**CURRICULUM**

**FOR THE TRADE OF**

# DRIVER CUM MECHANIC [LMV]

**UNDER**

**APPRENTICESHIP TRAINING SCHEME**


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

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# 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.** | G Vijayapal Reddy | Transport Department, TG | Retd. RTO |
| **2.** | M Subbarayudu | DGT, MSDE | Retd. Dy. Director |
| **3.** | MJ VijayaRaju | ATI, Hyderabad | Trg. Officer |

# 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 22$^{nd}$ 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.

# 2. RATIONALE

(Need for Apprenticeship in Driver Cum Mechanic 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 classroom training before undergoing PT (On The Job training).
2. It will enhance knowledge about scientific principles, familiarization with industrial culture, and basics need for mechanic and able to drive LMV
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 Engines and its accessories, Diagnosis techniques
5. It will enhance the ability to work on conventional as well as latest engines and to basic maintenance of LMV.

# 3. 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. Driver Cum Mechanic
2. Driver/Vehicle Operator (Three Wheeler)

**b) Self Employment**

1. Taxi / Car Driver

Reference NCO: 8322.10

# 4. GENERAL INFORMATION

1. **Name of the Trade** **: DRIVER CUM MECHANIC [LMV]**

2. **N.C.O. Code No.** : 8322.10

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**

3.2 **For ITI Passed :-**

**Duration of Basic Training**: - NIL

**Duration of Practical Training (On -job Training): 12 months**

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

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

**8. Rebate to ITI Passed out Trainees :** 03 Month for the trade of Driver cum Mechanic (LMV)

*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** :**DRIVER CUM MECHANIC(LMV)**

2) **Hours of Instruction** : 500 hrs.

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

4) **Power Norms** : 6.82 KW for Workshop

5) **Space Norms** : 56Sq.m. (Vehicle parking in common separate carriage )

6) **Examination** : The internal assessment will beheld on completion of Block.

7) **Instructor Qualification** :

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|---|
| Degree/Diploma in Mechanical / Automobile Engg. from recognized university/Board with one/two year post qualification experience respectively in the relevant field with LMV Driving license<br>**OR**<br>NTC/NAC in the trade of Driver Cum Mechanic(LMV) with three year post qualification experience in the relevant field with LMVDriving license<br><br>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**<br>- Viewing of engineering drawing sheets.<br>- 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**<br>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 :**<br>- Definition, types and applications in Drawing as per BIS SP:46-2003<br>- Classification of lines (Hidden, centre, construction, Extension, Dimension, Section)<br>- Drawing lines of given length (Straight, curved)<br>- Drawing of parallel lines, perpendicular line<br>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:<br>- Angle: Measurement and its types, method of bisecting.<br>- Triangle -different types<br>- Rectangle, Square, Rhombus, Parallelogram.<br>- Circle and its elements. | | **Average :**Problems of Average.<br>**Ratio &Proportion** : Simple calculation on related problems.<br>**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density. | |
| 5 | **Dimensioning:**<br>- Definition, types and methods of dimensioning (functional, non-functional and auxiliary)<br>- Types of arrowhead<br>- Leader Line with text | | | |
| 6 | **Free hand drawing of**<br>- Lines, polygons, ellipse, etc.<br>- geometrical figures and blocks with dimension | | | |

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|---|---|---|---|---|
| | - Transferring measurement from the given object to the free hand sketches. | | | |
| 7 | **Method of presentation of Engineering Drawing**<br>- Pictorial View<br>- Orthogonal View<br>- 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 :**<br>- Fastener (Rivets, Bolts and Nuts)<br>- Bars and profile sections<br>- Weld, brazed and soldered joints.<br>- Electrical and electronics element<br>- Piping joints and fittings | | - Forces definition.<br>- Definition and example of compressive, tensile, shear forces, axial and tangential forces.<br>Stress, strain, ultimate strength, factor of safety for MS.<br>**Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation. | |
| 9 | **Dimensioning practice:**<br>- Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003)<br>- Symbols preceding the value of dimension and dimensional tolerance. | | **Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle.<br>Volume of solids – cube, cuboids, cylinder and Sphere.<br>Surface area of solids – cube, cuboids, cylinder and Sphere.<br>- Area of cut-out regular surfaces: circle and segment and sector of circle.<br><br>- Volume of cut-out solids: hollow cylinders, frustum of cone, block section.<br>- Volume of simple solid blocks. | |
| 10 | **Construction of Geometrical Drawing Figures:**<br>- Polygons and their values of included angles.<br>Conic Sections (Ellipse) | | **Algebra** : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).<br>- Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force. | |
| 11 | **Projections:**<br>- Concept of axes plane and quadrant.<br>- Orthographic projections<br>- Method of first angle and third angle projections (definition and difference)<br>- Symbol of 1st angle and 3rd angle projection as per IS specification.<br><br>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. | |

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|---|---|---|---|---|
| **12** | - Machined components; concept of fillet & chamfer; surface finish symbols. | | **Trigonometry:** Trigonometric ratios, Trigonometric tables.<br>- Finding the value of unknown sides and angles of a triangle by Trigonometrical method.<br>- 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:**<br>- Read images, graphs, diagrams – bar chart, pie chart.<br>- 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.<br>How to make queries. | | **Transmission of power:** By belt, pulleys & gear drive. | |
| **16** | - Simple exercises related to trade related symbols.<br>- Solution of NCVT test papers. | | **Concept of pressure** – units of pressure, atmospheric pressure, gauge pressure – gauges used for measuring pressure.<br>**Introduction to pneumatics & hydraulics systems.**<br>Solution of NCVT test papers | |

## 7.1.2DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

### A. Block –I

### Basic Training

| Week NO | PROFESSIONAL SKILL (275 Hours) | PROFESSIONAL KNOWLEDGE (120 Hours) |
|---|---|---|
| 1 | GENERAL SHOP SAFETY<br>First aid and Fire safety, Use of fire extinguishers.<br><br>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**<br>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<br>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<br>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.<br><br>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.<br>Description of Power tools and equipment. |

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| 4 | FASTENERS AND BEARINGS<br>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.<br>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.<br>Fundamentals of Hydraulics & Pneumatics |
| 5 | BASIC ELECTRICAL AND ELECTRONICS<br>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 soldering wires. Practice on testing fuses and relays- test diodes | 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. Safety precautions to be observed while working with electrical equipment. |
| 6 | Identification of different type of Vehicle. Demonstration of vehicle specification data; Identification of vehicle information Number (VIN).<br>Identification of major components of vehicle<br>Demonstration of Garage, Service station equipment.- Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks**,**Stands.<br>Water wash a vehicle | Auto Industry - History, leading manufacturers, development in vehicle industry, trends, new product.<br>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.<br>Brief description and uses of Vehicle hoists – Two post and four post hoist, Engine hoists, Jacks**,** Stands.<br>Water washer- description and types- precautions to be observed while water washing a vehicle. |
| 7 | Identification of major components of engine and its accessories.<br><br>Different types of Starting and Stopping Methods of Engine. | Introduction to Engine:<br>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.<br>Technical terms used in engine, Engine specification. |

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| 8 | BATTERY<br>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- connecting two batteries in series- charging a battery – test battery- specific gravity test. | Purpose of battery- types- construction and working principle of a lead acid battery- maintenance free batteries- IBS-battery ratings- battery charging methods.<br>Description on starting and Charging system.<br>Description of Lighting system in reading Instrument panel light.<br>Study of sensors in Vehicle. |
| 9 | Check and top up coolant, and brake oil level-check vacuum and fuel hoses for any damages and leaks.<br>Check all lights, switches and horn<br>Wheel removing and refitting procedure. Tyre removing, refitting, checking & inflating procedure | Functions and components of Cooling and lubrication system of vehicle.<br>Construction & specification of tyres. Tyre repair materials. Causes of damage of tyres and their procedure.<br><br>Wheel removing and refitting procedure. Tyre removing, refitting, checking & inflating procedure.<br>Causes of damage of tyres. |
| 10 | Preliminary checking of the vehicle before driving.<br><br>Practice in observing different gauges and meter while driving.<br><br>Steering practice – Push and Pull method. Hand over hand method<br><br>Straight driving on an open ground | Motor Vehicle Act., Driving road rules. Knowledge about log book and different papers related to vehicles<br>Drivers responsibility on the road<br>Road Traffic signal and hand signal. Local road map reading. Speed regulation on city roads<br>Precautions during Pre-Driving Check- Before sitting/After sitting on driver seat. Adjustment of Rear view mirror.<br><br>Steering control- operation, functions of its each components. |
| 11 | Practice on Clutch Biting Point<br><br>Practice in changing gear from<br>a) Low gear to high gear and<br>b) High gear to low gear<br><br>Adjust free play in the accelerator, brake and clutch levers and greasing<br><br>Straight driving on wide road | Working principles of Transmission system and functions of its each components.<br><br>Understanding the needs of Brakes. Hand brakes. Different types of Brakes and its functions.<br><br>Anticipation, Judgement, and road positioning according to other users. |

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| 12 | Practice in reverse driving<br><br>Practice in parking vehicle. Parallel parking and diagonal parking.<br><br>Driving practice at Intersection.<br><br>Practice in driving steep slope and downhill. | Precautions to be taken at the time of reversing the vehicle. Locating reverse gear in sitting position, Speed control , Steering in reverse gear(Straight)<br><br>Parking precautions and positioning according to road users. Methods of parking a) Parallel parking, Angular parking, Perpendicular parking facing uphill , Parking facing downhill, Common errors<br><br>Precautions while applying Accelerator (Gradual/Sudden) |
| 13 | Practice on overtaking another vehicle. | Mirror Signal and Manoeuvres (MSM) and Position speed and Look Zone of vision.<br>Manoeuvres<br>Merging and diverging manoeuvres<br>(a) Turning manoeuvres to left and right<br>(b) 3- point turn and U-turn<br>(c) Overtaking stationary vehicles , moving Vehicles in left side and right side. |
| ASSESMENT / EXAM- 03 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 12$^{th}$ /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

| Topic No. | Topic | Duration (in hours) |
|---|---|---|
| | **English Literacy** | **7** |
| **1.** | **Reading**<br>Reading and understanding simple sentences about self, work and environment | |
| **2.** | **Writing**<br>Construction of simple sentences Writing simple English | |
| **3.** | **Speaking / Spoken English**<br>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**<br>Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer. | |
| **2.** | **Word processing and Worksheet**<br>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.<br>Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.<br>Use of External memory like pen drive, CD, DVD etc, | |
| **3.** | **Computer Networking and INTERNET**<br>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**<br>Communication and its importance<br>Principles of Effective communication<br>Types of communication - verbal, non verbal, written, email, talking on phone.<br>Non verbal communication - components-Para-language<br>Body - language<br>Barriers to communication and dealing with barriers. | |
| **2** | **Listening Skills**<br>Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. | |
| **3** | **Motivational Training**<br>Characteristics Essential to Achieving Success<br>The Power of Positive Attitude<br>Self awareness, Importance of Commitment, Ethics and Values<br>Ways to Motivate Oneself<br>Personal Goal setting and Employability Planning. | |
| **4** | **Facing Interviews**<br>Manners, Etiquettes, Dress code for an interview | |

| | | |
|---|---|---|
| | Do's & Don'ts for an interview | |
| | **Entrepreneurship skill** | **8** |
| **1.** | **Concept of Entrepreneurship**<br>**Entrepreneurship**- Entrepreneurship - Enterprises:-Conceptual issue.<br>Source of business ideas, Entrepreneurial opportunities, The process of setting up a business. | |
| **2.** | **Institutions Support**<br>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**<br>Definition, Necessity. | |
| **2.** | **Affecting Factors**<br>Skills, Working Aids, Automation, Environment, Motivation<br>How improves or slows down. | |
| **3.** | **Personal Finance Management**<br>Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance. | |
| | **Occupational Safety, Health & Environment Education** | **6** |
| **1** | **Safety & Health**<br>Introduction to Occupational Safety and Health importance of safety and health at workplace. | |
| **2** | **Occupational Hazards**<br>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**<br>Basic principles for protective equipment.<br>Accident Prevention techniques - control of accidents andsafety measures. | |
| **4** | **First Aid**<br>Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person | |
| | **Labour Welfare Legislation** | |
| 1 | **Welfare Acts**<br>Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act. | |
| | **Quality Tools** | **6** |
| **1.** | **Quality Consciousness :**<br>Meaning of quality, Quality Characteristic | |
| **2.** | **Quality Circles :**<br>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 :**<br>Purpose of Housekeeping, Practice of good Housekeeping. | |
| **4.** | **Quality Tools**<br>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** :**DRIVER CUM MECHANIC (LMV)**
2) **Duration of On-Job Training** : As per Apprenticeship Act amended time to time.
3) **Batch size** : 16 Nos.
4) **Examination** : i) The internal assessment will be held on completion of block
   ii) NCVT exam will be conducted at the end of the year.
5) **Instructor Qualification** :

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|---|
| Degree/Diploma in Mechanical / Automobile Engg. from recognized university/Board with one/two year post qualification experience respectively in the relevant field with LMV Driving license<br>**OR**<br>NTC/NAC in the trade of Driver Cum Mechanic(LMV) with three year post qualification experience in the relevant field with LMVDriving license<br><br>Preference will be given to a candidate with Craft Instructor Certificate (CIC) |

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

## 7.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

## A. BLOCK – I (12 Month)

1. BASIC MAINTENANCE
   a. Check electrical bulbs and components for proper working
   b. Lubricating the vehicle moving components
   c. Check Oil level in different unit.
   a. Adjust pedal/lever free play
   b. Inflate tyres

2. SERVICE COOLING SYSTEM
   a. Perform cooling system pressure tests, inspect and test radiator, pressure cap, coolant recovery tank, and hoses.
   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

4. ENGINE PROBLEMS
   a. Setting injection timing
   b. Service and test injectors

5. BRAKE SYSTEM
   a. Checking of brake fluid level Bleeding brake system
   b. Clean and adjust disc brake assembly
   c. Clean and adjust the drum brake assembly

6. WHEEL & TYRES
   a. Checking wheel jam & slipping of clutch.
   b. Repairing a punchered tube
   c. Repairing tubeless tyre puncture
   d. Wheel balancing

7. ELECTRICAL AND ELECTRONICS
   a. Test battery
   b. Check cranking voltage and charging voltage
   c. Carrying out checks on starting system
   d. Carrying out checks on Alternator unit,
   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

8. 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

## 8.2 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 CITS course.

**Employment opportunities:**

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

1. Transport sections of Govt. / PSUs
2. Self employment

**ANNEXURE – I**

# TOOLS & EQUIPMENT FOR BASIC TRAINING

## INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

## TRADE:DRIVER CUM MECHANIC(LMV)

## 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 | Cut section model of LMV showing all components with electric drive | 01 no |
| 2 | 4 stroke engine for dismantling and assembling | 01 no |
| 3 | Jeep | 01 no. |
| 4 | Light Motor Vehicle running condition | 01 no. |
| 5 | Light Motor Vehicle (With Double clutch and Double brake pedal) | 01 no. |
| 6 | Traffic Signals board | 01 no. |
| 9 | Air compressor with pneumatic pipe lines | 01 no |
| 10 | Car washer | 01 no |
| 11 | bench grinding machine | 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: DRIVER CUM MECHANIC (LMV)

## 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: DRIVER CUM MECHANIC

## 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.