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

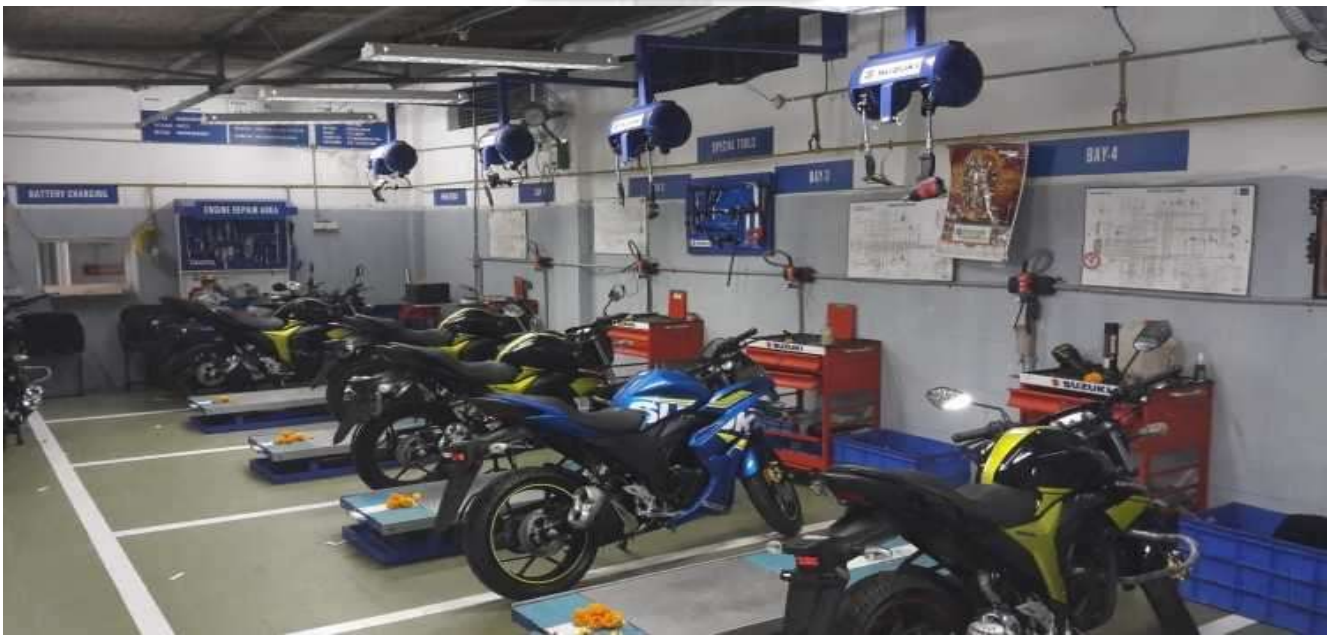
COMPETENCY BASED CURRICULUM

MECHANIC TWO & THREE WHEELER

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – AUTOMOTIVE

Industrial Training Institute

Directorate General of Training

Skill India
कौशल भारत - कुशल भारत

MECHANIC TWO & THREE WHEELER

(Engineering Trade)

(Revised in 2018)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
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ACKNOWLEDGEMENT

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert members contributed/ participated for finalizing the course curriculum of Mechanic Two and Three Wheeler trade held on 16.05.17 at Govt. ITI- Aundh, Pune			
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CONTENTS

1. COURSE INFORMATION

During one year duration of "Mechanic Two & Three Wheeler" trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill. In addition to this, a candidate is entrusted to undertake project work, extracurricular activities and on-the-job training to build up confidence. The broad components covered related to the trade are categorized in two semester each of six months duration. The semester wise course coverage is categorized as below: -

1st Semester – This semester will cover the safety aspect in general and specific to the trade, identification of tools & equipment, raw materials used. In this semester the trainee will perform Measuring & marking by using various Measuring & Marking tools. The trainee will be able to plan and perform basic fastening and fitting operations. Familiarize with basics of electricity, test and measure the electrical parameter. Practice on maintenance of batteries. Practice making various welding joints by using Arc and gas welding.

2nd Semester– In this semester the candidate will practice on dismantling Engine of Two and Three Wheeler as per given standard procedures. Able to achieve skill on Overhauling of Cylinder Head , valve train , Piston, connecting rod assembly, crankshaft, flywheel and mounting flanges, spigot and bearings, camshaft etc. practice reassembling all parts of engine in correct sequence as per workshop manual. Perform troubleshooting of Excessive smoke, overheating, knocking or abnormal noise etc. Practice servicing of Fuel Tank and its components, repair and overhaul Steering and suspension system of three wheelers. The trainee will overhaul brake system, transmission system and overhaul AC Generator, LPG/CNG fuel system of Two and three wheelers. Perform servicing and maintenance.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

Mechanic Two & Three Wheeler trade under CTS is one of the popular courses delivered nationwide through a network of ITIs. The course is of one-year (02 semester) duration. It mainly consists of Domain area and Core area. In the Domain area, Trade Theory & Practical impart professional skills and knowledge. While the core area (Workshop calculation & Science, Engg. Drawing and Employability Skill) imparts requisite core skills, knowledge, and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by NCVT which is recognized worldwide.

Trainee broadly needs to demonstrate that they are able to:

- Read and interpret technical parameters/ documentation, plan and organize work processes, identify necessary materials and tools.
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- Check the components as per workshop manual, identify and rectify errors and repair/replace components.
- Document the technical parameter related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS

- Can join the apprenticeship program in different types of industries leading to a National Apprenticeship Certificate (NAC).
- Self employment

2.3 COURSE STRUCTURE

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

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

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of 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 two semesters itself.

a) The **Internal Assessment** during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute 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).

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

2.4.1 PASS REGULATION

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

2.4.2 ASSESSMENT GUIDELINE

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

Assessment will be evidence based comprising the following:

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

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

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • Below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety	• Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% tolerance dimension achieved

procedures and practices	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% tolerance dimension 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

Brief description of job roles:

Mechanic, Motor Cycle after successful completion of the above course, the trainee shall be able to perform the following skills with proper sequence.

Repairs, services and overhauls motor cycles, auto rickshaws, scooters; etc., to keep them roadworthy. Examine motor cycle or scooter to locate faults by running engine in stationary position or by driving it on road. Dismantle parts such as engine, ignition system, dynamo forks, shock absorbers, gear box etc., as necessary. Grinds valves, sets timings, relines brakes, re-bushes steering mechanism, replaces worn out parts, assembles gear box clutch etc. Performs other tasks to affect repair, cleans and sets carburetor, fits driving chain, wheels silencer, kick, gear, clutch and brake levers and other accessories. Adjusts control cables for brake, clutch and accelerator, sets tappets and wheel alignment, tightens loose parts and makes necessary fittings and connections. Changes engine and gear box oil, starts engine and tunes it up. Tests performance of vehicle by driving on road and makes further adjustments to remove defects noticed if any. Assembles motor cycle or auto-rickshaws from previously dismantled parts.

Auto Service Technician (two and three wheelers) is responsible for the repairing and routine servicing and maintenance (including electrical and mechanical aggregates) of two/three wheeler vehicles.

Plan and organize assigned work and detect & resolve issues during execution in his own work area within defined limit. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Reference NCO-2015:

i. 7231.0500 - Mechanic, Motor Cycle
ii. 7231.0501 - Auto Service Technician

4. GENERAL INFORMATION

Name of the Trade	**Mechanic Two & Three Wheeler**
NCO - 2015	7231.0500, 7231.0501
NSQF Level	Level - 4
Duration of Craftsmen Training	One year (Two semesters each of six months duration)
Entry Qualification	Passed 10th Class Examination under 10+2 System of education with Mathematics and Science.
Unit Strength (No. Of Student)	16 (Max. Supernumeraries seats: 5)
Space Norms	100 sq. m (including parking area)
Power Norms	3 KW
Instructors Qualification for	
1. Mechanic Two & Three Wheeler	a) Degree in Automobile/ Mechanical Engg. (with specialization in Automobile) from recognized college/University with one year post qualification experience in the automobile industry and should possess valid driving license. **OR** Diploma in Automobile/Mechanical (specialization in automobile) from recognized board of technical education with two years post qualification experience in the Automobile industry and should possess valid driving license. **OR** NTC/ NAC in the relevant trade with 3 years post qualification experience in the relevant field and should possess valid driving license. **Desirable:** Preference will be given to a candidate with Craft Instructor Certificate (CIC) in the relevant trade. **Note**: 1) At least one Instructor must have Degree/Diploma in Automobile/ Mechanical Engg. (With specialization in Automobile) when applied for 02 units.

	Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.
2. Workshop Calculation & Science	Degree in Engineering with one year experience. **OR** Diploma in Engineering with two-year experience. **Desirable:** Craft Instructor Certificate in RoD&A course under NCVT.
3. Engineering Drawing	Degree in Engineering with one year experience. **OR** Diploma in Engineering with two-year experience. **OR** NTC/ NAC in the Draughtsman (Mechanical / Civil) with three-year experience.
4. Employability Skill	MBA OR BBA with two-year experience OR Graduate in Sociology/ Social Welfare/ Economics with two-year experience OR Graduate/ Diploma with two-year experience and trained in Employability Skills from DGT institutes. **AND** Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above. **OR** **Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.**
List of Tools and Equipment	As per Annexure – I

Distribution of training on Hourly basis: (Indicative only)

Total Hours/Week	Trade Practical	Trade Theory	Workshop Cal. & Sc.	Engg. Drawing	Employability Skills	Extra-curricular Activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for Mechanic Two & Three Wheeler trade under CTS: **Level 4**

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

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

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

a. Process
b. Professional Knowledge
c. Professional Skill
d. Core Skill
e. Responsibility

The Broad Learning outcome of the Mechanic Two & Three Wheeler trade under CTS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study.	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and learning and some responsibility for other's works and learning.

6. LEARNING/ ASSESSABLE OUTCOME

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

6.1. GENERIC LEARNING OUTCOME

1. Recognize & comply safe working practices, environment regulation and housekeeping / 5 S management / Kaizen (Continuous improvement)
2. Work in a team, understand and practice soft skills, technical English to communicate with required clarity.
3. Demonstrate knowledge of concept and principles of basic arithmetic & algebraic and apply knowledge of specific area to perform practical operations.
4. Understand basic science in the field of study.
5. Read and understand engineering drawing for different application in the field of work.
6. Understand the concept in productivity, quality tools, and labour welfare legislation.
7. Explain energy conservation, global warming and pollution.
8. Explain time management, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
9. Understand and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry.

6.2. SPECIFIC LEARNING OUTCOME

Semester – I

10. Comply environment regulations and housekeeping in the work shop.
11. Check &Perform precision measurements and marking by using various measures and marking tools used in automotive work shop practices.
12. Plan and Perform basic fastening and fittings operation by using correct hand tools, machine tools and equipments.
13. Perform surface finishing operations in the given job.
14. Construct electrical circuits and test its parameters by using electrical measuring instruments.

15. Perform basic electrical testing in two and three wheelers.
16. Perform battery testing and charging operations.
17. Construct basic electronic circuits and testing.
18. Join Components by using Arc & Gas welding
19. Inspect the Auto component using nondestructive testing method.
20. Identify the hydraulic and pneumatic components in a vehicle.
21. Check and interpret vehicle specification data and VIN, select & operate various service station equipments.

Semester – II

22. Carry out the general servicing of two and three wheelers.
23. Carry out Engine overhaul of two/three wheelers.
24. Overhauling of cylinder head assembly.
25. Diagnosis and trouble shoot for excessive smoke, engine overheating and abnormal noise.
26. Carry out Servicing of fuel tank.
27. Carry out overhauling of steering and suspension system.
28. Overhauling front and rear wheels, brake.
29. Overhaul automatic/manual transmission of two and three wheeler.
30. Overhaul AC generator.
31. Check ignition circuit for proper functioning.
32. Overhaul the LPG/ CNG fuel supply system and check exhaust smoke.
33. Carry out servicing and maintenance of two and three wheeler

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOME	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping / 5S management / Kaizen (Continuous improvement)	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose of dangerous/unsalvageable goods and substances according to site policy and procedures following safety / Environmental regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify personal protective equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguishers and use the same as per requirement
2. Work in a team, understand and practice soft skills, technical English to communicate with required clarity.	2.1 Obtain sources of information and recognize information.
	2.2 Use and draw up technical drawings and documents.
	2.3 Use documents and technical regulations and occupationally related provisions.
	2.4 Conduct appropriate and target oriented discussions with higher authority and within the team.
	2.5 Present facts and circumstances, possible solutions & use

		English special terminology. Listening skill ,Why - Why analysis , 5W1H
	2.6	Resolve disputes within the team
	2.7	Conduct written communication.
3. Demonstrate knowledge of concept and principles of basic arithmetic, algebraic, trigonometric, statistics, and co-ordinate system and apply knowledge of specific area to perform practical operations.	3.1	Semester examination to test basic skills on arithmetic, algebra, trigonometry and statistics.
	3.2	Their applications will also be assessed during execution of assessable outcome and also tested during theory and practical examination.
4. Understand and explain basic science in the field of study including basic electrical, and hydraulics & pneumatics.	4.1	Semester examination to test basic skills on science in the field of study including basic electrical and hydraulics &pneumatics.
	4.2	Their applications will also be assessed during execution of assessable outcome and also tested during theory and practical examination.
5. Read and apply engineering drawing for different application in the field of work.	5.1	Semester examination to test basic skills on engineering drawing.
	5.2	Their applications will also be assessed during execution of assessable outcome and also tested during theory and practical examination.
6. Understand and 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	Semester examination to test the concept in productivity, quality tools and labour welfare legislation.
	6.2	Their applications will also be assessed during execution of assessable outcome.
7. Explain energy conservation, global	7. 1	Semester examination to test knowledge on energy conservation, global warming and pollution.

	7. 2 Their applications will also be assessed during execution of assessable outcome.
8. Explain personnel finance, Entrepreneurship and manage/ organize related task in day to day work for personal & societal growth.	8.1 Semester examination to test knowledge on personnel finance, entrepreneurship.
	8.2 Their applications will also be assessed during execution of assessable outcome.
9. Understand and apply basic computer working, basic operating system, and uses internet services to get accustomed & take benefit of IT developments in the industry.	9. 1 Semester examination to test knowledge on basic Computer working, basic operating system and uses internet services.
	9. 2 Their applications will also be assessed during execution of assessable outcome.

SPECIFIC LEARNING/ ASSESSABLE OUTCOMES	
LEARNING/ ASSESSABLE OUTCOMES	**ASSESSMENT CRITERIA**
SEMESTER-I	
10. Comply environment regulations and housekeeping in the workshop (5S / Kaizen)	10.1 Identify environmental pollution and contribute to the avoidance of instances of environmental pollution
	10.2 Carryout maintenance and cleaning of work shop and lifting equipment environmentally friendly manner.
	10.3 Avoid waste and dispose waste as per procedure the working environment.
	10.4 Recognize different components of 5S and apply the same in the working environment.
11. Check & perform measuring and marking by using various measuring and marking tools.	11.1 Plan the working principles of measuring instruments and special tools required for auto workshop.
	11.2 Select, care and use of measuring instrument.
	11.3 Select, care and use of measuring instrument.
12. Plan and perform basic fastening operation by using correct hand tools, machine tools and equipments.	12.1 Describe the purpose, use of auto hand tools.
	12.2 List the safety rules for hand tools.
	12.3 Select the correct tool for the job.
	12.4 Set up the tacked pieces in specific position.
	12.5 Joint components by Brazing, Soldering, Riveting as per given drawing.
	12.6 Produce components by different operation (Drilling, Reaming, Taping, Dieing)
13. Perform surface finishing operations in the given job.	13.1 Do surface finishing of the job to meet specifications by scraping.
	13.2 Sharpen the scraping tool by grinding.
	13.3 Check accuracy/correctness of the job using measuring instruments.
	13.4 Do surface finishing of the job to meet specifications by scraping.
14. Construct electrical circuits and test its parameters by using electrical measuring	14.1 Plan and organize the work for basic electrical operations.
	14.2 Select the tools, instruments and materials required to do the job.

instruments.	14.3 Comply with safety rules when performing the basic electrical operations.
	14.4 Perform electrical wire joints, form electrical circuits and test basic electrical parameters as per the circuit drawings and operating procedures.
15. Perform basic electrical testing in two and three wheelers	15.1 Plan and organize the work for auto electrical component testing.
	15.2 Tracing the auto electrical components in a vehicle.
	15.3 Test continuity and voltage drop in the electrical circuits.
	15.4 Operate the electrical components in a vehicle and test lamps.
16. Perform battery testing and charging operations.	16.1 Ascertain and select tools and materials for the job.
	16.2 Comply with safety rules when performing the following operations.
	16.3 Plan and select different methods for charging the battery.
	16.4 Perform battery testing as per the operating procedure.
17. Construct basic electronic circuits and testing.	17.1 Plan and select different types of basic electronic components and measuring instruments.
	17.2 Construct and test the basic electronic gate circuits and its components as per the standard procedure.
18. Join components by using Arc & Gas welding.	18.1 Determine the principles, process of different welding process applicable in automobile industry.
	18.2 Demonstrate the edge preparation for butt and fillets welds.
	18.3 Select the type and size of filler rod and flux/electrode, size of nozzle and gas pressure/welding current, preheating method and temperature as per requirement.
	18.4 Set and tack metals as per drawing.
	18.5 Deposit the weld maintaining appropriate technique

	and safety aspects.
	18.6 Cool the welded joint by observing appropriate cooling method. Use post heating, peening etc. as per requirement.
	18.7 Clean the joint and inspect the weld for its uniformity and different types of surface defects.
19. Inspect the Auto Component using non-destructive testing methods.	19.1 Classify different vehicle components by its manufacturing processes.
	19.2 Ascertain and select tools and equipment to do NDT test the given job.
	19.3 Plan and organize the work for nondestructive testing.
	19.4 Perform different types of nondestructive tests using appropriate testing equipment.
	19.5 Observe safety/ precaution during testing the job.
20. Identify the hydraulic and pneumatic components in a vehicle.	20.1 Comply with safety rules when performing the following operations.
	20.2 Locate and identify the hydraulic components in a vehicle.
	20.3 Locate and identify the pneumatic components in a vehicle.
21. Check & Interpret Vehicle Specification data and VIN. Select & operate various Service Station Equipments.	21.1 Identify of different type of vehicle
	21.2 Identify the different vehicle specification data and information
	21.3 Demonstrate the garage, service station different equipment
SEMESTER-II	
22. Carry out the general servicing of two & three wheeler	22.1 Follow and maintain procedure to achieve a safe working environment in line with general servicing of two & three wheeler.

	22.2 Identify & locate the parts of two & three wheeler.
	22.3 Comply with safety rules when performing the operation.
	22.4 Select tools, equipment's and material required for servicing of vehicle.
	22.5 Wash the vehicle with washer with appropriate pressure required for each parts.
	22.6 Change and maintain the oil level as required.
	22.7 Lubricate the components which are necessary.
23. Carry out S.I engine Overhaul of two and three wheelers.	23.1 Carry out Engine overhaul of two / three wheeler.
	23.2 Plan and select the correct tools, equipments and material to carry out the job.
	23.3 Remove engine from vehicle.
	23.4 Dismantle the engine as per standard procedure of mfg.
	23.5 Check the components and compare with standard specification for its correctness.
	23.6 Replace the parts by doing necessary adjustments. As per specification
	23.7 Reassemble the engine. (Torque requirement , soft / hard joint knowledge / understanding)
	23.8 Refill the engine oil. Understanding of different types of automobile oils
	23.9 Check drive chain tension and lubricate it.
	23.10 check the performance of electrical system.
24. Overhauling of cylinder head assembly.	24.1 Select tools, equipment's, measuring instruments and material required for servicing of overhauling head assembly.
	24.2 Comply with safety rules when performing the operation.
	24.3 Check cylinder head assembly for functioning.
	24.4 Remove dismantle and clean cylinder head assembly.
	24.5 Measure dimension of all components in accordance with standard specification by using precision gauges.
	24.6 Replace/Repair and assemble the components of cylinder head assembly.
	24.7 Assemble cylinder head assembly as per mfg. guide line.
	24.8 Check and adjust tappet clearance as per specification.
	24.9 set ignition timing and start engine set for idling.
25. Diagnosis and trouble shoot for excessive smoke,	25.1 Select tools, equipment's, measuring instruments and material required for servicing of cylinder head assembly.

engine overheating and abnormal noise	25.2 Comply with safety rules when performing the operation.
	25.3 Diagnosis and trouble shoot for excessive smoke.
	25.4 Diagnosis and trouble shoot for engine overheats.
	25.5 Diagnosis and trouble shoot for engine abnormal noise
26. Carry out Servicing of fuel tank.	26.1 Select tools, equipment's, measuring instruments and material required for servicing of fuel tank.
	26.2 Plan, organize work and Comply with safety rules when performing job.
	26.3 Remove fuel tank and check for leakage and flow.
	26.4 Remove petrol tap, clean and refit the strainer.
	26.5 Refit the tank and check for proper functioning.
	26.6 Check fuel tank cap breathing function.
27. Carry out overhauling of steering and suspension system.	27.1 Select tools, equipment's, and material required for the job.
	27.2 Plan, organize work and Comply with safety rules when performing job.
	27.3 Identify the parts of steering and suspension system.
	27.4 Overhaul steering system.
	27.5 Overhaul suspension system.
	27.6 Check shock absorber for proper functioning and replace if necessary.
28. Overhauling front and rear wheels, brake.	28.1 Select tools, equipment's, and material required for the job.
	28.2 Plan, organize work and Comply with safety rules when performing job.
	28.3 Remove front and rear wheel, dismantle and check for truing, alignment.
	28.4 Inspect the brake drum, chain sprocket, rubber pad for worn out and replace if necessary.
	28.5 Check tire for wear and tube for puncture.
	28.6 Check and inflate tire for correct pressure as per specification.
	28.7 Check wheel bearing and grease it. (Understand specific grease requirement)
	28.8 Plan, organize work and Comply with safety rules when performing job.
	28.9 Check adjust front and rear brake lever free play as per

	manual.
	28.10 Inspect the brake shoe, drum and replace if necessary.
	28.11 Overhaul hydraulic disc brake.
29. Overhaul automatic/manual transmission of two and three wheeler.	29.1 Select tools, equipment's, and material required for the job.
	29.2 Plan, organize work and Comply with safety rules when performing job.
	29.3 Remove, dismantle, check parts, replace ~~warn~~ worn out parts if necessary of automatic transmission.
	29.4 Reassemble automatic transmission and check for proper functioning. (Torque requirement , soft / hard joint knowledge / understanding
	29.5 Remove and inspect crank shaft, timing sprocket replace if necessary.
	29.6 Overhaul kick start assembly.
	29.7 Overhaul gear shift mechanism.
	29.8 Identify and overhaul the oil pump assembly.
30. Overhaul AC generator.	30.1 Select tools, equipment's, and material required for the job.
	30.2 Plan, organize work and Comply with safety rules when performing job.
	30.3 Identify the parts of AC Generators. Remove AC Generator, dismantle, check components, replace if necessary.
	30.4 Trace the ac /dc circuit in three wheelers.
	30.5 Measure volt, amp, resistance and leakage in a circuit.
	30.6 Check pulse generator for proper functioning.
31. Check ignition circuit for proper functioning. (multi point fuel injection system to be added in syllabus)	31.1 select tools, equipment's, and material required for the job.
	31.2 Plan, organize work and Comply with safety rules when performing job.
	31.3 Identify the parts of ignition circuits.
	31.4 Measure resistance in primary and secondary winding replace if faulty.
	31.5 Check ignition system components for proper functioning.
	31.6 Inspect and adjust ignition timing.

	31.7 Set and check emission as per standard
32. Overhaul the LPG/ CNG fuel supply system and check exhaust smoke	32.1 Select tools, equipment's, and material required for the job.
	32.2 Plan, organize work and Comply with safety rules when performing job.
	32.3 Identify the parts of LPG/CNG fuel system in three wheelers.
	32.4 Service the LPG/CNG kit.
	32.5 Start the engine tune for slow speed.
	32.6 Identify the parts of smoke meter/ exhaust gas analyzer.
	32.7 Check diesel engine smoke with the help of smoke meter.
	32.8 Check petrol/LPG/CNG engine smoke with the help of gas analyzer and compare with standard emission level.
	32.9 Tune the vehicle for recommended emission level.
33. Carry out servicing and maintenance of two and three wheeler.	33.1 Select tools, equipment's, and material required for the job.
	33.2 Plan, organize work and Comply with safety rules when performing job.
	33.3 Identify the parts of vehicle to be service and maintain.
	33.4 Carry out servicing and maintenance of vehicle as per mfg.'s schedule.

SYLLABUS FOR MECHANIC TWO & THREE WHEELER			
FIRST SEMESTER - 6 MONTHS			
Week No.	**Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
1-2	• Comply environment regulations and housekeeping in the workshop.	1. Demonstration of Machinery used in the trade. (09 hrs) 2. Identification to safety equipment and their use etc. (05 hrs) 3. Importance of maintenance and cleanliness of Workshop. (05 hrs) 4. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of used engine oil. (10 hrs) 5. Demonstration with health centre. (05 hrs) 6. Demonstration fire service station to provide demo on First aid and Fire safety. (05 hrs) 7. Perform use of fire extinguishers. (05 hrs) 8. Energy saving Tips of ITI electricity Usage. (06 hrs)	- Importance of trade Training. - General discipline in the Institute - Elementary First Aid. - Importance of Mechanic diesel in Industry - Safety precautions in handling Diesel machine - Energy conservation - Safety disposal of Used engine oil, - Electrical safety tips. - Safe handling of Fuel Spillage, - Fire extinguishers used for different types of fire. - Safe disposal of toxic dust, - safe handling and Periodic testing of lifting equipment - Authorization of Moving & road testing vehicles.
3-5	• Check & perform Measuring & marking by using various Measuring & Marking tools	9. Perform practice using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc. (25 hrs) 10. Perform layout a work piece- for line, circle, arcs and circles. (10 hrs) 11. Perform to measure a wheel base of bike & auto with measuring tape. (05 hrs) 12. Perform to measure valve spring	Hand & Power Tools: - -Marking scheme, marking material-chalk, Prussian blue. - Cleaning tools- Scraper, wire brush, Emery paper, - Description, care and use of Surface plates, steel rule, measuring tape, try square. Calipers-inside and

		tension using spring tension tester. (05 hrs) 13. Perform to remove wheel lug nuts with use of an air impact wrench. (10 hrs) 14. Perform Practice on General workshop tools & power tools. (20 hrs)	outside. Dividers, surface gauges, scriber, - Punches-prick punch, center punch, pin punch, hollow punch, number and letter punch. - Chisel-flat, cross-cut. Hammer- ball pein, lump, mallet. Screwdrivers blade screwdriver, Phillips screw driver, Ratchet screwdriver. - Allen key, bench vice & C clamps, - Spanners- ring spanner, open end spanner & the combination spanner, universal adjustable open end spanner. - Sockets & accessories, - Pliers ,Combination pliers, multi grip, long nose, flat-nose, - Nippers or pincer pliers, Side cutters, Tin snips, Circlip pliers, external circlips pliers. - Air impact wrench, air ratchet, wrenches- Torque wrenches, pipe wrenches, car jet washers Pipe flaring & cutting tool, pullers - Gear and bearing.
6-7	-do-	15. Perform measuring practice on Cam height, Camshaft Journal dia, crankshaft journal dia, Valve stem dia, piston diameter, and piston pin dia with outside Micrometers. (05 hrs) 16. Perform measuring practice on the height of the rotor of an oil pump from the surface of the housing or any other auto component measurement with	Systems of measurement, Description, care & use of - Micrometers - Outside and depth micrometer, - Micrometer adjustments, - Vernier calipers, Telescope

		depth micrometer. (05 hrs) 17. Perform measuring practice on valve spring free length.(05 hrs) 18. Perform measuring practice on cylinder bore, Connecting rod bore, inside diameter (ID) of a camshaft bearing with Telescope gauges.(05 hrs) 19. Perform measuring practice on cylinder bore for taper and out-of-round with Dial bore gauges.(05 hrs) 20. Perform measuring practice to measure wear on crankshaft end play, crankshaft run out, and valve guide with dial indicator. (05 hrs) 21. Perform measuring practice to check the flatness of the cylinder head is warped or twisted with straightedge is used with a feeler gauge.(05 hrs) 22. Perform measuring practice to check the end gap of a piston ring, piston to cylinder wall clearance with feeler gauge.(05 hrs) 23. Perform check engine manifold vacuum with vacuum gauge. (05 hrs) 24. Perform check the air pressure inside the vehicle tires is maintained at the recommended setting. (05 hrs)	gauges - Dial bore gauges, Dial indicators, - - straightedge, feeler gauge, thread pitch gauge, - Vacuum gauge, tire pressure gauge.
8-9	Plan & perform basic fastening & fitting operation by using correct hand tools, Machine tools & equipments.	25. Perform general cleaning, checking and use of nut, bolts, & studs etc. (05 hrs) 26. Perform of removal of stud/bolt from blind hole. (05 hrs) 27. Perform cutting tools like Hacksaw, file, chisel, Sharpening of Chisels, center punch, safety precautions while grinding. (15 hrs) 28. Perform hacksawing and filing to	- Fasteners- Study of different types of screws, nuts, studs & bolts, locking devices, such as lock nuts, cotter, split pins, keys, circlips, lock rings, lock washers and locating where they are used. - Washers& chemical compounds can be

		given dimensions. (25 hrs)	used to help secure these fasteners. Function of Gaskets - Selection of materials for gaskets and packing, oil seals. - Cutting tools :- Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and uses., - OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding. - Limits, Fits &tolerances:-Definition of limits, fits &tolerances with examples used in auto components
10-11	-do-	29. Perform marking and drilling clear and Blind Holes, Sharpening of Twist Drills. (10 hrs) 30. Check safety precautions to be observed while using a drilling machine. (05 hrs) 31. Perform tapping a Clear and Blind Hole, Selection of tape drill Size. (15 hrs) 32. Use of stud-extractor. Cutting Threads on a Bolt/ Stud. (05 hrs) 33. Adjustment of two piece Die, Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface. (15 hrs)	Drilling machine - Description and study of Bench type drilling machine, Portable electrical Drilling machine, drill holding devices, - Work Holding devices, Drill bits. Taps and Dies: Hand Taps and wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and Die stock. - Screw extractors. Hand Reamers, different Type of

			hand reamers, Drill size for reaming, Lapping, Lapping abrasives and type of Laps.
12	Perform surface finishing operation in the given job.	34. Practice on making Rectangular Tray. (10 hrs) 35. Perform pipe bending, fitting nipples unions in pipes. Soldering and Brazing of Pipes. (15 hrs)	Sheet metal - State the various common metal Sheets used in Sheet Metal shop - Sheet metal operations - Shearing, bending, Drawing, Squeezing - Sheet metal joints - Hem & Seam Joints - - Fastening Methods - Riveting, soldering, brazing. Fluxes used on common joints. – - Sheet and wire-gauges. The blow lamp- its uses and pipe fittings.
13	Construct electrical circuits and test its parameters by using electrical measuring instrument.	36. Perform joining wires using soldering Iron. (05 hrs) 37. Construction of simple electrical circuits. (05 hrs) 38. Perform measure of current, voltage and resistance using digital multimeter. (05 hrs) 39. Perform continuity test for fuses, jumper wires, fusible links and circuit breakers. (10 hrs)	- Basic electricity, Electricity principles, - Ground connections, Ohm's law, Voltage, Current, Resistance, - Power, Energy. Voltmeter, ammeter, Ohmmeter Mulitmeter, Conductors & insulators, Wires, Shielding, - Length vs. resistance, Resistor ratings

14	Perform basic electrical testing in two and three wheelers.	40. Perform series, parallel, series parallel circuits using Ohm's law, (10 hrs) 41. Check electrical circuit with a test lamp, perform voltage drop test in circuits using multimeter, measure current flow using multimeter /ammeter, use of service manual wiring diagram for troubleshooting. (15 hrs)	- Fuses & circuit breakers, Ballast resistor, - Stripping wire insulation, cable colour codes and sizes, Resistors in Series circuits , Parallel circuits and Series-parallel circuits, - Electrostatic effects, Capacitors and its applications, Capacitors in series and parallel.
15	Perform battery testing and charging operation	42. Cleaning and topping up of a lead acid battery, testing battery with hydrometer. (05 hrs) 43. Perform connection battery to a charger for battery charging, Inspecting & testing a battery after charging. (10 hrs) 44. Measure and troubleshoot the cause(s) of excessive Key-off battery drain (parasitic draw) and do corrective action. Testing of relay and solenoids and its circuit. (10 hrs)	- Description of Chemical effects, Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF)batteries, - Magnetic effects, Heating effects, Thermoelectric energy, Thermistors, Thermo couples, - Electrochemical energy, photo-voltaic energy, Piezo electric energy, - Electromagnetic induction, Relays, Solenoids, Primary & Secondary windings, - Transformers, stator and rotor coils.
16	Construct basic electronic circuits and testing	45. Identify and test power and signal connectors for continuity. (05 hrs) 46. Identify and test different type of Diodes. (05 hrs) 47. Perform regulator /rectifier, inspection, and assembling. (05 hrs)	- Basic electronics: Description of Semiconductors, - Solid state devices-Diodes, transistors, Thyristors, Uni Junction Transistors (UJT), Metal Oxide Field

		48. Check NPN&PNP Transistors for its functionality, Construct and test simple logic circuits OR, AND & NOT Logic gates using as switches. (10 hrs)	Effect Transistors (MOSFETs), - Logic gates-OR, AND & NOT and Logic gates using switches.
17-18	Join components by using Arc & Gas welding.	49. Practice to make straight beads and Butt, Lap & T joints Manual Metal Arc Welding. (20 hrs) 50. Setting of Gas welding flames, practice to make a straight beads and joints Oxy- Acetylene welding. (20 hrs) 51. Film on Heat treatment process. (05 hrs)	- Introduction to welding and Heat treatment - Welding processes – Principles of Arc welding, brief description, classification and applications. - Manual Metal Arc welding -principles, power sources, electrodes, welding parameters, edge preparation & fit up and welding techniques; - Oxy – Acetylene welding, principles, equipment, welding parameters, edge preparation & fit up and welding techniques;. - Heat Treatment Process– Introduction, Definition of heat treatment, Definition of Annealing, - Normalizing, Hardening and tempering. Case hardening, Nitriding, - Induction hardening and Flame Hardening process used in auto components with examples.
19-20	Inspect the auto component using	52. Perform liquid penetrant testing method and Magnetic particle	- Non-destructive Testing Methods-

	nondestructive testing method Identify the hydraulic and pneumatic components in a vehicle	testing method. (05 hrs) 53. Identify the Hydraulic and pneumatic components used in vehicle. (25 hrs) 54. Tracing of hydraulic circuit on hydraulic jack, hydraulic power steering, brake circuit. (15 hrs) 55. Identify components in Air brake systems. (05 hrs)	Importance of Non-Destructive Testing In Automotive Industry, - Definition of NDT, Liquid penetrant and Magnetic particle testing method, Portable Yoke method - Introduction to Hydraulics & Pneumatics: -Definition of Pascal law, pressure, Force, viscosity. - Description, symbols and application in automobile of Gear pump-Internal & External, single acting, double acting & Double ended cylinder - Directional control valves-2/2, 3/2, 4/2, 4/3 way valve, Pressure relief valve, Non return valve, Flow control valve used in automobile. - Pneumatic Symbols, Description and function of air Reciprocating Compressor. Function of Air service unit (FRL-Filter, Regulator & Lubricator).
21	Check & Interpret Vehicle Specification data and VIN, Select & operate various Service Station Equipments.	56. Identify of different type of Vehicle. (05 hrs) 57. Demonstrate of vehicle specification data; Identification of vehicle information Number (VIN). (05 hrs) 58. Demonstrate of Garage, Service station equipments.- Vehicle	- Auto Industry - history, leading manufacturers, development in automobile industry, trends, new product. Brief about Ministry of Road transport &Highways,

		hoists – Two post and four post hoist, Engine hoists, Jacks, Stands. (15 hrs)	- The Automotive Research Association of India (ARAI), National Automotive Testing and R&D Infrastructure Project (NATRIP), & Automobile - Association. Definition: - Classification of vehicles on the basis of load as per central motor vehicle rule, wheels, final drive, and fuel used, axles, position of engine and steering transmission, body and load. - Brief description and uses of Vehicle hoists – Two posts and four post hoist, Engine hoists, Jacks, Stands.
22-23	Project Work/ Industrial Visit- Broad area: a) Construct an aluminium tray b) Construct a lap joint using electric arc welding. c) Maintenance of Battery. d) Construct a simple electronic circuit of horn/ flasher/ side indicators.		
24-25	**Revision**		
26	**Examination**		

SYLLABUS FOR MECHANIC TWO & THREE WHEELER			
SECOND SEMESTER – 06 Months			
Week No.	**Learning Outcome Reference**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
27-28	Carry out the general servicing of two & three wheelers	59. Identify the parts &general servicing of Two Wheeler and Three wheeler, washing, cleaning, oiling, greasing and lubricating. (10 hrs) 60. Dismantle the two wheeler SI engine, cleaning and inspecting the parts, checking engine bore, piston rings, connecting rod, bearings, crankshaft. (10hrs) 61. Assemble all the parts after assembling inspect Engine oil level, clutch cable free play. (15 hrs) 62. Adjust Drive chain tension, check performance of electrical system. (15 hrs)	- Two wheelers and three wheelers auto Industry in India - leading manufacturers, new product. **Introduction to Engine:** - Description of internal & external combustion engines, Classification of IC engines, Principle & working of 2&4-strokediesel engine Compression ignition Engine(C.I)), - Principle of Spark Ignition Engine(SI), differentiate between 2-strokeand 4 stroke, C.I engine and S.I Engine, - Direct injection and Indirect injection, - Technical terms used in engine, Engine specification. - Study of various gauges/instrument on a dash board of a vehicle-Speedometer, Tachometer, Odometer and Fuel gauge, and Indicators such as gearshift position,
29-30	Carryout SI engine overhaul of two wheeler& three wheelers	63. Perform dismantling three wheeler engine and inspection of cylinder head, piston, piston ring, connecting rod. (10 hrs) 64. Perform measurement of piston ring gap, the piston ring to	- **Basic engine components Engine cams&** Description & functions of pistons, piston rings, connecting rod and piston pins and materials. Used

		groove clearance, piston OD, cylinder to piston clearance, piston pin OD, piston pin hole ID in an X and Y axis, piston to pin clearance connecting rod small end ID, connecting rod small end to piston pin clearance and compare the measurements with service manual. (20 hrs) 65. Perform trouble shooting of low compression, High compression, Excessive noise, and poor idling. (20 hrs)	recommended clearances for the rings and its necessity, precautions while fitting rings, common troubles and remedies of piston. - Description and function of Crank shaft, Engine bearings. - Trouble shooting procedure for low compression, High compression, Excessive noise, and poor idling.
31	Overhauling of cylinder head assembly.	66. Identify valves and condition of valve and seat. Inspection of rocker arm and rocker arm shaft, camshaft, valve spring, valve guide, valve guide replacement, valve seat inspection and replacing. (05 hrs) 67. Perform cylinder head assembly. (05hrs) 68. Perform inspection of valve clearance and Ignition timing and setting. (05 hrs) 69. Perform trouble shooting of Excessive smoke, overheating, knocking or abnormal noise. Troubleshooting of cam chain noise and cam chain slack excessively. (10 hrs)	**Valves & Valve Trains** - Function of Engine Valves, different types, materials**,** Type of valve operating mechanism, Importance of Valve seats**,** Valve-timing setting. - Description of Camshafts & drives, importance of Cam lobes**,** Timing belts &chains**.** - Trouble shooting procedure for Excessive smoke, overheating, knocking or abnormal noise. Troubleshooting procedure for cam chain noise, and cam chain slack excessively.
32-33	Diagnose and troubleshoot for excessive smoke, engine overheating and abnormal noise.	70. Perform checking the throttle cable for deterioration, damage or kinks, measure the throttle grip free play, and adjustments. Check the carburetor idle speed and adjust as per manual. (10 hrs) 71. Perform compression test. Practice on throttle valve disassembly, check the throttle valve and jet needle surfaces	**Intake & exhaust systems** - Carbureted systems**,** - **Principle of** Carburetor, type of carburetor working of constant velocity type carburetor, - Carburetor operation- Carburetion**,** **c**arburetor systems**,** - Metering jets**,** Accelerating**,** Carburetor

		for presence of dirt, scratches or wear and assemble the throttle valve. (10 hrs) 72. Perform removal of carburetor, float, float valve, jet clean, inspect and adjust the flat level as per manual and assemble the carburetor. (10 hrs) 73. Adjust the throttle grip free play and carburetor as per manual. (10 hrs) 74. Perform removing and cleaning of air cleaner, Checking of Engine oil level, oil filter screen cleaning. Inspection of fuel lines, Spark plug. (10 hrs)	barrels, Carburetor filter Diesel fuel Injection system, Tanks & lines**,** Fuel lines. Idle speed circuit, slow speed circuit, high speed circuit, air cleaners**,** Intake manifolds**.** **Importance of Cooling systems &** **Lubrication system.** - Function of engine oil, Grades of oil, Lubrication points. - Trouble shooting procedure for Oil level too low and Oil contamination**.**
34	Carry out servicing of fuel tank.	75. Perform removal of fuel tank; check that fuel flow freely from the petrol tap. (05 hrs) 76. Perform removal of petrol tap and clean the strainer and assemble. (05 hrs) 77. Diagnose - causes and remedy for engine not starting, high fuel consumption, Practice on engine tune. (15 hrs)	**Gasoline /Diesel Fuel Systems:** - Gasoline fuel characteristics**,** Diesel fuel characteristics, Difference between Gasoline and diesel fuel. - Controlling fuel burn**,** Stoichiometric ratio (air-fuel ratio), Air density**,** Fuel supply system**,** Pressure & vacuum. - Trouble shooting procedure for Engine cranks but would not start, Lean mixture, Engine idles roughly, stalls or turns poorly, and Rich mixture.
35	Carryout overhauling of steering and suspension system.	78. Identify steering system components in two and three wheelers. (05 hrs) 79. Practice on handle bar removal, inspection and assembling of handlebar. (05 hrs) 80. Perform removal of front fork, inspection of front fork spring, fork tube, piston, slider and assembling of front fork. (5hrs) 81. Practice on steering stem	- **Introduction to steering Principles of steering,** Description of different types of steering & handle, fork mounted over races. - Description, construction and function of steering stem. - Troubleshooting Procedure for Hard steering Steers to one side or does not track strain, front wheel

		removal, steering stem adjustment. (05 hrs) 82. Inspect condition of fork and adjust rake of front fork, dismantle trailing link, adjust and service of heavy duty thrust races. (05 hrs)	wobbling, Soft suspension, Hard suspension, Front suspension noise.
36	-do-	83. Identify suspension system components in two and three wheelers. (05 hrs) 84. Practice on rear shock absorber removal, inspection of shock absorber spring and assembling of shock absorber. (05 hrs) 85. Perform removal of swing arm, inspection of pivot bolt, swing arm. (10 hrs) 86. Inspect condition of shock absorbers. Servicing of suspension, changing bush. (05 hrs)	**Suspension Systems** - Principles of suspension**,** Suspension force**,** Description, location, suspension-description, construction and working principle of telescopic front suspension, suspension oil, oil seal installation, **Shock absorber types** - Hydraulic shock absorbers**,** Gas-pressurized shock absorbers**,** Load-adjustable shock absorbers**,** - Manual adjustable rate shock absorbers**,** Electronic adjustable-rate shock absorbers**,** Automatic load-adjustable shock absorbers
37-38	Overhauling front and rare wheels, brake.	87. Perform removal of front wheel from vehicle, inspection of front wheel axle run-out, front wheel bearing inspection, front wheel rim run-out, brake drum inspection, and assembling of front wheel. (15 hrs) 88. Practice on removing rear wheel from vehicle, inspection of rear wheel axle run-out, rear wheel bearing inspection, rear wheel rim run-out, brake drum inspection, driven sprocket inspection, driven sprocket removal, and assembling of rear wheel, driven sprocket installation. Check the chains lack and adjust as per manual.	**Wheels & Tyres** - Function of wheel and construction, Wheel types-spoke, cast wheel& sizes, Wheel balancing**,** Rim sizes &designations**,** Tyre function and structure, size and designation, Radial ply tyres**,** Tubeless tyre, Center of gravity, Relation between tyre pressure and life**,** Tube size, TUFFUP tube. Aspect ratio of tyre, - Puncture procedure, Repair of TUFFUP tube, **Tyre construction** - Types of tyre construction**,** Tyre materials**,** Tyre sizes

		(20 hrs) 89. Dismantle tyres and tubes checking puncture. Assembling inflating to correct pressure. Checking & adjusting tire pressure by use of air or by Nitrogen Wheel truing, alignment. (10 hrs) 90. Analyze **tyre wear patterns.** Checking the wheel bearings and greasing. (05 hrs)	&designations, Tyre information, Tyre tread designs, Effects of air pressure and uneven wear pattern. - Descriptions Tire wear Patterns and causes, Nitrogen vs atmospheric air in tyres
39-40	-do-	91. Perform following practical on Two and three wheelers.- Measure the front brake lever free play and adjust as per manual, Measure the rear brake pedal free play and adjust as per manual. (20 hrs) 92. Perform Servicing of brake system, cleaning, checking, greasing and assembling. (15 hrs) 93. Inspect the shoes and wheel drums, changing of brake lining. Repairing and maintenance of hydraulic disc brake used in Motorcycles. (15 hrs)	**Braking Systems** - Braking fundamentals Principles of braking, description, construction and operation of Drum & disc brakes, advantage over drum brake, - Description and working principle of master cylinder, Hydraulic pressure & force, Brake fade - Braking system components- Brake pedal/lever , Brake fluid hose, Brake fluid, - Bleeding, Applying brakes, Brake force, Brake light switch - Disc brakes & components -Disc brake system, Disc brake operation, Disc brake rotors, Disc brake pads, Disc brake calipers, Brake friction materials, - Comparison of Drum brake and Disc brake. ABS Drum brakes & components
41-42	Overhaul clutch	94. Adjust clutch lever free play and	**Clutches & Transmission:-**

	assembly, automatic transmission of two and three wheelers	adjust as per manual, removing clutch assembly from Two-wheeler and three wheeler cleaning and inspecting parts. (05 hrs) 95. Replace defective parts. Fitting clutch assembly. (05 hrs) 96. Inspect and repair work of Automatic clutch and automatic transmission used in two wheeler and three wheeler. (10 hrs) 97. Practice on removal of crankshaft, inspection of crank shaft, timing sprocket replacement and installation, (05 hrs) 98. Practice on kick starter disassembly, inspection and assembly. (05 hrs) 99. Perform disassembly of transmission, inspection of main shaft, counter shaft, gearshift drum, shift fork, guide pin and gears and assembly of transmission. (10 hrs) 100. Removal of oil pump and inspection and assembly of oil pump. (05 hrs) 101. Gearshift linkage disassembly, inspection and assembly of gearshift linkage. (05 hrs)	- Clutch principles, Wet & dry clutches Single plate clutches, Multi-plate clutches, Operating mechanisms, Description of cam chain mechanism. Automatic clutch - Gearbox layout & operation Gearbox layouts, description of gear shift mechanism, gear ratio, Gearbox operation, Gear drive position – Neutral, 1st to 5thposition. - Trouble shooting procedure for Clutch slip when accelerating, clutch will not disengage, motor cycle creeps with clutch disengaged, - Excessive lever pressure, clutch lever pressure, clutch operation feels rough, Hard to shift, Gearshift pedal does not return, and Transmission jumps out of gears. - Automatic transmission used in two wheeler and three wheeler.
43-44	Overhaul AC generator	102. Practice on A.C. Generator removal, inspection and installation. (05 hrs) 103. Perform removal of cam chain tensioner, inspection of tensioner spring and pushrod, installation. (10 hrs) 104. Trace the A.C /D.C electrical circuit in a two wheeler and three wheeler. (05 hrs) 105. Perform measurement of Resistance, DC voltage measurement, DC Current	**Auto electrical** - Thermistor, Description and function of ignition switch, alternator, Regulator/rectifier, Ignition principles, Ignition components, - Battery power source, Ignition coil, DC/ACCDI, TCI Contact breaker, capacitor /condenser, Distributors, Distributor types, - High-tension leads, Spark

		measurement, pulse generator,(5hrs) 106. Inspect leakage current, measurement of charging voltage. (05 hrs) 107. Practice on headlight removal, headlight bulb replacement and installation. (05 hrs) 108. Practice on removal of speedometer, indicator lamp replacement. (05 hrs) 109. Check horn, head light and indicator and rectify the circuit. (05 hrs) 110. Practice on adjusting head light focus. Identifying wiring harness. (05 hrs)	plugs, Spark plug components, Principal of electronic ignition, advantage of electronic ignition. - Starter motor, Fuse, throttle position switch, source coil & pulser coil Power relay, Silicon rectifier, - Description of Charging system, starting system, Lighting system, Lamps/light bulbs, Lamp/light bulb information, Indicators, Headlights, Circuit diagrams.
45	Check ignition circuit for proper functioning	111. Inspection of spark plug gap and adjustments. (05 hrs) 112. Measurement the resistance of the ignition primary and secondary coil. (02 hrs) 113. Perform checking the performance of ignition coil, (03 hrs) 114. Inspect of A.C generator, practice on removal of C.D.I unit (Capacitive Discharge Ignition), inspection of C.D.I unit and assembling. (05 hrs) 115. Servicing of electronic Ignition system, Inspection of ignition timing and adjustment. (05hrs) 116. Inspect ignition switch, handlebar switches, front brake & rear brake stoplight light switch. (05 hrs)	**Troubleshooting procedure** - for No sparks at plugs, Engine starts but runs poorly, - No lights come on when ignition switch is turned ON, - All lights come on but dimly when ignition switch is turned ON - Headlight beams do not shift when HI-LO switch is operated. Misfiring.
46	Overhaul the LPG/CNG fuel system and check exhausts smoke	117. Identify the various parts of LPG/ CNG kit and Trouble shooting of the same. (10 hrs) 118. Practice on Starting engine, tuning for slow speed, perform exhaust emission	- Study about LPG / CNG powered engines used in Three Wheelers. Safety while handling gas units. **Emission Control-** - Sources of emission,

		test using gas analyzer/smoke tester and tuning the vehicle for recommended emission levels. (15 hrs)	Combustion, Hydrocarbons, Hydrocarbons in exhaust gases, Oxides of nitrogen, Particulates, Carbon monoxide, Carbon dioxide, Sulphur content in fuels, crankcase emission control system, Evaporative emission control, - Catalytic converter Regulated emissions standard.
47	Carryout servicing and maintenance of two and three wheelers.	119. Perform servicing and maintenance (25 hrs)	- Study of Motor Vehicle act Rules &Regulation. - Driving Rules, Case study of Major Indian models of motorcycles, scooters and mopeds, Bajaj, Enfield, TVS, Honda, Hero, Suzuki, Mahindra &Yamaha.
48-49	Project Work/ Industrial Visit- Broad area: a) Overhauling of valve train b) Overhauling of cylinder head c) Maintenance of Electrical/ Electronics systems. d) Brake system (Hydraulic & Air) & Hydraulic Power Steering		
50-51	**Revision**		
52	**Examination**		

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

First Semester **Duration: Six Months**		
S No.	**Workshop Calculation and Science**	**Engineering Drawing**
1.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance - Relationship to other technical drawing types - Conventions - Viewing of engineering drawing sheets - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
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.	Drawing Instruments: their Standard and uses - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins/ Clips.
3.	**Ratio &Proportion**: Simple calculation on related problems.	Lines: - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment
4.	**Percentage**: Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.	Free hand drawing of - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension

		Transferring measurement from the given object to the free hand sketches.
5.	**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.	Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6.	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight. Density, unit of density. Relation between mass, weight & density. Simple problems related to mass, weight, and density.	Drawing of Geometrical Figures: Definition, nomenclature and practice of : - Angle: Measurement and its types, method of bisecting. - Triangle-different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.
7.	**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 energyand kinetic energy.	Sizes and Layout of Drawing Sheets - Basic principle of Sheet Size - Designation of sizes - Selection of sizes - Title Block, its position and content - Borders and Frames (Orientation marks and graduations) - Grid Reference - Item Reference on Drawing Sheet (Item List)
8.	-----	Method of presentation of Engineering Drawing - Pictorial View - Orthographic View - Isometric view
9.	------	Symbolic Representation used in the related trade (as per BIS SP:46-2003) of: - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld brazed and soldered joints - Electrical and electronics element

		- Piping joints and fittings
Second Semester **Duration: Six Months**		
S No.	**Workshop Calculation and Science**	**Engineering Drawing**
1.	**Basic Algebra**: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	**Dimensioning practice:** - Position of dimensioning (unidirectional, aligned, as per BIS SP:46-2003) - Types of arrowhead - Leader Line with text - Symbols preceding the value of dimension and dimensional tolerance.
2.	**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.	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid) with dimensions.
3.	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables	Free hand Drawing of Solid figures (Prism, Pyramid, Frustum of Cone and Pyramid) with dimensions.
4.	**Elasticity:** Elastic & Plastic material. Stress & strain and their units. Young's modules. Ultimate stress and breaking stress.	Free Hand sketch of hand tools and measuring tools used in respective trades.
5.	**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.	**Projections:** - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1st angle and 3rd angle projection as per IS specification.

6.	**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. - Electrical insulating materials. - Basic concept of earthing.	Drawing of Orthographic projection in 3rd angle.
7.	- Area of irregular surfaces. - Application related to shop problems.	Free hand Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
8.	- Material weight and cost problems related to trade.	Free hand sketching of simple objects related to trade.
9.	- Temperature measuring instruments. Specific heats of solids & liquids.	- Riveted joints-Butt & Lap (Drawing one for each type).
10.	- Thermal Conductivity, Heat loss and heat gain.	- Reading of drawing. Simple exercises related to missing lines, dimensions. How to make queries.
11.	- Heat treatment and advantages.	- Simple exercises relating missing symbols. - Missing views
12.	----------	- Concept of preparation of assembly drawing and detailing. Preparation of simple assemblies & their details of trade related job/exercises with the dimensions from the given sample or models.
13.	----------	Reading of fabricated engineering drawing

9.2 EMPLOYABILITY SKILLS

CORE SKILL – EMPLOYABILITY SKILL	
First Semester	
1. English Literacy	**Duration : 20 hrs** **Marks : 09**
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, picture reading, gain confidence through role-playing and discussions on current happening, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers, ordinal numbers. Taking messages, passing on messages and filling in message forms, Greeting and introductions, office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. IT Literacy	**Duration : 20 hrs** **Marks : 09**
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of the computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc. Use of Common applications.
Word Processing and Worksheet	Basic operating of Word Processing, Creating, Opening and Closing Documents, Use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion &Creation of Tables. Printing

	document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of Computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, WebsSite, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	**Duration : 15 hrs** **Marks : 07**
Introduction to Communication Skills	Communication and its importance Principles of effective communication Types of communication - verbal, non-verbal, written, email, talking on phone. Non-verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening, guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active listening skills.
Motivational Training	Characteristics essential to achieving success. The power of positive attitude. Self awareness Importance of commitment Ethics and values Ways to motivate oneself Personal goal setting and employability planning.
Facing Interviews	Manners, etiquettes, dress code for an interview Do's &don'ts for an interview

Behavioral Skills	Problem solving Confidence building Attitude
Second Semester	
4. Entrepreneurship Skills	**Duration : 15 hrs** **Marks : 06**
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance &record, Role &function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing Analysis	Qualities of a good entrepreneur, SWOT and risk analysis. Concept &Application of PLC, Sales &Distribution management. Difference between small scale &large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's Support	Preparation of project. Role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the policies / programmes, procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop act, Estimation &costing, Investment procedure - Loan procurement - Banking processes.
5. Productivity	**Duration : 10 hrs** **Marks : 05**
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working aids, Automation, Environment, Motivation - How it improves or slows down productivity.
Comparison with Developed Countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in select industries, e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and insurance.
6. Occupational Safety, Health and Environment Education	**Duration : 15 hrs** **Marks : 06**

Safety & Health	Introduction to occupational safety and health Importance of safety and health at workplace.
Occupational Hazards	Basic hazards, chemical hazards, vibroacoustic hazards, mechanical hazards, electrical hazards, thermal hazards. occupational health, occupational hygiene, occupational diseases/ disorders & its prevention.
Accident &Safety	Basic principles for protective equipment. Accident prevention techniques - control of accidents and safety measures.
First Aid	Care of injured &sick at the workplaces, First-aid &transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to environment. Relationship between society and environment, ecosystem and factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of energy, re-use and recycle.
Global Warming	Global warming, climate change and ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	**Duration : 05 hrs** **Marks : 03**
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act.
8. Quality Tools	**Duration : 10 hrs** **Marks : 05**
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality

	circle, Roles and function of quality circles in organization, Operation of quality circle. Approaches to starting quality circles, Steps for continuation quality circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of housekeeping, Practice of good housekeeping.
Quality Tools	Basic quality tools with a few examples.

ANNEXURE-I

MECHANIC TWO & THREE WHEELER			
List of Tools and Equipment			
A. TRAINEES TOOL KIT per 4 Trainees (FOR 20 TRAINEES +1 ISTRUCTOR)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Allen Key set of 12 pieces	2mm to 14mm	6
2.	Caliper inside Spring	15 cm	6
3.	Calipers outside spring	15 cm	6
4.	Center Punch	10 mm. Dia. x 100 mm.	6
5.	Dividers Spring	15 cm	6
6.	Electrician Screw Driver	250mm	6
7.	Hammer ball peen with handle	0.5 kg	6
8.	Hands file, Second cut flat	20 cm.	6
9.	Philips Screw Driver set of 5 pieces	100 mm to 300 mm	6
10.	Pliers combination	20 cm	6
11.	Screw driver	20cm.X 9mm. Blade	6
12.	Screw driver	30 cm. X 9 mm. Blade	6
13.	Scriber	15 cm	6
14.	Spanner D.E. set of 12	Metric sizes6mm to 32mm	6
15.	Spanner, ring set of 12	Metric sizes 6 to 32 mm.	6
16.	Spanners socket with speed handle, T-bar, ratchet and universal of 28 pieces with box	up to 32 mm set	6
17.	Steel rule	30 cm inch and metric	6
18.	Steel tool box with lock and key (folding type)	400x200x150 mm	6

19.	Wire cutter and stripper		6
B. Tools Instruments and General Shop outfits			
20.	Adjustable spanner	pipe wrench 350 mm	2
21.	Air blow gun with standard accessories		1
22.	Air impact wrench with standard accessories		4
23.	Air ratchet with standard accessories		4
24.	Allen Key set of 12 pieces	2mm to 14mm	4
25.	Ammeter DC with external shunt	300A/ 60A	4
26.	Angle plate adjustable	250x150x175 mm	1
27.	Angle plate size	200x100x200mm	2
28.	Anvil with Stand	50 Kgs	1
29.	Auto Electrical test bench		1
30.	Battery –charger		2
31.	Blow Lamp	1 litre	2
32.	Caliper inside Spring	15 cm	4
33.	Calipers outside spring	15 cm	4
34.	Car Jet washer with standard accessories		1
35.	Chisel flat	10 cm	4
36.	Chisels cross cut	200 mm X 6mm	4
37.	Circlip pliers Expanding and contracting type	15cm and 20cm	4
38.	Clamps C	100mm	2
39.	Clamps C	150mm	2
40.	Clamps C	200mm	2
41.	Cleaning tray 45x30 cm.		4

42.	Compression testing gauge suitable for petrol engine. with standard accessories		2
43.	Copper bit soldering iron	0.25 Kg	4
44.	Cylinder bore gauge	20 to 160 mm capacity	2
45.	Cylinder bore gauge	capacity 20 to 160 mm	2
46.	Depth micrometer	0-25mm	4
47.	Dial gauge type 1 Gr. A (complete with clamping devices and stand)		4
48.	Dividers Spring	15 cm	4
49.	Drift Punch Copper	15 Cm	4
50.	Drill point angle gauge		1
51.	Drill twist	1.5 mm to 15 mm (various sizes) by 0.5 mm	4
52.	Electric Soldering Iron	230 V 60 watts 230 V 25 watts	2 each
53.	Electric testing screw driver		4
54.	Engineer's square Blade	15 cm.	4
55.	Feeler gauge 20 blades (metric)		4
56.	File flat bastard	20 cm	4
57.	File, half round second cut	20 cm	4
58.	File, Square second cut	20 cm	4
59.	File, Square round	30 cm	4
60.	File, triangular second cut	15 cm	4
61.	Files assorted sizes and types including safe edge file (20 No's)		2 sets
62.	Flat File second cut	25 cm	4
63.	Flat File bastard	35 cm	4

64.	Granite surface plate with stand and cover	1600 x 1000mm	1
65.	Grease Gun		2
66.	Growler		1
67.	Hacksaw frame adjustable	20-30 cm	10
68.	Hammer Ball Peen	0.75 Kg	4
69.	Hammer Chipping	0.25 Kg	5
70.	Hammer copper 1 Kg with handle		4
71.	Hammer Mallet		3
72.	Hammer Plastic		4
73.	Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm		2
74.	Hand reamers adjustable	10.5 to 11.25 mm, 11.25 to 12.75 mm, 12.75 to 14.25 mm and 14.25 to 15.75 mm	2 sets
75.	Hand Shear Universal	250mm	2
76.	Hand vice	37 mm	2
77.	Hollow Punch set of seven pieces	6mm to 15mm	2 sets each
78.	Insulated Screw driver	20 cm x 9mm blade	4
79.	Insulated Screw driver	30 cm x 9mm blade	4
80.	Left cut snips	250mm	4
81.	Magneto spanner set with 8 spanners		1 set
82.	Magnifying glass	75mm	2
83.	Marking out table	90X60X90 cm.	1
84.	Multimeter digital		5

85.	Oil can	0.5/0.25 liter capacity	4
86.	Oil Stone	15 cm x 5 cm x 2.5 cm	1
87.	Outside micrometer	0 to 25 mm	4
88.	Outside micrometer	25 to 50 mm	4
89.	Outside micrometer 50 to 75 mm		1
90.	Outside micrometer	75 to 100 mm	1
91.	Philips Screw Driver set of 5 pieces	(100 mm to 300 mm)	2 sets
92.	Pipe cutting tool		2
93.	Pipe flaring tool		2
94.	Piston ring compressor		2
95.	Piston Ring expander and remover.		2
96.	Piston Ring groove cleaner.		2
97.	Pliers combination 20 cm.		2
98.	Pliers flat nose 15 cm		2
99.	Pliers round nose 15 cm		2
100.	Pliers side cutting 15 cm		2
101.	Portable electric drill Machine		1
102.	Power Supply 0-12 v, lamp		1
103.	Prick Punch 15 cm		4
104.	Punch Letter 4mm (Number)		2 sets
105.	Right cut snips 250mm		2
106.	Rivet sets snap and Dolly combined	3mm, 4mm, 6mm	2
107.	Scooter / Motor cycle repairing stand		2

108.	Scraper flat	25 cm	2
109.	Scraper half round	25 cm	2
110.	Scraper Triangular	25 cm	2
111.	Scriber	15 cm	2
112.	Scriber with scribing black universal		2
113.	Set of stock and dies - UNC, UNF and metric		2 sets
114.	Shear Tin Man's	450 mm x 600mm	2
115.	Sheet Metal Gauge		2
116.	Shear Tinnman's	300mm	4
117.	Soldering Copper Hatchet type	500gms	2
118.	Solid Parallels in pairs (Different size) in Metric		2
119.	Spanner Clyburn	15 cm	1
120.	Spanner D.E. set of 12 pieces	6mm to 32mm	4
121.	Spanner T. flocks for screwing up and up-screwing inaccessible positions		2
122.	Spanner, adjustable 15cm.		2
123.	Spanner, ring set of 12 metric sizes 6 to 32 mm.		4
124.	Spanners socket with speed handle, T-bar, ratchet and universal up to 32 mm set of 28 pieces with box		2
125.	Spark lighter		2
126.	Spark plug spanner		2
127.	Steel measuring tape 10 meter in a case		4
128.	Steel rule 15 cm inch and metric		4
129.	Steel rule 30 cm inch and metric		4
130.	Straight edge gauge 2		2

131.	Stud extractor set of 3		2 sets
132.	Stud remover with socket handle		1
133.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm		4
134.	Tachometer (Counting type)		1
135.	Taps and Dies complete sets BSF		1 set
136.	Taps and wrenches - Metric		2 sets
137.	Telescope gauge		4
138.	Temperature gauge 0-100 deg c		2
139.	Thread pitch gauge metric, BSW		2
140.	Torque wrenches		1 each
141.	Trammel 30 cm		2
142.	Tyre pressure gauge with holding nipple		2
143.	Universal puller for removing pulleys, bearings		1
144.	V' Block with Clamps	75 x 38 mm pair	2
145.	Vacuum gauge	0 to 760 mm of Hg	2
146.	Valve Lifter		1
147.	Valve spring compressor universal.		2
148.	Vernier caliper	0-300 mm with least count 0.02mm	4
149.	Vice grip pliers		2
150.	Voltmeter 50V/DC		2
151.	Wire Gauge (metric)		2
152.	Work bench with 4 vices 12cm Jaw	250 x 120 x 60 cm	4
C. General Installation/ Machineries			

Sl. no.	Name of the Tool &Equipments	Specification	Quantity
153.	Arbor press hand operated 2 ton capacity		1
154.	Automotive exhaust 5 gas analyzer (petrol & Diesel) or Diesel Smoke Meter		1
155.	Battery tester to test 12V/ 24V		2
156.	Bench lever shears 250mm Blade x 3mm capacity		1
157.	Cut section working model of Continuous variable transmission		1
158.	Cut Section working model of Rotary clutch assembly of two wheeler		1
159.	Demonstration board of magneto ignition system of a two wheeler		1
160.	Discrete Component Trainer / Basic Electronics Trainer		1
161.	Drilling machine bench to drill up to 12mm dia along with accessories		1
162.	Dual Magnetization Yoke	AC / HWDC, 230 VAC, 50Hz	1set
163.	Gas Welding Table	1220mm x760mm	2
164.	Grinding machine (general purpose) D.E. pedestal with wheels rough and smooth	300 mm dia	1
165.	Ignition coil and CDI unit of four different make		1each
166.	Layout of working model 12 V automobile electrical systems		1 each
167.	Liquid penetrant Inspection kit		1 set
168.	Motor cycle (four stroke engine) with Digital twin spark		1
169.	Motor cycle (two stroke engine)		1
170.	Motor vehicle (3 wheeler)		1
171.	Pipe Bending Machine (Hydraulic type) 12mm to 30mm		1
172.	Pneumatic rivet gun		2
173.	Ridge cutter		1

174.	Scooter (four stroke engine)		1
175.	Scooter (two stroke engine)		1
176.	shock absorber for two wheeler four different type		2
177.	Spring tension tester		1
178.	Three wheeler chassis frame & power transmission system.		1
179.	Three wheeler Engine for dismantling and assembling		2
180.	Three wheeler gear box for dismantling and assembling		2
181.	Three wheeler steering system for dismantling and assembling		2
182.	Tin smiths bench folder 600 x 1.6mm		1
183.	Trolley type portable air compressor single cylinder with 45		1
184.	capacity Air tank, along with accessories & with working		2
185.	Welding Transformer	150-300 Amps	1
186.	Working model of electronic ignition system of three wheeler		1
187.	Working model of electronic ignition system of two wheeler		1
D. List of consumable:			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
188.	Automatic Transmission oils		As required
189.	Battery- SMF		As required
190.	Brake fluids		As required
191.	Chalk, Prussian blue.		As required
192.	Chemical compound for fasteners		As required
193.	Diesel		As required
194.	Different type gasket material		As required

195.	Different type of oil seal		As required
196.	Drill Twist (assorted)		As required
197.	Emery paper -	36–60 grit , 80–120 grit	As required
198.	Engine coolant		As required
199.	Engine oil		As required
200.	Gear oils		As required
201.	Gloves for Welding (Leather and Asbestos)		5 sets
202.	Hacksaw blade (consumable)		As required
203.	Hand rubber gloves tested for 5000 V		5 pairs
204.	Holders, lamp teakwood boards, plug sockets, solders, flux wires and cables batteries round consumable blocks and other consumables as required		As required
205.	Hydrometer		4
206.	Lapping abrasives		As required
207.	Leather Apron		5
208.	Petrol		As required
209.	Power steering oil		As required
210.	Radiator Coolants		As required
211.	Safety goggles		As required
212.	Steel wire Brush 50mmx150mm		5
E. Workshop Furniture			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
213.	Book shelf (glass panel)	6½ ‘ x 3’ x 1½’	As required
214.	Computer Chair		2

215.	Computer Table		2
216.	Desktop computer and related MS office software		2
217.	Discussion Table	8’ x 4’ x 2½ ‘	2
218.	Fire Extinguishers, first- aid box		As required
219.	Instructional Material – NIMI Books/Ref.books		As required
220.	Internet connection with all accessories		As required
221.	Laser printer		1
222.	LCD projector/ LED /LCD TV	42”	1
223.	Multimedia DVD for Automotive application / subjects		As required
224.	Online UPS 2KVA		1
225.	Stools		21
226.	Storage Rack	6½ ‘ x 3’ x 1½’	As required
227.	Storage shelf	6½ ‘ x 3’ x 1½’	As required
228.	Suitable class room furniture		As required
229.	Suitable Work Tables with vices		As required
230.	Tool Cabinet -	6½ ‘ x 3’ x 1½’	2
231.	Trainees locker (20 lockers)	6½ ‘ x 3’ x 1½’	2 Nos.

TOOLS &EQUIPMENTS FOR EMPLOYABILITY SKILLS		
S No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 nos.
2.	UPS - 500Va	10 nos.
3.	Scanner cum Printer	1 no.
4.	Computer Tables	10 nos.
5.	Computer Chairs	20 nos.
6.	LCD Projector	1 no.
7.	White Board 1200mm x 900mm	1 no.
Note: Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor:			**Year of Enrollment:**
Name & Address of ITI (Govt./Pvt.):			**Date of Assessment:**
Name & Address of the Industry:			**Assessment location: Industry / ITI**
Trade Name:	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

SNo	**Candidate Name**	**Father's/Mother's Name**	Safety Consciousness (15)	Workplace Hygiene (5)	Attendance/ Punctuality (10)	Ability to Follow Manuals/ Written Instructions (5)	Application of Knowledge (10)	Skills to Handle tools &Equipment (10)	Economical Use of Materials (5)	Speed in Doing Work (10)	Quality in Workmanship (15)	VIVA (15)	**Total Internal Assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														