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DEUTSCHE ZUSAMMENARBEIT

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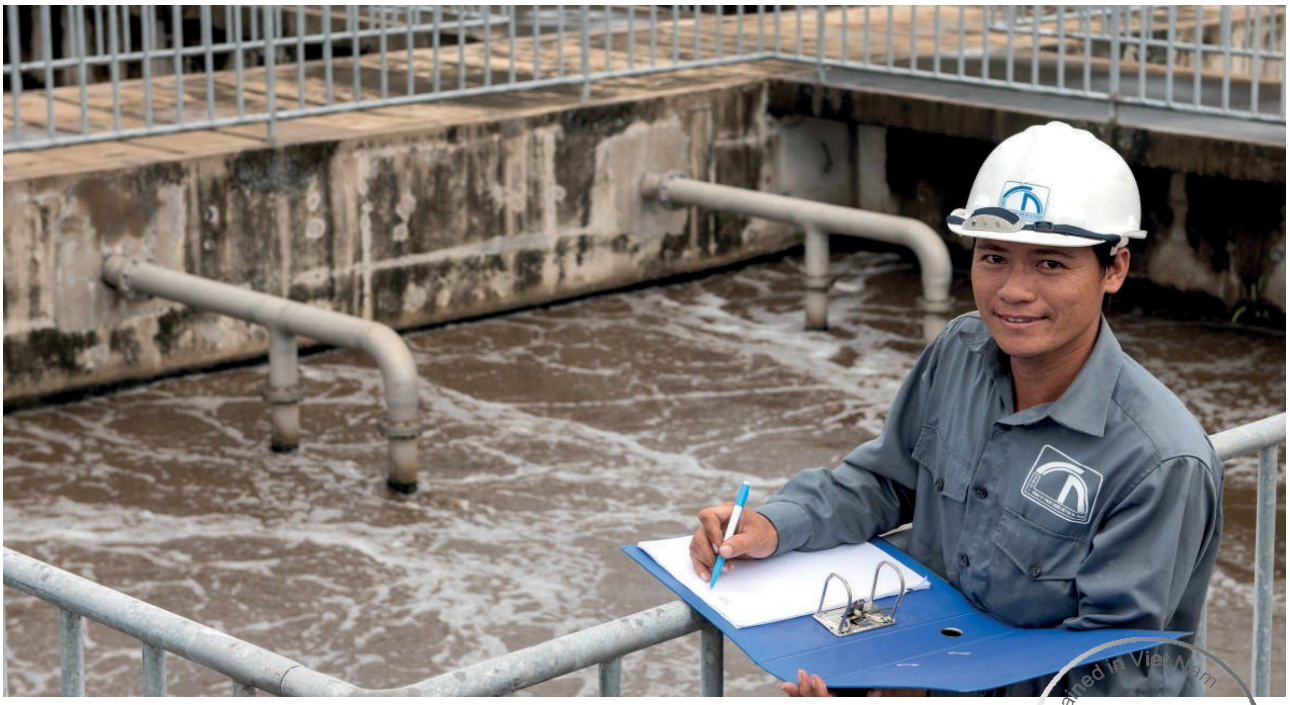
DVET

GOPA WORLDWIDE CONSULTANTS

Stadtentwässerung Dresden WIR KLÄREN DAS FÜR SIE

Cooperative Training Program
SEWAGE ENGINEERING TECHNICIAN



trained in Việt Nam
Việt Nam
Được Đào Tạo Tại Việt Nam

Level: TRANSITION FROM VIETNAMESE COLLEGE TO GERMAN-STANDARD COLLEGE

Pilot location:

CAO ĐẲNG CÔNG NGHIỆP HUẾ HueIC

CAO ĐẲNG KỸ NGHỆ II - COLLEGE OF TECHNOLOGY HVCT

CĐXD SỐ 1

Vietnam, 2022

INTRODUCTION

Cooperative Training Program, designed in modular form, following international standards

1. Introduction

The Vietnamese – German Cooperation Program “Reform of TVET in Viet Nam” is supporting eleven TVET colleges to become High-Quality TVET Institutes (HQTIs) that provide demand-oriented training. The Program “Reform of TVET in Viet Nam”, is financed by the German Ministry for Economic Cooperation and Development (BMZ) and implemented by Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) together with the Vietnamese Directorate of Vocational Education and Training (DVET).

The TVET Program has supported partner TVET Colleges to develop training Programs for technical occupations that are in line with Vietnamese regulations and requirements and international/German standards. These modular training Programs are flexibly used for the implementation of cooperative training at intermediary and college level TVET institutes and short-term “on the job” training in enterprises.

The pilot training Program of the "Sewage Engineering" profession has been developed and piloted by the " Program Reform of TVET in Vietnam " in the period 2015-2020. On the basis of a first pilot between 2016 and 2020, this training Program has been further revised to integrate a modularization, as well as new content (Greening, Industry 4.0, training for people with disabilities…).

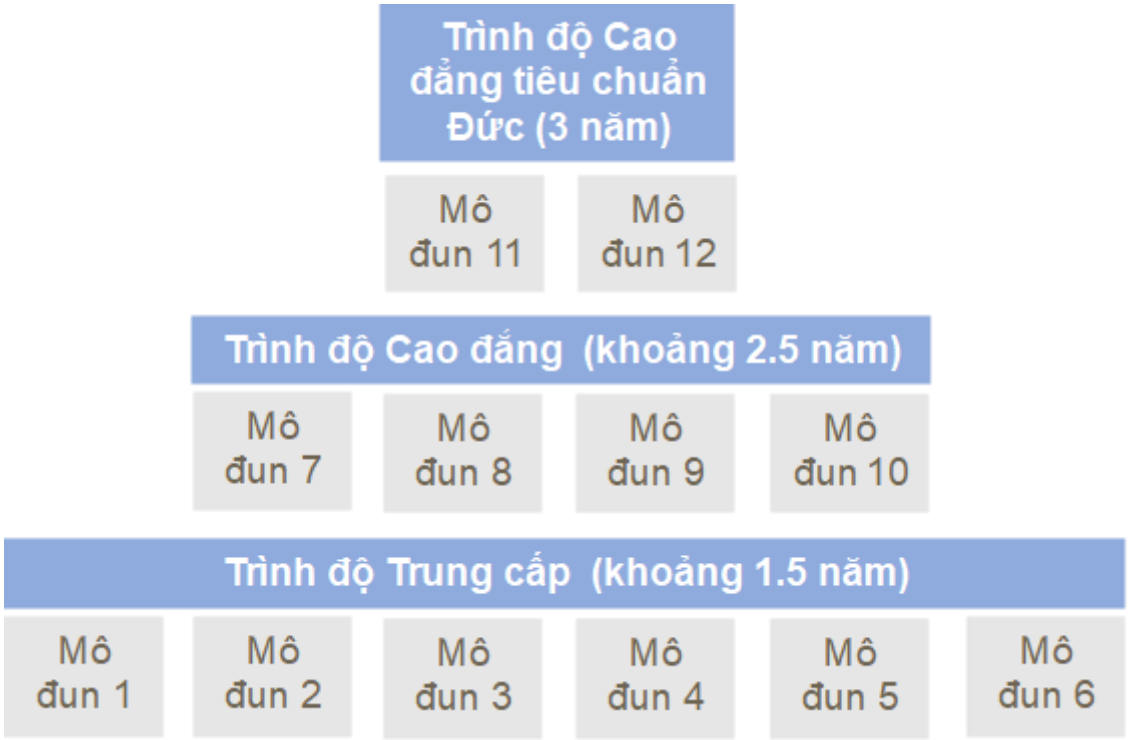
2. Characteristics of the training Program

The training Program is demand oriented and highly permeable between different training levels. It also meets the requirements formulated in Circular No.03/2017/TT-BLDTBXH of the Ministry of Labor, Invalids and Social Affairs (MOLISA) laying out the procedures for the development, appraisal, and issuance of training curricula. The modules are practice-oriented from basic to advanced level with integrated elements of:

- Digitalization and I4.0

- Greening TVET, environmental protection
- Occupational safety and health
- Gender and Inclusion

3. Structure



Training Program is designed in a modular way at different levels as follows:

- Training Program for intermediate level (approx. 1.5 years)

Besides the general compulsory subjects specified by MOLISA, learners need to complete 6 technical modules to obtain competencies, knowledge and skills of the occupation at intermediate level.

- Training Program for college level (approx. 2.5 years)

Besides the general compulsory subjects specified by MOLISA, learners need to complete 10 technical modules to obtain competencies, knowledge and skills of the occupation at intermediate and college levels.

- Training Program for advanced college level (approx. 3 years)

Besides the general compulsory subjects specified by MOLISA, learners need to complete 12 technical modules to obtain competencies, knowledge, and skills of the occupation at intermediate, college and advanced college levels that is equivalent to international/German standards.

To enable pathways and lifelong learning, also separate training Programs for students that graduated from a lower level have been developed:

- ✓ Training Programs for intermediate level transfer to college level. After graduation from intermediate level, learners may transfer to college level and need to complete 4 additional modules (from module 7 to module 10)
- ✓ Training Programs for college level transfer to advanced college level. After graduation from college level, learners may transfer to advanced college level and need to complete 2 additional modules (module 11 and module 12).

With this training Program structure, TVET institutes can flexibly implement cooperative training at different levels at their own institutes and at partner companies according to needs and capabilities. In addition to long-term training at intermediate and college levels, TVET institutes can also apply/ modify training modules to implement short-term or advanced training for workers and job seekers according to specific requirements.

The Minutes of Results for the revised training curriculum were signed in September 2022 by:

• Directorate of Vocational Education and Training

• Vietnam Water Industry Training Center / Water Supply and Drainage Association

• Hue Industrial College

• Ho Chi Minh Vocational College of Technology

• Construction Technical College No. 1

• GOPA Worldwide Consultants (Germany)

• Gesellschaft für Internationale Zusammenarbeit (GIZ)

APPENDIX 01

TRAINING PROGRAM

Occupation name	**:** Sewage Engineering Technician
Occupation code	**:**
Level	**:** German-standard college level
Training form	**:** Vocational training
Eligible enrollment applicants	**:** Graduates of the College Level Training Program of Sewage Engineering Technician
Training duration	**: 0.5 year (**01 semesters)

1. Training objectives

1.1. General objectives

The Training Program for Transition from Vietnamese College Level to German-Standard College Level of Sewage Engineering Technician shall ensure the minimum amount of knowledge and competency requirements that the graduates of the Intermediate-Level Training Program must be supplemented to achieve college level after graduation. The list, duration, and sequence of courses, modules, theoretical studying time, practical studying time, and internship time shall be clearly determined. The evaluation method for studying results shall be particularly regulated to evaluate if the learners fulfill the competency requirements after finishing the courses and modules.

1.2. Specific objectives

1.2.1. Knowledge

- Be able to describe the ecological cycle, the causes and consequences of environmental contamination, and pollution-reduction measures.
- Be able to explain the many types of microorganisms, their structure and living circumstances, as well as their role in wastewater treatment.
- Be able to demonstrate the fundamentals of chemistry and substance composition.
- Be able to demonstrate the chemical analysis methodologies and laboratory safety precautions.
- Be able to demonstrate the preparations for safety measures during operation, repair and maintenance of drainage system and wastewater treatment plant.

- Be able to demonstrate safety measures during operation, repair and maintenance of drainage system and wastewater treatment plant.
- Be able to demonstrate as-built drawings of drainage system, circuit diagrams and other technical documents.
- Be able to demonstrate energy and material conservation measures during operation, repair and maintenance of drainage system and wastewater treatment plant.
- Be able to examine the composition, physical, chemical, and biological aspects of wastewater.
- Be able to demonstrate the structure, characteristics, advantages and disadvantages of different types of drainage systems.
- Be able to describe the properties and applications of pipe and drain materials.
- Be able to demonstrate the functions, tasks and usual malfunctions of the works in the drainage system and in the wastewater treatment plant.
- Be able to present the causes, consequences and remedial measures of frequent damage to the drainage system and the wastewater treatment;
- Be able to describe the disease risks and potential hazards during operation, repair and maintenance of drainage system and wastewater treatment plant.
- Be able to describe the measurement, control, and adjustment procedures, as well as the structure and operation of the respective equipment.
- Be able to demonstrate the method for calculating sewer gradient, and the distance and depth of manholes.
- Be able to present the cleaning, repair and maintenance measures of sewers, manholes, connection points, and pumping stations.
- Be able to present the overview diagram of a wastewater treatment plant, treatment stages in a domestic wastewater treatment plant and a specific industrial wastewater treatment plant.
- Be able to present the decomposition processes of pollutants in each construction work and the methods to remove them.
- Be able to present the structure, function and operating principle of wastewater treatment facilities and equipment using mechanical, chemical, physical and biological methods, sterilization and deodorization structures.
- Be able to present the operation, repair and maintenance procedures for wastewater, sludge, waste and exhaust gas treatment works in a plant.

- Be able to list the sources, properties and impacts of sludge, emissions and waste in the wastewater treatment system.
- Be able to present the fundamental rights and obligations of employees and employers, national technical standards and regulations applicable to wastewater drainage and treatment, environmental protection, safety standards and regulations.
- Be able to present the names, characteristics, operating procedures, conditions of use and storage of laboratory equipment, tools, and chemicals.
- Be able to describe the techniques used to collect, transport, store, and preserve wastewater and sludge samples.
- Be able to present the criteria analysis methods in the field, factory, and laboratory for each parameter to be determined.
- Be able to present the general structure, functions, and duties of environmental protection of enterprises operating in the field of wastewater drainage and treatment.
- Be able to present the causes, techniques for identifying and evaluating the impact level, and solutions for preventing and handling operational errors and incidents.
- Be able to present the working and responding procedures in emergencies.
- Be able to demonstrate the methods for storing results, establishing and maintaining operation log, and preparing reports as per job requirements within the scope of responsibility.
- Be able to present the main contents in the factory operation manual, and the factory operation control procedures to ensure the stability of the treatment process.
- Be able to present the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to present the needs and changes in system procedures.
- Be able to present the measures to enhance quality in the factory.
- Be able to present the fundamental knowledge about politics, culture, society, law, national defense and security, and physical education as prescribed.

1.2.2. Skills

- Be able to use safety measures when working with microorganisms, chemicals, as well as analytical techniques in the laboratory.

- Be able to use safety measures during operation, repair and maintenance of drainage system and wastewater treatment plant.
- Be able to read as-built drawings of drainage system, technical diagrams and documents.
- Be able to cut, join and deform metal and plastic materials used in wastewater drainage and treatment systems.
- Be able to implement the techniques for measuring sludge, as well as the techniques for cleaning and dredging sludge in sewers, manholes, and troughs.
- Be able to perform the processes to inspect and evaluate joint tightness, condition of sewers, manholes, pressure capacity of manhole covers and discharge connection points.
- Be able to use energy and material conservation measures during operation, repair and maintenance of drainage system and wastewater treatment plant.
- Be able to identify and handle potential hazards during operation, repair and maintenance of drainage system and wastewater treatment plant.
- Be able to operate, control and adjust equipment and works on drainage system, at pumping stations and at wastewater treatment plants.
- Be able to evaluate the level of frequent damage, causes and consequences, and propose remedial measures for damage to sewers and works in the drainage system.
- Be able to undertake maintenance procedures for drainage system, pumping stations, and wastewater treatment plants.
- Be able to detect problems at works, equipment in factories and pumping stations, handling problems within the designated scope of duties.
- Be able to operate electrical equipment, automatic electrical systems, and backup generators in wastewater treatment plants.
- Be able to maintain operation log, record work procedures and outcomes, prepare corresponding reports, as well as implement data protection.
- Be able to collect, manage and treat all types of solid waste in accordance with regulations.
- Be able to apply national technical standards and regulations applicable to wastewater drainage and treatment, environmental protection, and safety standards and regulations.

- Be able to evaluate the quality of wastewater and sludge, identify the physical, chemical and microbiological parameters of wastewater and sludge according to technical regulations.
- Be able to select and appropriately use equipment, tools, supplies and chemicals in the field, factory and laboratory.
- Be able to collect, transport, store and preserve wastewater and sludge samples with suitable technique.
- Be able to monitor plant operations and indirect discharge points to ensure compliance with discharge regulations.
- Be able to evaluate the causes, techniques for identifying and evaluating the impact level, and solutions for preventing and handling operational errors and incidents.
- Be able to work and respond in emergencies.
- Be able to store results, establish and maintain operation log, and prepare reports as per job requirements within the scope of responsibility.
- Be able to apply the main contents in the factory operation manual, and the factory operation control procedures to ensure the stability of the treatment process.
- Be able to apply the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to determine the needs and changes in system procedures.
- Be able to apply the measures to enhance quality in the factory.
- Be able to use basic information technology as prescribed; exploit, process and apply information technology in professional roles within the industry and profession.
- Be able to use basic foreign languages, reaching level 2/6 in Foreign Language Proficiency Framework for Vietnam; use foreign languages in professional roles within the industry and profession.

1.2.3. Self-control ability and responsibility

- Maintain autonomy in environmental protection; respect the regulations on environmental protection and building a green and clean working environment; actively seek out relevant information.
- Actively save energy and resources.

- Actively improve and use environmentally friendly methods, tools and techniques.
- Actively comply with occupational safety principles and take appropriate response in case of incident.
- Comply with rules and regulations on occupational safety and health, as well as safety guidelines when working in electrically charged areas.
- Comply with regulations under the guidance of workshop assistants and instructors at the training institution.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.
- Comply with the privacy policies and occupational safety standards at the enterprise.
- Work independently or in a team, solve complicated issues and work in changing working conditions.
- Guide and supervise others to perform defined tasks; accept individual and collective accountability.
- Evaluate the quality of work outcomes and performance results of team members.

1.3. Job positions after graduation

Graduating from the training Program of Sewage Engineering Technician, German-standard college level, the learners may work at the following positions:

- Operation of drainage system.
- Repair and maintenance of drainage system.
- Operation, repair and maintenance of drainage pumping station.
- Operation of wastewater treatment plant.
- Repair and maintenance of wastewater treatment plants.
- Quality supervision of wastewater treatment procedure.
- Establishment and operation of a quality and environmental management system.

2. Knowledge volume and course duration

- Number of subjects, modules: 02 modules (excluding compulsory general subjects).
- Total number of course credits: 22 (credits).

- Duration of Specialized subjects and modules: 600 hours. In which:

+ Theory: 118 hours.

+ Practice, intern, laboratory, home assignment, discussion: 475 hours.

+ Examination: 25 hours.

3. Program's content:

Subject/module code	Subject/module name	Number of course credit	Total	*Total training time (hours)*		
				Theory	Intern/Laboratory/Home Assignment/Discussion	Examination
II.3	**Specialized modules (optional)**	**22**	**600**	**118**	**457**	**25**
MD 11	Automation and Digitization in Wastewater Drainage and Treatment	13	300	90	197	13
MD 12	Quality Supervision in Wastewater Drainage and Treatment	9	300	28	260	12

4. Manual instruction

According to the provisions of Circular No. 04/2022/TT-BLDTBXH dated March 30, 2022 of the Ministry of Labor, War Invalids and Social Affairs on organization of intermediate-level and college-level training by academic year or according to the method of accumulating modules or credits.

5. References

APPENDIX 03

MODULE PROGRAM

Module name: AUTOMATION AND DIGITIZATION IN WASTEWATER DRAINAGE AND TREATMENT

Module code: MD 11

Training duration: 300 hours; (Theory: 90 hours; Practice, laboratory, discussion, assignment: 197 hours; Examination: 13 hours).

I. Position and features:

- Position: "Automation and digitization in drainage and wastewater treatment" module is one of the Optional intensive modules for learners who want to gain knowledge equivalent to German standards in drainage and wastewater treatment. The module is taught along with other Optional intensive modules and after the Specialized modules.
- Features: This module provides learners with knowledge about the status of hydraulic works, and measures to respond to and prevent hazards for workers. Learners can also understand and operate the Supervisory control and data acquisition (SCADA) control system. They will learn about the importance of correct operation to save energy, materials and labor. They will also recognize the difficulties in operating a wastewater treatment plant and how to deal with the daily tasks at the plant. It is important to apply weather prediction instrument in the system for predicting impending hydraulic conditions.
- This module can be divided into chapters with different training durations and objectives as per the regulations on training duration for each module. However, this module must ensure its following main objectives.

II. Objectives

II.1. Knowledge

- Be able to present the basic knowledge of digitization and automation and application levels in real life.
- Be able to present the application principles and purposes of digitization and automation of drainage and wastewater treatment.
- Be able to present the structure, function and installation location of automatic devices, and connection to Internet of Things (IoTs).

- Be able to present the concepts and terms about Industrial Revolution 4.0, the roles and applications in real life.
- Be able to present the fields of application of 4.0 technology in water drainage and wastewater treatment.
- Be able to describe the functions of basic software in digitization and automation.
- Be able to present the basic techniques in using PLC, such as measurement, programming and data acquisition.
- Be able to present the methods for storing and transmitting data in operation and maintenance of wastewater treatment plant.
- Be able to present the parameters measurable by online meters/automatic monitoring stations for control and administration.
- Be able to present frequent issues when using software and equipment in automation and digitization.
- Be able to present how to use basic software for management, operation and prediction in drainage and wastewater treatment.

II.2. Skills

- Be able to formulate a digitalization plan for an object in drainage and wastewater treatment.
- Be able to use basic software in digitization and automation.
- Be able to use basic PLC in measurement and data collection.
- Be able to identify and handle frequent issues when using software and equipment in automation and digitization.
- Be able to apply basic software for management, operation and prediction in drainage and wastewater treatment.
- Be able to read and explain the basic parameters in the software for management and operation of drainage and wastewater treatment.

II.3. Self-control ability and responsibility

- Strictly comply with occupational safety regulations.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.

- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.
- Work independently or in a team, solve complicated issues and work in changing working conditions.
- Guide and supervise others to perform defined tasks; accept individual and collective accountability.
- Evaluate the quality of work outcomes and performance results of team members.

III. Description

1. General contents and time allocation

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
1	***Part 1: Overview of automation and digitization***	**120**	**30**	**85**	**5**
	Lesson 1: Automation and principles of automatic control 1. Basic knowledge of automation 2. Basic automatic control principles	**2**	**2**		
	Lesson 2: Basic elements of an automatic control system 1. Functional block diagram of automatic control system 2. Sensors and measuring elements 3. Basic measurement diagrams	**3**	**3**		

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	4. Relay 5. Converters and amplifiers 6. Executive structure and regulatory body 7. IT application in automatic control systems				
	Lesson 3: Application of control automation of drainage system 1. Automation control system for urban water distribution and drainage 2. Equipment of water control station 3. Automation of operation and maintenance of drainage system 4. Superiority of automation of economic - technological aspects	**20**	**5**	**15**	
	Lesson 4: Application of control automation at drainage pumping station 1. Main function of control automation at drainage pumping station 2. Considerations when using automatic equipment at drainage pumping station	**20**	**5**	**15**	

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	3. Examples of drainage pump station control				
	Lesson 5: Application of control automation at wastewater treatment works 1. Automation of mechanical treatment works 2. Automation of biological treatment works 3. Automation of sludge treatment 4. Automation of chemical treatment works 5. Automation of inspecting criteria	**20**	**5**	**15**	
	Lesson 6: Digital technology application in drainage and wastewater treatment 1. Concepts and terms of Industrial Revolution 4.0 2. Application of 4.0 technology in real life 3. Application of 4.0 technology in drainage system 4. Application of 4.0 technology in wastewater treatment plant operation	**50**	**10**	**40**	

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	Examination	**5**			**5**
2	***Part 2: Application of automation and digitization***	**180**	**60**	**112**	**8**
	Lesson 1: Transmission and control engineering (SCADA) 1. Introduction to measuring techniques 2. Basic programming techniques 3. Data collection and information processing methods	**22**	**5**	**17**	
	Lesson 2: Application of SCADA in wastewater treatment plant operation. 1. Operation of transmission and control engineering system 2. Interpretation of incident notification 3. Provide troubleshooting measures 4. Write report and operation log of control station	**65**	**20**	**45**	
	Lesson 3: Utilization and maintenance of online meters/automatic monitoring station 1. Parameters monitored by	**50**	**20**	**30**	

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	automatic monitoring station 2. Working principle of automatic monitoring station 3. Management and operation principle of automatic monitoring station 4. Maintenance of automatic meters				
	Lesson 4: Basic software for management, operation and prediction in drainage and wastewater treatment 1. Introduction to general application software 2. Mode of operation and scope of application 3. Frequent incidents when using the software	**35**	**15**	**20**	
	Examination	**8**			**8**

2. Detailed contents

PART I: OVERVIEW OF AUTOMATION AND DIGITIZATION

Lesson 1: Automation and principles of automatic control

Time: 2 hours

1. Lesson objectives:

- Be able to present the basic knowledge of automation, functions and application level of automation in real life.
- Be able to present the application principles and purposes of automation in drainage and wastewater treatment.
- Be able to present basic automatic control principles.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Basic knowledge of automation

2.1.1. Concepts

2.1.2. Levels of automation

2.1.3. Functions of automation

2.2. Basic automatic control principles

2.2.1. Deviation-based control principles

2.2.2. Distortion-based control principles

2.2.3. Coordinated automatic control principle

2.2.4. Program-based control principles

2.2.5. Adaptive control principles

Lesson 2: Basic elements of an automatic control system

Time: 3 hours

1. Lesson objectives:

- Be able to presents the functions of an automatic control system

- Be able to present the basic components of an automatic control system and the relationship between them.
- Be able to present the structure, function and installation location of automatic devices.
- Be able to describe the role of IT application in automatic control systems.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Functional block diagram of automatic control system

2.2. Sensors and measuring elements

2.3. Basic measurement diagrams

2.4. Relay

2.5. Converters and amplifiers

2.6. Executive structure and regulatory body

2.7. IT application in automatic control systems

Lesson 3: Application of control automation in drainage system

Time: 20 hours

1. Lesson objectives:

- Be able to present the application of automation at control stations of an urban water supply and drainage system.
- Be able to present how to use automatic devices to support the operation and maintenance of drainage system.
- Be able to use some basic software in automation of drainage system.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.

- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Automation control system for urban water distribution and drainage

2.2. Equipment of water control station

2.3. Automation of operation and maintenance in drainage system

2.3.1. Using cameras

2.3.2. Using robots

2.4. Superiority of automation of economic - technological aspects

Lesson 4: Application of control automation at drainage pumping station

Time: 20 hours

1. Lesson objectives:

- Be able to present the application of automation at pumping station.
- Be able to differentiate automatic devices and their functions, tasks and installation positions at pumping station.
- Be able to present the operation methods and considerations when using automatic equipment at pumping station.
- Be able to use some basic software in automation of pumping station.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Main function of control automation at drainage pumping station

2.2. Considerations when using automatic equipment at drainage pumping station

2.3. Examples of drainage pump station control

2.3.1. Diagram of automatic control system for drainage pumping station with 03 pumps

2.3.2. Diagram of automatic control system for drainage pumping station with 02 pumps (official and standby)

2.3.3. Diagram of automatic control system for trash screens/garbage crushers

Lesson 5: Application of control automation at wastewater treatment works

Time: 20 hours

1. Lesson objectives:

- Be able to present the structure, function and location of installation of automation equipment in wastewater treatment works.
- Be able to use some basic software in automation of wastewater treatment works.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Automation of mechanical treatment works

2.1.1. Trash screens

2.1.2. Grit chamber

2.1.3. Primary sedimentation tank

2.2. Automation of biological treatment works

2.2.1. Biological tank (Aerotank)

2.2.2. Secondary sedimentation tank

2.3. Automation of sludge treatment

2.3.1. Automation of methane incubation tank

2.3.2. Automation of vacuum filter tank

2.4. Automation of chemical treatment works

2.4.1. Automation of chemical sterilization

2.4.2. Automation of UV sterilization

2.5. Automation of inspecting criteria

Lesson 6: Digital technology application in drainage and wastewater treatment

Time: 50 hours

1. Lesson objectives:

- Be able to present the concepts and terms about Industrial Revolution 4.0, the roles and applications in real life.
- Be able to present the application principles and purposes of digitization in drainage and wastewater treatment.
- Be able to present the fields of application of 4.0 technology in water drainage and wastewater treatment.
- Be able to present the structure, function and installation location of connection devices to Internet of Things (IoTs).
- Be able to formulate a digitalization plan for an object in drainage and wastewater treatment.
- Be able to use basic software in digitization.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Concepts and terms of Industrial Revolution 4.0

2.2. Application of 4.0 technology in real life

2.3. Application of 4.0 technology in drainage system

2.3.1. Digitization and update information about drainage system on GIS

2.3.2. Control and assess the possibility of flooding

2.3.3. Planning for system maintenance, administration and renovation

2.4. Application of 4.0 technology in wastewater treatment plant operation

2.4.1. Flow meters

2.4.2. Volumetric measuring devices

2.4.3. Pressure measuring devices

2.4.4. Internet of Things (IoTs) connection devices

2.4.5. VR technology

Examination: 5 hours

PART II: APPLICATION OF AUTOMATION AND DIGITIZATION

Lesson 1: Transmission and control engineering (SCADA)

Time: 22 hours

1. Lesson objectives:

- Be able to present the basic techniques in using PLC, such as measurement, programming and data acquisition.
- Be able to use basic PLC in measurement and data collection.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Introduction to measuring techniques

2.2. Basic programming techniques

2.3. Data collection and information processing methods

Lesson 2: Application of SCADA in wastewater treatment plant operation

Time: 65 hours

1. Lesson objectives:

- Be able to present the methods for storing and transmitting data in operation and maintenance of wastewater treatment plant.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Operation of transmission and control engineering system

2.1.1. Structure and function of switchgear in electrical cabinets controlling wastewater treatment system

2.1.2. Control and operation principles of PLC

2.2. Interpretation of incident notification

2.3. Provide troubleshooting measures

2.4. Write report and operation log of control station

Lesson 3: Utilization and maintenance of online meters/automatic monitoring station

Time: 50 hours

1. Lesson objectives:

- Be able to present the parameters measurable by online meters/automatic monitoring stations for control and administration.
- Be able to present the operating principles, monitoring, operation and maintenance of online meters.
- Be able to describe the methods for data, transmit information and remote monitoring of wastewater treatment plants.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Parameters monitored by automatic monitoring station

2.2. Working principle of automatic monitoring station

2.3. Management and operation principle of automatic monitoring station

2.4. Maintenance of automatic meters

Lesson 4: Basic software for management, operation and prediction in drainage and wastewater treatment

Time: 35 hours

1. Lesson objectives:

- Be able to list basic software for management, operation and prediction in drainage and wastewater treatment.
- Be able to present the mode of operation and scope of application of software and equipment in automation and digitization.
- Be able to present frequent issues when using software and equipment in automation and digitization.
- Be able to identify and handle frequent issues when using software and equipment in automation and digitization.
- Be able to present how to use basic software for management, operation and prediction in drainage and wastewater treatment.
- Be able to apply basic software for management, operation and prediction in drainage and wastewater treatment.
- Be able to read and explain the basic parameters in the software for management and operation of drainage and wastewater treatment.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Introduction to general application software

2.2. Mode of operation and scope of application

2.3. Frequent incidents when using the software

Examination: 8 hours

IV. Module implementation conditions

1. Specialized classrooms and workshops

- Theory classrooms.
- Practice of electrical engineering.
- Practice workshops of measuring equipment.

2. Machine and equipment

- Computers, calculators.
- Measurement equipment
- VR technology equipment set

3. Learning materials, tools and consumables

Learning materials:

- Handouts for learners.
- Course books, reference materials…
- User manual for measuring devices and automatic monitoring stations

Tools:

- SCADA control station model
- Automatic monitoring station model
- General application software.

4. Other conditions

V. Assessment contents and methods

1. Description

1.1. Knowledge

1.1.1. Part 1: Overview of automation and digitization

- Be able to present the basic knowledge of digitization and automation and application levels in real life.
- Be able to present the application principles and purposes of digitization and automation of drainage and wastewater treatment.
- Be able to present the structure, function and installation location of automatic devices, and connection to Internet of Things (IoTs).
- Be able to present the concepts and terms about Industrial Revolution 4.0, the roles and applications in real life.
- Be able to present the fields of application of 4.0 technology in water drainage and wastewater treatment.
- Be able to describe the functions of basic software in digitization and automation.

1.1.2. Part 2: Application of automation and digitization

- Be able to present the basic techniques in using PLC, such as measurement, programming and data acquisition.

- Be able to present the methods for storing and transmitting data in operation and maintenance of wastewater treatment plant.
- Be able to present the parameters measurable by online meters/automatic monitoring stations for control and administration.
- Be able to present frequent issues when using software and equipment in automation and digitization.
- Be able to present how to use basic software for management, operation and prediction in drainage and wastewater treatment.

1.2. Skills

1.2.1. Part 1: Overview of automation and digitization

- Be able to formulate a digitalization plan for an object in drainage and wastewater treatment.
- Be able to use basic software in digitization and automation.

1.2.2. Part 2: Application of automation and digitization

- Be able to use basic PLC in measurement and data collection.
- Be able to identify and handle frequent issues when using software and equipment in automation and digitization.
- Be able to apply basic software for management, operation and prediction in drainage and wastewater treatment.
- Be able to read and explain the basic parameters in the software for management and operation of drainage and wastewater treatment.

1.3. Self-control ability and responsibility

- Attend all classes.
- Strictly comply with occupational safety regulations.
- Strictly comply with the workshop regulations and the instructions of the staff in charge.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.
- Have a sense of discipline in studying, cooperating and helping each other.

- Work independently in changing working conditions, accept individual and partial responsibility for the team.
- Instruct and supervise others performing assigned tasks.

2. Method

- Oral examination, multiple choice test, essay: Ask questions about the main and central issues of the Module.
- Observe how learners use measuring devices and (VR) technology equipment sets.
- Observe how learners perform operations during practice with SCADA models, software or control systems: monitor parameters, transmit meaning and predict problems as well as plan maintenance.
- Observe how learners perform the operation, maintenance of meters and measuring equipment at the automatic monitoring station.

VI. Module implementation instructions

1. Scope of application

"Automation and digitization in drainage and wastewater treatment" module can be used to teach learners at advanced German standards college levels for "Sewage Engineering Technician".

2. Introductions on module teaching and learning methods

2.1. For teachers/lecturers/trainers at enterprise

- Teaching methods include presentation, integration, conservation, group discussion, and practice;
- Following each lesson, it is required to offer questions and assignments for learners to complete independently outside of training hours.
- Teachers can use a combination of computers, projectors, and electronic lesson materials when teaching.

2.2. For learners

- Attend class on schedule with sufficient learning hours as required.
- Complete all assignments of the self-studying hours.
- Strictly follow the rules of practice workshop.
- Refer to related documents for more information.
- Actively participate in class activities.

- Strictly follow rules of control room.
- Perform operation and maintenance of measuring machines devices under the guidance of teachers or managers in charge.

3. Key points requiring attention

- All contents.

4. References

[1]. Dang Van Dao and Le Van Doanh (2001). *Electrical Engineering*, Education Publishing House.

[2]. Pham Thi Gioi (2003). *Automation of water supply and drainage works,* Construction Publishing House.

[3]. Vu Quang Hoi, *Engine Control Techniques course book,* Education Publishing House.

[4]. Tran Van Thinh (Ed) et al. (2008). *Automation and control of electrical equipment*, Education Publishing House.

[5]. General Directorate of Vocational Training. *Electrical Engineering course book*.

[6]. Danang University of Science and Technology. *Measurement and Remote Control course book.*

5. Notes and explanations (if any)

APPENDIX 03

MODULE PROGRAM

Module name: QUALITY SUPERVISION IN WASTEWATER DRAINAGE AND TREATMENT

Module code: MD 12

Training duration: 300 hours; (Theory: 90 hours; Practice, laboratory, discussion, assignment: 197 hours; Examination: 12 hours).

I. Position and features:

- Position: "Quality Supervision in Wastewater Drainage and Treatment" module is one of the Optional intensive modules for learners who want to gain knowledge equivalent to German standards in drainage and wastewater treatment. The module is taught along with other Optional intensive modules and after the Specialized modules.

- Features: This specialized module to provide learners with knowledge about quality management systems and the methods to apply legal regulations and technology in the wastewater treatment process. Thereby, learners can apply professional knowledge to participate in the process of building, monitoring and operating a quality management system in domestic or centralized wastewater treatment plants. Learners will realize the importance of storing data, writing reports and proposing changes in the scope of assigned work.

- This module can be divided into chapters with different training durations and objectives as per the regulations on training duration for each module. However, this module must ensure its following main objectives.

II. Objectives

II.1. Knowledge

- Be able to describe the terms and concepts of quality and quality management.
- Be able to describe the quality management methods.
- Be able to present the new management methods given the development of science and technology.
- Be able to clearly present the concepts of standard and standardization in daily life.

- Be able to present the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to present the structure of the quality management system according to the ISO 9000 series of standards.
- Be able to describe the organization methods for implementation of the ISO 9000 series of standards.
- Be able to describe the benefits and limitations of the ISO 9000 series certification in Vietnam and other countries.
- Be able to present the structure of the environmental management system according to the ISO 14000 series of standards.
- Be able to describe the organization methods for implementation of the ISO 9000 series of standards.
- Be able to describe the benefits and limitations of the ISO 14000 series certification in Vietnam and other countries.
- Be able to present the steps to implement and prepare relevant documents in the ISO 9000/14000 series of standards.
- Be able to present the steps to implement and prepare relevant documents in the application for a permit to discharge wastewater into the receiving water source.
- Be able to describe the quality management system at enterprise.
- Be able to describe the process of automatic operation, analysis and recognition of digitization capabilities in a number of areas and fields at enterprise.
- Be able to demonstrate the plant quality improvement measures such as using digital tools to visualize data as the basis for further improvement measures.
- Be able to present the steps to implement and prepare relevant documents in the ISO 9000/14000 series of standards.
- Be able to present the changes in system procedures.
- Be able to present the measures to enhance quality in the factory.
- Be able to present the method of recording an operation log and making reports within the scope of assigned tasks.

II.2. Skills

- Be able to apply theoretical knowledge and legal regulations to the organization of a company that learners may work at.
- Be able to apply the knowledge of management science to increase efficiency when participating in operating and performing work at a company that learners may work at.
- Be able to apply knowledge of standards and standardization to contribute to increasing production - operating efficiency at an organization, especially in the era of international integration.
- Be able to apply the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to apply 8 principles of quality management according to the ISO 9000 series of standards.
- Be able to analyze the advantages and disadvantages when building and applying a quality management system according to the ISO 9000 series of standards.
- Be able to apply methodologies and implementation method of the ISO 14000 series of standards to create environmentally friendly products.
- Be able to analyze the advantages and disadvantages when building and applying an environmental management system according to the ISO 14000 series of standards.
- Be able to apply the proper automation operating process at enterprise.
- Be able to assess the digitization applicability at enterprise.
- Be able to apply modern technology (e.g. cloud computing) in storing operational information and conducting reports.
- Be able to apply the learned knowledge in building a set of standards for a company.
- Be able to prepare a profile to build a quality management system according to the ISO 9000/14000 series of standards.
- Be able to apply the ISO document system to improve efficiency in the management of the company's operations and compliance with laws.

- Be able to collect information and receive system nonconformity reports, and monitor the effectiveness of corrective or preventive actions.
- Be able to identify the needs and changes in systems.
- Be able to update and propose to improve processes and regulations related to the company's quality management system.
- Be able to prepare weekly, monthly and yearly reports to evaluate the performance of quality management as per requirements and the scope of assigned duties.

II.3. Self-control ability and responsibility

- Be straightforward and honest.
- Have responsibility and enthusiasm for assigned tasks.
- Work independently or in a team, solve complicated issues and work in changing working conditions.
- Guide and supervise others to perform defined tasks; accept individual and collective accountability.
- Evaluate the quality of work outcomes and performance results of team members.

III. Description

1. General contents and time allocation

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
1	***Part 1: Overview of quality control and quality management systems***	***45***	***13***	***30***	***2***
	Lesson 1: Quality and quality control	**2**	**2**		

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	1. Quality and characteristics of quality 2. Quality control				
	Lesson 2: Main contents for quality management in current context 1. Knowledge management 2. Breakthrough thinking 3. Customer relationship management 4. Human resource management 5. Customer satisfaction measurement 6. Productivity measurement 7. Technical barriers in commerce	**20**	**5**	**15**	
	Lesson 3: Standards and standardization in integration period 1. Basic concepts 2. Objectives of standardization 3. Objects of standardization 4. Seven principles of standardization 5. Standards development process 6. Level, type and validity of standards 7. Application of standards	**21**	**6**	**15**	

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	Examination	**2**			**2**
2	***Part 2: Quality monitoring process***	***60***	***10***	***55***	***5***
	Lesson 1: Legal document system 1. Documentation system for quality control 2. Documentation system for environmental management	**1**	**1**		
	Lesson 2: Quality management system according to ISO 9000 1. ISO 9000 series of standards 2. Requirements for ISO 9000 quality management system 3. Cost of quality management system 4. Applying ISO 9000 to an organization 5. Benefits and difficulties in developing, applying and maintaining ISO 9000 6. Actual situation of applying ISO 9000 7. Role of documentation system in ISO 9000 system 8. Conformity assessment	**34**	**7**	**27**	

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	9. Implementation steps of conformity assessment				
	Lesson 3: ISO 14000 environmental management system 1. The world and environmental pollution problems 2. Establishment of ISO 14000 3. ISO 14000 environmental management system 4. Benefits of applying ISO 14000 5. Effects of investing in ISO 14000 system 6. Application steps of ISO 14000 7. Promulgation of ISO 14000 8. Some indicators related to working environment according to Vietnam's regulations 9. Introduction to relevant ISO 14000 standards	**35**	**7**	**28**	
	Examination	**5**			**5**
3	***Part 3: Practice of quality system at enterprise***	***180***		***175***	***5***
	Lesson 1: Overview of quality monitoring system at enterprise 1. Quality management standard	**5**		**5**	

No.	Module name	Time (hour)			
		Total	**Theory**	**Practice, laboratory, discussion, assignment**	**Examination**
	system 2. Environmental management standard system 3. Laboratory management standard system				
	Lesson 2: Automatic and digitized operation process at enterprise 1. Automatic operation and monitoring system 2. Digitization process	**45**		**45**	
	Lesson 3: Process of building a quality management system per ISO 9000/14000 at enterprise 1. Phase 1 - Preparation 2. Phase 2 - Writing the document system 3. Phase 3 - Implementation 4. Phase 4 - Certification 5. Stage 5 - Quality maintenance after certification	**125**		**125**	
	Examination	**5**			**5**

2. Detailed contents

PART I: OVERVIEW OF QUALITY CONTROL AND QUALITY MANAGEMENT SYSTEMS

Lesson 1: Quality and quality control

Time: 2 hours

1. Lesson objectives:

- Be able to describe the terms and concepts of quality and quality management.
- Be able to describe the quality management methods.
- Be able to apply the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to apply theoretical knowledge and legal regulations to the organization of a company that learners may work at.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Quality and characteristics of quality

2.1.1. Quality

2.1.2. Characteristics of quality

2.2. Quality control

2.2.1. Functions of quality control

2.2.2. Principles of quality control

2.2.2.1. Principle 1: Customer-oriented

2.2.2.2. Principle 2: Leadership

2.2.2.3. Principle 3: Participation of everyone

2.2.2.4. Principle 4: Process perspective

2.2.2.5. Principle 5: Systematic

2.2.2.6. Principle 6: Continuous improvement

2.2.2.7. Principle 7: Fact-based decision

2.2.2.8. Principle 8: Win-win partnership

2.2.3. Quality management methods

2.2.3.1. Product quality control (KCS)

2.2.3.2. Quality control (QC)

2.2.3.3. Total quality control (TQC)

2.2.3.4. Total quality management (TQM)

Lesson 2: Main contents for quality management in current context

Time: 20 hours

1. Lesson objectives:

- Be able to present the new management methods given the development of science and technology.
- Be able to apply the knowledge of management science to increase efficiency when participating in operating and performing work at a company that learners may work at.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Knowledge management

2.2. Breakthrough thinking

2.2.1. Concept of breakthrough thinking

2.2.2. Seven fundamentals of breakthrough thinking

2.3. Customer relationship management

2.4. Human resource management

2.5. Customer satisfaction measurement

2.6. Productivity measurement

2.6.1. Concept of productivity

2.6.2. Meaning of productivity measurement

2.6.3. System of productivity indicators

2.7. Technical barriers in commerce

2.7.1. Standards, technical regulations, safety and epidemiology

2.7.2. Processing and production standards per environmental regulations

2.7.3. Labeling requirements

2.7.4. Packaging requirements

2.7.5. Environmental charges

2.7.6. Eco-label

Lesson 3: Standards and standardization in integration period

Time: 21 hours

1. Lesson objectives:

- Be able to clearly present the concepts of standard and standardization in daily life.
- Be able to apply knowledge of standards and standardization to contribute to increasing production - operating efficiency at an organization, especially in the era of international integration.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Basic concepts

2.1.1. Standards

2.1.2. Standardization

2.2. Objectives of standardization

2.3. Objects of standardization

2.4. Seven principles of standardization

2.4.1. Principle 1: Simplification

2.4.2. Principle 2: Agreement

2.9. National and international organization for standardization

2.9.1. National organization for standardization

2.9.2. Standardization agency in Vietnam

2.9.3. International organization for standardization

2.10. Standardization in company

2.10.1. Purpose of standardization in company

2.10.2. Scope of standardization in company

2.10.3. Organization of standardization activities at company

2.10.4. Development of company standards

2.10.5. Application of company standards

Examination: 2 hours

PART II: QUALITY MONITORING PROCESS

Lesson 1: Legal document system

Time: 1 hours

1. Lesson objectives:

- Be able to present the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to apply the technical standards and national technical regulations applicable to each type of wastewater.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Documentation system for quality control

2.2. Documentation system for environmental management

Lesson 2: Quality management system according to ISO 9000

Time: 34 hours

1. Lesson objectives:

- Be able to present the structure of the quality management system according to the ISO 9000 series of standards.
- Be able to apply 8 principles of quality management according to the ISO 9000 series of standards.
- Be able to describe the organization methods for implementation of the ISO 9000 series of standards.
- Be able to describe the benefits and limitations of the ISO 9000 series certification in Vietnam and other countries.
- Be able to apply 8 principles of quality management according to the ISO 9000 series of standards.
- Be able to analyze the advantages and disadvantages when building and applying a quality management system according to the ISO 9000 series of standards.

- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. ISO series of standards

2.2. Requirements for ISO quality management system

2.3. Cost of quality management system

2.4. Applying ISO 9000 to an organization

2.5. Benefits and difficulties in developing, applying and maintaining ISO 6

2.5.1. Benefits

2.5.2. Difficulties

2.6. Actual situation of applying ISO 9000

2.6.1. Application purpose and actual situation of ISO 9000 system

2.6.2. Reasons limiting the efficiency of the system

2.6.3. Guarantee to increase the efficiency of the system

2.7. Role of documentation system in ISO 9000 system

2.8. Conformity assessment

2.9. Implementation steps of conformity assessment

Lesson 3: Environmental management system according to ISO 14000

Time: 35 hours

1. Lesson objectives:

- Be able to present the structure of the environmental management system according to the ISO 14000 series of standards.
- Be able to apply methodologies and implementation method of the ISO 14000 series of standards to create environmentally friendly products.
- Be able to describe the benefits and limitations of the ISO 14000 series certification in Vietnam and other countries.

- Be able to apply methodologies and implementation method of the ISO 14000 series of standards to create environmentally friendly products.
- Be able to analyze the advantages and disadvantages when building and applying an environmental management system according to the ISO 14000 series of standards.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. The world and environmental pollution problems

2.2. Establishment of ISO 14000

2.3. ISO 14000 environmental management system

2.4. Benefits of applying ISO 14000

2.4.1. Preventing pollution

2.4.2. Saving on input costs

2.4.3. Proving legal compliance

2.4.4. Satisfying the needs of foreign customers

2.4.5. Increasing market share

2.4.6. Building trust for stakeholders

2.5. Effects of investing in ISO 14000 system

2.6. Application steps of ISO 14000

2.6.1. Commitment to implement from leaders

2.6.2. Formation of a dedicated group

2.6.3. Conducting preliminary environmental assessment

2.6.4. Identifying environmental aspects

2.6.5. Determining the objectives and targets to be achieved for the environmental management system

2.6.6. Developing the organization's environmental management program

2.6.7. Defining and establishing the organization's environmental responsibility structure

2.6.8. Raising environmental awareness for employees in the organization

2.6.9. Developing a document system on environmental management of the organization

2.6.10. Internal audit of the organization's environmental management system

2.6.11. Review by third party

2.7. Promulgation of ISO 14000

2.8. Some indicators related to working environment according to Vietnam's regulations

2.9. Introduction to relevant ISO 14000 2.10 Case studies

Examination: 2 hours

PART III: PRACTICE OF QUALITY SYSTEM AT ENTERPRISE

Lesson 1: Overview of quality monitoring system at enterprise

Time: 5 hours

1. Lesson objectives:

- Be able to describe the quality management system at enterprise.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Quality management standard system

2.2. Environmental management standard system

2.3. Laboratory management standard system

Lesson 2: Automatic and digitized operation process at enterprise

Time: 45 hours

1. Lesson objectives:

- Be able to describe the process of automatic operation, analysis and recognition of digitization capabilities in a number of areas and fields at enterprise.
- Be able to demonstrate the plant quality improvement measures such as using digital tools to visualize data as the basis for further improvement measures.
- Be able to apply the proper automation operating process at enterprise.
- Be able to assess the digitization applicability at enterprise.
- Be able to apply modern technology (e.g. cloud computing) in storing operational information and conducting reports.
- Comply with regulations under the guidance of workshop assistants.
- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.

- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Automatic operation and monitoring system

2.2. Digitization process

Lesson 3: Quality management system according to ISO 9000/14000

Time: 125 hours

1. Lesson objectives:

- Be able to present the steps to implement and prepare relevant documents in the ISO 9000/14000 series of standards.
- Be able to present the changes in system procedures.
- Be able to present the measures to enhance quality in the factory.
- Be able to present the method of recording an operation log and making reports within the scope of assigned tasks.
- Be able to apply the learned knowledge in building a set of standards for a company.
- Be able to prepare a profile to build a quality management system according to the ISO 9000/14000 series of standards.
- Be able to apply the ISO document system to improve efficiency in the management of the company's operations and compliance with laws.
- Be able to collect information and receive system nonconformity reports, and monitor the effectiveness of corrective or preventive actions.
- Be able to identify the needs and changes in systems.
- Be able to update and propose to improve processes and regulations related to the company's quality management system.
- Be able to prepare weekly, monthly and yearly reports to evaluate the performance of quality management as per requirements and the scope of assigned duties.
- Comply with regulations under the guidance of workshop assistants.

- Maintain workplace safety and hygiene, protect assets, and adhere to working principles.
- Be diligent, optimistic, hard-working, careful and self-responsible for assigned work results.
- Maintain a serious and forward-thinking approach to learning.

2. Lesson contents:

2.1. Phase 1 - Preparation

2.2. Phase 2 - Writing the document system

2.2.1. Quality handbook

2.2.2. Processes and procedures

2.2.3. Regulations, guidelines and forms

2.2.4. Synthesize document system

2.3. Phase 3 - Implementation

2.3.1. Promulgation and application

2.3.2. Collecting feedback, reviewing

2.3.3. Training internal reviewer team

2.3.4. Conducting internal review

2.3.5. Correction after internal review

2.3.6. Review meeting of leaders

2.4. Phase 4 - Certification

2.5. Stage 5 - Quality maintenance after certification

Examination: 5 hours

IV. Module implementation conditions

1. Specialized classrooms and workshops

- Theory classrooms.
- Study in the office of the factory or company.

2. Machine and equipment

- Computers, calculators.

3. Learning materials, tools and consumables

Learning materials:

- Handouts for learners.
- Course books, reference materials…

Tools:

- A0 paper, pens, colored paper, etc.

4. Other conditions

V. Assessment contents and methods

1. Description

1.1. Knowledge

1.1.1. Part 1: Overview of quality control and quality management systems

- Be able to describe the terms and concepts of quality and quality management.
- Be able to describe the quality management methods.
- Be able to present the new management methods given the development of science and technology.
- Be able to clearly present the concepts of standard and standardization in daily life.

1.1.2. Part 2: Quality monitoring process

- Be able to present the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to present the structure of the quality management system according to the ISO 9000 series of standards.
- Be able to describe the organization methods for implementation of the ISO 9000 series of standards.
- Be able to describe the benefits and limitations of the ISO 9000 series certification in Vietnam and other countries.
- Be able to present the structure of the environmental management system according to the ISO 14000 series of standards.
- Be able to describe the organization methods for implementation of the ISO 9000 series of standards.

- Be able to describe the benefits and limitations of the ISO 14000 series certification in Vietnam and other countries.

1.1.3. Part 3: Practice of quality system at enterprise

- Be able to present the steps to implement and prepare relevant documents in the ISO 9000/14000 series of standards.
- Be able to present the steps to implement and prepare relevant documents in the application for a permit to discharge wastewater into the receiving water source.
- Be able to describe the quality management system at enterprise.
- Be able to describe the process of automatic operation, analysis and recognition of digitization capabilities in a number of areas and fields at enterprise.
- Be able to demonstrate the plant quality improvement measures such as using digital tools to visualize data as the basis for further improvement measures.
- Be able to present the steps to implement and prepare relevant documents in the ISO 9000/14000 series of standards.
- Be able to present the changes in system procedures.
- Be able to present the measures to enhance quality in the factory.
- Be able to present the method of recording an operation log and making reports within the scope of assigned tasks.

1.2. Skills

1.2.1. Part 1: Overview of quality control and quality management systems

- Be able to apply theoretical knowledge and legal regulations to the organization of a company that learners may work at.
- Be able to apply the knowledge of management science to increase efficiency when participating in operating and performing work at a company that learners may work at.
- Be able to apply knowledge of standards and standardization to contribute to increasing production - operating efficiency at an organization, especially in the era of international integration.

1.2.2. Part 2: Quality monitoring process

- Be able to apply the technical standards and national technical regulations applicable to each type of wastewater.
- Be able to apply 8 principles of quality management according to the ISO 9000 series of standards.
- Be able to analyze the advantages and disadvantages when building and applying a quality management system according to the ISO 9000 series of standards.
- Be able to apply methodologies and implementation method of the ISO 14000 series of standards to create environmentally friendly products.
- Be able to analyze the advantages and disadvantages when building and applying an environmental management system according to the ISO 14000 series of standards.

1.2.3. Part 3: Practice of quality system at enterprise

- Be able to apply the proper automation operating process at enterprise.
- Be able to assess the digitization applicability at enterprise.
- Be able to apply modern technology (e.g. cloud computing) in storing operational information and conducting reports.
- Be able to apply the learned knowledge in building a set of standards for a company.
- Be able to prepare a profile to build a quality management system according to the ISO 9000/14000 series of standards.
- Be able to apply the ISO document system to improve efficiency in the management of the company's operations and compliance with laws.
- Be able to collect information and receive system nonconformity reports, and monitor the effectiveness of corrective or preventive actions.
- Be able to identify the needs and changes in systems.
- Be able to update and propose to improve processes and regulations related to the company's quality management system.
- Be able to prepare weekly, monthly and yearly reports to evaluate the performance of quality management as per requirements and the scope of assigned duties.

1.3. Self-control ability and responsibility

- Attend all classes.
- Have a sense of discipline in studying, cooperating and helping each other.
- Be straightforward and honest.
- Have responsibility and enthusiasm for assigned tasks.
- Work independently in changing working conditions, accept individual and partial responsibility for the team.
- Instruct and supervise others performing assigned tasks.
- Evaluate the quality of work outcomes and performance results of team members.
- Solve occupational problems.
- Have good communication, presentation and persuasion skills.
- Master office software, can read and understand documents in English.

2. Method

- Oral examination, multiple choice test, essay: Ask questions about the main and central issues of the Module and objectives in each specific lesson.
- Observe learners performing group exercises or group presentations.

VI. Module implementation instructions

1. Scope of application

"Quality Supervision in Wastewater Drainage and Treatment" module can be used to teach learners at advanced German standards college levels for "Sewage Engineering Technician".

2. Introductions on module teaching and learning methods

2.1. For teachers/lecturers/trainers at enterprise

For teachers/lecturers at school

- Teaching methods include presentation, integration, conservation, group discussion, and practice;
- Following each lesson, it is required to offer questions and assignments for learners to complete independently outside of training hours.

- Teachers can use a combination of computers, projectors, and electronic lesson materials when teaching.
- Teachers need to prepare learning materials with complete instructions for conducting experiments.

For teachers/lecturers at enterprise

- Joint training enterprises need to appoint qualified teachers and lecturers to train learners during their internship at the company.
- Teachers and business trainers need to be trained in pedagogical ability, the ability to assess learners' capacity and organize the appropriate division of tasks for learners.
- Teaching methods include presentation, conversation, group discussion, practice and application of practical models.
- Teaching aids such as computers, projectors, etc. can be used, and teachers can new tools to enrich the lecture content.

2.2. For learners

- Attend class on schedule with sufficient learning hours as required.
- Complete all assignments of the self-studying hours.
- Refer to related documents for more information.
- Regularly research on the Internet to update knowledge.
- Actively participate in class activities.

3. Key points requiring attention

- Quality management system according to ISO 9000.
- Environmental management system according to ISO 14000.

4. References

[1]. Dr. Hoang Manh Dung (2012). *Quality Management Manual*, Ho Chi Minh City Open University.

[2]. University of Economics - Technology for Industries (2019). *Quality Management learning materials*.

[3]. TCVN Vietnamese set of standards for quality management systems ISO 9000.

[4]. TCVN Vietnamese set of standards for environmental management systems ISO 14000.

5. Notes and explanations (if any): Certification of the equivalence and quality of the “Sewage Engineering Technician” vocational training program

IHK-WAHL 2022
Wahl der Vollversammlung 2022-2027

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Đào tạo nghề trong " Chuyên gia công nghệ xử lý nước thải"

Kính thưa Ông/ Bà,

Kết quả cho chương trình đào tạo thí điểm 3 năm cho "Chuyên gia công nghệ xử lý nước thải" đã có ở Phòng Công nghiệp và Thương mại Dresden.

Chúng tôi xác nhận tính tương đương của chương trình đào tạo nghề "Chuyên gia công nghệ xử lý nước thải" trong quy chế đào tạo nghề về kỹ thuật môi trường do Luật Đào tạo nghề của Cộng hòa Liên bang Đức ban hành phiên bản từ ngày 17.06.2002 đến 04.05.2020.

Chúng tôi rất vui khi biết rằng với khóa đào tạo này, Luật Đào tạo nghề có nghiều khả năng được triển khai trong việc đào tạo nghề cho thanh niên ở Việt Nam.

Chúng tôi vui mừng khẳng định lại sự chất lượng của chương trình đào tạo này tại Việt Nam và chúc chương trình nhiều thành công trong quá trình triển khai.

Chào thân ái

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