difference between job and career	
Basic Professional Skills	Job roles available in respective trades	
Career Pathways	Awareness of industries, and the respective professional pathways	
Search and apply for a job	Awareness of higher education/up skilling (short-term) options Steps involved in online application for Instructor course, Apprenticeship and different jobs in popular site like the indiajobs.com, naukri.com, monsterindia.com, Govt. website.	
12.CustomerInteraction/ service		**Duration: 05 Hr. Marks:**
Greeting customers	Forms of greeting	
Probing-understanding Customer requirements	Use of positive body language	
Handling grievances	Handling grievances (Use of ask-listen-repeat technique)	
Relationship building with customers	Relationship building with customers, importance of probing.	
To identify the importance of probing	Use of open-ended/close-ended questions to gauge requirement	

Second Year-60 Hr		
Module	**Topics**	**Methodology**
1. English Literacy		**Duration: 20Hr. Marks:12**
Me/Myself, We/Ourselves	Greetings Introducing yourself Talking about your family Likes and dislikes	Student speaks & writes 1 paragraph about themselves

Role Models	Introduce their role model Discuss strength and weakness/ criticism etc. Adjectives, verbs, pronouns etc. all covered. Write-up about this person	Group activity–who are the role models of each group. Displayed on a chart with pictures and text– make a collage and present.
My Society	Describe your surrounding Changes in your environment Dos and dont's Dumping of garbage Use of plastic Water conservation Strength and weakness Roads /pollution Gardens	Summarizing the discussion Pictures of something in the past/ what it is now
My Interests	Theme parks Historical areas/cities (places) Adventure–sea, mountain, beaches Hobbies	Student speaks about their favorite place/area of interest/ hobby and why they like it
My Work	What they want to do Why they want to do it What do they know about this opportunity Competition/sector	Bring a newspaper clipping/news item of that industry and discuss it [individual activity–everyone has to talk about it and write about it]
App based Learning	Actual speaking practice–all 4 skills tested Gamified Vernacular Capability Mapped to what is covered in class Benefits Interactive Self-confidence High engagement	App based learning practice by the trainee using popular apps available
2. Communication Skills		**Duration: 10 Hr.** **Marks: 12**
Personal	Reflection Template Revision Importance of Communication Managing Emotions Create online profile +Form al Introduction of self (based on the industry)	Self-reflection-Pg193 Case study from the workplace-videos Reflection on Industry visit Digital practice + Classroom Practice
Interpersonal	Giving and Receiving Feedback Communication based on context-Formal, Informal Verbal & Non-verbal	Burgar Feedback Template & Practice Role play and Peer Evaluation Role Play & Reflection

	Listening Skills Gender Sensitivity Application of Gender sensitivity	Gender Pledge
Workplace Communication	Interview Preparation (With Resume, Formal Dress) Communication Etiquette: a. Mobile Applications for the workplace b. Fake News Customer Interaction a. Defining my customer(other department, client) b. Communication based on the customer base Workplace Communication- Peer, Superior, Junior Formal Communication - Practice	Career Day: Scenario based activity, with Guest Lecture or HR person Reflection of Market Scan Trade specific examples + Role play Case Study, Role Play Case Study, Digital practice via email
3.I.T.Literacy		**Duration: 10Hr.** **Marks: 10**
MS-PowerPoint	Basics -creating, opening, closing, slide show	ppt, audiovisual, task-based activities.
File Conversion & Reducing file size	Identify file types, types of files- pdf, jpg, doc, excel, ppt Converting files to other types	ppt, demonstration & practice
Data/webcasting Through mobile	Casting desktop application or web application By WIFI or Bluetooth	Demonstration &practice
Server & cloud computing	Introduction to server and cloud computing accessing, storing and retrieving file through google drive	audio visual, task-based activity, demonstration
Language translation	Language translation through voice Voice to text, text to voice application	task-based, demonstration
Customize and use online CVs	Access CV templates online Customize CVs as per requirement	task-based, demonstration
Artificial Intelligence	latest technology based model or simulated software	Demonstration & practice

4. Entrepreneurship Skills		**Duration: 10Hr.** **Marks:6**
Entrepreneurship Mindset	Aspect of inspiring/motivating should be sprinkled across all topics. Recall the qualities/characteristics. Being a leader (your values, personal code of conduct)(ownership for my enterprise). Listen, Learn and Observe (framework of an effective leader) Grit (***Addressing difficulties/ challenges in an entrepreneur's life positively***) Managing personal time ***Focus on breaking myths related to entrepreneurship wherever possible.***	Share experience of successful entrepreneurs (examples of alumni from ITI)(Can be given as an instruction to teachers)
Opportunity identification	Selection of type of business - Product/service/trading UVP–unique idea about the business Being environment friendly (to be touched upon in as many activities that learner is taking part in) Reminder about Business model framework	Systems thinking and then doing market research (***related to innovation and problem solving done by other players in the market***)
Being Resourceful	Being resourceful Identify ways of being resourceful– Inexpensive ways of marketing Networking Importance of Networking (interpersonal skills, communication skills related activity) How to connect (through Net and otherwise– bring in English and IT skills related activity) Business model revisit	communication skills related activity project English and IT skills related activity Business model revisit Connecting with likeminded people
Ease of Doing Business	Single window mechanism for running the business	learner can be directed to it

	How to apply for business, awareness of statutory compliances, and govt or non govt schemes Business model revisit activity	through communication and inter personal focused activities
Managing Resources	Human resource (customers and internal employees or other entities in the business cycle) Finance(activities to bring about importance of financial literacy) Infrastructure (location, equipment, machinery etc.) Use of Internet (importance of IT skills)Business model revisit activity	Activities will bring about Importance of communication and interpersonal skills
Mentorship and Role Models	Importance of mentorship They will to look at mentors in their own ecosystem, connecting with them through Net or otherwise again.	Interpersonal skills, communication and IT skills can be reinforced
Learning Cycle	Business model revisit (it's an ever-evolving Model and you may need to revisit the model and different aspects of it along with your own capabilities, revisit mindsets frequently, being a lifelong learner by being aware of skills and attitudes displayed by other successful entrepreneurs.	Role Play/live demonstration Skills and attitudes displayed by other successful entrepreneurs
5. Sustainable Career		**Duration:10 Hr.** **Marks:10**
Career Awareness	Learn and explore upcoming advances in the industry Students will be able to connect all the subsequent topics with real-life experience, and understand the importance of mastering career planning and readiness topics Gain exposure to a modern workplace from his/ her industry	Webinar / online pre-recorded lectures from industry representatives. Visit / view a video on online portal /interact with industry experts. A video about the evolution of workplace in the past few years (past to future). The students must get a template to record the insights from the visit/interaction like a simple worksheet.

Career Planning	Learn and apply growth mindset to career planning Ashok Leyland shares an example- they are undergoing an extensive tech. overhaul and technicians will have to learn new things to stay relevant/ updated in thei.r jobs. Learn about personal skills and interests Adapt to ever-changing business environment Learn about continuous up skilling/ re skilling learning requirements in their industry ITI students should be aware that their skilling Journey will continue for life, and will not end with the end of final year. Map career pathways within your sector	Case studies / self-awareness activities/ mapping the barriers to growth mind set in everyday life, and devising strategies to apply growth mindset through easy-to- implement actions every day. Write 16PF, or other relevant personality tests that gives students an insight into their strengths, and also provides them a vocabulary to express their personal strengths and interests Case studies/team work activities to practice adaptability/ working in ambiguity /openness to change in industry. Online job search / advanced market scanning related to their chosen sectors- update your year 1market scan. Within the same market scan activity-explore both-jobs and self-employment opportunities Share a template on which students can envision their future of work - identify what your workplace looks like today - through market research, online content etc. and what it will look like in a decade. QA has developed videos on how new jobs will look different from today's jobs. Anticipate challenges (apprenticeships, untimely termination, location of job-be open to migration, assess cost of living etc.) Common future plan template –for planning a self- employment journey/career options Share relevant keywords / direction for conducting a career pathway search for each trade

Career Readiness	Practice writing technical evaluations / aptitude test. Communicate their fit (positive attitude /adaptability/self-led learner) during the interview. Final year students are placement read. Hence, placement preparation. Prepare and review final resume. Identify and apply for apprenticeships on NAPS. Register on government job portals (national and state). Learn and apply for DST / internship opportunities. Apply for jobs (practice reading key words in job descriptions, understand salaries and benefits) Request and receive feedback to improve performance. Develop cultural intelligence. Respecting gender equality at workplace. Cultivating professional attitude. Apply green practices in life and career.	Conduct a mock interview exercise involving a panel, which includes industry representative, college faculty, HR (desired) Scores/internship experience etc. is most relevant Employment Exchange / Youth Employability Services What is an internship? Structured and unstructured. State Skill Development Missions portals. Respecting my time/others time, work/life balance, cooperativeness/ quality conscious /teamwork/empathy /commitment/ deliver on time.

ANNEXURE-I

List of Tools and Equipment			
ASSEMBLY TECHNICIAN (AUTOMOTIVE)(For a batch of 20 candidates)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. TOOLS, EQUIPMENT, MACHINERIES AND VEHICLES			
1.	Double ended spanner set 6-32mm		8 set
2.	Ringspannerset6-32mm		8 set
3.	Tubularspanners8,10,12,14,16,17mm		8 nos.
4.	Socketspanners6-32mmwithTbarandratchet		8 set
5.	Allenkeys4-12mminstepsof 2mm		8 set
6.	Screwdriver (flat)20cmx 9mmblade		8 nos.
7.	Screwdriver(flat)30cmx 9 mm blade		8 nos.
8.	Screwdriver(Philips type)100-300mmsetof 5 pieces		8 set
9.	Hammer ball peen0.75kg		8 nos.
10.	Mallethammer		8 nos.
11.	Hammer Nylon		8 nos.
12.	Noseplier straight15 cm		8 nos.
13.	Combinationplier15 cm		8 nos.
14.	Circlip plierexternal & contracting6”		5 nos.
15.	Circlip plierexternal & contracting7”		5 nos.
16.	Feelergauge20bladesmetric		8 nos.
17.	Adjustablespanner20cm		8 nos.
18.	Sparkplug spanner12,14,17mm		8 nos.
19.	Knife Edge		5 set
20.	Pneumatic/ Impact wrench		6 nos.
21.	Battery impact		5 nos.
22.	Socket set		8 nos.
23.	Screw Bit set		20 nos.
24.	Torquewrench0-50NM		8 no.
25.	Digital Multimeter		2 no.
26.	Tap pet adjuster		8 no.
27.	Puller Set		8 nos.
28.	Impact screwdriver for flat and Philips type		8 set
29.	Pneumatictyreinflator		2 set
30.	Measuring Jars (Different capacity)		1 Set
31.	2 post lift (3toncapacity)		4 nos.
32.	Desktop computers for Basictraining		8nos.
33.	Engine(Petrol1ZZFE)for dismantling and assembly		8 nos.

34.	Engine(Diesel2KD)for dismantling and assembly	8 nos.
35.	Transmission for assembly and disassembly training	8 nos.
36.	Transaxle for assembly and disassembly training	8 nos.
37.	4-Wheelervehicle (Monocoque and Frame)	4+4 nos.
38.	Streeting for assembly and disassembly training	8 nos.
39.	Toe-Measuring Gauge	1 no.
40.	Vane pump & starter assembly and disassembly training	8 nos.
41.	Differential set for assembly and disassembly training	8 nos.
B. LIST OF MACHINE AND EQUIPMENT		
42.	Wheel balancer	1 no.
43.	Exhaust gas Analyzer	1 no.
44.	Car Washer	1 no.
45.	Brake Bleeding Equipment	1 no.
46.	Air compressor 200literscapacity	1 no.
47.	Battery Tester & battery charger	2 nos.
48.	Hydro meter	3 no.
49.	Hydraulic Press	1 no.
50.	TRG – Turning Radius gauge	1 no.
51.	CCK – Caster, camber & kingpin angle inclination set	1 no.
52.	Green Power Jump starter	1 no.

ANNEXURE - II

TRAINEE INTERNAL ASSESSMENT REPORT							
Name:					Batch No.:		
Card ID No.					Dept:		
Attendance %:					Trade:		
Quarters	**Month**	**Attend %**	**Month**	**Attend %**	**Month**	**Attend %**	**Quarterly Average Attend %**
Qtr – 1							
Qtr – 2							
Qtr – 3							
Qtr – 4							

General Assessment

Sl No.	**Attributes**		**Score Qtr - 1**	**Score Qtr - 2**	**Score Qtr – 3**	**Score Qtr - 4**	**Score Sum of 4 Qtr Qtr – Sum**
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, Behavior , 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 In charge / Dept Manager)							
Remarks (ITP Training Coordinator)							