CURRICULUM

FOR THE TRADE OF

MECHANIC MOTOR CYCLE

UNDER

APPRENTICESHIP TRAINING SCHEME

सत्यमेव जयते
Government of India

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

CONTENTS

1. ACKNOWLEDGEMENT

The DGT sincerely express appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum.

Special acknowledgement is expended by DGT to the following expert members who had contributed immensely in this curriculum.

Co-ordinator for the course: Shri G. Venkatesh, ADT, ATI, Vidyanagar, Hyderabad

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
1.	VKR Vadivelan	M/S Brilliant TVS, Chennai	Proprietor
2.	Jayapal	Two wheeler Owner association, Chennai	Secretary
3.	N. Ramesh Kumar	CTI, Chennai	TO
4.	D.Sankar	CTI, Chennai	VI

2. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

3. RATIONALE

(Need for Apprenticeship in Mechanic Motor Cycle trade)

The revised Apprenticeship Training Scheme (ATS) shall make the students more adapt to industry requirement through latest theoretical & practical inputs as:

1. It offers a good synergy between BT (Theoretical Inputs) & PT (On the Job training) unlike earlier scheme where students need to complete two year's classroom training before undergoing PT (On The Job training).
2. It will enhance knowledge about scientific principles, familiarization with industrial culture, and basics of Two wheeler and Three wheeler and its need.
3. It will enhance the ability to work with help of hand tools, power tools and machines. At the same time it creates the base for achieving hard skills.
4. It will enhance knowledge about different types of two and three wheeler Engines and its accessories, Diagnosis techniques and tools used in industries.
5. It will enhance the ability to work on conventional as well as latest engines and to service and trouble shoot Engine and other parts.
6. It will enhance knowledge about industrial terminology, industrial practices and revitalize previous learning.

4. JOB ROLES: REFERENCE NCO

Brief description of Job roles:

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.

a) Wage Employment

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

b) Self Employment

1. Two/Three wheeler Mechanic
2. Spare Parts Salesman
3. Spare Parts Dealer

Reference NCO: 7231.50

5. GENERAL INFORMATION

1. **Name of the Trade** **: MECHANIC MOTOR CYCLE**

2. **N.C.O. Code No.** : 7231.50

3. **Duration of Apprenticeship Training**
(Basic Training + Practical Training**): 15 Months**

3.1 **For Fresher :-**

Duration of Basic Training: -

a) Block –I : 3 months

Total duration of Basic Training: 3 months

Duration of Practical Training (On -job Training): -

a) Block–I: 12 months

Total duration of Practical Training: 12 months

4 .**Entry Qualification** : 10th Passed

5. **Selection of Apprentices:** The apprentices will be selected as per Apprentices Act amended time to time.

6. Rebate for ITI passed trainees: 3 Monthsfor those who have passed Mechanic Motor Cycle trade under CTS.

Note: Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.

6. COURSE STRUCTURE

Training duration details: -

Time (in months)	1-3	4-15
Basic Training	**Block– I**	**-----**
Practical Training (On - job training)	**----**	**Block – I**

Components of Training	Duration of Training in Months →														
↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Basic Training Block - I															
Practical Training Block - I															

7. SYLLABUS

7.1 BASIC TRAINING

(BLOCK – I)

DURATION: 03MONTHS

GENERAL INFORMATION

1) **Name of the Trade** :**MECHANIC MOTOR CYCLE**
2) **Hours of Instruction** :500 hrs.
3) **Batch size** : 16 Nos.
4) **Power Norms** : 3 KW for Workshop
5) **Space Norms** : 100 Sq.m. (Including Parking area)
6) **Examination** : The internal assessment will beheld on completion of each Block.
7) **Instructor Qualification** :

Degree/Diploma in Mechanical / Automobile Engg. from recognized university/Board with one/two year post qualification experience respectively in the relevant field. **OR** NTC/NAC in the trade of MechanicMotor Cycle with three year post qualification experience in the relevant field. Preference will be given to a candidate with Craft Instructor Certificate (CIC)

8) **Tools, Equipment& Machinery required** : - As per Annexure – I

7.1.1 DETAILSYLLABUS OF CORE SKILL

A. Block– I
Basic Training

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
1	**Engineering Drawing: Introduction and its importance** - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003	**30**	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	**20**
2	**Drawing Instruments : their uses** Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.		**Fractions**: Fractions, Decimal fraction, Addition, Subtraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Calculator.	
3	**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		**Properties of Material** : 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 Alloys.	
4	**Drawing of Geometrical Figures:**Drawing practice on: - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.		**Average :**Problems of Average. **Ratio &Proportion** : Simple calculation on related problems. **Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density.	
5	**Dimensioning:** - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text			
6	**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.			

7	**Method of presentation of Engineering Drawing** - Pictorial View - Orthogonal View - Isometric view		**Percentage**: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	
8	**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		- Forces definition. - Definition and example of compressive, tensile, shear forces, axial and tangential forces. Stress, strain, ultimate strength, factor of safety for MS. **Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation.	
9	**Dimensioning practice:** - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance.		**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. - Area of cut-out regular surfaces: circle and segment and sector of circle. - Volume of cut-out solids: hollow cylinders, frustum of cone, block section. - Volume of simple solid blocks.	
10	**Construction of Geometrical Drawing Figures:** - Polygons and their values of included angles. Conic Sections (Ellipse)		**Algebra** : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables). - Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force.	
11	**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. Drawing of Orthographic projection from isometric/3D view of blocks		**Work, Power and Energy**: work, unit of work, power, unit of power, Horse power, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	

12	- Machined components; concept of fillet & chamfer; surface finish symbols.		**Trigonometry:** Trigonometric ratios, Trigonometric tables. - Finding the value of unknown sides and angles of a triangle by Trigonometrical method. - Finding height and distance by trigonometry.	
			Friction and its application in Workshop practice.	
13	- Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS.		**Heat & Temperature**: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	
14	- Reading & interpretation of assembly drawing and detailing.		**Basic Electricity**: Introduction, use of electricity, 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. Concept of earthing.	
			Heat treatment – Necessity, different common types of Heat treatment.	
			Graph: - Read images, graphs, diagrams – bar chart, pie chart. - Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.	
15	- Reading of drawing. Simple exercises related to missing lines, dimensions and views. How to make queries.		**Transmission of power:** By belt, pulleys & gear drive.	
16	- Simple exercises related to trade related symbols. - Solution of NCVT test papers.		**Concept of pressure** – units of pressure, atmospheric pressure, gauge pressure – gauges used for measuring pressure. **Introduction to pneumatics & hydraulics systems.** Solution of NCVT test papers	

7.1.2DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

A. Block –I

Basic Training (03 Month)

Week No.	PROFESSIONAL SKILL(275 Hours)	PROFESSIONAL KNOWLEDGE (120 Hours)
1	GENERAL SHOP SAFETY First aid and Fire safety, Use of fire extinguishers. Identify fuels, oils and chemicals used in the engines and accessories-handling of shop safety equipment-handling of safety devices-first aid- practice on hazard waste disposal.	**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 handling of Fuel Spillage, Fire extinguishers used for different types of fire. Safe disposal of toxic dust, safe handling and Electrical safety tips.
2	MEASURING SYSTEMS AND MEASUREMENTS Practice on measuring on the given jobs-measuring space with a feeler gauge-measuring the given jobs with precision measuring instruments- checking external and internal diameter and run outs-measure straightness on the given job.	Measuring systems and types- description of steel rule- description of feeler gauge-constructional details and working principle of precision measuring instruments like Vernier caliper, micrometer, bore gauge and dial gauge- description of surface plate and V blocks- importance of correct roundness-surface finish and its importance.
3	BASIC HAND TOOLS Practice on marking and cutting of a given job- file the job to bring required size-practice on drilling, tapping and dying-reaming practice- repair damaged threads. Exercise on using impact wrenches	Details of various types of marking and cutting tools- punch, scriber, hammer and mallets, hack saw frame and blade, chisels etc. – marking media-description of work holding devices like vices- details of various drill bits- description and types of drilling machines- details of taps, dies and reamers-details of screw extractors- details of bench grinders- safety precautions to be observed while working with hand tools and lifting & carrying components and equipment. Description of Power tools and equipment.

4	FASTENERS AND BEARINGS Practice on general cleaning, checking and on loosening and tightening of various types of screwing joints using screwing tools. Removal of broken stud /bolt from blind hole. Remove and replace bearings from the given jobs.	Threads- thread categorization- types of threads- types of screwed joints- types of nuts- property classes of bolts- screw locking arrangements- types and description of screwing tools- description and types different types of bearings. Fundamentals of Hydraulics & Pneumatics
5	BASIC ELECTRICAL AND ELECTRONICS AND BATTERY Identify and interpret electrical/electronic system concern. Practice on measuring circuit voltage, ampere and resistance. Practice on measuring voltage drop. Practice on installing crimp connector and terminal end. Practice on testing fuses and relays- test diodes Remove and connect battery terminal from a battery- clean terminals- check voltage of a battery- check cranking voltage- check charging voltage- top up distilled water up to the level- charging a battery – test battery- specific gravity test.	General principles of electrical engineering- structure of atoms- voltage- current- fuses- electrical conduction- current direction- types of current- voltage drop- resistance- PTC and NTC resistors- types of resistors- ohm's law- resistor circuits- electro magnetism- electromagnetic induction- description of multimeter- function and types of relays- semiconductors- N type and P type semiconductors- description of diodes and transistors. Purpose of battery- types- construction and working principle of a lead acid battery- maintenance free batteries- battery ratings- battery charging methods- trouble shooting a battery

6	IDENTIFICATION OF TWO AND THREE WHEELERS AND BASIC MAINTENANCE Identification of major components of a motor cycle, scooter and 3wheeler. Remove and refit the engine assembly from the given vehicle- decarbonize engine by using chemicals. Water wash a vehicle- Check and top up coolant, engine oil level and brake oil level- clean and refit air filter- check oil leaks in an engine- check vacuum and fuel hoses for any damages and leaks- adjust free play in the accelerator, brake and clutch levers and greasing- check all lights, switches and horn- inflate tyres.	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)**)** **&**spark ignitionengine**(S.I) ,** 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. Motor cycle water washer- description and types- precautions to be observed while water washing a vehicle.
7	COOLING AND LUBRICATION SYSTEM Drain, Reverse flush and refill cooling system- remove and refit drive belt and hoses- remove and refit coolant pump- remove and refit radiator and fan assembly- test thermostat. Drain engine oil- change oil filter- refit new engine oil- blotting paper test- remove and refit oil pump- remove, clean and refit oil cooler. CYLINDER HEAD Remove accessories fitted with the petrol engine- remove and dismantle cylinder head- clean and lubricate cylinder head components viz. valve, valve guide, valve seats, valve spring, timing belt, rocker arm and cam shaft - reassemble and refit cylinder head components- set valve timing- adjust valve clearance.	Engine operating temperature- requirements of cooling system- types of cooling system and its description- description of pump circulating system components- radiator and its types- description- expansion tank- details of radiator pressure cap- coolant pump- construction and working of fan- types of thermostat and its description. Functions of a lubricating system- description of lubricating system- forced feed and petrol system - list out engine lubricating components- description of different types of oil pumps- types of oil filtering systems and its description- description of oil cooler- crank case ventilation. Description of cylinder head design- details of arrangement of valves in engines- valve timing diagram of a petrol and diesel engines- details of arrangement of camshaft in engines- multiple valve technology- detailed description of valve components- details of camshaft drives- valve clearance and its importance.

8	CYLINDER BLOCK & TRANSMISSION IN TWO WHEELERS Remove and refit clutch cable assembly- Remove, clean and reassemble clutch assembly from the vehicle- remove and refit gear linkage mechanism- remove and refit magneto assembly from a vehicle- remove, clean and reassemble drive chain assembly- remove and refit drive belt assembly. Dismantle engine block and gear components- clean and lubricate components viz. Crank shaft, main and connecting rod bearings, piston, piston rings, connecting rod and fly wheel – clean gear components- s-reassemble engine block assembly- tighten cylinder head bolts.	Functions of a cylinder- cylinder types and description- types of cylinder liners- description of cylinder head gasket- functions of a piston- types and material used for piston- connecting rod- functions- material and design of connecting rod- crank shaft- functions- material and design of crank shaft- fly wheel- description of gear box in the two wheeler. Description and types of clutches- description of gear linkage mechanism- types of drive belts and chain and their description- trouble tracing in transmission system in a 2 wheeler.
9	TRANSMISSION IN THREE WHEELER Remove, clean and refit clutch assembly in three wheelers- disconnect and connect clutch linkages- remove, dismantle, clean and reassemble gear box assembly in three wheeler- service universal joint and propeller shaft- remove and refit differential assembly.	Description and types of clutch in three wheelers- description of clutch linkages- description and types of gear box- types of universal joints- description and types of propeller shaft- description of differential- precautions to be observed while servicing transmission system in three wheelers- trouble tracing in transmission system in three wheelers
10	PETROL AND DIESEL FUEL SYSTEM Remove, clean and refit fuel tank from the given vehicle- check leakages in the fuel tank- remove and refit fuel filter- remove and refit carburetor- dismantle and clean carburetor components and reassemble- remove and refit throttle body assembly in the MPI system- clean carbon deposits in the throttle body. Clean diesel fuel tank- remove and refit diesel fuel filters- check leaks in fuel system-remove and refit fuel hoses- removing and refitting fuel injection pump and injectors- setting injection timing- bleed fuel system	Description of air induction system- Description of fuel tank- carburetor types and its description- lay out of MPI system- precautions to be observed while servicing carburetor and MPI system- types and description of fuel filters. Lay out of diesel fuel systems- description of fuel tank- details of low pressure pump- importance of clean fuel- types of fuel filters and its description- construction and working of different types of fuel injection pumps- types and working of governor- description of injectors- different types of nozzles.

	Remove, clean and refit intake system- remove and refit exhaust manifold, silencer and exhaust pipe- Test and service a secondary air induction system- check hoses in the crank case ventilation.	Description of air induction system- description of intake and exhaust manifold- details of various types of mufflers Details of air pollution and emissions- emission standards- description of smoke meter- types and description- secondary air induction system design and operation.
11	STEERING, SUSPENSION, WHEEL AND BRAKE. Remove, clean and refit steering assembly from a two wheeler and three wheeler- remove front fork assembly- drain fork oil- dismantle and clean the fork components- reassemble and refit front fork assembly- check fork bend- remove and refit rear shock absorber. Remove, dismantle, clean and reassemble tyres from the wheel assembly- practice on repairing puncture in a tube tyre- practice on repairing puncture in a tubeless tyre- wheel balancing. Remove and refit. Brake cable- Remove, clean and refit front and rear drum brake assembly- remove, clean and refit front disc brake assembly- bleed hydraulic brake- adjust brake shoes.	Description and types of steering system used in two and three wheelers- description of a front fork assembly- types and description of telescopic shock absorbers- trouble tracing in steering and suspension in two and three wheelers. Description and types of wheels- different types of tyres and its constructional details- tyre wear pattern- effects of correct inflation of tyres- tyre storage- tyre rotation Description and types of drum and disc brakes- description of hydraulic braking system- precautions to be observed while servicing brake assembly- trouble tracing in brake system.

12	DASH BOARD AND ELECTRICAL EQUIPMENTS Remove and refit gauges in the dash board- start the engine and observe the readings shown in the gauges- remove and refit head lights and tail lights- remove and refit horn- remove, clean and refit electrical switches. Practice on tracing input sensor wiring and connectors-remove and refit sensors. STARTING AND CHARGING SYSTEM Remove and refit starter- check starting system wiring harness- test ignition switch- remove and refit starter relay- dismantle and assemble starter- Check the operation of the charging system- perform voltage drop tests- remove and refit alternator- dismantle and reassemble alternator- remove and refit magneto assembly in a vehicle.	Description about fuel gauges- purpose and types of warning lights- their description- description of head and tail light- construction and working principle of horn. Description of electronic control system- classification of sensors- description of various types of sensors-Function and working principle of sensors. Study about wiring diagram of a stating system- Principle of starter- components of a starter- construction and working of starter- starter field coil design- solenoids- types and function- Study about wiring diagram of a charging system- construction and working principle of magneto assembly - description of voltage regulator and rectifier operation.
13	Revision &Assessment / Exam-3 days	

7.1.3 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1)	**Name of the subject**	**:**	**EMPLOYABILITY SKILLS**
2)	**Applicability**	**:**	ATS- Mandatory for fresher only
3)	**Hours of Instruction**	**:**	**55 hrs.**
4)	**Examination**	**:**	The examination will be held at the end of two years Training by NCVT.
5)	**Instructor Qualification**	**:**	

i)MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12th /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGT Institute.

7.1.3.1 SYLLABUS OF EMPLOYABILITY SKILLS

A. Block – I
Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	**7**
1.	**Reading** Reading and understanding simple sentences about self, work and environment	
2.	**Writing** Construction of simple sentences Writing simple English	
3.	**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. 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.	
	I.T. Literacy	**10**
1.	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	**Word processing and Worksheet** Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets. Use of External memory like pen drive, CD, DVD etc,	
3.	**Computer Networking and INTERNET** 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.	
	Communication Skill	**18**
1	**Introduction to Communication Skills** Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication - components-Para-language Body - language Barriers to communication and dealing with barriers.	
2	**Listening Skills** Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
3	**Motivational Training** Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness	

	Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.	
4	**Facing Interviews** Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
	Entrepreneurship skill	**8**
1.	**Concept of Entrepreneurship** **Entrepreneurship**- Entrepreneurship - Enterprises:-Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2.	**Institutions Support** Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes& procedure & the available scheme.	
	Productivity	
1.	**Productivity** Definition, Necessity.	
2.	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	**6**
1	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents andsafety measures.	
4	**First Aid** Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
	Labour Welfare Legislation	
1	**Welfare Acts** Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
	Quality Tools	**6**
1.	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2.	**Quality Circles :** Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	

3.	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
4.	**Quality Tools** Basic quality tools with a few examples	

7.2 PRACTICAL TRAINING (ON-JOB TRAINING)
(BLOCK – I)
DURATION: 12MONTHS

GENERAL INFORMATION

1) **Name of the Trade** :**MECHANIC MOTOR CYCLE**

2) **Duration of On-Job Training** : As per Apprentices Act amended time to time.

3) **Batch size** : 16 Nos.

4) **Examination** : i) The internal assessment will be held on completion of each block

ii) NCVT exam will be conducted at the end of 2nd year.

5) **Instructor Qualification** :

i) Degree/Diploma in Mechanical / Automobile Engg. from recognized university/Board with one/two year post qualification experience in the relevant field.

OR

ii) NTC/NAC in the trade of Mechanic Motor Cycle with three year post qualification experience in the relevant field.

Preference will be given to a candidate with Craft Instructor Certificate (CIC)

6) **Tools, Equipments& Machinery required** : - As per Annexure – II

6.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

A. BLOCK – I

1. BASIC MAINTENANCE
   a. Washing a vehicle
   b. Check electrical bulbs and components for proper working
   c. Lubricating the vehicle moving components
   d. Adjust pedal/lever free play
   e. Inflate tyres

2. SERVICE COOLING SYSTEM
   a. perform cooling system pressure tests, inspect and test radiator, pressure cap, coolant recovery tank, and hoses; determine necessary action
   b. inspect, refit and adjust drive belts, and pulleys; check pulley and belt alignment
   c. inspect, test, and refit thermostat
   d. inspect and test fan

3. SERVICE LUBRICATING SYSTEM
   a. change engine oil and filter
   b. flush lubricating system
   c. service oil pump

4. SERVICE FUEL FEED SYSTEM (PETROL)
   a. Clean fuel tank
   b. Service carburetor
   c. Tuning carburetor with the help of exhaust gas analyzer
   d. Service throttle body in FI engines
   e. Service FI system injector

5. SERVICE FUEL FEED SYSTEM (DIESEL)
   a. clean fuel tank
   b. service low pressure pump
   c. service fuel filter
   d. setting injection timing
   e. remove and refit high pressure fuel injection pump
   f. service and test injectors

6. BASIC ELECTRICAL AND ELECTRONICS
   a. Test ampere, voltage and resistance in a electrical circuit
   b. Test diodes
   c. Test voltage drop
   d. Test continuity and discontinuity in a circuit

7. DIAGNOSE ENGINE PROBLEMS
    a. perform engine vacuum test, engine compression and engine oil pressure test, interpret and conclude the results

8. OVERHAULING OF CYLINDER HEAD ASSEMBLY

DISMANTLE, CLEAN, INSPECT, MEASURE, CONCLUDE THE RESULTS, DETERMINE FOR REFIT THE COMPONENTS AND REASSEMBLE CYLINDER HEAD ASSEMBLY.

a. dismantle engine head assembly
b. visual inspection of components for cracks
c. check gasket surface areas for warpage and surface finish
d. inspect and measure valves, valve seats and valve spring
e. refit valve seats and valves
f. valve lapping
g. refit valve guide, check valve stem- to- guide clearance
h. reaming valve guide for correct clearance
i. inspect and measure rocker assembly, determine necessary action
j. inspect and measure cam shaft run out, journal and cam lobe wear
k. inspect valve lifters
l. inspect and refit drive belt/chain
m. reassemble engine head assembly

9. OVERHAULING OF CYLINDER BLOCK ASSEMBLY

DISMANTLE, CLEAN, INSPECT, MEASURE, CONCLUDE THE RESULTS, DETERMINE FOR REFIT THE COMPONENTS AND REASSEMBLE CYLINDER BLOCK ASSEMBLY.

a. dismantle engine block assembly
b. inspect engine block for visible cracks and surface warpage
c. inspect and measure cylinder walls/sleeves for damage, wear and ridges
d. inspect and measure crank shaft for journal wear
e. inspect and measure main and connecting rod bearings for wear
f. determine piston to bore clearance
g. inspect, measure and install piston rings
h. service oil pump, measure oil pump components
i. reassemble engine block components
j. adjust valve clearance

10. TRANSMISSION IN TWO WHEELERS
    a. Remove, clean and inspect clutch assembly
    b. Replace the clutch components if necessary
    c. Remove the engine and take out the gear components.

d. Inspect the gear components and refit. Replace if necessary
e. Remove, clean and inspect the drive chain/belt. Lubricate chain assembly. Lubricate drive belt assembly components. Reassemble the components.

11. TRANSMISSION IN THREE WHEELERS

a. Service clutch assembly. Clean and inspect the components.
b. Service gear box assembly. Clean and inspect the components.
c. Service universal joint and propeller shaft
d. Service differential

12. STEERING AND SUSPENSION

a. Service steering system in a two wheeler and three wheeler.
Remove, dismantle, clean and inspect the components. Conclude the inspection results. Replace the components if necessary. Reassemble and refit the steering system. Check for its proper functioning.

b. Service suspension system in a two wheeler and three wheeler.
Remove and dismantle front fork assembly. Inspect the components and conclude the results. Replace the worn out components. Reassemble and refit the fork assembly.

13. BRAKE SYSTEM

a. Remove, clean and refit the disc brake assembly
b. Remove, clean and refit the drum brake assembly
c. Inspect the components and replace if necessary
d. Bleed the hydraulic brake system

14. WHEELS AND TYRES

a. Repairing a punchered tube
b. Repairing tubeless tyre puncture
c. Wheel balancing in three wheelers

15. ELECTRICAL AND ELECTRONICS

a. Test battery
b. Check cranking voltage and charging voltage
c. Inspect, test and diagnose starting system
d. Inspect, test and diagnose charging
e. Tune horn
f. Replace head light and tail lights
g. Align head light
h. Test electrical components for its proper functioning
i. Remove and refit sensors
j. Inspect electrical gauges

16. INTAKE, EXHAUST AND EMISSION SYSTEM

a. Remove, clean and refit intake and exhaust manifold
b. Service secondary air induction system

8. ASSESSMENT STANDARD

8.1 Assessment Guideline:

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarp/wastage as per procedure, behavioral attitude and regularity in training.

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 this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.

In this work there is evidence of:

- good skill levels in the use of hand tools, machine tools and workshop equipment
- many tolerances while undertaking different work are in line 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 which 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
- the majority of tolerances while undertaking different work are in line 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
- tolerances while undertaking different work being substantially in line 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

A. FINAL ASSESSMENT- ALL INDIA TRADE TEST

SUBJECTS	Marks	Internal assessment based on competency	Full Marks	Pass Marks	Duration of Exam.
Professional Skill	300	100	400	240	**08 hrs.**
Professional Knowledge	100	20	120	48	3 hrs.
Workshop Cal. & Sc.	50	10	60	24	3 hrs.
Engineering Drawing	50	20	70	28	4 hrs.
Employability Skill	50	--	50	17	2 hrs.
Grand Total	**550**	**150**	**700**	--	

Note:-The candidate pass in each subject conducted under all India trade test

9. FURTHER LEARNING PATHWAYS

- On successful completion of the course trainees can opt for Diploma course (Lateral entry).
- On successful completion of the course trainees can opt for CITS course.

Employment opportunities:

On successful completion of this course, the candidates shall be gainfully employed in the following industries:

1. Production & Manufacturing industries.
2. Automobile and allied industries
3. In public and private industries two / three wheeler in India & abroad.
4. Self employment

ANNEXURE – I

TOOLS & EQUIPMENT FOR BASIC TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TRADE:MECHANIC MOTOR CYCLE

LIST OF TOOLS & EQUIPMENTS FOR 16APPRENTICES

A : TRAINEES TOOL KIT:-

SL NO	TOOLS	QUANTITY
1	D.E. spanner set 4-32mm	16 sets
2	Ring spanner set 4-32 mm	16 sets
3	Socket spanner set 4-32 mm	16 sets
4	Deep socket set 4-32 mm	16 sets
5	Screw driver flat head small and big size	16 nos
6	Screw driver Philips type small and big size	16 nos
7	Impact screw driver set	16 sets
8	Flat chisel	16 nos
9	Allen key set	16 nos
10	Feeler gauge	16 nos
11	Ball peen hammer 0.5kg	16 nos
12	Mallet	16 nos
13	Hand file 20 cm	16 nos
14	Scriber 15cm	16 nos
15	Steel rule 30 cm	16 nos
16	Centre punch 10 x 100 mm	16 nos
17	Tools box with lock and key	16 nos
18	Plier combination	16 nos
19	Wire cutter	16 nos
20	Multi meter	16nos
21	Continuity tester	16 nos
22	T spanner 8mm	16 nos
23	T spanner 10mm	16 nos
24	T spanner12 mm	16 nos

B :TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS

SL NO	ITEM WITH SPECIFICATION	QUANTITY
1	Vernier caliper 30 cm	01 no
2	Outside micrometer 0-25mm	01 no
3	Outside micrometer 25-50mm	01 no
4	Outside micrometer 50-75mm	01 no
5	Outside micrometer 75-100mm	01 no
6	Outside micrometer 100-125 mm	01 no
7	Outside micrometer125-150mm	01 no
8	Inside micrometer 25-150 mm	01 no
9	Dial test indicator 0.01mm accuracy	01 no
10	Stand for dial gauge with magnetic base	01 no
11	Surface plate with stand	01 no
12	V block suitable to hold components	02 nos
13	Vice fitted on table	04 nos
14	Battery charger	01 no
15	Caliper inside spring type 15 cm	04 nos
16	Caliper outside spring type 15 cm	04 nos
17	Cleaning tray plastic made	10 nos
18	Divider spring type	04 nos
19	Electrical soldering iron	04 nos
20	Try square 15 cm	14 nos
21	Files assorted types and sizes	01 set each
22	Hack saw frame	04 nos
23	Hand operated crimping tool	01 no
24	Oil can 0.5 litre capacity	10 nos
25	Piston ring compressor	01 no
26	Piston ring expander	01 no
27	Piston ring groove cleaner	01 no
28	Valve spring compressor	01 no
29	Bearing puller	01 set
30	Bearing installer	01 set
31	Oil seal installer	01 set
32	Compression gauge petrol	01 no
33	Compression gauge diesel	01 no
34	Vacuum gauge	01 no
35	Magneto puller for different vehicles	01 no each
36	Clutch puller for different vehicles	01 no each
37	Circlip plier internal	01 no
38	Circlip plier external	01 no
39	Tachometer	01 no
40	Timing light	01 no

41	Spark plug spanner for different vehicles	01 set
42	CDI and ignition coil tester	01 no
43	Greasilator	01 no
44	Special tools for removing and refitting variable belt transmission	01 set for each vehicle
45	Special tools for removing and refitting steering components	01 set for each vehicle
46	Special tools for removing and refitting front fork components	01 set for each vehicle
47	Hydraulic brake bleeder unit	01 no
48	Taps and die set	01 set
49	Hand reamer of different sizes	01set
50	Hand drilling machine with various size drill bits	01 set
51	Stud remover	04 nos
52	Stud extractor ezy out	04 nos
53	Letter punch	01 set
54	Number punch	01 set
55	Scraper flat	01 no
56	Thread pitch gauge	01 set
57	Torque wrench able to tighten all nuts and studs	01 set each
58	Tyre pressure gauge	01 no
59	Grip plier	04 nos
60	Spark plug cleaner	01 no
61	Special tools for carburetor service	01 set
62	Spring tension tester	01 no

C :GENERAL MACHINERY INSTALLATIONS:-

1	Motor cycle 100 cc both drum brakes	01 no
2	Motor cycle with FI engine above 150 cc with disc and drum brakes and water cooled	01 no
3	Scooter with variable belt drive	01 no
4	Moped 100 cc	01 no
5	Three wheeler with 2 stroke engine	01 no
6	Three wheeler with 4 stroke engine	01 no
7	Three wheeler with diesel engine	01 no
8	Vehicle lift for two and three wheeler	01 no each
9	Air compressor with pneumatic pipe lines	01 no
10	Car washer	01 no
11	bench grinding machine	01 no
12	Gas welding machine	01 no
13	Cut model motor cycle showing all components electric drive	01 no
14	2 stroke engine for dismantling and assembling	01 no
15	4 stroke engine for dismantling and assembling	01 no

Note: In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: MECHANIC MOTOR CYCLE

LIST OF TOOLS& EQUIPMENTS FOR 16 APPRENTICES

1) **Space Norms** : 45 Sq.m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Draughtsman drawing instrument box	16
2.	Set square celluloid 45^0 (250 X 1.5 mm)	16
3.	Set square celluloid 30^0-60^0 (250 X 1.5 mm)	16
4.	Mini drafter	16
5.	Drawing board (700mm x500 mm) IS: 1444	16

B : FURNITURE REQUIRED

Sl. No.	Name of the items	Quantity (indicative)
1	Drawing Board	20
2	Models : Solid & cut section	as required
3	Drawing Table for trainees	as required
4	Stool for trainees	as required
5	Cupboard (big)	01
6	White Board (size: 8ft. x 4ft.)	01
7	Trainer's Table	01
8	Trainer's Chair	01

ANNEXURE – II

TOOLS & EQUIPMENT FOR ON-JOB TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

TRADE: MECHANIC MOTOR CYCLE

For Batch of 16 APPRENTICES

Actual training will depend on the existing facilities available in the establishments. However, the industry should ensure that the broad skills defined against On-Job Training part are imparted. In case of any short fall the concern industry may impart the training in cluster mode/ any other industry/ at ITI.

ANNEXURE-III

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1.Due care to be taken for proper & inclusive delivery among the batch. Some of the following some 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

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.