COMPETENCY BASED CURRICULUM

FOR THE TRADE OF

MECHANIC MOTOR CYCLE (MMC)

SEMESTER-I & II

UNDER

CRAFTSMAN TRAINING SCHEME (CTS)

IN SEMESTER PATTERN

BY

सत्यमेव जयते
Government of India

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

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1. INTRODUCTION

India is one of the youngest nations in the world. Our youth are our strength. However, a challenge facing the country is that of skilling our youth as per the demands of the industry. Recognizing the need for quickly coordinating the skill development and entrepreneurship efforts of all concerned stakeholders, the Government of India created the Ministry of Skill Development and Entrepreneurship on 9th November, 2014. To create further convergence between the Vocational Training System through Industrial Training Institutes (ITIs) and the new skill initiatives of the Government, the Training and Apprenticeship Training divisions from the Directorate General of Employment and Training (DGET) under the Ministry of Labour and Employment stand transferred to the Ministry of Skill Development and Entrepreneurship (MSDE) with effect from 16th April, 2015. This move brings over 11000 ITIs and scores of other institutions, and the Apprenticeship and Training divisions, under the Ministry.

The Ministry of Skill Development and Entrepreneurship is an apex organization for the development and coordination of the vocational training including Women's Vocational Training in our country. The Ministry conducts the vocational training programmes through the Craftsmen Training Scheme (CTS), Apprenticeship Training Scheme (ATS), Modular Employable Scheme (MES) under the Skill Development Initiative (SDI) Scheme, and Craftsmen Instructor Training Scheme (CITS) to cater the needs of different segments of the Labour market. The National Council for Vocational Training (NCVT) acts as a central agency to advise Government of India in framing the training policy and coordinating vocational training throughout India. The day-to-day administration of the ITIs rests with the State Governments/ Union Territories.

- Training courses under the CTS is being offered through a network of more than 11000 Government and Private Industrial Training Institutes (ITIs) located all over the country with a total seating capacity of more than 16 Lakhs with an objective to provide skilled workforce to the industry in 126 trades. Skill development courses exclusively for women are also being offered under CTS and other schemes through Government and Private ITIs and Regional Vocational Training Institutes (RVTIs) for Women.
- The Apprentices Act, 1961 was enacted with the objective of regulating the program of apprenticeship training in the industry by utilizing the facilities available within for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart on the job training for school leavers, and ITI passed outs to develop skilled manpower for the industry.
- The Ministry is implementing the Employable Scheme (MES) under the Skill Development Initiative Scheme to provide vocational training to people to develop skilled manpower for the industry through a network of Vocational Training Providers (VTPs) located across the country.

Central Staff Training and Research Institute (CSTARI), Kolkata is the nodal institute for the development/revision of curricula under all vocational training schemes of the Ministry. National Instructional Media Institute (NIMI), Chennai is to make available instructional material in various trades for the use of trainees and trainers to ensure overall improvement in the standard of institutional training under the CTS and ATS schemes. The institute is actively involved in the development, production and dissemination of instructional media Packages (IMPs) comprising of books on Trade Theory, Trade Practical, Test/Assignment, and Instructor's Guide.

The National Skills Qualification Framework (NSQF), published in the Gazette of India on 27th December, 2013, is a national framework that aims to integrate general and vocational streams of education and training. The main goal of the NSQF is to focus on competency-based qualifications, which in turn facilitate and enhance transparency, both within and between general and vocational streams. The National Skill Development Agency (NSDA) under the Ministry is responsible for anchoring and implementation of the Framework, by bringing together the key stakeholders through the National Skill Qualifications Committee (NSQC).

The competency-based framework organizes qualifications into ten levels, with the entry level being 1, and the highest level being 10. Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are (1) Process, (2) Professional knowledge, (3) Professional skill, (4) core skill, and (5) Responsibility. The paradigm shift from learning focused on inputs to an outcome/competency-based education would help in the Recognition of Prior Learning (RPL), and simultaneously enable the alignment of the Indian qualifications with international ones. Government funding is expected to be on a preferential basis for NSQF compliant courses. The NSQF notification provides a Qualification Register, which is the official national database of all qualifications aligned to NSQF levels. Through this Register, learners can expect access to all NSQF compliant qualifications.

The Ministry has set up Mentor Councils to focus on courses under NCVT in various sectors with representation from thought leaders among different stakeholders viz., industries, innovative entrepreneurs who have proved to be game-changers, academic/professional institutions, and champion ITIs for each of the sectors. The Mentor Council for each sector reviews curriculum, admission criteria, course duration, and requirement of trainers and assessment/evaluation systems for the sector on a continuous basis and make recommendations regarding the same. Sector-wise Core Groups are formed to plan and prepare the documentation for the competency-based curricula for the courses under each sector.

2. GENERAL INFORMATION

1	Qualification	MECHANIC MOTOR CYCLE (MMC)
2	N.C.O./NOS Code No.	7231.50 , ASC/Q1411
3	NSQF Level	Level 4
4	Duration of the course/qualification	1 year (Two Semester having duration of six months each)
5	Entry Qualification	Passed 10th class examination with Maths and Science
6	Trainees per unit	16 + 30% super Numeric

Note:

i) Out of the two Instructors required for a unit of 2(1+1), one must have Degree/Diploma, and other must have NTC/NAC qualifications, in the relevant field.
ii) Qualification of the Instructor for WCS and ED must be as per the training manual.

Distribution of notional training hours of the training per week:

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

3. COURSE STRUCTURE

Name of the Qualification: MECHANIC MOTOR CYCLE (MMC)

Total duration of the course: 12 Months

Training duration details:

Course Elements	**Hourly Distribution**
Professional Skills	1100 HRS
Professional Knowledge	260 HRS
Workshop Calculation & Science	90 HRS
Engineering Drawing	130 HRS
Employability Skills	110 HRS
Extra Curricular Activities	90 HRS
In-plant Training/Project Work	120 HRS
Admission & Examination	80 HRS
Total	1980 hrs

4. JOB ROLES

4.1 Brief description

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 make and keep them roadworthy.
- Examines motor cycle or scooter to locate faults by running engine in stationary position or by driving it on road.
- Dismantles parts such as engine, ignition system, dynamo forks, shock absorbers, gear box etc., as necessary.
- Grinds valves, sets timings, relines brakes, rebushes steering mechanism, replaces worn out parts, assembles gear box clutch etc.
- Performs other tasks to effect repair, cleans and sets carburettor, 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.
- May assemble motor cycle or auto-rickshaws from assembled parts.

Employment opportunities:

On successful completion of the course the candidates can either get employed, or become a self-employed Entrepreneur in any one of the following fields.

1. Wage Employment
2. Mechanic Motor cycle
3. Motor Cycle Service Technician
4. Auto Fitter in Manufacturing Concern
5. Assembly Shop or Test Shop
6. Mechanic in Auto Manufacturing Industry
7. Dealers service mechanic
8. Driver/Vehicle Operator
9. Spare Parts Sales Assistant / Manufacturers' Representative

1. Self Employment
2. Two/Three wheeler Mechanic
3. Diesel Fuel System Service Mechanic
4. Spare Parts Salesman
5. Spare Parts Dealer

Further learning pathways:

- On successful completion of the course trainee can get themselves enrolled in Apprenticeship training in reputed Industrial organisation.
- The qualified candidates have scope for lateral entry into the Diploma courses offered by some of the State Governments

4.2 NOS & QP/NCO Mapping:

5. NSQF LEVEL COMPLIANCE

The Broad Learning outcomes of **Mechanic Motor Cycle** trade under CTS matches with the Level descriptor at Level 4.

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The NSQF **level 4**descriptor is given below:

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

6. GENERAL TRAINING PLAN, EXAMINATION & PASS REGULATION

General Training Plan

The knowledge and skill components as stated in the section for 'learning outcomes' are to be imparted in accordance with the instructions in respect of the content and time structure.

Assessment

The assessment for the semester-based qualification is carried out by conducting formative assessments, and end-of-semester examinations, as per the guidelines given in the Curriculum. The internal assessments for theory subjects and practical are conducted for evaluating the knowledge and skill acquired by trainees and the behavioural transformation of the trainees as per the learning outcomes. Theory examinations are conducted in Trade Theory, Workshop Calculation & Science, Engineering Drawing and Employability Skills. Trade practical examinations are conducted by the respective State Governments. The details of the examination and assessment standard are in a latter section. NCVT prepares the question papers for the Trade practical. Candidates are to demonstrate that they can:

1. Read& interpret technical parameters/documentation, plan and organize work processes, and identify necessary materials and tools,
2. Perform a task/job with due consideration to safety rules, accident prevention regulations and environmental protection stipulations,
3. Apply Professional Knowledge, Core Skills, and Employability Skills while performing the task/job.
4. Check the task/job as per the drawing for proper functioning, and identify and rectify errors in the job, if any.
5. Document the technical parameters related to the task/job.

Pass regulation

For the purposes of determining the overall result, weightage of 25 percent is applied to each semester examination. The minimum pass percent for Practical is 60% & minimum pass percent for Theory subject is 40%.

7. LEARNING OUTCOMES

The following are minimum broad learning outcomes after completion of the Mechanic Motor Cycle, course of one year duration:

A. GENERIC OUTCOMES

1. Recognize & comply safe working practices, environment regulation and housekeeping.
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.

B. SPECIFIC OUTCOMES

SEMESTER – I

1. Apply safe working practices in an automotive work shop.
2. Comply environment regulations and housekeeping in the work shop.
3. Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.
4. Make choices to carry out marking out the components for basic fitting operations in the work shop.
5. Use different types of tools and work shop equipment in the Auto work shop.

6. Use of different type of fastening and locking devices in a vehicle.
7. Perform basic fitting operations used in the work shop practices and inspection of dimensions.
8. Grinding of cutting tools in the work shop.
9. Perform surface finishing operations in the given job.
10. Produce sheet metal components using various sheet metal operations.
11. Produce components using bending process in the given work piece.
12. Inspect the auto component using Nondestructive testing methods
13. Manufacture components with different types of welding processes in the given job.
14. Identify the hydraulic and pneumatic components in a vehicle.
15. Construct electrical circuits and test its parameters by using electrical measuring instruments.
16. Perform basic electrical testing in a vehicle.
17. Perform battery testing and charging operations.
18. Construct basic electronic circuits and testing.

SEMESTER - II

1. Apply safe working practices and environment regulation in an automotive work shop.
2. Use different types of conventional and special tools, hardware, fasteners and work shop equipment in the work shop.
3. Ascertain and select measuring instrument and measure dimension of components and evaluate for accuracy.
4. Select appropriate tools, data & information for servicing & overhauling of 2w and 3 Wheeler.
5. Dismantle and assemble of engine components of 2 w and 3 wheelers and check for performance.
6. Dismantle repair and re-assemble 2 w and 3 wheeler automatic transmissions and check their functionality.
7. Dismantle repair and re-assemble 2 w and 3 wheeler Disc Brake and check their functionality.
8. Dismantle and assemble of chassis system overhaul including steering, suspension and braking in a 2&3 wheeler.
9. Carry out repair and maintenance of wheels and tires.
10. Dismantle and assemble of front fork of 2 w and 3 wheelers and check for performance.
11. Apply appropriate rule and tools for starting and charging system and diagnose & rectify faults.
12. Carry out repair and maintenance of electrical system.
13. Apply appropriate rule and tools for electrical system and diagnose & rectify faults.
14. Carry out repair and maintenance of Ignition system.

15. Carry out servicing and maintenance of battery.
16. Carry out the fuel system (petrol, Diesel, LPG, CNG) overhaul in 2 & 3 wheelers.
17. Carry out checking of exhaust smoke by using gas analyzer and smoke tester.
18. Carry out servicing and maintenance of vehicle.

8. ASSESSABLE OUTCOMES WITH ASSESSMENT CRITERIA

Note:

1. The training shall be conducted as per the syllabus.
2. The trainee shall demonstrate the competencies that are defined below in the assessable outcomes highlighted below.
3. The trainee shall be assessed for his/her achievement levels in all the assessable outcomes on the basis of the formative assessment, Theory & Practical examinations, observation, and viva-voce.
4. The trainee shall be assessed for his/her achievement levels in all the assessable outcomes of the Employability Skills, Workshop Calculation & Science, and Engineering Drawing, on the basis of Theory Examinations, and for his/her ability to apply the concepts in Practical.
5. The assessable outcomes and assessment criteria will serve as a set of guidelines for Trainers, Paper setters, Moderators, and Assessors.

Assessable outcomes along with assessment criteria to be achieved after each semester and completion of qualification:

Generic assessable outcomes:

ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose off dangerous goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in

	regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution & contribute to the avoidance of instances of environmental pollution.
	1.13 Deploy environmental protection legislation & regulations
	1.14 Take opportunities to use energy and materials in an environmentally friendly manner
	1.15 Avoid waste and dispose waste as per procedure
	1.16 Recognize different components of 5S and apply the same in the working environment.
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.
	2.2Use 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.
	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, 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. 3.2Their 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 warming and pollution and contribute in day to day work by optimally using available resources.	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 assessable outcomes:

Semester-I

ASSESSABLE OUTCOME	ASSESSMENT CRITERIA
1. Apply safe working practices in an automotive work shop.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store/dispose off dangerous goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/competent of authority in the event of accidents 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. Comply environment regulations and housekeeping in the work shop.	2.1 Identify environmental pollution and contribute to the avoidance of instances of environmental pollution.
	2.2 Carryout maintenance and cleaning of work shop and lifting equipment.
	2.3 Take opportunities to use energy and materials in an environmentally friendly manner.
	2.4 Avoid waste and dispose waste as per procedure.

	2.5 Recognize different components of 5S and apply the same in the working environment.
3. Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.	3.1 Measure all dimensions in accordance with standard specifications and tolerances by using precision measuring instruments.
	3.2 Measure the parameters related with the vehicle components for its effective operation by matching with manufacturer's specification using different gauges
4. Make choices to carry out marking out the components for basic fitting operations in the work shop.	4.1 Mark according to drawings by using marking tools on the work pieces.
	4.2 Chip the job in accordance with standard specifications and tolerances.
	4.3 Measure all dimensions in accordance with standard specifications and tolerances.
5. Use different types of tools and work shop equipment in the work shop.	5.1 Identify the different types of hand and power tools used in the automotive work shop.
	5.2 Operate various tools and work shop equipment.
6. Use of different type of fastening and locking devices in a vehicle	6.1 Identify the different type of fasteners and locking devices used in the vehicle.
	6.2 Use different types of locking devices correctly.
	6.3 Specify the bolt and nut threads.
	6.4 Practice on removing the damaged studs and bolts
7. Perform basic fitting operations used in the work shop practices and inspection of dimensions.	7.1 Mark according to drawing by using marking tools on flat surfaces.
	7.2 Hack saw and file the job using different methods and perform in accordance with the standard specifications and tolerances.
	7.3 Drilling and reaming on flat surfaces.
	7.4 Identify and use hand tools for internal and external threading with taps and dies.
	7.5 Measure all dimensions in accordance with standard specification and tolerances.
8. Grinding of cutting tools in the work shop	8.1 Identify cutting tool materials and their application.
	8.2 Plan and grind cutting and marking tools.
	8.3 Measure the tool angles with gauges.
9.Perform surface finishing operations in the given job.	9.1 Do surface finishing of the job to meet specifications by scraping.
	9.2 Sharpen the scraping tool by grinding.
	9.3 Check accuracy/correctness of the job using measuring instruments.
10. Produce sheet	10.1 Ascertain and select tools and materials for the job and make

metal components using various sheet metal operations.	this available for use in a timely manner.
	10.2 Plan and organize the work for different types of sheet metal operations.
	10.3 Mark according to drawing by using marking tools on flat surfaces.
	10.4 Produce components as per the drawing.
11.Produce components using bending process in the given work piece.	11.1 Ascertain and select tools, equipment and materials for the job and make this available for use in a timely manner.
	11.2 Plan and organize the work for pipe bending operations.
	11.3 Perform bending, soldering and brazing operations in accordance with standard operating procedure using appropriate tools.
	11.4 Check accuracy/correctness of the job using appropriate measuring instruments.
12. Inspect the auto component using Nondestructive testing methods	12.1 Classify different vehicle components by its manufacturing processes.
	12.2 Ascertain and select tools and equipment to do NDT test the given job.
	12.3 Plan and organize the work for nondestructive testing.
	12.4 Perform different types of nondestructive tests using appropriate testing equipment.
	12.5 Observe safety/precaution during testing the job.
13. Manufacture components with different types of welding processes in the given job.	13.1 Plan and select appropriate method to produce components with welding process.
	13.2 Comply with safety rules when performing the above operations.
	13.3 Mark according to the drawing using marking tools on the job.
	13.4 Select appropriate tools and equipment to perform the above operations.
	13.5 Set up and produce component as per standard operating procedure.
14. Identify the hydraulic and pneumatic components in a vehicle.	14.1 Comply with safety rules when performing the following operations.
	14.2 Locate and identify the hydraulic components in a vehicle.
	14.3 Locate and identify the pneumatic components in a vehicle.
15. Construct electrical circuits and test its parameters by using electrical measuring instruments.	15.1 Plan and organize the work for basic electrical operations.
	15.2 Select the tools, instruments and materials required to do the job.
	15.3 Comply with safety rules when performing the basic electrical operations.
	15.4 Perform electrical wire joints, form electrical circuits and test

	basic electrical parameters as per the circuit drawings and operating procedures.
16. Perform basic electrical testing in a vehicle.	16.1 Plan and organize the work for auto electrical component testing.
	16.2 Tracing the auto electrical components in a vehicle.
	16.3 Test continuity and voltage drop in the electrical circuits.
	16.4 Operate the electrical components in a vehicle and test lamps.
17. Perform battery testing and charging operations.	17.1 Ascertain and select tools and materials for the job.
	17.2 Comply with safety rules when performing the following operations.
	17.3 Plan and select different methods for charging the battery.
	17.4 Perform battery testing as per the operating procedure.
18. Construct basic electronic circuits and testing.	18.1 Plan and select different types of basic electronic components and measuring instruments.
	18.2 Construct and test the basic electronic gate circuits and its components as per the standard procedure.

Semester-II

ASSESSABLE OUTCOME	ASSESSMENT CRITERIA.
19. Carry out the general servicing of two & three wheeler.	19.1 Follow and maintain procedure to achieve a safe working environment in line with general servicing of two & three wheeler.
	19.2 Identify & locate the parts of two & three wheeler.
	19.3 Comply with safety rules when performing the operation.
	19.4 select tools, equipment's and material required for servicing of vehicle.
	19.5 Wash the vehicle with washer with appropriate pressure required for each parts.
	19.6 change and maintain the oil level as required.
	19.7 Lubricate the components which are necessary.
20. Carry out S.I engine Overhaul of two wheeler.	20.1 Identify the engine components of two wheeler.
	20.2 Plan and select the correct tools, equipments and material to carry out the job.
	20.3.Remove engine from vehicle.
	20.4 Dismantle the engine as per standard procedure of mfg.
	20.5 Check the components and compare with std specification for its correctness.
	20.6 Replace the parts by doing necessary adjustments.
	20.7 Re assemble the engine.
	20.8 Refill the engine oil.
	20.9 Check drive chain tension and lubricate it.

	20.10Check the performance of electrical system.
21 Carry out overhaul of three wheeler SI engine .	21.1 Identify the engine components of three wheeler.
	21.2 Plan and select the correct tools, equipment's and material to carry out the job.
	21.3 Remove engine from vehicle.
	21.4 Dismantle the engine as per standard procedure of mfg.
	21.5 Check and measure the all components with precision measuring instruments and compare with std specification for its correctness
	21.6 Replace the parts by doing necessary adjustments.
	21.7 Re assemble the engine.
	21.8 Refill the engine oil.
	21.9 Check the performance of electrical system.
22. Diagnosis and troubleshoot engine.	22.1 Plan and select the correct tools, equipment's and material to carry out the job.
	222 Comply with safety rules when performing the operation.
	22.3 Check compression pressure of an engine.
	22.4 Diagnosis the causes for improper compression pressure (low & high) and rectify the same.
	22.5 Diagnosis the causes for abnormal noise from an engine and rectify the same.
	22.6 Check and adjust the engine idling speed.
23. Overhauling of cylinder head assembly.	23.1 select tools, equipment's, measuring instruments and material required for servicing of overhauling head assembly.
	23.2 Comply with safety rules when performing the operation.
	23.3 Check cylinder head assembly for functioning.
	23.4 Remove dismantle and clean cylinder head assembly.
	23.5 Measure dimension of all components in accordance with standard specification by using precision gauges.
	23.6 Replace/Repair and assemble the components of cylinder head assembly.
	23.7 Assemble cylinder head assembly as per mfg. guide line.
	23.8 Check and adjust tappet clearance as per specification.
	23.9 set ignition timing and start engine set for idling.
24 Diagnosis and trouble shoot for excessive smoke, engine overheating and abnormal noise.	24.1 select tools, equipment's, measuring instruments and material required for servicing of cylinder head assembly.
	24.2 Comply with safety rules when performing the operation.
	24.3 diagnosis and trouble shoot for excessive smoke.
	24.4 diagnosis and trouble shoot for engine overheat.
	24.5 diagnosis and trouble shoot for engine abnormal noise
25. Carry out overhauling of	25.1 select tools, equipment's, measuring instruments and material required for servicing of cylinder head assembly.

carburetor.	25 2. Plan, organize work and Comply with safety rules when performing job.
	25.3 service carburetor as per mfg. procedure.
	25.4 Service throttle assembly.
	25.5 Carry out compression test and compare measurements as per specification.
	25.6 Service air cleaner, oil filter and change engine oil if required.
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.
27. Diagnose the causes and remedy for engine not starting and high fuel consumption.	27.1 select tools, equipment's, measuring instruments and material required for the job.
	27.2 Plan, organize work and Comply with safety rules when performing job.
	27.3 .diagnosis the causes for not starting the engine and rectify.
	27.4 diagnosis the causes for high fuel consumption and rectify.
	27.5 carry out tuning as per mfg specification.
28. Carry out overhauling of steering and suspension system.	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 Identify the parts of steering and suspension system.
	28.4 overhaul steering system.
	28.5 overhaul suspension system.
	28.6 check shock absorber for proper functioning and replace if necessary.
29. overhaul front and rear wheel	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 front and rear wheel, dismantle and check for truing, alignment.
	29.4 Inspect the brake drum, chain sprocket, rubber pad for warn out and replace if necessary.
	29.5check tire for wear and tube for puncture.
	29.6 check and inflate tire for correct pressure as per specification.
	29.7 check wheel bearing and grease it.
30. Overhauling front and rear brake.	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 check, adjust front and rear brake lever free play as per manual.
	30.4 Inspect the brake shoe, drum and replace if necessary.
	30.5 overhaul hydraulic disc brake.
31. Overhaul clutch assembly of two and three wheeler.	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 Check and adjust clutch lever free play.
	31.4 Overhaul clutch assembly in two wheeler.
	31.5 Overhaul clutch assembly in three wheeler
	31.6 Refit clutch assembly and check for proper functioning.
32. Overhaul automatic transmission of two and three wheeler.	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 Remove, dismantle, check parts, replace warn out parts if necessary of automatic transmission.
	32.4 Reassemble automatic transmission and check for proper functioning.
33. Overhaul manual transmission 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 components of transmission.
	33.4 Remove and inspect crank shaft, timing sprocket replace if necessary.
	33.5 overhaul kick start assembly.
	33.6 overhaul gear shift mechanism.
	33.6 Identify and overhaul the oil pump assembly.
34. Overhaul AC generator.	34.1 select tools, equipment's, and material required for the job.
	34.2 Plan, organize work and Comply with safety rules when performing job.
	34.3 Identify the parts of AC Generators. Remove AC Generator, dismantle, check components, replace if necessary.
	34.4 trace the ac /dc circuit in three wheeler.
	34.5 Measure volt, amp, resistance and leakage in a circuit.
	34.6 Check pulse generator for proper functioning.
35. Check electrical circuit.	35.1 select tools, equipment's, and material required for the job.
	35.2 Plan, organize work and Comply with safety rules when performing job.
	35.3 check head light circuit and its components for proper functioning replace if necessary and align the head lamp.
	35.4 check speedometer light circuit and its components for proper functioning replace if necessary.
	35.5 check horn circuit and its components for proper functioning

	replace if necessary.
	35.6 Identify the wire harness by using wiring diagram
36. Perform battery testing and charging operation.	36.1 select tools, equipment's, and material required for the job.
	36.2 Plan, organize work and Comply with safety rules when performing job.
	36.3 Plan and select the methods for charging the battery.
	36.4 Perform battery testing as per the operating procedure.
	36.5 Check regulator/ rectifier for proper functioning.
37. Check ignition circuit for proper functioning.	37.1 select tools, equipment's, and material required for the job.
	37.2 Plan, organize work and Comply with safety rules when performing job.
	37.3 Identify the parts of ignition circuits.
	37.4 Measure resistance in primary and secondary winding replace if faulty.
	37.5 Check ignition system components for proper functioning.
	37.6 Inspect and adjust ignition timing.
38. Overhaul the LPG/ CNG fuel supply system.	38.1 select tools, equipment's, and material required for the job.
	38.2 Plan, organize work and Comply with safety rules when performing job.
	38.3 Identify the parts of LPG/CNG fuel system In three wheeler.
	38.4 Service the LPG/CNG kit.
	38.5 start the engine tune for slow speed.
39. Check exhaust smoke.	39.1 select tools, equipment's, and material required for the job.
	39.2Plan, organize work and Comply with safety rules when performing job.
	39.3 Identify the parts of smoke meter/ exhaust gas analyzer.
	39.4 identify the parts of exhaust system.
	39.5 start and tune the slow speed.
	39.6 Check diesel engine smoke with the help of smoke meter.
	39.7 check petrol/LPG/CNG engine smoke with the help of gas analyzer and compare with std emission level.
	39.8 Tune the vehicle for recommended emission level.
40. Carry out servicing and maintenance of two and three wheeler.	40.1 select tools, equipment's, and material required for the job.
	40.2 Plan, organize work and Comply with safety rules when performing job.
	40.3 Identify the parts of vehicle to be service and maintain.
	40.4 Carry out servicing and maintenance of vehicle as per mfg.'s schedule.

9. SYLLABUS CONTENT WITH TIME STRUCTURE

SYLLABUS FOR THE TRADE OF MECHANIC MOTOR CYCLE

9.1 Syllabus Content for Professional Skill & Knowledge

First Semester
Duration: Six Months

Learning Objectives (1st Semester)

- Introduce the occupational safety & health risks and procedures in the trade
- Instruct the usage of measurement systems for engine components
- Instruct the usage of the right tools and equipment used in the workshop for marking, fitting, filing, cutting, drilling, reaming and welding
- Introduce the tolerances and fits and their applications in automotive engineering production.
- Instruct the Mechanical properties of materials, Heat treatment processes, Hydraulic and Pneumatic and their application in automotive Engineering.
- Introduce basic electricity and electronics

Detailed Syllabus:
Syllabus for Trade practical and Trade Theory

Week No.	Trade Practical (27 Hrs/week)	Trade Theory (5 Hrs/week)
1	Familiarisation with institute, Job opportunities in the automobile sector, Machinery used in Trade. Types of work done by the students in the shop floor.	Admission & introduction to the trade: Introduction to the Course duration, course content, study of the syllabus. General rule pertaining to the Institute, facilities available– Hostel, Recreation, Medical and Library working hours and time table
2	Practical related to Safety and Health, Importance of maintenance and cleanliness of Workshop.	Occupational Safety & Health Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & personal safety message. Safe

	Interaction with health centre and fire service station to provide demo on First aid and Fire safety, Use of fire extinguishers. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of Used engine oil. Energy saving Tips of ITI electricity Usage	handling of Fuel Spillage, Fire extinguishers used for different types of fire. Safe disposal of toxic dust, safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles. Energy conservation-Definition, Energy Conservation Opportunities (ECOs)-Minor ECos and Medium ECOs, Major ECOs), Safety disposal of Used engine oil, Electrical safety tips.
3-5	Practice using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc., Layout a work piece- for line, circle, arcs and circles. Practice to measure a wheel base of a vehicle with measuring tape. Practice to measure valve spring tension using spring tension tester Practice to remove wheel lug nuts with use of an air impact wrench Practice on General workshop tools & power tools.	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 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. Screw drivers-blade screwdriver, Phillips screw driver, Ratchet screwdriver. Allen key, bench vice & C-clamps, Spanners- ring spanner, open end spanner & the combination spanner, universal adjustable open end spanner. Sockets & accessories, Pliers - Combination pliers, multi grip, long nose, flat-nose, Nippers or pincer pliers, 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	Measuring practice on Cam height, Camshaft Journal dia, crankshaft journal dia, Valve stem dia, piston diameter, and piston pin dia with outside Micrometers. 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 depth micrometer. Measuring practice on valve	Systems of measurement, Description, care & use of - Micrometers- Outside and depth mirometer, Micrometer adjustments, Vernier calipers, Telescope gauges, Dial bore gauges, Dial indicators, straightedge, feeler gauge, thread pitch gauge, vacuum gauge, tire pressure gauge.

	spring free length. Measuring practice on cylinder bore, Connecting rod bore, inside diameter (ID) of a camshaft bearing with Telescope gauges. Measuring practice on cylinder bore for taper and out-of-round with Dial bore gauges. Measuring practice to measure wear on crankshaft end play, crankshaft run out, and valve guide with dial indicator. Measuring practice to check the flatness of the cylinder head is warped or twisted with straightedge is used with a feeler gauge. Measuring practice to check the end gap of a piston ring, piston-to-cylinder wall clearance with feeler gauge. Practice to check engine manifold vacuum with vacuum gauge. Practice to check the air pressure inside the vehicle tires is maintained at the recommended setting.	
8 & 9	Practice on General cleaning, checking and use of nut, bolts, & studs etc., Removal of stud/bolt from blind hole. Practice on cutting tools like Hacksaw, file, chisel, Sharpening of Chisels, center punch, safety precautions while grinding. Practice on Hacksawing and filing to given dimensions.	Fasteners- Study of different types of screws, nuts, studs & bolts, locking devices, Such as lock nuts, cotter, split pins, keys, circlips, lock rings, lock washers and locating where they are used. Washers & chemical compounds can be used to help secure these fasteners. 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 &	Practice on Marking and Drilling	Drilling machine - Description and study of Bench

11	clear and Blind Holes, Sharpening of Twist Drills Safety precautions to be observed while using a drilling machine. Practice on Tapping a Clear and Blind Hole, Selection of tape drill Size, use of Lubrication, Use of stud extractor. Cutting Threads on a Bolt/ Stud. Adjustment of two piece Die, Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface.	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, type of Laps.
12	Practice on making Rectangular Tray. Pipe bending, Fitting nipples unions in pipes. Soldering and Brazing of Pipes.	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	Practice in joining wires using soldering Iron, Construction of simple electrical circuits, Measuring of current, voltage and resistance using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.	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	Diagnose series, parallel, series-parallel circuits using Ohm's law, 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.	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	Cleaning and topping up of a lead acid battery, Testing battery with hydrometer, Connecting battery to a charger for battery charging, Inspecting	Description of Chemical effects, Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF) batteries, Magnetic effects, Heating effects, Thermo-electric energy, Thermisters, Thermo couples, Electrochemical energy, Photo-voltaic energy, Piezo-electric energy, Electromagnetic induction, Relays,

	& testing a battery after charging, Measure and Diagnose the cause(s) of excessive Key-off battery drain (parasitic draw) and do corrective action. Testing of relay and solenoids and its circuit.	Solenoids, Primary & Secondary windings, Transformers, stator and rotor coils.
16	Identify and test power and signal connectors for continuity, Identify and test different type of Diodes, NPN & PNP Transistors for its functionality, Construct and test simple logic circuits OR, AND & NOT and Logic gates using switches.	Basic electronics: Description of Semi conductors, Solid state devices- Diodes, Transistors, Thyristors, Uni Junction Transistors (UJT), Metal Oxide Field Effect Transistors (MOSFETs), Logic gates-OR, AND & NOT and Logic gates using switches.
17& 18	Practice to make straight beads and Butt, Lap & T joints Manual Metal Arc Welding. Setting of Gas welding flames, practice to make a straight beads and joints Oxy – Acetylene welding Film on Heat treatment process	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	Practice on Liquid penetrant testing method and Magnetic particle testing method. Identification of Hydraulic and pneumatic components used in vehicle. Tracing of hydraulic circuit on hydraulic jack, hydraulic power steering, and Brake circuit. Identification of components in Air brake systems.	Non-destructive Testing Methods- 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	Identification of different type of	Auto Industry - History, leading manufacturers,

	Vehicle. Demonstration of vehicle specification data; Identification of vehicle information Number (VIN). Demonstration of Garage, Service station equipments.- Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.	development in automobile industry, trends, new product. Brief about Ministry of Road transport & Highways, The Automotive Research Association of India (ARAI), National Automotive Testing and R&D Infrastructure Project (NATRIP), & Automobile Association. Definition: - Classification of vehicles on the basis of load as per central motor vehicle rule, wheels, final drive, and fuel used, axles, position of engine and steering transmission, body and load. Brief description and uses of Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks, Stands.
22-23	In-plant Training	
24-25	Revision and Test	
26	NCVT Exam	

Second Semester
Duration: Six Months

Learning Objectives (2nd Semester)

- Introduce Two & Three wheelers auto industry history
- Instruct the Uses of Vehicle hoists.
- Instruct the principle of two stroke and four stroke petrol.
- Instruct the components of two & three wheeler
- Introduce the principle of intake and exhaust systems.
- Instruct the principle of Gasoline and Diesel fuel system applicable to two and Three wheelers
- Instruct the operation of steering fork & Stem
- Instruct the principle of suspension and shock absorber system.
- Introduce the function of wheels and tyres.
- Instruct the function of two & three wheeler braking system
- Introduce the principle of Clutches and Transmission system
- Introduce the auto electrical components.
- Introduce the importance of emissions control procedures.
- Instruct to follow the Motor vehicle act Rules and Regulations.

Week No.	Trade Practical (27 Hrs/week)	Trade Theory (5 Hrs/week)

Detailed Syllabus:
Syllabus for Trade practical and Trade Theory

1 & 2	Identify the parts & General servicing of Two Wheeler and Three wheeler, washing, cleaning, oiling, greasing and lubricating. Dismantling the two wheeler SI engine, cleaning and inspecting the parts, checking engine bore, piston rings, connecting rod, bearings, crankshaft, assembling all the parts after assembling inspect Engine oil level, clutch cable free play, Drive chain tension, performance of electrical system	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-stroke diesel engine (Compression ignition Engine (C.I)), Principle of Spark Ignition Engine(SI), differentiate between 2-stroke and 4 stroke, C.I engine and S.I Engine, Direct injection and Indirect injection, Technical terms used in engine, Engine specification. Study of various gauges/instrument on a dash board of a vehicle- Speedometer, Tachometer, Odometer and Fuel gauge, and Indicators such as gearshift position,
3&4	Practice on Dismantling three wheeler engine and inspection of cylinder head, piston, piston ring, connecting rod Practice on measurement of piston ring gap, the piston ring to 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. Trouble shooting of low compression, High compression, Excessive noise, and poor idling.	**Basic engine components Engine cams &** Description & functions of pistons, piston rings, connecting rod and piston pins and materials. Used 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.
5	Identification of 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.	**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,

	Cylinder head assembly. Inspection of valve clearance and Ignition timing and setting. Trouble shooting of Excessive smoke, overheating, knocking or abnormal noise. Troubleshooting of cam chain noise and cam chain slack excessively.	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.
6&7	Practice on check 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. Practice on compression test. Practice on throttle valve disassembly, check the throttle valve and jet needle surfaces for presence of dirt, scratches or wear and assemble the throttle valve. Practice on removal of carburetor, float, float valve, jet – clean, inspect and adjust the flat level as per manual and assemble the carburetor. Adjust the throttle grip free play and carburetor as per manual. Practice on removing and cleaning of air cleaner, Checking of Engine oil level, oil filter screen cleaning. Inspection of fuel lines, Spark plug.	**Intake & exhaust systems -** Carbureted systems**,** **Principle of** Carburetor, type of carburetor – working of constant velocity type carburetor, Carburetor operation**-** Carburetion**,** Carburetor systems**,** Metering jets**,** Accelerating**,** Carburetor barrels **,** Carburetor filters 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**.**
8	Practice on removal of fuel tank; check that fuel flow freely from the petrol tap. Practice on removal of petrol tap and clean the strainer and assemble. Diagnose - causes and remedy for engine not starting, high fuel consumption, Practice on engine tune.	**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.

9	Identification of steering system components in two and three wheelers, Practice on handle bar removal, inspection and assembling of handle bar. Practice on removal of front fork, inspection of front fork spring, fork tube, piston, slider and assembling of front fork. Practice on steering stem removal, steering stem adjustment, Inspect condition of fork and adjust rake of front fork, dismantle trailing link, adjust and service of heavy duty thrust races.	**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 wobbling, Soft suspension, Hard suspension, Front suspension noise.
10	Identification of suspension system components in two and three wheelers, Practice on rear shock absorber removal, inspection of shock absorber spring and assembling of shock absorber. Practice on removal of swing arm, inspection of pivot bolt, swing arm Inspection of condition of shock absorbers. Servicing of suspension, changing bush.	**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
11&12	Practice on removing front wheel from vehicle, inspection of front wheel axle runout, front wheel bearing inspection, front wheel rim runout, brake drum inspection, and assembling of front wheel. 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,	**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

	driven sprocket removal, and assembling of rear wheel, driven sprocket installation. Check the chain slack and adjust as per manual. Dismantling tyres and tubes checking puncture. Assembling inflating to correct pressure. Checking & adjusting tire pressure by use of air or by Nitorgen Wheel truing, alignment. Analyse **tyre wear patterns.** Checking the wheel bearings and greasing.	construction**,** Tyre materials**,** Tyre sizes & designations**,** Tyre information**,** Tyre tread designs**,** Effects of air pressure and uneven wear pattern. Descriptions Tirewear Patterns and causes Nitrogen vs atmospheric air in tyres
13&14	Following practical to be Practiced 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, Servicing the brake system, Cleaning, checking, greasing and assembling. Inspecting the shoes and wheel drums, changing of brake lining. Repairing and maintenance of hydraulic disc brake used in Motorcycles.	**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 -Drum brake system**,** Drum brake operation**,** Brake linings & shoes**,** Backing plate**.** Brake fluid reservoir, TMC. Wheel cylinder
15&16	Adjusting clutch lever free play and adjust as per manual, removing clutch assembly from Two-wheeler and three wheeler cleaning and inspecting parts.	**Clutches & Transmission:-** Clutch principles**,** Wet & dry clutches Single-plate clutches**,** Multi-plate clutches**,** Operating mechanisms, Description of cam

	Replacing defective parts. Fitting clutch assembly. Inspection and repair work of Automatic clutch and automatic transmission used in two wheeler and three wheeler. Practice on removal of crankshaft, inspection of crank shaft, timing sprocket replacement and installation, practice on kick starter disassembly, inspection and assembly. Practice on transmission disassembly, inspection of main shaft, counter shaft, gearshift drum, shift fork, guide pin and gears and assembly of transmission. Removal of oil pump and inspection and assembly of oil pump. Gearshift linkage disassembly, inspection and assembly of gearshift linkage.	chain mechanism. Automatic clutch Gearbox layout & operation Gearbox layouts**,** description of gear shift mechanism, gear ratio, Gearbox operation**,** Gear drive position – Neutral, 1st to 5th position. 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.
17&18	Practice on A.C.Generator removal, inspection and installation. Practice on removal of cam chain tensioner, inspection of tensioner spring and pushrod, installation. Tracing the A.C /D.C electrical circuit in a two wheeler and three wheeler. Practice on Resistance measurement, DC voltage measurement, DC Current measurement, pulse generator, Inspection of leakage current, measurement of charging voltage. Practice on headlight removal, head light bulb replacement and installation. Practice on removal of speedometer, indicator lamp replacement. Checking horn, head light and indicator	**Auto electrical** Thermistor, Description and function of ignition switch, alternator, Regulator/rectifier, Ignition principles, Ignition components, Battery power source, Ignition coil, DC/AC CDI, TCI Contact breaker**,** **c**apacitor / condenser**,** Distributors**,** Distributor types**,** High-tension leads**,** Spark 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

	and rectify the circuit. Practice on adjusting head light focus. Identifying wiring harness.	diagrams.
19	Practice on removal of battery, specific gravity test, and practice on battery charging, practice on removal of regulator/rectifier, inspection, and assembling. Inspection of spark plug gap and adjustments, Measuring the resistance of the ignition primary and secondary coil, check the performance of ignition coil, inspection of A.C generator, practice on removal of C.D.I unit (Capacitive Discharge Ignition), inspection of C.D.I unit and assembling. Servicing of electronic Ignition system, Inspection of ignition timing and adjustment. Inspection of ignition switch, handle bar switches, front brake & rear brake stoplight light switch.	**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, and Headlight beams do not shift when HI-LO switch is operated. Misfiring.
20	Identify the various parts of LPG/ CNG kit and Trouble shooting of the same. Starting engine, tuning for slow speed, checking smoke using gas analyzer/ smoke tester and tuning the vehicle for recommended emission levels.	Study about LPG / CNG powered engines used in Three Wheelers. Safety while handling gas units. **Emission Control-** Sources of emission**,** Combustion**,** Hydrocarbons**,** Hydrocarbons in exhaust gases**,** Oxides of nitrogen**,** Particulates**,** Carbon monoxide**,** Carbon dioxide**,** Sulfur content in fuels**,** crankcase emission control system, Evaporative emission control**,** catalytic converter Regulated emissions standard**.**
21	Practice on servicing and maintenance.	Study of Motor Vehicle act Rules & Regulation. Driving Rules Case study of Major Indian models of motor cycles, scooters and mopeds, Bajaj, Enfield,

		TVS, Honda, Hero, Suzuki, Mahendra & Yamaha.
22-23	In plant Training	
24-25	Revision and Test	
26	NCVT Exam	

9.2 SYLLABUS CONTENT OF CORE SKILLS

First Semester
(Semester Code no. - 01)
Duration: Six Month

LEARNING OBJECTIVES OF 1ST SEMESTER

1. Demonstrate basic arithmatic to derive value of unknown quantity / variable.
2. Understand & apply engineering material, their classification, properties and applications in the day to day technical application.
3. Explain & apply speed, velocity, work, power & energy for application in field of work.
4. Understand & explain importance of engineering drawing, drawing instruments, their standard & uses.
5. Draw lines, geometrical figures, free hand sketches.
6. Understand and apply sizes & layout of drawing sheet, method of presentation of engineering drawing & symbolic representation as per BIS standards

Sl. No.	Professional Knowledge	Professional Knowledge & Skills
	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	Drawing Instruments : their Standard and uses

	Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	- 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.	**Square Root** : Square and Square Root, method of finding out square roots, Simple problem using calculator.	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.	**Ratio & Proportion** : Simple calculation on related problems.	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.
5.	**Percentage** : Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6.	**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-	Dimensioning: - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text

	Ferrous Alloys.	
7.	**Mass, Weight and Density** : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	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.
8.	**Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.	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)
9.	**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.	Method of presentation of Engineering Drawing - Pictorial View - Orthogonal View - Isometric view
10.	-----	Symbolic Representation (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
(Semester Code no. - 02)
Duration: Six Month

LEARNING OBJECTIVES OF 2ND SEMESTER

1. Demonstrate basic algebraic, mensuration, trigonometric facts and formulas to derive value of unknown quantity / variable.
2. Apply the factual knowledge of basic heat & temperature, basic electricity for day to day practical application.
3. Explain & apply principles of simple machine & levers for mechanical advantage, efficiency for practical application.
4. Draw & practice dimensioning, construction of solid figures and projections as per IS specifications.

Sl. No.	Professional Knowledge Workshop Calculation and Science	Professional Knowledge & Skills Engineering Drawing
1.	**Algebra** : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Construction of Scales and diagonal scale
2.	**Mensuration :** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere.	Practice of Lettering and Title Block
3.	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables	Dimensioning practice: - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance. - Text of dimension of repeated features, equidistance elements,

		circumferential objects.
4.	**<u>Heat & Temperature</u>**: 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.	Construction of Geometrical Drawing Figures: - Different Polygons and their values of included angles. Inscribed and Circumscribed polygons. - Conic Sections (Ellipse& Parabola)
5.	**<u>Basic Electricity</u>**: 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.	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.
6.	**<u>Levers and Simple Machines:</u>** levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.	Free Hand sketch of hand tools and measuring tools used in respective trades.
7.		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.

8.		Drawing of Orthographic projection from isometric/3D view of blocks
9.		Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
10.		Drawing details of two simple mating blocks and assembled view.

9.3 SYLLABUS CONTENT OF EMPLOYABILITY SKILLS

General Information

<table>
<tr><td>Name of the subject</td><td>: EMPLOYABILITY SKILLS</td></tr>
<tr><td>Applicability</td><td>: CTS- Mandatory for all trades

ATS- Mandatory for fresher only</td></tr>
<tr><td>Hours of Instruction</td><td>110 Hrs.</td></tr>
<tr><td>Examination</td><td>: The examination shall be held at the end of semesters.</td></tr>
<tr><td>Instructor Qualification</td><td>• 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 ITIs 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 DGET institutes</td></tr>
<tr><td>Instructor</td><td>One full time regular instructor shall be engaged on every 240 number of trainees for teaching the subject 'Employability Skills'. One additional full time regular instructor would be required on increase in every 240 trainees. Wherever the trainees are less than 240 or part thereof, a part-time instructor may be engaged to teach the subject. This has been illustrated in the table below:
<table>
<tr><th>S. No.</th><th>Number of trainees</th><th>Instructor (s) required</th></tr>
<tr><td>a)</td><td>Less than 240</td><td>One part-time Instructor</td></tr>
<tr><td>b)</td><td>240</td><td>One full-time Instructor</td></tr>
<tr><td>c)</td><td>Between 240 and 480</td><td>One full-time Instructor +
One part-time Instructor</td></tr>
<tr><td>d)</td><td>Between 480 and 720</td><td>Two full-time Instructors +
One part-time Instructor</td></tr>
<tr><td>e)</td><td>Between 720 and 960</td><td>Three full-time Instructors +
One part-time Instructor</td></tr>
</table>
</td></tr>
</table>

Semester-wise Distribution of Topics (Employability Skill)

Course Duration	Topics		Examination
	Semester 1	Semester 2	
01 Year (Two semesters)	1. English Literacy 2. I.T. Literacy 3. Communication Skills	1. Entrepreneurship Skills 2. Productivity 3. Occupational Safety , Health, and Environment Education 4. Labour Welfare Legislation 5. Quality Tools	Final examination at the end of second semester

LEARNING OBJECTIVES OF 1ST SEMESTER

1. Read, write and communicate in English language for day to day work.
2. Communicate in written and oral and with required clarity ensuring that the information communicated is clear, concise and accurate.
3. Understand and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry.

1. English Literacy **Hours of Instruction: 20 Hrs.** **Marks Allotted: 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 know, 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 messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy **Hours of Instruction: 20 Hrs.** **Marks Allotted: 09**	
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing	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

and Worksheet	document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets
Computer Networking and INTERNET	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT – ACT, types of cyber crimes.

3. Communication Skills

Hour of Instruction: 15 Hrs. Marks Allotted: 07

Topic	Contents
Introduction to Communication Skills	Communication and its importance
	Principles of Effective communication
	Types of communication – verbal, nonverbal, written, email, talking on phone.
	Nonverbal 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.
	Characteristics Essential to Achieving Success
	The Power of Positive Attitude

Motivational Training	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

SEMESTER-II

LEARNING OBJECTIVES OF 2ND SEMESTER

1. Knowledge of business activities, ability to interact with consumers for development of businesses.
2. Understand and apply productivity, its benefits and factors affecting the productivity.
3. Follow and maintain procedures to achieve a safe working environment in line with occupational health, safety, environment regulations and Labour welfare legislation and requirements.
4. Understand and apply quality concepts as per ISO and BIS system and its importance.
5. Recognize different components of 5S and apply the same in the working environment.

4. Entrepreneurship skill **Hour of Instruction: 15 Hrs.Marks Allotted: 06**	
Topic	**Content**
Business & Consumer:	Types of business in different trades and the importance of skill, Understanding the consumer, market through consumer behavior, market survey, Methods of Marketing, publicity and advertisement

Self Employment:	Need and scope for self-employment, Qualities of a good Entrepreneur (values attitude, motive, etc.), SWOT and Risk Analysis
Govt Institutions :	Role of various Schemes and Institutes for self-employment i.e. DIC, SIDBI, MSME, NSIC, Financial institutions and banks
Initiation Formalities :	Project Formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment Procedure - Loan Procurement - Agencies - banking Process
5. Productivity **Hour of Instruction: 10 Hrs.Marks Allotted: 05**	
Productivity	Definition, Necessity, Meaning of GDP.
Benefits	Personal / Workman – Incentive, Production linked Bonus, Improvement in living standard. Industry Nation.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health & Environment **Hour of Instruction: 15 Hrs.Marks Allotted: 06**	
Safety & Health :	Introduction to Occupational Safety and Health and its importance at workplace
Occupational Hazards :	Occupational health, Occupational hygiene, Occupational Diseases/ Disorders & its prevention
Accident & safety :	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 provisions of safety, health, welfare under legislation of India
7.Labour Welfare Legislation Hour of Instruction: 05 Hrs.Marks Allotted: 03	
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
8.Quality Tools Hour of Instruction: 10 Hrs.Marks Allotted: 05	
Quality Consciousness :	Meaning of quality, Quality Characteristic
Quality Circles :	Definition, Advantage of small group activity, objectives of Quality Circle, Roles and Functions of Quality Circles in organisation, 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.5**S** Principles of Housekeeping: SEIRI – Segregation, SEITON – Arrangement, SEISO – Cleaning, SEIKETSU – maintenance of Standards, SHITSUKE - Discipline

10. INFRASTRUCTURE

1. Instructors' Qualification	Degree in Automobile/ Mechanical Engg. (with specialization in Automobile) from recognised college/University with on year experience in the automobile industry and should possess valid LMV driving license. OR Diploma in Automobile/Mechanical (specialization in automobile) from recognized board of technical education with two years experience in the automobile industry and should posses valid LMV driving license. OR 10th Passed + NTC/NAC in the Trade of ("**Mechanic Motor Cycle)** **(Repair and Maintenance of Two Wheeler**")/ **(Mechanic Repair and Maintenance of Three Wheeler**") with 3 years post qualification experience in the relevant field and and should posses valid LMV driving license. **and** b) With "**National Crafts Instructor Certificate".** .
Desirable qualification	Preference will be given to a candidate with CIC (Craft Instructor Certificate) in MECHANIC MOTOR CYCLE Trade.
3. Space Norms	Space Area 100 Sq. Mt. (Including parking area)
4. Power Norms	3 KW
5.Tools, Equipment & General Machinery	(As per Annexure II)

Note:

i) Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma, and other must have NTC/NAC qualifications.
ii) Instructor qualification for WCS and E.D, as per the training manual.

iii) The list of Tools, Equipment& General Machinery listed in Annexure – II is for a particular trade (MECHANIC MOTOR CYCLE) comprising of TWO semesters and not for a single semester.

11. ASSESSMENT STANDARD

11.1ASSESSMENT GUIDELINES:

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 shall be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitive to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude shall be considered while assessing competency.

Assessment shall be evidence based comprising the following:

1) Job carried out in labs/workshop
2) Record book/ daily diary
3) Answer sheet for assessment
4) Viva-voce
5) Progress Chart
6) Attendance and punctuality
7) Assignment
8) Project work

Evidence of internal assessment should be preserved for an appropriate period of time for audit and verification by examination body.

The following marking pattern to be adopted while assessing:

a) Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work that demonstrates attainment of an acceptable standard of craftsmanship. In this work there is evidence of:

- 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 above75%- 90% to be allotted during assessment under following performance level:

For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work that demonstrates attainment of a reasonable standard of craftsmanship. In this work there is evidence of:

- Good skill levels in the use of hand tools, machine tools, and workshop equipment
- 70-80% tolerance dimension 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 above 90% to be allotted during assessment under following performance level:

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. In this work there is evidence of:

- 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.

11.2. INTERNAL ASSESSMENT (FORMATIVE ASSESSMENT)

Comp. No.	ASSESSABLE OUTCOME	INTERNAL ASSESSMENT Marks
GENERIC		
1	Recognize & comply safe working practices, environment regulation and housekeeping.	
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, trigonometric, statistics, co-ordinate system and apply knowledge of specific area to perform practical operations.	
4	Understand and explain basic science in the field of study including basic electrical, and hydraulics & pneumatics.	
5	Read and apply engineering drawing for different application in the field of work.	
6	Understand and explain the concepts of productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	
7	Explain energy conservation, global warming, and pollution and contribute in the day to day work by optimally using available resources.	
8	Explain personnel finance, entrepreneurship, and manage/organize related task in the 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.	
SPECIFIC		
SL NO.	ASSESSABLE OUTCOME	INTERNAL ASSESSMENT MARKS
1	Apply safe working practices in an automotive work shop	
2	Comply environment regulations and housekeeping in the work shop.	
3	Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.	
4	Make choices to carry out marking out the components for basic fitting operations in the work shop.	
5	Use different types of tools and work shop equipment in the Auto work shop.	
6	Use of different type of fastening and locking devices in a vehicle	
7	Perform basic fitting operations used in the work shop practices and inspection of dimensions.	
8	Grinding of cutting tools in the work shop.	

9	Perform surface finishing operations in the given job.	
10	Produce sheet metal components using various sheet metal operations	
11	Produce components using bending process in the given work piece.	
12	Inspect the auto component using Nondestructive testing methods	
13	Manufacture components with different types of welding processes in the given job.	
14	. Identify the hydraulic and pneumatic components in a vehicle.	
15	Construct electrical circuits and test its parameters by using electrical measuring instruments.	
16	Perform basic electrical testing in a vehicle.	
17	Perform battery testing and charging operations.	
18	Construct basic electronic circuits and testing	
Sub-Total of Internal assessment for Semester- I		100
19	Carry out the general servicing of two & three wheeler	
20	Carry out S.I engine Overhaul of two wheeler.	
21	Carry out overhaul of three wheeler SI engine .	
22	Diagnosis and troubleshoot engine.	
23	Overhauling of cylinder head assembly.	
24	Diagnosis and trouble shoot for excessive smoke, engine overheating and abnormal noise.	
25	Carry out overhauling of carburetor.	
26	Carry out Servicing of fuel tank.	
27	Diagnose the causes and remedy for engine not starting and high fuel consumption.	
28	Carry out overhauling of steering and suspension system.	
29	overhaul front and rear wheel	
30	Overhauling front and rear brake.	
31	Overhaul clutch assembly of two and three wheeler.	
32	Overhaul automatic transmission of two and three wheeler	
33	Overhaul manual transmission of two and three wheeler.	
34	Overhaul AC generator	
35	Check electrical circuit.	
36	Perform battery testing and charging operation.	
37	Check ignition circuit for proper functioning.	
38	Overhaul the LPG/ CNG fuel supply system.	
39	Check exhaust smoke.	
40	Carry out servicing and maintenance of two and three wheeler.	
Sub-Total of Internal assessment for Semester- II		100
Total of Internal assessment		

Note: The generic outcome to be assessed along with the specific outcome.

11.3 FINAL ASSESSMENT- All India Trade TEST (SUMMATIVE ASSESSMENT)

- There shall be a single objective type Examination paper for the subjects Engineering Drawing and Workshop Calculation & Science.
- There shall be a single objective type Examination paper for the subjects Trade Theory and Employability Skills.
- The two objective type Examination papers as mentioned above shall be conducted by National Council for Vocational Training (NCVT), whereas examination for the subject Trade Practical shall be conducted by the State Governments. NCVT shall supply the Question Paper for the subject Trade Practical.

<table>
<tr><th colspan="3">MARKING PATTERN</th></tr>
<tr><th>Sl. No.</th><th>Subject for the trade test</th><th>Maximum marks for the each subject</th></tr>
<tr><td></td><td>Practical</td><td>300</td></tr>
<tr><td></td><td>Trade Theory</td><td rowspan="2">200
Objective type Written Test of 200 marks (Trade Theory 150 Marks & Employability Skills 50 marks)</td></tr>
<tr><td></td><td>Employability Skills</td></tr>
<tr><td></td><td>Workshop Calculation and Science.</td><td rowspan="2">100
Objective Type Written test of 100 marks (Engineering Drawing 50 marks & Workshop Calculation and Science 50 marks)</td></tr>
<tr><td></td><td>Engineering Drawing</td></tr>
<tr><td></td><td>Internal assessment</td><td>100</td></tr>
<tr><td colspan="2">TOTAL:</td><td>700</td></tr>
</table>

Annexure - I

TRADE: Mechanic Motor Cycle

LIST OF TOOLS & EQUIPMNT

A. TRAINEES TOOL KIT per 4 Trainees FOR 20 TRAINEES +1 ISTRUCTOR

Sl.No.	Item with specification	Qty (Nos.)
1.	Allen Key set of 12 pieces (2mm to 14mm)	(5+1)
2.	Caliper inside 15 cm Spring	6
3.	Calipers outside 15 cm spring	6
4.	Center Punch 10 mm. Dia. x 100 mm.	6
5.	Dividers 15 cm Spring	6
6.	Electrician Screw Driver 250mm	6
7.	Hammer ball peen 0.5 kg with handle	6
8.	Hands file 20 cm. Second cut flat	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 pieces (6mm 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 upto 32 mm set of 28 pieces with box	6
17.	Steel rule 30 cm inch and metric	6
18.	Steel tool box with lock and key (folding type) 400x200x150	6
19.	Wire cutter and stripper	6

B. Tools Instruments and General Shop outfits

Sl.No.	Item with specification	Qty. (Nos)
1.	Adjustable spanner (pipe wrench 350 mm)	2
2.	Air blow gun with standard accessories	1
3.	Air impact wrench with standard accessories	4
4.	Air ratchet with standard accessories	4
5.	Allen Key set of 12 pieces (2mm to 14mm)	4
6.	Ammeter 300A/ 60A DC with external shunt	4
7.	Angle plate adjustable 250x150x175	1
8.	Angle plate size 200x100x200mm	2
9.	Anvil 50 Kgs with Stand	1
10.	Auto Electrical test bench	1
11.	Battery –charger	2
12.	Blow Lamp 1 litre	2

13.	Caliper inside 15 cm Spring	4
14.	Calipers outside 15 cm spring	4
15.	Car Jet washer with standard accessories	1
16.	Chisel 10 cm flat	4
17.	Chisels cross cut 200 mm X 6mm	4
18.	Circlip pliers Expanding and contracting type 15cm and 20cm	4
19.	Clamps C 100mm	2
20.	Clamps C 150mm	2
21.	Clamps C 200mm	2
22.	Cleaning tray 45x30 cm.	4
23.	Compression testing gauge suitable for petrol engine. with standard accessories	2
24.	Copper bit soldering iron 0.25 Kg	4
25.	Cylinder bore gauge capacity 20 to 160 mm	2
26.	DC Ohmmeter 0 to 300 Ohms, mid scales at 20 Ohms	2
27.	Depth micrometer 0-25mm	4
28.	Dial gauge type 1 Gr. A (complete with clamping devices and	4
29.	Dividers 15 cm Spring	4
30.	Drift Punch Copper 15 Cm	4
31.	Drill point angle gauge	1
32.	Drill twist 1.5 mm to 15 mm (various sizes) by 0.5 mm	4
33.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts	2 each
34.	Electric testing screw driver	2
35.	Engineer's square 15 cm. Blade	4
36.	Feeler gauge 20 blades (metric)	4
37.	File flat 20 cm bastard	4
38.	File, half round 20 cm second cut	4
39.	File, Square 20 cm second cut	4
40.	File, Square 30 cm round	4
41.	File, triangular 15 cm second cut	4
42.	Files assorted sizes and types including safe edge file (20 Nos)	2 set
43.	Flat File 25 cm second cut	4
44.	Flat File 35 cm bastard	4
45.	Granite surface plate 1600 x 1000 with stand and cover	1
46.	Grease Gun	2
47.	Growler	1
48.	Hacksaw frame adjustable 20-30 cm	10
49.	Hammer Ball Peen 0.75 Kg	4
50.	Hammer Chipping 0.25 Kg	5
51.	Hammer copper 1 Kg with handle	4
52.	Hammer Mallet	2
53.	Hammer Plastic	4
54.	Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm	2
55.	Hand reamers adjustable 10.5 to 11.25 mm, 11.25 to 12.75 mm, 12.75 to 14.25 mm and 14.25 to 15.75 mm	2sets

56.	Hand Shear Universal 250mm	2
57.	Hand vice – 37 mm	2
58.	Hollow Punch set of seven pieces 6mm to 15mm	2 sets each
59.	Insulated Screw driver 20 cm x 9mm blade	4
60.	Insulated Screw driver 30 cm x 9mm blade	4
61.	Left cut snips 250mm	4
62.	Magneto spanner set with 8 spanners	1 set
63.	Magnifying glass 75mm	2
64.	Marking out table 90X60X90 cm.	1
65.	Multimeter digital	5
66.	Oil can 0.5/0.25 liter capacity	4
67.	Oil Stone 15 cm x 5 cm x 2.5 cm	1
68.	Outside micrometer 0 to 25 mm	4
69.	Outside micrometer 25 to 50 mm	4
70.	Outside micrometer 50 to 75 mm	1
71.	Outside micrometer 75 to 100 mm	1
72.	Philips Screw Driver set of 5 pieces (100 mm to 300 mm)	2 sets
73.	Pipe cutting tool	2
74.	Pipe flaring tool	2
75.	Piston ring compressor	2
76.	Piston Ring expander and remover.	2
77.	Piston Ring groove cleaner.	2
78.	Pliers combination 20 cm.	2
79.	Pliers flat nose 15 cm	2
80.	Pliers round nose 15 cm	2
81.	Pliers side cutting 15 cm	2
82.	Portable electric drill Machine	1
83.	Power Supply 0-12 v, lamp	1
84.	Prick Punch 15 cm	4
85.	Punch Letter 4mm (Number)	2 set
86.	Right cut snips 250mm	2
87.	Rivet sets snap and Dolly combined 3mm, 4mm, 6mm	2
88.	Scooter / Motor cycle repairing stand	2
89.	Scraper flat 25 cm	2
90.	Scraper half round 25 cm	2
91.	Scraper Triangular 25 cm	2
92.	Scriber 15 cm	2
93.	Scriber with scribing black universal	2
94.	Set of stock and dies - UNC, UNF and metric	2 sets
95.	Shear Tin Man's 450 mm x 600mm	2
96.	Sheet Metal Gauge	2
97.	Sher Tinmans 300mm	4
98.	Soldering Copper Hatchet type 500gms	2
99.	Solid Parallels in pairs (Different size) in Metric	2
100.	Spanner Clyburn 15 cm	1
101.	Spanner D.E. set of 12 pieces (6mm to 32mm)	4
102.	Spanner T. flocks for screwing up and up-screwing inaccessible positions	2

103.	Spanner, adjustable 15cm.	2
104.	Spanner, ring set of 12 metric sizes 6 to 32 mm.	4
105.	Spanners socket with speed handle, T-bar, ratchet and universal upto 32	2
106.	Spark lighter	2
107.	Spark plug spanner	2
108.	Steel measuring tape 10 meter in a case	4
109.	Steel rule 15 cm inch and metric	4
110.	Steel rule 30 cm inch and metric	4
111.	Straight edge gauge 2	2
112.	Stud extractor set of 3	2 sets
113.	Stud remover with socket handle	1
114.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm	4
115.	Tachometer (Counting type)	1
116.	Taps and Dies complete sets BSF	1 set
117.	Taps and wrenches - Metric	2 sets
118.	Telescope gauge	4
119.	Temperature gauge 0-100 deg c	2
120.	Thread pitch gauge metric, BSW	2
121.	Torque wrenches 5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
122.	Trammel 30 cm	2
123.	Tyre pressure gauge with holding nipple	2
124.	Universal puller for removing pulleys, bearings	1
125.	V' Block 75 x 38 mm pair with Clamps	2
126.	Vacuum gauge to read 0 to 760 mm of Hg.	2
127.	Valve Lifter	1
128.	Valve spring compressor universal.	2
129.	vernier caliper 0-300 mm with least count 0.02mm	4
130.	Vice grip pliers	2
131.	Voltmeter 50V/DC	2
132.	Wire Gauge (metric)	2
133.	Work bench 250 x 120 x 60 cm with 4 vices 12cm Jaw	4

C. General Installation/ Machineries

Sl.No.	Item with specification	Qty (Nos.)
1.	Arbor press hand operated 2 ton capacity	1
2.	Automotive exhaust 5 gas analyzer (petrol & Diesel) or Diesel Smoke	1
3.	Battery tester to test 12V/ 24V	2
4.	Bench lever shears 250mm Blade x 3mm Capacity	1
5.	Cut section working model of Continuous variable transmission	1
6.	Cut section working model of Rotary clutch assembly of two	1
7.	Demonstration board of magneto ignition system of a two	1

8.	Discrete Component Trainer / Basic Electronics Trainer	1
9.	Drilling machine bench to drill up to 12mm dia along with	1
10.	Dual Magnetization Yoke : AC / HWDC, 230 VAC, 50Hz	1 set
11.	Gas Welding Table 1220mm x760mm	2
12.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia	1
13.	Ignition coil and CDI unit of four different make	1each
14.	Layout of working model 12 V automobile electrical systems	1 each
16.	Liquid penetrant Inspection kit	1 set
17.	Motor cycle (four stroke engine) with Digital twin spark	1
18.	Motor cycle (two stroke engine)	1
19.	Motor vehicle (3 wheeler)	1
20.	Pipe Bending Machine (Hydraulic type) 12mm to 30mm	1
22.	Pneumatic rivet gun	2
23.	Ridge cutter	1
24.	Scooter (four stroke engine)	1
25.	Scooter (two stroke engine)	1
26.	shock absorber for two wheeler four different type	2
27.	Spring tension tester	1
29.	Three wheeler chassis frame & power transmission system.	1
31.	Three wheeler Engine for dismantling and assembling	2
32.	Three wheeler gear box for dismantling and assembling	2
33.	Three wheeler steering system for dismantling and assembling	2
34.	Tin smiths bench folder 600 x 1.6mm	1
35.	Trolley type portable air compressor single cylinder with 45	1
36.	Welding plant Oxy-Acetylene complete (high pressure)	2
37.	Welding Transformer (150-300 Amps)	1
38.	Working model of electronic ignition system of three wheeler	1
39.	Working model of electronic ignition system of two wheeler	1

D. List of consumable:

Sl. No.	Description	Quantity
1.	Automatic Transmission oils	As required
2.	Battery- SMF	As required
3.	Brake fluids	As required
4.	Chalk, Prussian blue.	As required
5.	Chemical compound for fasteners	As required
6.	Diesel	As required
7.	Different type gasket material	As required
8.	Different type of oil seal	As required

9.	Drill Twist (assorted)	As required
10.	Emery paper - 36–60 grit , 80–120	As required
11.	Engine coolant	As required
12.	Engine oil	As required
13.	Gear oils	As required
14.	Gloves for Welding (Leather and Asbestos)	5 sets
15.	Hacksaw blade (consumable)	As required
16.	Hand rubber gloves tested for 5000 V	5 pair
17.	Holders, lamp teakwood boards, plug sockets, solders, flux wires and cables batteries round consumable blocks and other consumables as required	As required
18.	Hydrometer	4
19.	Lapping abrasives	As required
20.	Leather Apron	5
21.	Petrol	As required
22.	Power steering oil	As required
23.	Radiator Coolants	As required
24.	Safety goggles	As required
25.	Steel wire Brush 50mmx150mm	5

E. Workshop Furniture

Sl. No.	Description	Quantity
1.	Book shelf (glass panel) 6½ ' x 3' x 1½'	As required
2.	Computer Chair	1+1
3.	Computer Table	1+1
4.	Desktop computer and related MS office	1+1
5.	Discussion Table 8' x 4' x 2½ '	2
6.	Fire Extinguishers, first- aid box	As required
7.	Instructional Material – NIMI	As required
8.	Internet connection with all accessories	As required
9.	Laser printer	1
10.	LCD projector/ LED /LCD TV (42")	1
11.	Multimedia DVD for Automotive application/subjects	As required
12.	Online UPS 2KVA	1
13.	Stools	21
14.	Storage Rack 6½ ' x 3' x 1½'	As required
15.	Storage shelf 6½ ' x 3' x 1½'	As required.
16.	Suitable class room furniture	As required
17.	Suitable Work Tables with vices	As required
18.	Tool Cabinet - 6½ ' x 3' x 1½'	2
19.	Trainees locker 6½ ' x 3' x 1½'	2 Nos. to accommodate 20 Lockers

ANNEXURE-II

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1. All questions of theory paper for the trade will be in objective type format.
2. Due care to be taken for proper & inclusive delivery among the batch. Some of the following method of delivery may be adopted:
   a. Lecture
   b. Lesson
   c. Demonstration
   d. Practice
   e. Group discussion
   f. Discussion with peer group
   g. Project work
   h. Industrial visit

3. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. May be adopted.
4. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.
5. Questions may be set based on following instructions:-

Sl. No.	Question on different aspect	Weightage in %age	Key Words may be like
1	Information received	25	What, Who, When
2	Knowledge	50	Define, Identify, Recall, State, Write, List & Name
3	Understanding	15	Describe, Distinguish, Explain, Interpret & Summarize
4	Application	10	Apply, Compare, Demonstrate, Examine, Solve & Use

6. Due weightage to be given to all the topics under the syllabus while setting the question paper.

13. LIST OF TRADE COMMITTEE MEMBERS

1	V Krishna Shankar, Gen. Manager, Ashok Leyland
2	G Satish Kumar, Manager, Ashok Leyland
3	GM Cholanrajan, Sr. Manager, Training, Lansun Toyota, Chennai
4	M Shanavas Khan, Hinduja Foundaries
5	Dr. Abhijit KR Mandal, National Automotive Testing and R&D Infrastructure Project, Global, Automotive Research center, Chennai
6	Vadivelan, National Automotive Testing and R&D Infrastructure Project, Global, Automotive Research center, Chennai
7	Anatharaman, Proprietor, Care Care Center, Chennai
8	MK Gupta, Maruthi Suzuki
9	Pandey, Director, SRFMTTI, Anathapur
10	P. Thangapalam, DM- Trg, Dailmer India
11	S Gopinath, Sr. Manager, Crompton Greaves
12	RA. Armstrong, TAFE
13	B Muthukumar, Toyoto Kirloskar, New Delhi
14	J Dharsan, Asst. Mgr, Toyoto Kirloskar, Bangalore
15	C Prakash, Sr. Gen. Manager, Ashok Leyland
16	P Palanivelan, Manger, TVS Sundram Fasteners ltd.
17	TN Umashankar, Head Manufacturing, Delphi TVS Ltd.
18	K Aravind,Regional Trainer,Bosch Ltd., Chennai
19	K Mohankumar, TAFE
20	M Sivaraman, Consultant, Delphi TVS

Representatives from Academic/Professional Institutions

21	Dr. Ramesh A Professor, D/o Mechanical Engineering Indian Institute of Technology Madras IIT P.O., Chennai 600 036
22	Dr. A.R. Mohanty Professor, D/o Mechanical Engg Indian Institute of Technology Kharagpur Kharagpur India - 721302
23	Dr. Shankar Ram C S Assistant Profesor D/o Engineering Design Indian Institute of Technology Madras IIT P.O., Chennai 600 036

24	Prof. Nilesh J Vasa, Professor, IIT Chennai
25	Prof. G. Balaganesh, Professor, IIT Chennai
26	J. Rajakumar,Principal,Brakes India
27	S Horlyok Chelladurai,Retd. ITI Principal

DGT Coordinator

28	Shri T.C. Saravanabava, Deputy Director General (AT), DGET Headquarters

Core Group

29	Mr. K.S. Rao, JDT, NIMI, Chennai
30	* CSTARI
31	Mr. Yuvraj, DDT, ATI Chennai
32	Mr. G. Venktesh, ADT, ATI Hyd
33	Mr. S.P. Rewaskar, ATI, Hyd
34	Mr. T.N. Rudra, TO, ATI, Howrah
35	Mr. N. Ramesh Kumar, TO, ATI, Chennai
36	Mr. Akhilesh Pandey, TO, ATI, Mumbai
37	Mr. Vijayaraju, TO, ATI, Hyd
38	Mr. R. Rajesh Kanna, TO, ATI Chennai

Champion ITIs

39	Mr. H.S. Kalara, Principal, Govt. ITI, Chandigarh
40	Mr. A. Duraiswamy, ATO, Govt. ITI, Coimbattore
41	Mr. W. Nirmal Kumar Isarael, ATO, Govt. ITI, Trichy
42	Mr. K. Thaniarasu, ATO, Govt. ITI, Trichy
43	Mr. N. Durimurugan, TO, Govt. ITI, Chengalpattu
44	Mr. Ravindernath, Govt. ITI, Ambattur
45	Palanikumar, Govt. ITI, Pudukotai, TN