CURRICULUM

Technical School Leaving Certificate

Water Supply and Sanitary Engineering

(18 months program)

Council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur

Developed in 2044

First Revision 2052

Second Revision 2064

Third Revision 2072 (2015)

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Table of Contents

Introduction:

Nepal Government, Ministry of Education implemented the Letter grading system in SLC.The door of TSLC program is open for those who have appeared 10th grade exam and achieved any GPA and any grade in any subject. Focusing on such students the curriculum of TSLC of 29 months and 15 months has been converted into 18 months.

This is the competency based and market oriented curriculum guide for sanitation which is designed to produce competent skillful sanitation workers equipped with knowledge, skills and attitudes. This curriculum focuses on basic sanitation works so as to contribute in the national streamline of the use of sanitation equipment and repair and maintenance of sanitation devices used in the country. It aims at providing ample opportunities for the employment in the related sector, mainly entrepreneurship development of the graduates as well as in national and international employment market.

Title:

The title of the programme is TSLC in Water Supply and Sanitary Engineering

Aim:

The aim of the programme is to produce water supply and sanitation sub-overseer to provide water supply and sanitation services to the people by performing occupation related tasks independently and accurately.

Objectives:

After the completion of the training program the trainees will be able to:

- Explain the meaning of water supply and sanitation
- Install basic electrical components
- Perform basic mechanical functions
- Repair and maintain water pipes
- Repair and maintain of plumbing works
- Interpret water supply and sanitation drawing
- Find faults in plumbing system
- Repair and maintain faults of plumbing system
- Familiarize with electrical, mechanical and electronic components related with water supply and sanitation system
- Familiarize with basic computer and computerized drawing system

Course Description:

This curriculum is designed to implement in the Technical schools under CTEVT to produce basic level water supply and sanitation sub-overseers in the country. These basic water supply and sanitation workforces called water supply and sanitation sub-overseer would be the key persons to provide repair and maintenance service in the plumbing and pipe installation peripheral level. They are absorbed by water supply and sanitation engineering organizations, as water supply and sanitation sub overseers and other NGOs and INGOs for the development of the communities of Nepal emphasizing on the plumbing installation, and repairing and maintaining of drinking water pipes as well as fittings of bathroom and other plumbing and sanitation related places.

Course Duration:

This course will be completed within 18 months (40 hrs/week X 39 weeks a year = 1560 hrs.) class plus 6 months (40 hrs/week X 24 weeks = 960 hrs. on the job training (OJT).

Entry criteria:

Individuals with following criteria will be eligible for this program:

- SLC with any grade and any GPA (Since 2072 SLC).
- SLC appeared (Before 2072 SLC)
- Pass entrance examination administered by CTEVT

Group size:

The group size will be maximum 40 (forty) in a batch.

Medium of Instruction:

The medium of instruction will be in English and/or Nepali language.

Pattern of Attendance:

The students should have minimum 90% attendance in theory classes and practical/performance to be eligible for internal assessments and final examinations.

Instructors' Qualification:

- Instructors should have bachelor degree in Civil Engineering or Diploma in Civil Engineering with minimum 5 years practical based experiences.
- The demonstrator should have Diploma in Civil Engineering with minimum 2 years practical based experiences.
- Good communicative/instructional skills

Teacher and Student Ratio:

- Overall at institutional level: 1:10
- Theory: 1:40
- Practical: 1:10
- Minimum 75% of the teachers must be fulltime

Instructional Media and Materials:

The following instructional media and materials are suggested for the effective instruction, demonstration and practical.

- Printed media materials (assignment sheets, handouts, information sheets, performance check lists, textbooks, newspaper etc.).
- Non-projected media materials (display, photographs, flip chart, poster, writing board etc.).
- Projected media materials (multimedia/overhead transparencies, slides etc.).
- Audio-visual materials (films, videodiscs, videotapes etc.).
- Computer-based instructional materials (computer-based training, interactive video etc.)

Teaching Learning Methodologies:

The methods of teaching for this curricular program will be a combination of several approaches such as;

- Theory: lecture, discussion, assignment, group work, question-answer.
- Practical: demonstration, observation, guided practice and self-practice.

Evaluation Details:

- The distribution of marks for theory and practical tests will be as per the marks given in the course structure of this curriculum for each subject. Ratio of internal and final evaluation is as follows:

S.N.	Particulars	Internal Assessment	Final Exam	Pass %
1.	Theory	50%	50%	40%
2.	Practical	50%	50%	60%

- There will be three internal assessments and one final examination in each subject. Moreover, the mode of assessment and examination includes both theory and practical or as per the nature of instruction as mentioned in the course structure.
- Every student must pass in each internal assessment to appear the final exam.
- Continuous evaluation of the students' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of a subject specified in the curriculum.
- The on-the-job training is evaluated in 500 full marks. The evaluation of the performance of the student is to be carried out by the three agencies; the concerned institute, OJT provider industry/organization and the CTEVT Office of the Controller of Examinations. The student has to score minimum 60% for successful completion of the OJT.

Grading System:

The grading system will be as follows:

Grading	Overall marks
Distinction	80% or above
First division	75% to below 80%
Second division	65% to below 75%
Third division	Pass aggregate to below 65%

Certificate Awarded:

The council for technical education and vocational training will award certificate in **"Technical School Leaving Certificate in Water Supply and Sanitary Engineering"** to those graduates who successfully complete the requirements as prescribed by the curriculum.

Job Opportunity:

The graduate will be eligible for the position equivalent to Non-gazetted 2nd class/level 4 (technical) as prescribed by the Public Service Commission or other relevant organizations.

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Course Structure

S.N	Subject	Nature	Class/ week	Total class hrs/year	Full Marks		
					Theory	Practical	Total
1	Basic Mechanics	P	4	156		100	100
2	Trade Technology	T	3	117	80	0	80
3	Applied Math	T	2	78	50	0	50
4	Engineering Drawing	P	2	78		50	50
5	Water Supply Engineering	T	2	78	50	0	50
6	Supply Pipe Installation	P	8	312		200	200
7	Drain Pipe Installation	P	7	273		170	170
8	Apparatus Installation	P	4	156		100	100
9	Construction Technology	P	2	78		50	50
10.	Computer Application	P	2	78		50	50
11	Gas Welding	P	2	78		50	50
12	Entrepreneurship Development	T+P	2	78	20	30	50
Total			**40**	**1560**	**200**	**800**	**1000**

Subject Title	**Nature of instruction**	**Duration (Hrs)**	**Full marks**
On the job training (OJT)	Practical	960	500
Grand Total (OJT)		**2520**	**1500**

Basic Mechanics

Course Nature: Practical **Class per Week: 4 hrs.**

Full marks: 100 **Total Class: 156 hrs.**

Subject : Basic Mechanics	
Description:	This subject provides skill and knowledge to perform basic mechanical work. Which consists of filling, measuring, marking, sawing, punching, drilling, tapping, cutting, folding, riveting, bending, etc.
Objectives:	At the end of the course the participants will be able to: ▪ Know hazards and observe safety rules. ▪ Identify, use and care of mechanical tools, instrument and machines. ▪ Perform basic operation related to mechanical work, such as: measure, mark, cut. bend,. file, drill, rivet according to the specification . ▪ Perform sheet metal works.

			Time Hours		
S.N.	Task/Skill	Related Technical Knowledge	Th.	Pr.	Total
1.	Perform filling	Filling • Introduction • Types • Tools/materials • Importance & Applications • Process • Safety precautions	4	17	21
2.	Perform measuring and marking	Measuring & marking • Introduction • Types • Tools/materials • Importance & Applications • Process • Safety precautions	1	6	7
3.	Perform the punching	Letter/number/centre punch • Introduction • Types & size • Tools/materials • Importance & Applications • Process • Safety precautions	2	12	14
4.	Perform the sawing	Sawing • Introduction • Types • Tools/materials • Importance & Applications • Process • Safety precautions	1.5	5.5	7

5.	Perform the drilling	Drilling • Introduction • Types & Parts • Tools/materials • Importance & Applications • Process • Method of selection RPM and drill bit size • Safety precautions	2	43	45
6.	Perform Tapping/die.	Thread cutting (Tapping/Die) • Introduction • Types • Importance and uses • Procedure of tapping and die • Applications • Safety precautions	1.5	5.5	7
7.	Perform Sheet metal work (figure cutting)	Sheet metal • Introduction • Tools and materials • Application • Safety precautions	2	5	7
		Folding • Introduction • Types • Importance and uses • Methods • Safety precautions	3	21	24
		Riveting • Introduction • Importance and application • Types • Uses • Methods	2	22	24
		Total	19	137	156

Reference Book:

- Work Shop Technology (Volume I & II) – Hajra & Chaudhary
- Sheet Metal Workers Handy Book

  By Edwin P. Anderson.

Trade Technology

Course Nature : Theory **Class Per week : 3 hrs**
Full Marks : 50 **Total Class : 117 hrs**

Subject : Trade Technology	
Description	This subject provides knowledge in Safety precaution, Metallic Metal, Non Metallic Metal, Plumbing tools and equipments, Plumbing machines, Plumbing materials, Pipes, Pipe joints, valves and taps, Water Supply systems, Define Lay Out System, apparatus and water heaters, Water Siphon / Trap, Hot Water System, Water pumps, plumbing tools, materials and equipments, etc.
Objectives	At the end of the course participants will be able to: • Know about Safety precaution • Metallic Metal • Non Metallic Metal • Plumbing tools and equipments • Plumbing machines • Plumbing materials • Pipes • Pipe joints • valves and taps • Water Supply systems • Define Lay Out System • apparatus and water heaters • Water Siphon / Trap • Hot Water System • Water pumps • plumbing tools, materials and equipments

1. Safety precaution. 4

1.1 Define Safety rules.
1.2 Causes of accident.
1.3 Types of Safety.
1.3.1 Personal safety.
1.3.2 Workshop Safety
1.3.3 Tools and Equipments Safety.

2. Metallic Metal 10

2.1 Iron ore
2.2 Cast Iron
2.3 Mild Steel
2.4 Stainless Steel

3. Non Metallic Metal 15

3.1 Copper
3.2 Zinc
3.3 Tin
3.4 Nickel
3.5 Chrome

4. Plumbing tools and equipments. 10

4.1 Introduction, Types and Uses of:
4.1.1 Measuring tools.
4.1.2 Marking tools.
4.1.3 Cutting tools.
4.1.4 Clamping tools.
4.1.5 Safety tools.
4.1.6 Masonry tools.
4.1.7 Counter Sink and Reamer Tools
4.1.8 Miter Saw

5. Plumbing machines. 6

5.1 Introduction, Types and Uses of:
5.1.1 Thread cutting machines.
5.1.2 Drilling machine.
5.1.3 Grinder machine.
5.1.5 Sheet metal folding, rolling and beading machines.
5.1.6 Sheet metal shearing machine.
5.1.7 Punching machine.
5.1.8 Pressure testing Machine.

6. Plumbing materials. 8

6.1 Manufacturing of pipe and materials.
6.2 Introduction, Types and Uses of:
6.2.1 Sealing materials.
6.2.2 Finishing materials
6.2.3 Fastening Materials
6.2.4 Cooling materials.
6.2.5 Fuels.

7. Pipes. 10

Introduction, types and uses of:
7.1 G.I. Pipe.
7.2 uPVC Pipe.
7.3 CPVC Pipe.
7.4 Pe-Pipe.
7.5Cast Iron Pipe.
7.6 D.I. Pipe.
7.7 Steel Pipe.

7.8 Multi Layer composite tube.
7.9 PPR Pipe.
7.10 Copper pipe.
7.11Wrought iron pipe.

8. Pipe joints (Nature & Process) 8

Introduction types and uses of:

8.1 Thread joint.
8.2 Spigot joint.
8.3 Rubber seal
8.4 Lead
8.5 Cement
8.6 Compression joint.
8.7 Lead joint.
8.8 Solvent joint.
8.9 Flanged joint.
8.10 Welded joint.
8.11 Expansion Joint.

9. Identify / repair and use of different valves and taps. 10

9.1 Gate valve
9.2 Globe valve
9.3 Safety valve
9.4 Float valve
9.5 Diaphragm
9.6 valve
9.7 Needle valve
9.8 Butterfly valve
9.9 Slide valve
9.10 Non return/check valve
9.11 Foot valve
9.12 Air valve
9.13 Mixture valve.

10. Water Supply systems. 6

Introduction, types and uses of:

10.1 Water supply system
10.2 Continuous water supply system
10.3 Intermittent water supply system
10.4 Distribution system.
10.5 Gravity system
10.6 Pumping system
10.7 Dual system
10.8 Unit calculation of different sanitary apparatus.

11. Define Lay Out System. 4

11.1 Branch system (Dead end system).
11.2 Radial system.
11.3 Circular system.
11.4 Ring system.

12. Introduction, uses and repair apparatus and water heaters. 6

12.1 Wash basin.
12.2 Commode.
12.3 Pan.
12.4 Urinals.
12.5 Bidet.
12.6 Cistern.
12.7 Bath tube.
12.8 Kitchen sink.
12.9 Shower trays.
12.10 Electric water heater/Gas Geyser.
12.11 Solar water heater / Flat tank.
12.12 Washing machine.

13. Water Siphon / Trap. 4

Introduction, types and uses of:

13.1 P trap.
13.2 S trap.
13.3 Multi floor trap.
13.4 An inter septic trap.
13.5 Gully trap.

14. Hot Water System. 6

Introduction, types and uses of:

14.1 Solar system.
14.2 Electric system.
14.3 Gases system.
14.4 Fuel system.

15. Water pumps. 6

15.1 Principle of pump
15.2 Types of pump
15.3 Reciprocating pump
15.4 Centrifugal pump
15.5 Submersible pump
15.6 Rotary pump
15.7 Axial flow pump
15.8 Air-lift pump
15.9 Component of pump
15.10 Repair of pump

16. Quality of plumbing tools, materials and equipments. 4

16.1 Concept of quality.
16.2 Standards and values.
16.3 Quality control.
16.4 Quality re-commendation.

Total Hours **117**

Reference Book:

- Water supply and Sanitary Engineering,

  S.K. Husain.

- Water supply and Sanitary Engineering,GS Birdie,JS Birdie, Ninth Edition 2012

Applied Math

Course Nature: Theory **Class Per week : 2 hrs**
Full Marks : 50 **Total Class : 78 hrs**

Subject 2: Applied Math	
Description	This subject provides knowledge in basically calculation on measurement, area, mass, volume, pressure, energy, power, head loss, estimate and analysis of rate etc.
Objectives	At the end of the course participants will be able to: • Calculate measurement in different unit • Calculate length, Area and volume • Calculate mass, volume and density of different materials. • Calculate gas, solid and fluid pressure. • Calculate work, power and energy (pumping and water force) • Calculate head loss.(hydraulic grade line, pressure head and pipe size calculation • Estimate (calculate materials, labor charges of sanitary and water supply works). • Analysis the rates.

1. Unit. (Conversion) 10

2.1 Conversion factor in length.
2.2 Conversion factor in weight.

2. Menstruation 20

2.1 Area calculation of rectangles, Squares, Triangular, Circular & Ellipse.
2.2 Volume & Weight of simple bodies, Pythagoras theorem..

3. Calculate mass, volume and density. 10

3.1 Reservoir tank design and calculations.
3.2 Density and different in weights.
3.3 Different materials and density.

4. Calculate pressure. 10

4.1 Definitions.
4.2 Solid pressure.
4.3 Fluid pressure.
4.4 Archimedes principle.
4.5 Gas pressure.

5. Calculate work, power and energy. **8**

5.1 Definitions.
5.2 Pumping power calculation.
5.3 Water force calculation.
5.4 Mixing temperature.

6. Calculate head loss. **8**

6.1 Head loss.
6.2 Hydraulic grade line.
6.3 Pressure head calculation.
6.4 Pipe length and size calculation.

7. Estimate **10**

7.1Definition of estimate.
7.2 Method of estimate.
7.3 Estimate of an object.
7.4 Complete estimate of a project with examples

8. Analysis the rates. **2**

8.1 Estimate quantities of materials.
8.2 Analysis of rates of material and labour for sanitary and water supply works.

Total Hours **78**

Engineering Drawing

Course Nature: **Practical** **Class per Week: 2 hrs**

Full marks: 50 **Total Class: 78**

Subject: Engineering Drawing	
Description:	This subject provides skill and knowledge to perform engineering drawing. Which consists of lettering and numbering, sketch different lines, draw isometric, orthographic, plumbing symbols, utilization area, draw simple building plan and bathroom design etc.
Objectives:	At the end of the course the participants will be able to: • Draw lines. • Write lettering and numbering • Draw isometric • Draw orthographic • Draw plumbing symbols • Draw utilization area of bathroom. • Draw simple building plan • Draw bathroom design with water supply and drain system.

S.N.	Task/Skill	Related Technical Knowledge	Time Hours		
			Th.	Pr.	Total
1.	Handle drawing instrument.	Drawing instrument. • Introduction • Use of different drawing instrument. • Types • Uses • Handling methods • Importance	**0.5**	**1.5**	**2.0**
2.	Practice lettering and numbering.	Lettering and numbering. • Introduction • Types • Uses • Importance	**0.5**	**1.5**	**2.0**
3.	Identify and Practice of lines.	Lines. • Introduction • Types • Thickness of lines • Uses • Advantages • Importance	**0.5**	**5.5**	**6.0**

4.	Draw Isometric Projection.	Isometric Projection. • Introduction • Types • Importance • View • Scale • Dimension	**1.0**	**7.0**	**8.0**
5.	Draw Orthographic projection	Orthographic projection • Introduction • Types • Importance • Application	**1.0**	**9.0**	**10.0**
6.	Draw symbols use in plumbing	Plumbing symbols • Introduction • Types • Importance • Application	**0.5**	**3.5**	**4.0**
7.	Draw Orthographic Projection of Washbasin	Orthographic Projection of Washbasin • Introduction • Types • Dimensioning method • Distance of water source • Scale	**0.5**	**1.5**	**2.0**
8.	Draw Orthographic Projection of Water closet	Orthographic Projection of Water closet • Introduction • Types • Dimensioning method • Distance of water source • Scale	**0.5**	**1.5**	**2.0**
9.	Draw Orthographic Projection of Pan	Orthographic Projection of Pan • Introduction • Types • Dimensioning method • Distance of water source • Scale	**0.5**	**1.5**	**2.0**
10.	Draw Orthographic Projection of Bathtub	Orthographic Projection of Bathtub • Introduction • Types • Dimensioning method • Distance of water source • Scale	**0.5**	**1.5**	**2.0**

11.	Draw Orthographic Projection of Shower	Orthographic Projection of Shower • Introduction • Types • Dimensioning method • Distance of water source • Scale	**0.5**	**1.5**	**2.0**
12.	Draw Utilization area of apparatus.	Utilization area of apparatus • Introduction • Types • Dimensioning method • Scale	**0.5**	**3.5**	**4.0**
13.	Design Bathroom with different apparatus.	Bathroom with different apparatus. • Introduction • Types of apparatus • Distance of water source • Importance	**1.0**	**7.0**	**8.0**
14.	Draw Cold and Hot water pipeline.	Cold and Hot water pipeline. • Introduction • Uses • Unit calculation • Types • Pipe size	**1.0**	**7.0**	**8.0**
15.	Draw Isometric of pipeline.	Isometric of pipeline. • Introduction • Pipe calculation • Importance • Advantages • Pipe size • Pipe height • Pose number	**1.0**	**5.0**	**6.0**
16.	Draw waste and Soil water pipeline.	waste and Soil water pipeline • Introduction • Types • Uses • Importance • Advantages	**1.0**	**5.0**	**6.0**

17.	Draw Schematic drawings.	Schematic drawings. • Introduction • Uses • Importance • Advantages	**0.5**	**3.5**	**4.0**
		Total	**11.5**	**66.5**	**78.0**

Reference Book:

1. Drinking Water Installation and Drainage Requirement in Nepal- Andreas Bachmann & Heinz Waldvogel, Fourth Edition 1988 Revised and expanded, co-published by MTC and SKAT

Water Supply Engineering.

Course Nature: Theory | Class Per week: 2 hrs
Full Marks : 50 | Total Class : 78 hrs

Subject : Water Supply Engineering	
Description	This subject provides knowledge in Water quality and treatments, Source of water, Rain water harvesting, Water filtration, Water Transmission, Septic tank and soak pit, Drainage Systems etc.
Objectives	At the end of the course participants will be able to: • Understand Water quality and treatments • Classify Source of water • Understand Rain water harvesting • Understand about Water filtration • Type of Water Transmission • Important of Septic tank and soak pit • Identify different type of Drainage Systems etc.

1. Water quality and treatments. 16

1.1 Qualities of surface and ground water.
1.2 Basic requirement of drinking water.
1.3 Water treatment and disinfections.

2. Source of water. 20

- **Introduction, types and uses of:**

2.1 Under Ground Water

2.1.1 Springs water.
- Gravity depression spring
- Gravity overflow spring
- Artesian depression spring
- Artesian fissure spring
- Artesian overflow spring

2.1.2 Well
- Dug wells
- tube wells

2.1.3 Tunnels and ditches.

2.2 Ground Water

2..2.1 Surface water.
- Lake water.
- River water.
- Ponds.
- Sea.
- Ocean.

3. Rain water harvesting. **6**

Introduction, types and uses of:

3.1 Rain water.
3.2 Roof.
3.3 Area Calculation

4. Water filtration. **6**

Introduction, types and uses of:

4.1 Filtration.
4.2 Method of filtration.

5. Water Transmission. **8**

5.1 Introduction.
5.2 Type of water conduits.
5.3 Design pressure.

6. Septic tank and soak pit. **8**

6.1 Introduction.
6.2 Mains features of septic tank.
6.3 Septic tank function.
6.4 Soak pit functions.

7. Drainage Systems. **14**

7.1 Waste water system.
- 7.1.1 Domestic Waste
- 7.1.2 Domestic Soil

7.2 Stack System
- 7.2.1 Single stack system
- 7.2.2 Divided stack system
- 7.2.3 Two pipe system

7.3 Sewerage value of different sanitary apparatus.

Total Hours **78**

Reference Book:

1. Drinking Water Installation and Drainage Requirement in Nepal- Andreas Bachmann & Heinz Waldvogel, Fourth Edition 1988 Revised and expanded, co-published by MTC and SKAT

Supply Pipe Installation

Course Nature: Practical **Class per Week : 8**
Full marks : 200 **Total Class hours: 312**

Subject: Trade technology	
Description:	This subject provides skill and knowledge to Cut G.I. Pipe , Cut Thread , Cut long thread , Install G. I. Fittings, Install Hot and Cold water supply, Install Roof Tank , Install Multilayer Composite Pipe Line, Install PPR composite pipe line, Install CPVC Pipe line.etc.
Objectives:	At the end of the course the participants will be able to: • Cut G.I. Pipe. • Cut Thread. • Cut long thread. • Install G. I. Fittings. • Install Hot and Cold water supply. • Install Roof Tank. • Install Multilayer Composite Pipe Line. • Install PPR composite pipe line. • Install CPVC Pipe line.etc.

			Time Hours		
S.N.	**Task/Skill**	**Related Technical Knowledge**	**Th.**	**Pr.**	**Total**
1	Cut G.I. Pipe.	**G.I. Pipe Cutting** • Introduction • Types • Uses • Clamping method. • Importance • Advantages	**3**	**12**	15
2	Cut Thread.	**Thread Cutting** • Introduction • Types • Uses • Clamping method • Threading Process • Thread Pitch • Testing Thread • Importance • Advantages	**3**	**13**	16

3	Cut long thread.	**Cutting Long Thread** • Introduction • Types • Uses • Clamping method • Threading Process • Testing Thread • Importance • Advantages	**2**	**12**	14
4	Install G. I. Pipeline	**Install G. I. Pipeline** • Introduction • Types / size • Uses • Clamping method • Application • Z – dimension calculation • Assembling process • Importance • Advantages	**12**	**84**	**96**
5	Install Hot and Cold water supply line	Install Hot and Cold water supply line. • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**12**	**84**	**96**
6	Install Roof Tank.	Install Roof Tank. • Introduction • Types • Uses • Sizes • Base adjustment • Installation procedure • Calculation pipes • Pipe connection • Ventilation in pipe • Application • Importance • Advantages	**2**	**4**	**6**

7	Install Multilayer Composite Pipe Line.	Install Multilayer Composite Pipe Line. • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages **Multilayer fittings** • Introduction • Types • Uses • Sizes • Importance • Advantages	**2**	**4**	**6**
8	Install PPR composite pipe line.	Install PPR composite pipe line. • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages **PPR fittings** • Introduction • Types • Uses • Sizes • Importance • Advantages	**3**	**36**	**39**
9	Install CPVC Pipe line.	Install CPVC Pipe line. • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**4**	**20**	**24**

		CPVC fittings • Introduction • Types • Uses • Sizes • Importance • Advantages			
		Total	43	269	312

Reference Book:

1. Drinking Water Installation and Drainage Requirement in Nepal- Andreas Bachmann & Heinz Waldvogel, Fourth Edition 1988 Revised and expanded, co-published by MTC and SKAT

Drain Pipe Installation

Course Nature: Practical **Class per Week : 7**
Full marks : 170 **Total Class hours : 273**

Subject:	
Description:	This subject provides skill and knowledge to perform Butt-welding joint of pe-pipe, Bend 90°, Bend 45°, Branch 90° (Tee), Branch 45°, Install HDPE (Pe) waste pipe line with single, double & Three apparatus, Install uPVC-Waste pipe & Fittings, etc.
Objectives:	At the end of the course the participants will be able to: • Perform Butt-welding joint of pe-pipe. • Fabricate Bend 90°. • Fabricate reducer socket ϕ110/50, 110/63, 63/50 • Fabricate Bend 45°. • Fabricate Branch 90° (Tee). • Fabricate Branch 45°. • Install HDPE (Pe) waste pipe line with single, double & Three apparatus. • Install uPVC-Waste pipe & Fittings etc.

			Time Hours		
S.N.	**Task/Skill**	**Related Technical Knowledge**	**Th.**	**Pr.**	**Total**
1	Perform Butt-welding joint of pe-pipe	**Perform Butt-welding joint of pe-pipe** • Introduction • Types • Uses • Importance • Advantages • Butt Welding • Introduction • Types • Clamping method • Cleaning process • Joining method and Procedures • Advantages • Melting process	**4**	**18**	**22**

2	**Fabricate 90°Pe Bend**	**Bend 90°.** • Introduction • Process of fabrication (**ϕ 50, 63, 110)** • Cutting tools • Advantages • Safety	**4**	**18**	**22**
3	**Fabricate reducer socket ϕ110/50, 110/63, 63/50**	**Reducer socket ϕ110/50, 110/63, 63/50** • Introduction • Process of fabrication • Cutting tools • Advantages • Safety	**4**	**18**	**22**
4	**Fabricate 45°Pe Bend**	**Bend 45°** • Introduction • Types • Uses • Process of fabrication (**ϕ 50, 63, 110)** • Importance • Advantages	**4**	**18**	**22**
5	**Fabricate 90° Tee Branch**	**Tee Branch 90°** • Introduction • Process of Fabrication (**ϕ 50, 63, 110)** • Cutting tools • Importance • Uses • Advantages	**4**	**18**	**22**
6	**Fabricate 45° Branch.**	**Branch 45°** • Introduction • Process of Fabrication (**ϕ 50, 63, 110)** • Cutting tools • Importance • Uses • Advantages	**4**	**18**	**22**

7	Install HDPE (Pe) waste pipe line with single, double & Three apparatus.	**HDPE pipe waste line** • Introduction • Type • Joining method • Uses • Advantages	**6**	**66**	**72**
8	**Install uPVC-Waste pipe & Fittings**	**Install uPVC-Waste pipe & Fittings** • Introduction • Type • Measuring and marking procedures • uPVC Joining method • Uses • Advantages	**9**	**60**	**69**
		Total	39	234	**273**

Reference Book:

1. Drinking Water Installation and Drainage Requirement in Nepal- Andreas Bachmann & Heinz Waldvogel, Fourth Edition 1988 Revised and expanded, co-published by MTC and SKAT

Apparatus Installation

Course Nature: Practical **Class per Week: 4**
Full marks : 100 **Total Class : 156**

Subject:	
Description:	This subject provides skill and knowledge to perform Install Sanitary Apparatus (Washbasin, Commode / Cistern, Bathtub, Kitchen sink, Urinal, Indian Pan, Bidet and Water closet or One piece commode). etc.
Objectives:	At the end of the course the participants will be able to: • Install Sanitary Apparatus Washbasin. • Install Commode / Cistern. • Install Bathtub. • Install Kitchen sink. • Install Urinal. • Install Indian Pan. • Install Bidet. • Install Water closet or one piece commode.

			Time Hours		
S.N.	Task/Skill	Related Technical Knowledge	Th.	Pr.	Total
1	Install Sanitary Apparatus Washbasin.	Wash basin • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**4**	**12**	16
2	Install Commode / Cistern.	**Install Commode / Cistern.** • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**2**	**18**	20

3	Install Bathtub.	**Install Bathtub.** • Introduction • Types • Uses • Sizes • Trap connection • Mixture valve • Installation procedure • Application • Importance • Advantages	**2**	**18**	20
4	Install Kitchen sink.	**Install Kitchen sink.** • Introduction • Types • Uses • Sizes • Trap connection • Sink Mixture valve • Installation procedure • Application • Importance • Advantages	**2**	**6**	8
5	Install Urinal.	**Install Urinal.** • Introduction • Types • Uses • Sizes • Trap connection • Drainage system • Installation procedure • Application • Importance • Advantages	**2**	**12**	**14**
6	Install Nepali Pan.	**Install Nepali Pan.** • Introduction • Types • Uses • Sizes • Trap connection • Installation procedure • Application • Advantages	**2**	**12**	**14**

7	Install Bidet.	**Install Bidet.** • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**2**	**12**	**14**
8	Install Water closet or One piece commode.	**Install Water closet or One piece commode.** • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**2**	**12**	**14**
9	Install Sanitary Apparatus water pump	**Install Sanitary Apparatus water pump** • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**2**	**14**	**16**
10	Repair/Install Sanitary Apparatus solar water heater and geyser	**Repair/Install Sanitary Apparatus solar water heater and geyser** • Introduction • Types • Uses • Sizes • Installation procedure • Application • Importance • Advantages	**2**	**18**	**20**
		Total	**22**	**134**	**156**

Reference Book:

1. Drinking Water Installation and Drainage Requirement in Nepal- Andreas Bachmann & Heinz Waldvogel, Fourth Edition 1988 Revised and expanded, co-published by MTC and SKAT

Construction Technology

Course Nature: Practical **Class Per week: 2 hrs**
Full Marks : 50 **Total Class : 78 hrs**

Part I: Basic Construction	
Description	This subject provides skill and knowledge to perform Basic construction work in sanitary and water supply work
Objectives	At the end of the course participants will be able to: • Built 1/2 brick thick wall. • Built 1 brick thick Straight wall in English bond. • Built a return wall of 1 brick thick wall in English bond. • Build a straight wall in English garden bond of 1 brick thick. • Build a straight wall of 1 brick thick Flemish bond. • Build a cross wall 1 brick thick either in Flemish or English bond,(leaving one end stopped, the other rocked back, other in tooting & the last as you wish). • Plaster the surface, corner, edges of the masonry work.

		Time Hours		
Task /skill	**Related Technical Knowledge**	**Th**	**Pr**	**Total**
Built 1/2 brick thick wall.	Masonry work • Introduction • Types • Importance Tools & equipment • Introduction • Types • uses • Handling method/Demo Brick • Introduction • Constituents • Types • Manufacturing process • Cutting process (Demo) **Mortar** • Introduction • Types • Uses • Preparation/Method(Demo) **Brick bonds** • Introduction • Types • Uses • Importance	1	4	5

	Terminology • Introduction • Types • Uses **½ Brick thick wall** • Introduction • Types • Application • Advantages • Building technique • Safety rules			
Built 1 brick thick Straight wall in English bond.	**Brick thick wall in English Bond** • Introduction • Types • Application • Advantages • Building technique	1	4	5
Built a return wall of 1 brick thick wall in English bond.	**Return wall/ English bond** • Introduction • Types • Application • Advantages • Disadvantage • Building technique	1	2	3
Build a straight wall in English garden bond of 1 brick thick.	**Straight wall in English garden bond** • Introduction • Types • Application • Advantages • Building technique	1	4	5
Build a straight wall of 1 brick thick Flemish bond.	**Straight wall/ Flemish bond.** • Introduction • Types • Application • Advantages • Building technique	1	4	5
Build a cross wall (1 brick thick either in Flemish or English bond, (leaving one end stopped, the other rocked back, other in tooting & the last as you wish).	**Cross wall/ Flemish or English bond** • Introduction • Types • Application • Advantages • Building technique	1	10	11
Plaster the surface, corner, edges of the masonry work.	**Plaster** • Introduction • Types • Importance • Advantages • Plastering process	1	4	5

	Mortar • Introduction • Types • Elements • Mixing process **PCC works** • Introduction • Elements • Mixing process • Compaction • Curing Works			
Total		**7**	**32**	**39**

Part II: 2 Survey	
Description	This subject provides skill and knowledge to perform basic survey for laying pipe in sanitary and water supply work
Objectives	At the end of the course participants will be able to: • Measure Distance. • Measure Horizontal and Vertical angle. • Establish bench mark. • Conduct level survey by dumpy level. • Plot longitudinal profile. • Conduct abney level survey and plot data. • Conduct prismatic compass survey. • Measure the rate of flow water.

		Time Hours		
Task /skill	**Related Technical Knowledge (RTK)**	**Th**	**Pr**	**Total**
Measure Distance.	**Measuring Distance** • Introduction • Length calculation • Uses **Chain** • Introduction • Parts • Types • Uses • Importance	1	2	3
Measure Horizontal and Vertical angle.	**Angle** • Introduction • Types • Uses	1	4	5

	Compass • Introduction • Function • Parts • Types • Uses • Importance • Dimension calculation			
Establish bench mark.	**Bench mark** • Introduction • Types • Use of equipments • Marking Procedure • Checking records	1	2	3
Conduct level survey by dumpy level.	**Dumpy level** • Introduction • Types • Uses • Leveling Procedure • Keeping field book records • Elimination of method • Dumpy level survey • Calculation of R.L.	1	5	6
Plot longitudinal profile	**Profile** • Introduction • Types • Uses • Calculation methods • Scale reading • Standard of profile • Plotting guide ling	1	4	5
Conduct abney level survey and plot data.	**Abney level** • Introduction • Types • Uses • Reading • Handling • Recording **Plotting** • Introduction • Types • Calculation • Selection scale • Detail work of plotting	1	5	6
Conduct prismatic compass survey.	**Prismatic compass** • Introduction • Types • Uses • Ports • Angle Calculation • Local attraction	1	5	6

Measure the rate of flow water.	**Water quantity** • Introduction • Type of measurement • Uses **V - notch** • Introduction • Types • Uses • Calculation • Stop watch	1	4	5
Total		8	31	39

References:

- Surveying Part I- B.C. Punemiya
- गाह्रे लगाउने प्रविधिः मोहन मान बेञ्जनकार

Computer Application

Course Nature: Practical
Full Marks : 50

Class Per week: 2 hrs
Total Class : 78 hrs

Subject : Basic Computer				
Description	This subject provides skill and knowledge to perform basic computer work which consists of personal computer operating systems, expands the student's skills in word processing using MS Word, students will learn to manage and manipulate numerical data in a spreadsheet using MS Excel, create and modify presentation, use of an internet browser.			
Objectives	At the end of the course the participants will be able to • Know how to operate computer • Identify, use and care of computer device • Create a document in Microsoft Word with formatting • Write functions in Microsoft Excel • Browse Internet, Sent/Receive E-mail • Create PowerPoint Presentation			
Task /Skill	**Related Technical Knowledge (RTK)**	**Time Hours**		
		Th	**Pr**	**Total**
Operate Windows	1. Familiarization with ▪ Task bar ▪ Start button ▪ Recycle bin ▪ My document ▪ My computer 2. Familiar with icons. 3. Different program used in computer. 4. Creating & defining process. ▪ Maximize ▪ Minimize ▪ Close.	0.5	3.5	4
Operate Ms-word	1. MS-Word ▪ What does it do? ▪ Ribbons 2. Clipboard	1.5	6.5	8

	3. Font 4. Paragraph 5. Tables 6. Illustrations 7. Header & Footer 8. Page Setup 9. Asking the office assistant for help.			
Operate Excel	1. Feature of excel. 2. Components of excel worksheet & work book. ▪ Font ▪ Name box ▪ Formula box ▪ Tab scrolling button ▪ Active sheet tab ▪ Inactive sheet tab ▪ Functions	2	8	10
Operate Internet	1. Definition of ▪ e-mail ▪ Internet ▪ Web-page ▪ Web-sites	0.5	1.5	2
Operate PowerPoint	**Concept of power point Presentation** • Manage Presentation • Design • Animation • Slideshow	0.5	1.5	2
Total		6	21	26

Part II: AutoCAD	
Description	This subject provides skill and knowledge to perform basic Drawing using AutoCAD. It also provides Design bathroom skill Using AutoCAD.
Objectives	At the end of the course participants will be able to:

	• Create drawing sheet. • Create Geometric drawing. • Layer and line type. • Write Text on drawing. • Perform Hatching on drawing • Draw Dimension on drawing • Create Block. • Plot the drawing. • Project work.

		Time Hours		
Task /skill	**Related Technical Knowledge (RTK)**	**Th**	**pr**	**Total**
Create drawing sheet.	• Line • Explode • Offset • Trim	0.5	2.5	3
Create Geometric drawing	• Concept of auto CAD. • Concept of line type • Method of Rectangle • Type o f arc • Concept of ellips • Concept of polygon • Concept of move, rotate, marrow, offset, arry, tram, extend, fillet.	1	8	9
Layer and line type.	• Line type • Line weight • Scale factor • Line load • Layer name • colors	0.5	3	3.5
Write Text on drawing.	• Front effect. • Single line text. • Multiple line text. • Character • Properties • Line space • Find replace • Import text	0.5	3	3.5

Perform Hatching on drawing	• Dimension • Line arrow • Extension line • Line or align • Radius, diameter • Base line.	0.5	2.5	3
Draw Dimension on drawing	• Dimension text • Line arrow • Extension line • Liner align • Radius diameter • Base line	0.5	3	3.5
Create Block.	• Block and attributes • Correct layer • Name path • Explode	0.5	2	2.5
Plot the drawing.	• Block and attributes • Correct layer • Name path • Explode	0.5	3	3.5
Project work.(Bathroom design with accessories and apparatus)	• Line type • Circular • Rectangle • Hatch • Text • Dimension • Layers • Block • Trim • Extent • Fillet • Modify • Mirror • Copy	1	19.5	20.5
	Total	**5.5**	**46.5**	**52**

Gas welding

Course Nature: Practical **Class Per week: 2 hrs**
Full Marks : 50 **Total Class : 78 hrs**

Subject : Gas welding	
Description	This subject provides skill and knowledge to perform basic Gas welding and Brazing.
Objectives	At the end of the course participants will be able to: • Generate Acetylene Gas. • Perform Surface welding with filler rod by Gas. • Perform Butt-welding by Gas. • Perform Lap welding by Gas. • Perform Corner welding by Gas. • Perform 'T' Welding by Gas. • Perform Brazing (hard soldering) by Gas.

		Time Hours		
Task /skill	**Related Technical Knowledge**	**Th.**	**Pr.**	**Total**
Generate Acetylene Gas.	**Acetylene gas** • Introduction • Types • Uses • Calcium carbide • Safety precaution • Application • Importance • Advantages **Generate acetylene gas** • Introduction • Types • Generating procedure • Temperature • Safety precaution • Application • Importance • Advantages	1	2	3
Perform Surface welding with filler rod by Gas.	**Surface welding by Gas** • Introduction • Types • Uses	1	7	8

	• Materials • Temperature • Tools and equipments • Safety precaution • Application • Advantages **Filler rod** • Introduction • Types • Uses • Materials • Application • Advantages			
Perform Butt-welding by Gas.	**Butt welding by Gas** • Introduction • Types • Uses • Materials • Temperature • Tools and equipments • Butt welding procedure • Safety precaution • Application • Advantages	1	2	3
Perform Lap welding by Gas.	Lap welding • Introduction • Types • Uses • Materials • Temperature • Tools and equipments • Lap welding procedure • Safety precaution • Application • Advantages	1	6	7
Perform Corner welding by Gas	**Corner welding** • Introduction • Types • Uses • Materials • Temperature • Tools and equipments • Corner welding procedure • Safety precaution	1	3	4

	• Application • Advantages			
Perform 'T' Welding by Gas.	**T - welding** • Introduction • Types • Uses • Materials • Temperature • Tools and equipments • T- welding procedure • Safety precaution • Application • Advantages	1	2	3
Perform Brazing (hard soldering) by Gas	**Hard soldering (Brazing) by Gas** • Introduction • Types • Uses • Materials • Flux • Temperature • Tools and equipments • Brazing procedure • Safety precaution • Application • Advantages	8	42	50
Total		14	64	78

Reference Book:

- Gas Welding Book
  H.A. Nolden.

Entrepreneurship Development

Total: 78 hrs
Class/week: 2

Course description

This course is designed to impart the knowledge and skills on formulating business plan and managing small business in general. This course intends to deal with exploring, acquiring and developing enterprising competencies, identification of suitable business idea and developing of business plan.

Course objectives

After completion of this course students will be able to:

1. Understand the concept of business and entrepreneurship
2. Explore entrepreneurial competencies
3. Analyze business ideas and viability
4. Formulate business plan
5. Learn to manage small business

S.N	Task statements	Related technical knowledge	Time (hrs)		
			T	P	Tot
Unit 1: Introduction to Entrepreneurship			5.75	4.08	9.83
1	Introduce business	**Introduction of business:** • Definition of business/enterprise • Types of business • Classification of business • Overview of MSMEs(Micro, Small and Medium Enterprises) in Nepal	1.5		1.5
2	*Define entrepreneur/entrepreneurship*	**Definition of entrepreneur:** • Definition of entrepreneur • Definition of entrepreneurship • Entrepreneurship development process	0.5	0.5	1.0
3	*Describe entrepreneur's characteristics*	**Entrepreneur's characteristics:** • Characteristics of entrepreneurs • Nature of entrepreneurs	0.67	0.83	1.5
4	*Assess entrepreneur's characteristics*	**Assessment of entrepreneur's characteristics:** • List of human characteristics • Assessment of entrepreneurial characteristics	0.5	1.0	1.5
5	Compare entrepreneur with other occupations	**Entrepreneur and other occupations:** • Comparison of entrepreneur with other occupations • Types and styles of entrepreneurs	1.0		1.0
6	Differentiate between entrepreneur and employee	**Entrepreneur and employee:** • Difference between entrepreneur and employee • Benefit of doing own business	0.5	0.5	1.0
7	Assess "Self"	**"Self" assessment:** • Understanding "self" • Self disclosure and feedback taking	0.6	0.4	1.0
8	Entrepreneurial personality test: • Assess "Self" inclination to business	**Entrepreneurial personality test:** • Concept of entrepreneurial personality test • Assessing self entrepreneurial inclination	0.67	0.83	1.5

S.N	Task statements	Related technical knowledge	Time (hrs)		
			T	P	Tot
Unit 2: Creativity and Assessment			**6.5**	**4.0**	**10.5**
9	Create viable business idea	**Creativity:** • Concept of creativity • Barriers to creative thinking	1.67	0.33	2.0
10	Innovate business idea	**Innovation:** • Concept of innovation • SCAMPER Method of innovation	0.83	0.67	1.5
11	Transfer ideas into action	**Transformation of idea into action:** • Concept of transferring idea into action • Self assessment of creative style	1.0	0.5	1.5
12	Assess personal entrepreneurial competencies	**Personal entrepreneurial competencies:** • Concept of entrepreneurial competencies • Assessing personal entrepreneurial competencies	0.5	1.0	1.5
13	Assess personal risk taking attitude	**Risk taking attitude:** • Concept of risk • Personal risk taking attitude • Do and don't do while taking risk	1.5	1.0	2.5
14	Make decision	**Decision making:** • Concept of decision making • Personal decision making attitude • Do and don't do while making decision	1.0	0.5	1.5
Unit 3:Identification and Selection of Viable Business Ideas			**0.83**	**3.42**	**4.25**
15	Identify/ select potential business idea • Analyze strength, Weakness, Opportunity and Threat (SWOT) of business idea	**Identification and selection of potential business:** • Sources of business ideas • Points to be considered while selecting business idea • Business selection process • Potential business selection among different businesses • Strength, Weakness, Opportunity and Threats (SWOT) analysis of business	0.83	3.42	4.25

S.N	Task statements	Related technical knowledge	Time (hrs)		
			T	P	Tot
		idea • Selection of viable business idea matching to "self"			
Unit 4: Business Plan			**16.67**	**36.58**	**53.25**
16	Assess market and marketing	**Market and marketing:** • Concept of market and marketing • Marketing and selling • Market forces • 4 Ps of marketing • Marketing strategies	1.33	0.75	2.08
17	**Business exercise:** Explore small business management concept	**Business exercise:** • Business exercise rules • Concept of small business management • Elements of business management · Planning · Organizing · Executing · Controlling	1.58	1.67	3.25
18	Prepare market plan	**Business plan/Market plan** • Concept of business plan • Concept of market plan • Steps of market plan	2.0	2.0	4.0
19	Prepare production plan	**Business plan/Production plan:** • Concept of production plan • Steps of production plan	1.25	1.5	2.75
20	Prepare business operation plan	**Business plan/Business operation plan:** • Concept of business operation plan • Steps of business operation plan • Cost price determination	2.5	2.67	5.17
21	Prepare financial plan	**Business plan/Financial plan:** • Concept of financial plan • Steps of financial plan • Working capital estimation • Pricing strategy • Profit/loss calculation • BEP and ROI analysis • Cash flow calculation	4.5	7.5	12.0

S.N	Task statements	Related technical knowledge	Time (hrs)		
			T	P	Tot

22	Collect market information /prepare business plan	**Information collection and preparing business plan:**
		• Introduction
		• Market survey
		  · Precaution to be taken while collecting information
		  · Sample questions for market survey
		  · Questions to be asked to the customers
		  · Questions to be asked to the retailer
		  · Questions to be asked to the stockiest/suppliers
		• Preparing business plan
			2.0	13.0	15.0

23	Appraise business plan	**Business plan appraisal:** • Return on investment • Breakeven analysis • Cash flow • Risk factors	0.5	5.5	6.0
24	Maintain basic book keeping	**Basic book keeping:** • Concept and need of book keeping • Methods and types of book keeping • Keeping and maintaining of day book and sales records	1.0	2.0	3.0
	Total:		**30**	**48**	**78**

Text book:

क) प्रशिक्षकहरुका लागि निर्मित निर्देशिका तथा प्रशिक्षण सामग्री, प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, २०६९

ख) प्रशिक्षार्थीहरुका लागि निर्मित पाठ्यसामग्री तथा कार्यपुस्तिका, प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद् (अप्रकाशित), २०६९

Reference book:

Entrepreneur's Handbook, Technonet Asia, 1981.

On the Job Training (OJT)

Full Marks: **500** **Practical: 24 weeks/960Hrs**

Description:
On the Job Training (OJT) is a 6 months (24 weeks/144 working days) program that aims to provide trainees an opportunity for meaningful career related experiences by working fulltime in real organizational settings where they can practice and expand their classroom based knowledge and skills before graduating. It will also help trainees gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The trainee will be eligible for OJT only after attending the final exam. The institute will make arrangement for OJT. The institute will inform the CTEVT at least one month prior to the OJT placement date along with plan, schedule, the name of the students and their corresponding OJT site.

Objectives:
The overall objective of the On the Job Training (OJT) is to make trainees familiar with firsthand experience of the real work of world as well as to provide them an opportunity to enhance skills.The specific objectives of On the Job Training (OJT)are to;

- Apply knowledge and skills learnt in the classroom to actual work settings or conditions and develop practical experience before graduation
- Familiarize with working environment in which the work is done
- Work effectively with professional colleagues and share experiences of their activities and functions
- Strengthen portfolio or resume with practical experience and projects
- Develop professional/work culture
- Broaden professional contacts and network.
- Develop entrepreneurship skills on related occupation.

Activities:

In this program the trainees will be placed in the real work of world under the direct supervision of related organization's supervisors. The trainees will perform occupation related daily routine work as per the rules and regulations of the organization as follows;

- Install basic electrical components
- Perform basic mechanical functions
- Repair and maintain water pipes
- Repair and maintain of plumbing works
- Interpret water supply and sanitation drawing
- Find faults in plumbing system
- Repair and maintain faults of plumbing system
- Perform electrical, mechanical and electronic components related with water supply and sanitation system
- Prepare computerized drawing

Potential OJT Placement site:

The nature of work in OJT is practical and potential OJT placement site should be as follows;

- Sanitation workshops
- Water supply and sanitation industries
- Water Supply Corporation
- Pipe producing industries
- Plumbing workshops

Requirements for Successful Completion of On the Job Training:

For the successful completion of the OJT, the trainees should;

- submit daily attendance record approved by the concerned supervisor and minimum 144 working days attendance is required
- maintain daily diary with detail activities performed in OJT and submit it with supervisor's signature
- prepare and submit comprehensive final OJT completion report with attendance record and diary
- secured minimum 60% marks in each evaluation

Complete OJT Plan:

SN	Activities	Duration	Remarks
1	Orientation	2 days	Before OJT placement
2	Communicate to the OJT site	1 day	Before OJT placement
3	Actual work at the OJT site	24 weeks/144 days	During OJT period
4	First-term evaluation	one week (for all sites)	After 6 to 7 weeks of OJT start date
5	Mid-term evaluation	one week (for all sites)	After 15 to 16 weeks of OJT start date
6	Report to the parental organization	1 day	After OJT placement
7	Final report preparation	5 days	After OJT completion

- First and mid-term evaluation should be conducted by the institute.
- After completion of 6 months OJT period, trainees will be provided with one week period to review all the works and prepare a comprehensive final report.
- Evaluation will be made according to the marks at the following evaluation scheme but first and mid-term evaluation record will also be considered.

Evaluation Scheme:

Evaluation and marks distribution are as follows:

S.N	Activities	Who/Responsibility	Marks
1	OJT Evaluation (should be three evaluation in six months –one evaluation in every two months)	Supervisor of OJT provider	300
2	First and mid- term evaluation	The Training Institute	200
	Total		500

Note:

- Trainees must secure 60 percent marks in each evaluation to pass the course.
- If OJT placement is done in more than one institution, separate evaluation is required from all institutions.

OJT Evaluation Criteria and Marks Distribution:

- OJT implementation guideline will be prepared by the CTEVT. The detail OJT evaluation criteria and marks distribution will be incorporated in the guidelines.
- Representative of CTEVT, Regional offices and CTEVT constituted technical schools will conduct the monitoring & evaluation of OJT at any time during the OJT period.

Basic Requirement for TSLC in Sanitation Engineering

Implementation Requirements

Physical facilities: (rooms and labs)

- Well equipped lab -1
- Class room -1
- Office room -1
- Principle room -1
- Reception room -1

TOOL & EQUIPMENT (FOR A CLASS OF 40 TRAINEES)

Basic Mechanic

ITEMS	SPECIFICATION	QUANTITY
1. Steel Scale	300 mm	40
2. Marking Scriber	150 mm	40
3. Back Square	100 mm	40
4. Bench Brush	4"	40
5. Flat File	300 mm	40
6. Steel Hammer	500 grm.	40
7. Number Punch	Ø 5 mm	4
8. Centre Punch	100 mm	40
9. Hacksaw Frame	12"	40
10 Bench Vice	Jaw size 100 mm	40
11. Tapping Tool Set	M5, M6, M8 & M10	15
12. Drill Bit Set	1mm to 25 mm	10
13. Drill Machine	Table stand	5
14. Oil Can		40
15. Thread Cutting die Set	(Ø1/2", Ø3/4" & 1")	40
16. Anvil		5
17. Chisel	6"	20
18. Safety Goggles		40
19. Drill Vice	100 mm	6
20. Counter Sink	(Ø8x45°&60°,Ø10x45°&60°)	40
21. Snips	Left + Right	40
22. Mallet		20
23. Divider	8"	40
24. Measuring Tape	2 mtr.	40
25. Bending Machine		2
26. Adjustable Wrench	10"	40
27. Wooden Hammer		20
28. Ilen Key Set	2 mm – 12 mm	5
29. Lighter		10
30. Rivet Punch	Ø 3 to Ø 6 mm	10

TOOL & EQUIPMENT (FOR A CLASS OF 40 TRAINEES)
Pipe Installation

ITEMS	SPECIFICATION	QUANTITY
1. Steel Scale	300 mm	40
2. Measuring Tape	2 mtr.	40
3. Marking Scriber	150 mm	40
4. Chain Pipe Vice		40
5. Hacksaw Frame	12"	40
6. Back Square	100 mm	40
7. Cleaning Brush	4"	40
8. Oil Can		40
9. Thread Cutting Die Set	(Ø1/2", Ø3/4" & 1")	40
10. Sprit Level	500 mm	40
11. Spanner Set	6-24 mm	20
12. Hand Drill Machine	Upto Ø12 mm	20
13. Drill Bit Set	1mm to 25 mm	10
14. Pressure Test Pump	5 bar	4
15. Pipe Wrench	14"	80
16. Masson Hammer	1 Kg.	40
17. Chisel (Cold)	4"	40
18. Hand Glove	Pair	40
19. Yarning Tool	6"	10
20. Clacking Tool	6"	10
21. Stove	No.3	4
22. Lead Melting Pot	Upto 5 Kg.	4
23. Dadu	Big size	4
24. Gas Cylinder	14 Kg.	13
25. Wooden Saw	14"	20
26. Pe-Knife	2"	20
27. Pe-File	14"	20
28. Welding Plate	Ø 6"	20
29. Cabal Drum	10mtr, 30mtr.	10
30. Wooden Block	500 x 110 mm	5
31. Blow Lamp		5
32. Heating Tools		5
33. Hole Making Tools		5
34. Plastering Trowel		20
35. Plumbob	150 grm.	20
36. Line and Pins		20
37. Straight Edge		20
38. Mortar Board (G.I.Sheet)	4' x 8'	10
39. Store Rod		20
40. Brick Axe	Normal	20

41. Shovel	Normal	20
42. Trawel		20
43. Iron Pan		20
44. Ratio Container (Mixing Box)	1' x 1'	5
45. Helmet		20
46. Safety Belt		20

TOOL & EQUIPMENT (FOR A CLASS OF 40 TRAINEES)
Plumbing Installation

ITEMS	SPECIFICATION	QUANTITY
1. Sprit Level	500 mm	40
2. Spanner Set	6 - 24	20
3. Pressure Test Pump	5 bar	5
4. Pipe Wrench	14"	80
5. Thread Cutting Die Set	(Ø1/2", Ø3/4" & Ø1")	40
6. Chain Pipe Vice	(Ø1/2", 4")	40
7. Hand Hack Saw	12"	40
8. Oil Can	¼ Pint	40
9. Chisel	6"	40
10. Masson Hammer	1 Kg.	40
11. Measuring Tape	3 mtr.	40
12. Adjustable Wrench	12"	40
13. Screw driver	(No. 3 / 4 / 5)	40
14. Hand Drill Machine		20
15. Iron drill Bit Set	Ø 1mm to 25 mm	20
16. Concrete drill Bit Set	Ø 5mm to 12 mm	20
17. Center Punch	100 mm	40
18. Yarning Tool	6"	10
19. Calcking Tool	6"	10
20. Stove	No.3	5
21. Lead Melting Pot	Upto 5 Kg.	5
22. Dadu	Big size	5
23. Gas Cylinder	14 Kg.	5
24. Cabal Drum	10mtr, 30mtr.	10

TOOL & EQUIPMENT (FOR A CLASS OF 40 TRAINEES)
Waste Pipe Installation

ITEMS	SPECIFICATION	QUANTITY
1. Measuring Tape	3 mtr.	40
2. Sprit Level	500 mm	40
3. Back Square	100 mm	20
4. Welding Plate	2"	20
5. Pe-Knife	3"	20
6. Drill Machine (Portable)	Ø 12	5
7. Concrete drill Bit Set	Ø 5mm to 12 mm	5
8. Set Square	12"	10
9. Pe-File	14"	20
10. Spanner Set	6 – 24	20
11. Masson Hammer	1 Kg.	20
12. Chisel (Cold)	4"	20
13. Hand Glove	Pair	40
14. Cabal Drum	10mtr, 30mtr.	10
15. Yarning Tool	6"	10
16. Clacking Tool	6"	10
17. Stove	No. 3	5
18. Lead Melting Pot	Upto 5 Kg.	5
19. Dadu	Big size	5
20. Gas Cylinder	14 Kg.	5

TOOL & EQUIPMENT (FOR A CLASS OF 10 TRAINEES)
Welding Arc / Gas

ITEMS	SPECIFICATION	QUANTITY
1. Measuring Tape	2 mtr.	10
2. Steel Scale	300 mm	10
3. Marking Scriber	150 mm	10
4. Goggle		10
5. Welding seal		10
6. Lather Apron		10
7. Lather Glove	Pair	10
8. Welding Tong		10
9. Cheeping Hammer		10
10. Number Punch	Ø 5 mm	5
11. Steel Hammer	500 grm.	10
12. Wire Brush	4"	10
13. Adjustable Wrench	10"	10
14. Water Pump Pliers	10"	10
15. Screw Driver	No. 4	10
16. Square Key for Oxygen Cylinder	8 mm square	3
17. Snips (Pair)	Right + Left	10
18. Divider	8"	10
19. File	300 mm	10
20. Centre Punch	100 mm	10
21. Mallet		10
22. Welding Torch	300 grm.	10
23. Lighter		10
24. Masson Hammer	1 Kg.	10
25. Shearing Machine		3
26. Welding Nozzle		10
27. Marker		10
28. Vice (Bench)		10
29. Anvil (Black Smith)		4
30. Back Square	100 mm	10
31. Hand Grip Pliers		10
32. Welding Goggle		10
33. Chain Vice	2" – 4"	10
34. Hand Hacksaw	12"	10

TOOL & EQUIPMENT (FOR A CLASS OF 40 TRAINEES)
Apparatus Installation

ITEMS	SPECIFICATION	QUANTITY
1. Measuring Tape	3 mtr.	40
2. Adjustable Wrench	12"	40
3. Pipe Wrench	14"	80
4. Hand Hacksaw	12"	40
5. Spanner Set	6 – 24	40
6. Screw Driver	(No. 3 / 4 / 5)	40
7. Hand Drill Machine	Up to 12 mm	5
8. Concrete drill Bit Set	Ø 5mm to 12 mm	20
9. Masson Hammer	1 Kg.	40
10. Centre Punch	100 mm	40
11. Chassis Punch	Ø20mm, Ø30mm	5
12. Marker		40
13. Water Pump Pliers	12"	40
14. Thread Cutting Die Set	(Ø1/2", Ø3/4" & Ø1")	40
15. Oil Can		40
16. File	300 mm	40
17. Chain Pipe Vice	Ø 1/2" – 4"	40
18. Cabal Drum	10mtr, 30mtr.	10
19. Sprit Level	500 mm	40
20. Sprit level	1000 mm	5

TOOL & EQUIPMENT (FOR A CLASS OF 40 TRAINEES)

Survey

ITEMS	SPECIFICATION	QUANTITY
1. Chain / Tape		40
2. Masson Hammer	1 Kg.	40
3. Peg	Wooden Handel	40
4. Compass	Surveyor	40
5. Clinometer		20
6. Plumbob Thread		40
7. Optical Square		40
8. Ringing Rod	2 mtr. Folded	40
9. Peg Nail		40
10. Barometer or Altimeter Staff		20
11. Dumpy Level		20
12. Tripod rubber		20
13. Prismatic Compass		20
14. Tripod Stand		20
15. Scale Difference Size	1:500 / 1: 2500 / 1":100 Ft	40
16. Abney Level		20
17. Staff (Folded / Aluminum)	Standard Size	10
18. Theodolite Set		3
1. Total Station Set		2 pcs
2. Prism	Standard Size	6 pcs
3. Water Flow Meter (Gauge) for Small Water Supply Work		2 set