BUILDING MAINTENANCE TECHNICIAN

COMPETENCY BASED CURRICULUM

(Duration: 1 Yr. 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4

SECTOR – CONSTRUCTION

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

BUILDING MAINTENANCE TECHNICIAN

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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1. Construction Skills Consultant,
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1. 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.

2. TRAINING SYSTEM

2.1 GENERAL

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

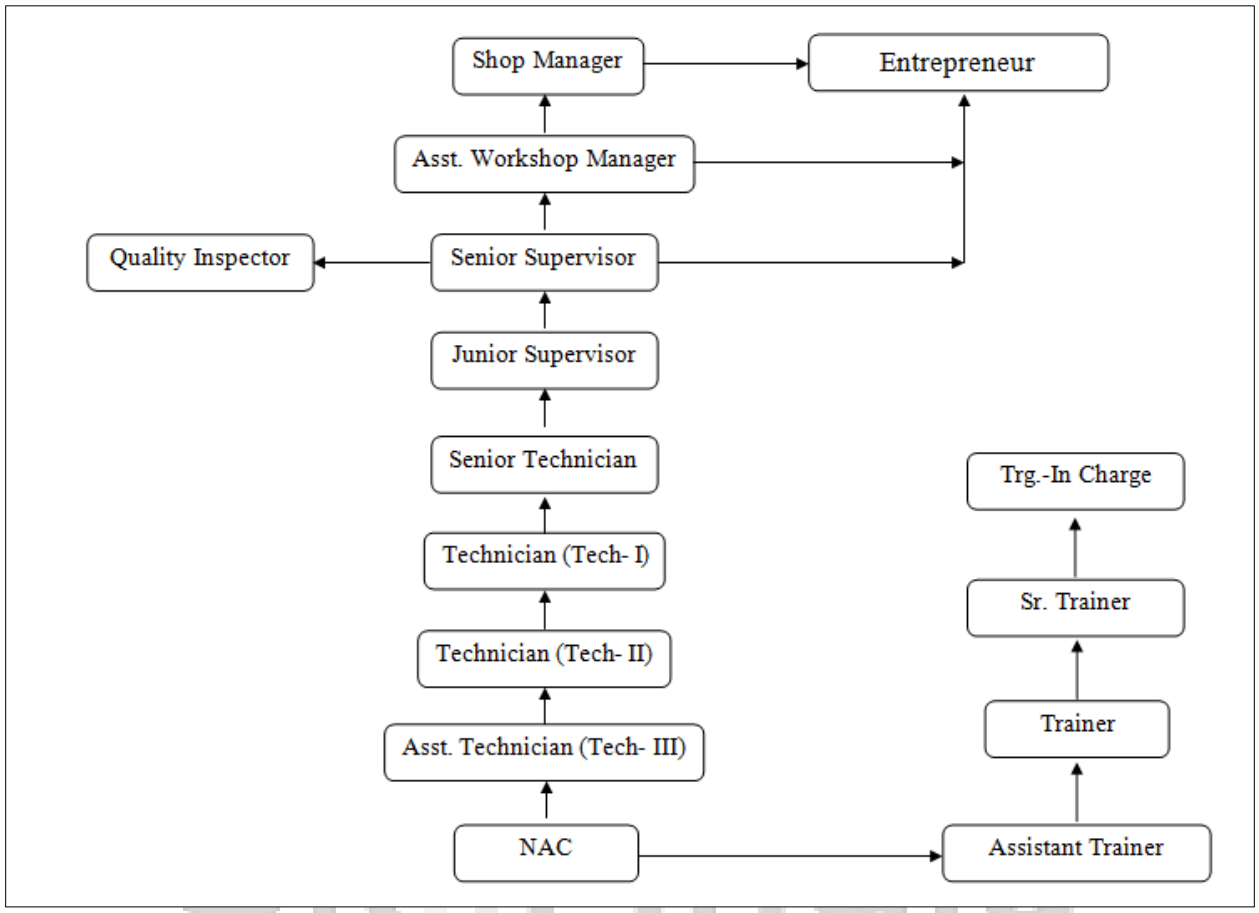
Building Maintenance Technician trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of one year three months (01 Block of 15 months duration including basic training) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of one year (*Basic Training and On-Job Training*) : -

Total training duration details: -

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

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)
For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	**For 01 Yr. course**
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	**1000**	**500**

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

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

institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

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

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

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

Assessment will be evidence based comprising the following:

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

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

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	

For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • 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	
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.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • 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	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Building Maintenance Technician lays brick or stone with mortar, and other construction material to repair building-walls, arches, floors, pillars and other structures. Repairs damaged roofs. Receives instructions regarding nature and type of work to be done. Directs Laborers to prepare mortar in required proportions and water bricks. Dismantles masonry / other wooden or steel structures for reconstruction or facility of work. Does plastering, decoration pointing and repair work. Erects scaffolding. Paints walls (white washing / putty /distemper colour / acrylic emulsion), wooden structures, steel structures, varnishing, polishing. Repairs false ceiling, wall panels. Replaces glasses, glazed tiles. Does anti termite treatment in building. Repairs and maintains sanitary and drainage works.

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

Reference NCO - 2015: 3112.9900 - Civil Engineering Technicians, Other

4. NSQF LEVEL COMPLIANCE

NSQF level for Building Maintenance Technician trade under ATS: **Level 4**

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

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

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

a. Process
b. professional knowledge,
c. professional skill,
d. core skill and
e. Responsibility.

The Broad Learning outcome of Building Maintenance Technician trade under ATS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	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.

5. GENERAL INFORMATION

Name of the Trade	Building Maintenance Technician
NCO - 2015	3112.9900
NSQF Level	Level – 4
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months+ One year (01 Block of 15 months duration including basic training).
Duration of Basic Training	a) Block –I : 3 months **Total duration of Basic Training: 3 months**
Duration of On-Job Training	a) Block–I: 12 months **Total duration of Practical Training: 12 months**
Entry Qualification	Passed 10th class examination under 10+2 system of education with Science and Mathematics or its equivalent.
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for basic Training	As per related trade of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	Three months
CTS trades eligible for Building Maintenance Technician Apprenticeship	1. MASON (Building Constructor) **2.** Building Maintenance**.**

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.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*
- *Tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Building Maintenance Technician course of 01 years duration under ATS.

Block I:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science- Unit, Basic Mathematics, Percentage, Material Science ,Mass, Weight and Density, Mensuration, Elasticity, Heat & Temperature, Basic Electricity.]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing- Lines, Free hand drawing , Drawing of Geometrical Figures , Sizes and Layout of Drawing Sheets, Method of presentation of Engineering Drawing, Drawing of Solid figures, Free hand Drawing of Solid figures, Free Hand sketch, Projections, Drawing of Orthographic projection in 3rd angle.]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Practice and perform works as per the safety precaution on the shop floor.
2. Construct brick wall 10, 20 & 30 cm. All types of bonds.
3. Build stone masonry & ashlars and rubble masonry.
4. Repair and finish cracks in old brick work and stone work.
5. Perform pointing and plastering.
6. Perform cement concrete and line concrete work.

7. Make RCC lintel and arch of any span after making arrangement of centering.
8. Construct floors of different types and repair defective work.
9. Repair crack in various types of roofs to stop leakage.
10. Paint wood/steel work.
11. Whitewash or coat distemper and carry out colour washing of building.
12. Measure, plan and construct false ceiling and lay wall paper.
13. Replace broken glass of window, ventilator etc.
14. Construct courses for damp proofing.
15. Perform varnishing and polishing.
16. Perform tiles work with vitrified and/or glazed tiles
17. Perform Pipe cutting & joining and carry out plumbing and sanitary work.

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

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING 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.
	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/unsalvageable 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 avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science- Unit, Basic Mathematics,	2.1 Explain concept - Unit, Basic Mathematics, Percentage, Material Science, Mass, Weight and Density, Mensuration, Elasticity, Heat & Temperature, Basic Electricity,

Percentage, Material Science, Mass, Weight and Density, Mensuration, Elasticity, Heat & Temperature, Basic Electricity.	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation &earthing
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different Lines, Free hand drawing , Drawing of Geometrical Figures , Sizes and Layout of Drawing Sheets, Method of presentation of Engineering Drawing, Drawing of Solid figures, Free hand Drawing of Solid figures, Free Hand sketch, Projections, Drawing of Orthographic projection in 3rd angle.engineering drawing-*	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read &analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, verniercalipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts

6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
<u>Block-I</u>	
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **Block – I**(section: 10) must ensure that the trainee works in familiar, predictable, routine, situation of clear choice. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, etc.); **Execution** apply factual knowledge of field of knowledge, recall and demonstrate practical skill during performing the work in routine and repetitive in narrow range of application, using appropriate rule and tool, complying with basic arithmetic and algebraic principles and language to communicate in written or oral with required clarity; **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for his/her own work and learning.*	

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	**Introduction to Training** Make the trainees familiar with workshop discipline, layout of the shop, tools and equipments, and safety precautions. **Mortar & Concrete** Prepare mortar and concrete of given mix. **Stone Masonry and Brick Masonry** Raise a brick wall of half, full and one & half with English or Flemish bond to a height of 1.0m, on spread footing.	Introduction to trade, scope of training, its importance and safety precaution. Different types of bricks, cements, lime, and tiles. Concept of water cement ratio workability and curing. Tools & plants required for preparation, transporting and placing of mortar and concrete. Factor affecting strength of mortar and concrete. Methods of laying bricks in walls. Precaution to be taken in Construction of Walls.
2	Repair and finish cracks in old brickwork and stone Masonry. Pointing Knowledge required. Construct Floors of various types of an area of l.00m x l.00m. Repair a given defective floor. Maintenance of hurt tiles.	Defect in stone Masonry and their repair. Methods of fixing new work with old Work (tooting, racking back and block bonding) Defects in brickwork, Maintenance of brick Masonry construction. Merit and demerit of brick Masonry Work. Method of using concrete for repair work and concrete grouting. Causes of defects in Brick, cement concrete, terrazzo and Mosaic, marble and stone floors and their remedial measures. Repair of old floors. Methods of cleaning, cutting and polishing of mosaic, terrazzo and Marble floors/granite (Materials and tools required). Laying, repair and Maintenance of PVC and linoleum floor / wooden flooring.

3	**R.C.C. Structure :** Make R. C. C. or brick lintel of any span after making proper arrangement of centring. Repair cracks in various types of roofs to stop leakage. Repair the Mangalore tile roof covering. Repair of old damage structure reinforcement.	Knowledge of flat tiles & maintenance of ceramic tiles. Different types of lintel. Tools required to lay RCC & RBC roofs. Method of lay on R.C.C & R.B.C. (Including knowledge for bending, binding and placement of bars. Repair of cracks in R.C.C. roofs, methods, tools and materials required. Knowledge of roof and lintel and Chemical treatment.
4	**Surface Finishing :** Plaster a given brick surface of area lm X lm. Repair a defective plaster surface. Plinth Protection. Do pointing on old brick masonry work.	Tools required for Plastering. Methods of cement and lime plastering. Preparation of surface for plastering. Application of plaster coats. Curing of plaster. Defects in plaster work and their preparations. Repair of defective plaster. Repair of damp surface of wall / ceiling. Tools and material required for pointing. Operation involved pointing of masonry works. Repair of old pointing.
5	**Painting :** Painting of wood/ steel work. Practice white washing /distempering/colour Washing/ cement painting of area of 2mx2m. Repair wooden workout door/ window/ventilators/ other Wooden structures. Replace broken glass panes, acrylic emulsion over plaster of parish. Replace broken glazed tiles. (The students should be encouraged to undertake repair work in the institution building under the guidance of the instructor; quality of work should be the main objective.)	Knowledge about painting different types of Washing i.e. water base, oil base primer applying with surface preparation before painting. Brush /Spray / roller used in painting. Texture painting. Preparation of wall surface with putty. Knowledge of timber, different type of fitting, knowledge of different type of doors and windows and different types of joints.
6	**Painting of Iron and steel Works :** Paint on different steel structures and	Methods of painting old iron and steelwork.

	other surfaces of plasters.	
7	**False ceiling, wall paneling and wall Decorating :** False ceiling wall and wallpapering & construction and repairing. Mode of Measurement.	Tools and materials required for false ceiling, wall paneling and wallpapering. Process for placing wallpaper. Method of wall paneling and false ceiling with different materials in old and new walls. Knowledge of false ceiling.
8	**Damp Proofing :** Construction of course for damp proofing.	Surface of dampness. Effect of dampness. Precautions to be taken to prevent dampness. Methods of damp proofing basements, ground floors, plinth and walls. Special damp proofing arrangement in bathroom WC and kitchen. Damp proofing for flat and pitched roofs and windowsills. Methods for laying damp proof course in existing buildings. Knowledge, reason and subsequent remedial measure. Knowledge required to different type of damp proofing material bonding agents.
9	**Varnishing and polishing :** Practice on varnishing and polishing coats in different methods.	Tool required for varnishing and polishing coats. Process of varnishing and polishing-preparation of surface, knotting and priming-Application of varnish coats. Methods of polishing on metal surfaces.
10	**Glazing Work :** Practice on cutting and fixing glasses and replacement.	Replacement and cleaning of glazing work. Tools required. Methods of cutting glass and fixing glass as desired. Materials required for cleaning old glass panes and method of cleaning.
11	**Vitrified tiled work :** Practice on method of cleaning of china clay.	Method of cleaning of china clay glazed tiles and materials required for cleaning.
12	**Sanitary and drainage works :** Cutting of pipes to required length and also thread on a given piece of pipes. Jointing G.I. pipes, plastic pipes by suitable methods. Jointing of sewerage pipes cast- iron and stoneware. Exercises involving the fitting of various pipe fittings and also involving the fitting	Brief idea of inspection chamber, manhole, intercepting chamber ventilating pipes, soak pit, septic tank and different type of fittings and specials. Gradient followed in house sewers, connection of house sewer with municipal service. Measurement, inspection and quality

	of various sewerage fittings. Student should be attached in batches to work with a plumber who is executing work locally or in Government public health work. Installation and maintenance of Water pumps. Prepare Layout Plan (from modification point of view) of concealed and open type Water line (G.I) of a bathroom. Visit to New Construction area.	control parameters. Problem and remedies.
13.	**<u>Anti termite Treatment in Building</u> :** Practice on application.	Method of Anti termite Treatment for walls. Anti termite Treatment for wood work in Building.
	Revision &Internal Assessment 03days	

<u>Note:</u> - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Topic No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration: - 30 hrs.)
1	Metric System: Measurement of length, breadth & height in metric units Measurement of weight in metric system. Unit conversion. Reading of plain scales. Reading of tapes & foot rules.	• Free hand Sketching of masonry tools. • Drawing practice and Properties of lines, angles, triangles, Square, circles & polygons.
2	Ratio and proportion: Problems to find out quantities of materials for various mortar & concrete mixes.	• Freehand sketching of bricks, queen closers, king closers and bats. • Isometric views of simple objects such as cubes, cuboids, square & rectangular prisms, pyramids and cylinders.
3	Mensuration: Areas & perimeters of rectangles, squares and triangles, circles, sectors, segments, quadrilaterals, trapezium, parallelogram & rhombus , polygons such as pentagons, hexagons & octagons.	• Preparation of freehand sketches of rat trap bond and other ornamental panels. • Use of drawing instruments-'T' square, drawing board, etc. Printing of letters & numbers.
4	• Volume & surface area of simple geometrical solids such as cubes & prisms. • Mensuration applied to area & volume of brickwork. • Calculation of cement & sand required.	• Types of lines & symbols used in building drawings. • Drawing architectural drawings such as ovolo, cavetto, bolten, scotia, cyma recta, cyma reversa, astragal, etc.
5	• Simple cost comparison between facing bricks & common bricks. Cost comparison between walls built in English/Flemish/garden wall bonds/cavity walls. Problems on areas. Allowances for simple rectangular window & other openings.	• Simple isometric scaled drawings, isometric views of simple objects such as cubes, cuboids, square & rectangular prism and pyramids, etc. • Projections of solids. • Freehand sketches in plan & elevation of 4 ½" wall-Quoins & Junctions.

6	• Weight of walling supported by lintels and arches-simple problems. • Calculation of rise & span for arches.	• Drawing to scale: a) 4 ½" stepped wall, b) 4 ½" wall racked back, c) 9" walls in English & Flemish bonds showing stepped end, racking back &toothing. • Drawing to scale: a) 4 ½" quoin wall with stepped end & racking back, b) 4 ½" junction wall, c) 9" quoin wall in English & Flemish bonds, d) 9" Flemish bonded wall junction, e) 9" wall in garden wall bond, f) 13 ½" main wall in garden wall bond & 9" cross wall in English/Flemish bond.
7	• Volume of brickwork in mass retaining walls. • Volume of stonework or concrete work required for a given piece of work.	• Drawing to scale: 18" wall in English garden wall bond. • Hexagonal & octagonal pillars showing bonds and cavities.
8	• Mensuration applied to area of marble works. • Calculation of length & weight of steel reinforcement from detailed RCC drawings.	• Preparation of drawing showing timbering in trenches • Preparation of drawings showing methods of setting out simple segmental, circular & elliptical arches.
9	• Calculation of quantities of cement, sand, aggregate & reinforcement for a given RCC work. • Calculation of quantities of various materials for brick / tile / cement concrete/terrazzo flooring. Quantities of materials required for skirting.	• Interpretation of building drawing. Preparation of plan, elevation & section of a simple building.
10	• Calculation of length of drainage pipe & materials for foundation & covering concrete. • Calculation of materials required for a manhole from given drawing.	• Reading of a building plan showing drainage line, position of manhole, etc. • Drawing of manhole and inspection chamber with details
11		• Constructional details of hollow block roof with precast RCC joints. • Stonework: Drawing of random rubble, coursed rubble & ashlar masonry. Layout of stairs. • Drawing of stone pillar showing architectural moulding.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 55 HRS.)

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, nonverbal, written, email,**	

	talking on phone. **Nonverbal 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**	

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block – I

1. Practice and perform works as per the safety precaution on the shop floor.
2. Construct brick wall 10, 20 & 30 cm. All types of bonds.
3. Build stone masonry & ashlars and rubble masonry.
4. Repair and finish cracks in old brick work and stone work.
5. Perform pointing and plastering.
6. Perform cement concrete and line concrete work.
7. Make RCC lintel and arch of any span after making arrangement of centering.
8. Construct floors of different types and repair defective work.
9. Repair crack in various types of roofs to stop leakage.
10. Paint wood/steel work.
11. Whitewash or coat distemper and carry out colour washing of building.
12. Measure, plan and construct false ceiling and lay wall paper.
13. Replace broken glass of window, ventilator etc.
14. Construct courses for damp proofing.
15. Perform varnishing and polishing.
16. Perform tiles work with vitrified and/or glazed tiles
17. Perform Pipe cutting & joining and carry out plumbing and sanitary work.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.

2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

BUILDING MAINTENANCE TECHNICIAN			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 16 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Bolster	100mm	17 Nos.
2.	Pitching tool (Masons)		17 Nos.
3.	Chisel Masons Hammer Headed Punch		17 Nos.
4.	-do-	12mm	17 Nos.
5.	-do-	25mm	17 Nos.
6.	Cross cut type		17 Nos.
7.	-do-	18mm	17 Nos.
8.	-do-	35mm	17 Nos.
9.	Hammer Masons (club)	1 kg	17 Nos.
10.	Hammer brick mason	(600-800gm)	17 Nos.
11.	Helmets		17 Nos.
12.	Leather gloves		17 Nos.
13.	Goggles		17 Nos.
14.	Level masons 1 mt (plumb level)		17 Nos.
15.	Pins (line)		17 Nos.
16.	Plumb bob		17 Nos.
17.	Square (steel) 0.75m x .5m		17 Nos.
18.	Trowel Plastering double		17 Nos.
19.	Wooden floats		17 Nos.
20.	Trowel brick	25cm long	17 Nos.
21.	Trowel pointing	15cm	17 Nos.
22.	Taslas (tin) pans		17 Nos.
23.	Bucket		17 Nos.
24.	Spirit level-	15 cm	17 Nos.
25.	Pocket steel tape	(2mts.)	17 Nos.
26.	Four fold foot rule -	30 cm	17 Nos.
27.	Scrapers		17 Nos.

B : INSTRUMENTS & GENERAL SHOP OUTFIT			
28.	Spade		8nos.
29.	Shovel		10 nos.
30.	Measuring tape steel 5 and 15 mt.		4 nos. each.
31.	Wooden straight edges 1.5mt.		1 nos.
32.	Ladders of different sizes -2,3&4mts.		1 no of each size
33.	Sledge hammers 4 kg.		2 nos.
34.	Drums-200lts.		2 nos.
35.	Rubber hose pipe 25 mm superior		200 mts.
36.	Bar Bending tool and cutting tool		1 set
37.	Screw Driver (assorted)		4 nos. each.
38.	Sprit level 30 cms		4 nos.
39.	Pick axes		4nos.
40.	Crow bars- 5 mt. Long		8nos.
41.	BUILDING MAINTENANCE tool kit consisting of	a) Hand saw - 1 b) Mortise chisel - 1 c) Tennon saw - 1 d) Firmer chisel - 1 e) Mallet - 1 f) Claw hammer - 1 g) Hand brace with bits - 1 h) Plane - 1	
42.	Wheel barrow		3 nos.
43.	Tubular scaffolding 25mm dia. With coupling and fitting complete		As required
44.	Steel measuring boxes - .(.06cft- 3nos.&12cft- 3nos.)		6 nos.
45.	Adjustable props. Steel		24nos.
46.	Flat form - 1.5mx 1.5mx2mt.		2nos.
47.	Bending rods		2 nos.
48.	Steel shuttering- 200sq.mts.		1 no.
49.	Water pipe level 10 mts.		4 nos.
C : GENERAL MACHINERY INSTALLATIONS			
50.	Bench grinder		1 no.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: BUILDING MAINTENANCE TECHNICIAN

LIST OF TOOLS& EQUIPMENTS FOR -16APPRENTICES

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

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box	As per standard	16+1 set
2.	Set square celluloid 45^o	(250 X 1.5 mm)	16+1 set
3.	Set square celluloid 30^o-60^o	(250 X 1.5 mm)	16+1 set
4.	Mini drafter	As per standard	16+1 set
5.	Drawing board IS: 1444	(700mm x500 mm)	16+1 set
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board	As per standard	16
2	Models : Solid & cut section	As per standard	as required
3	Drawing Table for trainees	As per standard	as required
4	Stool for trainees	As per standard	as required
5	Cupboard (big)	As per standard	01
6	White Board	(Size: 8ft. x 4ft.)	01
7	Trainer's Table	As per standard	01
8	Trainer's Chair	As per standard	01

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

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

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

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														