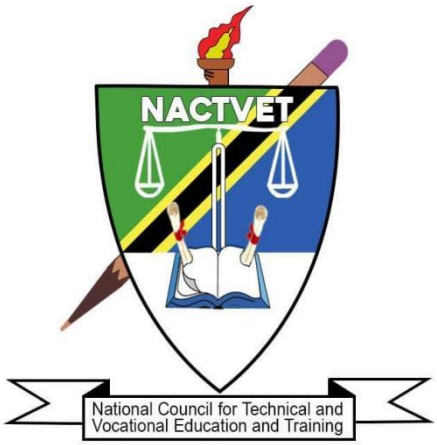
THE NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING



OCCUPATIONAL STANDARDS

OCCUPATION: RENEWABLE ENERGY ENGINEER (HYDRO)

LEVEL: NTA LEVEL 7

FEBRUARY 2024

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ABBREVIATIONS

CAD	Computer-Aided Design
CBET	Competency Based Education and Training
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation**.**

Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	A set of statements, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.
Task Analysis:	The process of analyzing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.
Underpinning Knowledge:	Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status, with a high level of human development. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical and Vocational Education and Training (NACTVET) has begun the job of drafting Occupational Standards (OS) that will eventually be adopted as National Occupational Standards (NOS) for use in the delivery of TET that meets the needs of the labour market and the country's economic agenda.

Occupational Standards (OS) are performance criteria that are matched with labour market demands. Each of them describes the functions, performance standards, and understanding or knowledge underpinning a given occupation. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruitment, supervision, and appraisal, as well as TET Standards. They are also helpful for benchmarking and harmonizing job qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in application across all public and private institutions.

However, it must be noted that Occupational Standards are different from Training /Education Standards. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical circuits, performs troubleshooting in electrical circuits, etc.), and are usually defined by Employers following procedures as agreed upon by all the stakeholders. On the other hand, Training and Education Standards are developed from the activities defined in the occupational standards, and they specify learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him/her to function at an agreed level in an occupation. Training and Education Standards are used to define curricula in training institutions. It is critical, however, to establish a direct link between the occupational standards and the training standards for both of them to respond collaboratively to the demands of the labour market.

For the purpose of TET delivery, Tanzania has adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. Therefore, it is quite pertinent for TET institutions to use the relevant occupational standards as a benchmark for formulating their curricula.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training.

The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The process of developing these Occupational Standards involved both local and international expertise. The process began with an examination of major documents that guide Tanzanian skills development including the *10-year National Skills Development Strategy (2016-2026).* NACTVET labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a team of experts in consultation with practitioners developed draft occupational standards. The draft document was used to develop an occupational profile for each occupation (DACUM Chart), which is attached as an **Appendix** to every Occupational Standard.

The occupational standards were validated during the stakeholders' forum held on 22nd and 23rd February 2024 at Morogoro. The information from the stakeholders' forum provides insight from the workplaces, professional bodies, regulatory bodies and sector ministries regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR RENEWABLE ENERGY ENGINEERS (HYDRO)

These standards cover a broad range of duties and tasks that can be performed by a Renewable Energy Engineer (Hydro). However, the occupational standards are not meant to replace individual job

descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Renewable Energy Engineer (Hydro) may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Renewable Energy Engineer (Hydro) shall complete the operation management, overhaul and maintenance of the hydropower station under the coordination of the renewable energy technician (hydro). They can also conduct the operation management of hydraulic structures, metal structures, electromechanical equipment, auxiliary equipment and management equipment in the hydropower station, as well as optimal regulation of reservoirs and economic operation of hydropower stations in accordance with regulating principles.

Generally, the Renewable Energy Engineer (Hydro) performs the following responsibilities:

a) Typical faults and treatment of generator set equipment in hydropower stations

b) Hydropower station management

c) Design of small and medium-sized hydropower stations

d) Operation management of hydraulic structures

e) Operation management of metal structures

f) Operation management of electromechanical equipment

g) Operation management of auxiliary equipment

h) Operation management of management equipment

i) Optimization of operation management

k) Hydropower station management

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA level 7 and 8.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR RENEWABLE ENERGY ENGINEER (HYDRO) - NTA LEVEL 7

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CONDUCT THE OPERATION MANAGEMENT OF HYDRAULIC STRUCTURES	**DUTY NO.**	**701**
TASK TITLE	MONITOR AND ANALYZE THE SEEPAGE PRESSURE OF HYDRAULIC STRUCTURES	**TASK NO.**	**7011**
PERFORMANCE CRITERIA	The person performing this task must be able to monitor and analyze the seepage pressure of hydraulic structures, in accordance with the technical requirements and maintenance regulations.		
RANGE STATEMENT	The task can be performed in the hydraulic structure under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Water measuring weirs, piezometer tubes, flowmeters and its parts; 2. Computer and its operating system; 3. Statistical analysis software. 4. Safety gear.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe seepage discharge with water measuring weirs or flowmeters; 2. Observe uplift pressure (concrete dams) or wetting lines (earth-rock dams) with piezometer tubes; 3. Judge and remove common faults of monitoring equipment; 4. Conduct sensitivity tests of observation equipment; 5. Analyze and fill in the seepage observation record table in accordance with observation data;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to 1.1 Observe the seepage discharge; 1.2 Observe the uplift pressure; 1.3 Observe the wetting line; 1.4 Check and analyze seepage monitoring data; 1.5 Check and maintain the monitoring equipment and system. **2.0 Principles** The person performing this task must be able to

6. Check the original data monitored by the equipment and analyze and judge the abnormal value; 7. Arrange observation sections and organize the implementation of manual comparison and measurement of seepage discharge; 8. Clean the tools, equipment and workplaces; 9. Standardize the storage of operating tools and equipment. 10. Observe health occupational and environmental safety rules and regulations	explain the following principles: 2.1 Working principles of water measuring weirs or flowmeters; 2.2 Working principles of piezometer tubes; 2.3 Working principles of the automatic monitoring system; 2.4 Principles and procedures of manual comparison and measurement of seepage; 2.5 Principles and procedures of inspection and maintenance of the automated system. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principles of judging the fault of monitoring equipment; 3.2 Principles of analyzing abnormal seepage monitoring data; 3.3 Causes of common faults of monitoring equipment; 3.4 Causes of abnormal seepage monitoring data. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Equipment operation skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Observation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The seepage pressure of hydraulic structures is monitored and analyzed in accordance with the technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety;

	2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CONDUCT THE OPERATION MANAGEMENT OF HYDRAULIC STRUCTURES	**DUTY NO.**	**701**
TASK TITLE	MONITOR AND ANALYZE THE EXTERNAL DEFORMATION OF THE DAM SURFACE OF THE HYDRAULIC STRUCTURES	**TASK NO.**	**7012**
PERFORMANCE CRITERIA	The person performing this task must be able to monitor and analyze the external deformation of dam surface of the hydraulic structures in accordance with technical requirements and maintenance regulations.		
RANGE STATEMENT	The task can be performed in the hydraulic structure under the supervision and cooperation of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Theodolites or total stations and other equipment and their parts; 2. Computer and its operating system; 3. Statistical analysis software. 4. Safety gear.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Conduct the settlement observation of the dam surface with theodolites; 2. Use the total stations to conduct the horizontal displacement observation of dam surface; 3. Conduct sensitivity tests of observation equipment; 4. Analyze and fill in the observation record table of dam surface displacement in accordance with the observation data; 5. Check the original data monitored by the equipment, and analyze and judge the abnormal value;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Conduct dam surface displacement observation with theodolites or total stations; 1.2 Check and analyze the monitoring data of dam surface displacement; 1.3 Check the dam surface displacement inspection data; 1.4 Analyze the dam surface displacement inspection data. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of theodolites and total stations;

6. Organize the manual comparison and measurement of dam surface displacement; 7. Clean the tools, equipment and workplaces; 8. Standardize the storage of operating tools and equipment. 9. Observe health occupational and environmental safety rules and regulations	2.2 Working principles of the automatic monitoring system; 2.3 Principles and procedures of manual comparison and measurement of dam surface displacement; 2.4 Principles and procedures of inspection and maintenance of the automated system. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principles of judging the common fault of monitoring equipment; 3.2 Principles of analyzing the abnormal monitoring data of dam surface displacement; 3.3 Causes of common faults of monitoring equipment; 3.4 Causes of abnormal monitoring data of dam surface displacement. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Equipment operation skills; 4.5 Teamwork skills; 4.6 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The external deformation of the dam surface of hydraulic structures is monitored, and analyzed in accordance with the technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF METAL STRUCTURES OF THE HYROPOWER STATIONS	**DUTY NO.**	**702**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCEOF PENSTOCKS OF THE HYDROPOWER STATIONS	**TASK NO.**	**7021**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the penstock of hydropower stations in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the hydraulic structure under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Penstocks and its accessory structural parts.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Carry out the overhaul and maintenance of the penstock of hydropower stations in accordance with Technical Requirements for Operation and Maintenance of Small Hydropower Stations; 2. Conduct the detection of deformation, cracking and leakage of penstocks; 3. Conduct the overhaul and maintenance of the buried section in the dam; 4. Conduct the detection and maintenance of exposed penstock vibration. 5. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the penstock; 1.2 Maintain the penstock. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operation and maintenance principles of penstocks; 2.2 Overhaul and maintenance procedures for burying penstocks in the dam; 2.3 Operating procedures for handling abnormal penstocks. **3.0 Theories** The person performing this task must be able to explain

	the following: 3.1 Principles of judging the abnormality of penstocks; 3.2 Causes of common faults of penstocks; 3.3 Overhaul procedures of penstock vibration and measures of vibration reduction. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The penstocks of the hydropower stations are overhauled and maintained in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF METAL STRUCTURES OF THE HYDROPOWER STATIONS	**DUTY NO.**	**702**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF GATES AND HOISTS AND TRASH RACKS OF THE HYDROPOWER STATIONS	**TASK NO.**	**7022**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the gates, hoists and trash racks of hydropower stations in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the hydraulic structure under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Metal structure parts of the gate.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Carry out the overhaul and maintenance of the gate and hoist of hydropower stations in accordance with Technical Requirements for Operation and Maintenance of Small Hydropower Stations; 2. Carry out the overhaul and maintenance of the defect of gate surfaces; 3. Carry out the overhaul and maintenance of gate waterstop integrity; 4. Carry out the overhaul and maintenance of gate lifting point structure;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the gate and hoist; 1.2 Maintain the gate and hoist. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operation and maintenance principles of gates, hoists and trash racks; 2.2 Causes of common faults in gates, hoists and trash racks. **3.0 Theories** The person performing this task must be able to explain the following:

5. Carry out the overhaul and maintenance of hydraulic hoists; 6. Carry out the overhaul and maintenance of winches; 7. Carry out the overhaul and maintenance of trash racks; 8. Carry out power supply equipment inspection and test switching; 9. Fill in overhaul and maintenance records; 10. Formulate the annual overhaul and maintenance plan. 11. Observe health occupational and environmental safety rules and regulations	3.1 Principles of judging the faults of gates, hoists and trash racks; 3.2 Procedures for overhauling gates and hoists; 3.3 Procedures for maintaining gates and hoists. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The gates, hoists and trash racks of the hydropower stations are overhauled and maintained in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE ENVIRONMENTAL QUANTITY MONITORING AND ANALYSIS OF THE HYDROPOWER STATIONS	**DUTY NO.**	**703**
TASK TITLE	CARRY OUT THE ENVIRONMENTAL QUANTITY MONITORING AND ANALYSIS OF THE HYDROPOWER STATIONS	**TASK NO.**	**7031**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the environmental quantity monitoring and analysis of the hydropower station in accordance with technical requirements and maintenance regulations.		
RANGE STATEMENT	The task can be performed in the hydraulic structure under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Water gauges, rain gauges and relevant parts; 2. Computer and its operating system; 3. Statistical analysis software. 4. Safety gear.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Use water gauges to observe the water level correctly; 2. Monitor air temperature, precipitation and other items; 3. Check the original data monitored by the equipment; analyze and judge the abnormal value; 4. Integrate the monitoring data and carry out preliminary analysis; 5. Judge and remove common faults of monitoring equipment; 6. Carry out the overhaul and maintenance of the monitoring equipment and system.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use water gauges and rain gauges to carry out precipitation observation; 1.2 Check and analyze the environmental quantity monitoring data. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of water gauges and rain gauges; 2.2 Working principles of the automatic monitoring system; 2.3 Integrating procedures of environmental quantity monitoring data;

7. Observe health occupational and environmental safety rules and regulations	2.4 Principles and procedures of inspection and maintenance of the automated system. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principles of judging the common fault of monitoring equipment; 3.2 Principles of analyzing the causes of abnormal environmental quantity monitoring data; 3.3 Causes of common faults of monitoring equipment; 3.4 Causes of abnormal water level and precipitation monitoring data. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The environmental quantity monitoring of hydropower stations is carried out and common faults are dealt with, and abnormal data and hydrological status of environment are judged and analyzed in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE OPERATION MANAGEMENT OF ELECTROMECHANICAL EQUIPMENT	**DUTY NO.**	**704**
TASK TITLE	CARRY OUT THE OUTPUT MONITORING AND ANALYSIS OF THE HYDRAULIC TURBINES	**TASK NO.**	**7041**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the output monitoring and analysis of the hydraulic turbines in accordance with technical requirements and maintenance regulations.		
RANGE STATEMENT	The task can be performed in the powerhouse of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Hydraulic turbine parts.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Handle the over speed of generator sets; 2. Handle the fault where the generator set suddenly loses the load when running with load due to various reasons; 3. Handle the fault where the speed controller is out of control during the normal start-up and shutdown of the generator set; 4. Handle the fault where multiple shear pins are cut off during the normal start-up and shutdown (or emergency shutdown) of the generator set; 5. Handle the over-high temperature of guide bearing shoes; 6. Handle the reduction of lubricating oil;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Handle common faults in hydraulic turbine operation. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of handling common faults in hydraulic turbine operation; 2.2 Causes of common faults in hydraulic turbine operation. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principles of judging the causes of common faults in hydraulic turbine operation;

7. Handle oil deterioration; 8. Handle the cooling water interruption or cooling water pressure reduction; 9. Handle the cutting off of shear pins; 10. Handle the fault where the guide vane fails to move due to foreign bodies or mechanical jamming between guide vanes; 11. Handle the fault where the pressure of water flow on the guide vane increases when the guide vane is opened or closed too fast. 12. Observe health occupational and environmental safety rules and regulations	3.2 Procedures of handling common faults in hydraulic turbine operation; 3.3 Causes of the fault where the generator set suddenly loses the load when running with load due to various reasons; 3.4 Causes of the fault where the speed controller is out of control during the normal start-up and shutdown of the generator set; 3.5 Causes of the fault where multiple shear pins are cut off during the normal start-up and shutdown (or emergency shutdown) of the generator set; 3.6 Causes of lubricating oil reduction; 3.7 Causes of oil deterioration; 3.8 Causes of cooling water interruption or cooling water pressure reduction; 3.9 Causes of the fault where the guide vane failing to move due to foreign bodies or mechanical jamming between guide vanes; 3.10 Causes of the fault where the pressure of water flow on the guide vane increases when the guide vane is opened or closed too fast. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The output monitoring and analysis of hydraulic turbines are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE OPERATION MANAGEMENT OF ELECTROMECHANICAL EQUIPMENT	**DUTY NO.**	**704**
TASK TITLE	CARRY OUT THE MONITORING AND ANALYSIS OF THE GENERATOR PARAMETERS	**TASK NO.**	**7042**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the monitoring and analysis of the generator parameters in accordance with technical requirements and maintenance regulations.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Components and parts of generators.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Monitor the electrical parameters; 2. Monitor the active power, reactive power and frequency; 3. Monitor the stator voltage and currents; 4. Monitor the rotor voltage and currents; 5. Monitor the cooling medium; 6. Monitor the stator winding (interlayer) temperature and iron core temperature; 7. Monitor the outlet temperature of stator winding cooling water and cooling water pressure; 8. Monitor the flow, hydrogen temperature, and the inlet and outlet water temperature of hydrogen coolers;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Processing generator monitoring parameters; 1.2 Analyze the causes of generator abnormality. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of monitoring generator parameters; 2.2 Principles of generator abnormality. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Monitoring analysis of active power, reactive power and frequency; 3.2 Monitoring analysis of stator voltage and currents;

9. Monitor the mechanical parameters; 10. Monitor the hydrogen pressure and sealing oil pressure in the machine; 11. Monitor the bearing temperature; 12. Monitoring of axial vibration. 13. Analyze the obtained data 14. Observe health occupational and environmental safety rules and regulations	3.3 Monitoring analysis of rotor voltage and currents; 3.4 Monitoring analysis of stator winding (interlayer) temperature and iron core temperature; 3.5 Monitoring analysis of the outlet temperature of the stator winding cooling water and cooling water pressure; 3.6 Monitoring analysis of flow, hydrogen temperature, and the inlet and outlet water temperature of hydrogen coolers; 3.7 Monitoring analysis of hydrogen pressure and sealing oil pressure in the machine; 3.8 Monitoring analysis of bearing temperature. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The monitoring and analysis of the generator parameters are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE OPERATION MANAGEMENT OF ELECTROMECHANICAL EQUIPMENT	**DUTY NO.**	**704**
TASK TITLE	ANALYZE THE OPERATING STATE OF GENERATOR SETS AND CARRY OUT TROUBLESHOOTING	**TASK NO.**	**7043**
PERFORMANCE CRITERIA	The person performing this task must be able to analyze the operating state of generator sets and carry out troubleshooting in accordance with technical requirements and maintenance regulations.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Components and parts of generators.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Handle generator overload; 2. Handle the one-point grounding fault of generator rotors; 3. Handle the two-point grounding fault of rotor circuits; 4. Handle the over-high temperature of generators; 5. Handle the disconnection of generator rotor circuits; 6. Handle the grounding fault of generator stators; 7. Handle the smoke and fire of generators. 8. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Analyze the running status of electromechanical equipment; 1.2 Troubleshoot the operation failure of generator sets. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of electromechanical equipment; 2.2 Principles of operation analysis of electromechanical equipment. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Causes of generator overload; 3.2 Causes of the one-point grounding fault of generator rotors; 3.3 Causes of the two-point grounding fault of rotor circuits; 3.4 Causes of the over-high temperature of generators; 3.5 Cause of the disconnection of generator rotor circuits; 3.6 Causes of the grounding fault of generator rotors; 3.7 Causes of smoke and fire of generators. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The operating state of generator sets is analyzed and the troubleshooting are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF SPEED CONTROL SYSTEMS	**TASK NO.**	**7051**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of speed control systems in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the speed controller.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Handle the fault of new debugging programs during debugging; 2. Handle coil aging; 3. Handle the hydraulic value failing to meet the requirements; 4. Handle the poor contact between plug assemblies; 5. Handle the fault in the fixed rotational speed controller during debugging; 6. Handle the fault where foreign bodies enter parts and pipelines; 7. Handle external leakage; 8. Handle the lack of flexibility in the execution process; 9. Handle the fault in execution;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the speed control system; 1.2 Maintain the speed control system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of speed control systems; 2.2 Principles of the overhaul and maintenance of speed control systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Causes of coil aging;

10. Handle the multiple oil return angles for the pipeline; 11. Handle the oil leakage of seals; 12. Handle oil cleanliness reduction; 13. Handle unstable component operation. 14. Observe health occupational and environmental safety rules and regulations	3.2 Causes of hydraulic value failing to meet the requirements; 3.3 Causes of the poor contact between plug assemblies; 3.4 Causes of the fault where foreign bodies enter parts and pipelines; 3.5 Causes of external leakage; 3.6 Causes of the lack of flexibility in the execution process; 3.7 Causes of multiple oil return angles for the pipeline; 3.8 Causes of the oil leakage of seals; 3.9 Causes of oil cleanliness reduction; 3.10 Causes of unstable component operation. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of speed control systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND THE MAINTENANCE OF EXCITATION SYSTEMS	**TASK NO.**	**7052**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of excitation systems in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the excitation system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Clean the screen cabinet; 2. Conduct insulation inspection; 3. Conduct signal tests; 4. Conduct the FCB test; 5. Conduct the detection of excitation transformers; 6. Conduct the dummy load test; 7. Conduct the excitation test; 8. Conduct the automatic and manual adjustment range test; 9. Conduct the current sharing inspection; 10. Conduct te verification of volts/hertz limiting; 11. Set the over-excitation limit; 12. Conduct the PT disconnection.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the excitation system; 1.2 Maintain the excitation system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of excitation systems; 2.2 Principles of the overhaul and maintenance of excitation systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of cleaning the screen cabinet; 3.2 Methods of insulation inspection;

13. Observe health occupational and environmental safety rules and regulations	3.3 Methods of testing signals; 3.4 Methods of conducting the FCB test; 3.5 Methods of detecting excitation transformers; 3.6 Methods of conducting the dummy load test; 3.7 Methods of conducting the excitation test; 3.8 Methods of conducting the automatic and manual adjustment range test; 3.9 Methods of conducting the current sharing inspection; 3.10 Methods of verification of volts/hertz limiting; 3.11 Methods of setting the over-excitation limit; 3.12 Methods of conducting the PT disconnection. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of excitation systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF MAIN VALVES AND CRANES	**TASK NO.**	**7053**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of main valves and cranes in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of main valves and cranes.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Handle the fault in the main valve; 2. Handle the system fault; 3. Handle the abnormal valve strength; 4. Handle the damage of plates; 5. Handle the fault in the crane; 6. Handle the fault in the transmission mechanism; 7. Handle the fault in the braking device; 8. Handle the fault in the metal structure; 9. Handle the fault in the electrical system. 10. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the main valve and crane; 1.2 Maintain the main valve and crane. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of main valves and cranes; 2.2 Principles of the overhaul and maintenance of main valves and cranes. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Causes of system faults; 3.2 Causes of abnormal valve strength;

	3.3 Causes of the damage of plates; 3.4 Causes of the fault in the transmission mechanism; 3.5 Causes of the fault in the braking device; 3.6 Causes of the fault in the metal structure; 3.7 Causes of the fault in the electrical system. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of main valves and cranes are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF BOOSTER SYSTEMS	**TASK NO.**	**7054**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the booster systems in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the booster system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Prevent insulating oil from absorbing moisture or being covered with dust, resulting in the reduction of insulation performance; 2. Ensure that the lighting, heat dissipation and dust removal equipment around the transformer are in good condition; 3. Ensure the flexible operation and good contact of load switches on the high voltage side of transformers; 4. Carry out the trial operation of transformers; 5. Obtain the assistance of local power departments to check the performance of new oil during oil replacement;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the booster system; 1.2 Maintain the booster system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of booster systems; 2.2 Principles of the overhaul and maintenance of booster systems. **3.0 Theories** The person performing this task must be able to explain the following:

6. Measure the insulation resistance value (to ground and between phases) of high and low voltage coils of transformers with meggers; 7. Ensure a good grounding wire in the high-voltage generator or combined head. 8. Observe health occupational and environmental safety rules and regulations	3.1 Methods of preventing insulating oil from absorbing moisture or being covered with dust, resulting in the reduction of insulation performance; 3.2 Methods of ensuring that the lighting, heat dissipation and dust removal equipment around the transformer are in good condition; 3.3 Methods of ensuring the flexible operation and good contact of load switches on the high voltage side of transformers; 3.4 Methods of carrying out the trial operation of transformers; 3.5 Methods of oil replacement; 3.6 Methods of measuring the insulation resistance value (to ground and between phases) of high and low voltage coils of transformers with meggers; 3.7 Methods of ensuring a good grounding wire in the high-voltage generator or combined head. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of booster systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF POWER DISTRIBUTION SYSTEMS	**TASK NO.**	**7055**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the booster system in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the power distribution system.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Inspect the transformer; 2. Inspect the power capacitor; 3. Inspect the current transformer; 4. Inspect the DC system. 5. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the power distribution system; 1.2 Maintain the power distribution system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of power distribution systems; 2.2 Principles of the overhaul and maintenance of power distribution systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of inspecting the transformer; 3.2 Methods of inspecting the power capacitor;

	3.3 Methods of inspecting the current transformer; 3.4 Methods of inspecting the DC system. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of power distribution systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	M CARRY OUT THE ANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF WATER-OIL-GAS SYSTEMS	**TASK NO.**	7056
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of water-oil-gas systems in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the water-oil-gas system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Carry out the overhaul and maintenance of the water system; 2. Check the temperature and water pressure (or flow) of the cooled equipment; 3. Check the leakage and water hammer resonance in the pipe network system; 4. Check the oil level and color of the cooled equipment; 5. Check the air cooler and water filter; 6. Carry out the overhaul and maintenance of the oil system; 7. Accept the new oil; 8. Reserve the absolute oil; 9. Fill or refill the equipment with oil;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the water-oil-gas system; 1.2 Maintain the water-oil-gas system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of water-oil-gas systems; 2.2 Principles of the overhaul and maintenance of water-oil-gas systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of checking the temperature and water pressure (or flow) of the cooled equipment;

10. Discharge dirty oil from the equipment; 11. Conduct oil purification; 12. Conduct oil supervision, maintenance, sampling and testing; 13. Conduct the collection and processing of waste oil; 14. Carry out the overhaul and maintenance of the gas system; 15. Conduct the overhaul and maintenance of air compressors; 16. Conduct the overhaul and maintenance of gas supply pipe networks; 17. Conduct the overhaul and maintenance of measurement and control components; 18. Conduct the overhaul and maintenance of gas-consuming equipment. 19. Observe health occupational and environmental safety rules and regulations	3.2 Methods of checking the leakage and water hammer resonance in the pipe network system; 3.3 Methods of checking the oil level and color of the cooled equipment; 3.4 Methods of checking the air cooler and water filter; 3.5 Methods of accepting the new oil; 3.6 Methods of reserving the absolute oil; 3.7 Methods of filling or refilling the equipment with oil; 3.8 Methods of discharging dirty oil from the equipment; 3.9 Methods of oil purification; 3.10 Methods of oil supervision, maintenance, sampling and testing; 3.11 Methods of conducting the collection and processing of waste oil; 3.12 Methods of the overhaul and maintenance of air compressors; 3.13 Methods of the overhaul and maintenance of gas supply pipe networks; 3.14 Methods of the overhaul and maintenance of measurement and control components; 3.16 Methods of the overhaul and maintenance of gas-consuming equipment. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of water-oil-gas systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance;

	4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF THE RELAY PROTECTION SYSTEM	**TASK NO.**	**7057**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the relay protection system in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the relay protection system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the action of transfer switches and buttons; 2. Check the logo and name of components; 3. Check the meter, relay and wiring terminal screws of the panel cabinet; 4. Check the luminous plate and red and green indicator lights in the control room; 5. Check the voltage; 6. Check the microprocessor-based protector; 7. Check the wiring. 8. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the relay protection system; 1.2 Maintain the relay protection system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of relay protection systems; 2.2 Principles of the overhaul and maintenance of relay protection systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of checking the action of transfer switches and buttons;

	3.2 Methods of checking the logo and name of components; 3.3 Methods of checking the meter, relay and wiring terminal screws of the panel cabinet; 3.4 Methods of checking the luminous plate and red and green indicator lights in the control room; 3.5 Methods of checking the voltage; 3.6 Methods of checking the microprocessor-based protector; 3.7 Methods of checking the wiring. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of relay protection systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE OVERHAUL AND MAINTENANCE OF THE DC SYSTEM	**TASK NO.**	**7058**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the DC system in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the powerhouse of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the DC system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the signal indication; 2. Check the alarm system; 3. Check the meter indication; 4. Check the auxiliary system such as cooling and lighting; 5. Check the devices in the panel cabinet; 6. Check the environment and temperature. 7. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the DC system; 1.2 Maintain the DC system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of DC systems; 2.2 Principles of the overhaul and maintenance of DC systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of checking the signal indication; 3.2 Methods of checking the alarm system; 3.3 Methods of checking the meter indication;

	3.4 Methods of checking the auxiliary system such as cooling and lighting; 3.5 Methods of checking the devices in the panel cabinet; 3.6 Methods of checking the environment and temperature. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of DC systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE MANAGEMENT AND MAINTENANCE OF AUXILIARY EQUIPMENT	**DUTY NO.**	**705**
TASK TITLE	CARRY OUT THE LIGHTNING PROTECTION AND GROUNDING SYSTEM MAINTENANCE	**TASK NO.**	**7059**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the overhaul and maintenance of the lightning protection and grounding system in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the lightning protection and grounding system.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the system wire corrosion; 2. Check the solder point of contact parts; 3. Conduct the grounding resistance test; 4. Conduct temporary checking after severe thunderstorm; 5. Check the grounding electrode in the corrosive soil. 6. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Overhaul the lightning protection and grounding system; 1.2 Maintain the lightning protection and grounding system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of lightning protection and grounding systems; 2.2 Principles of the overhaul and maintenance of lightning protection and grounding systems. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Methods of checking the system wire corrosion; 3.2 Methods of checking the solder point of contact parts; 3.3 Methods of conducting the grounding resistance test; 3.4 Methods of temporary checking after severe thunderstorm; 3.5 Methods of checking the grounding electrode in the corrosive soil. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The overhaul and maintenance of lightning protection and grounding systems are carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE OPERATION MANAGEMENT OF MANAGEMENT SYSTEMS	**DUTY NO.**	**706**
TASK TITLE	CARRY OUT THE OPERATION MANAGEMENT OF MONITORING SYSTEMS	**TASK NO.**	**7061**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the operation management of monitoring systems in accordance with technical requirements and maintenance regulations to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the monitoring system.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Conduct the operation management of electrical equipment; 2. Conduct the maintenance of generators; 3. Conduct the maintenance of transformers; 4. Conduct daily data recording and monitoring analysis; 5. Analyze the information content of abnormal equipment in the data; 6. Conduct the comparative analysis of manual and automatic observation data; 7. Record the original data and basic information of electrical equipment;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Operate the monitoring system; 1.2 Maintain the monitoring system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of monitoring systems; 2.2 Management principles of monitoring systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of maintaining the generator; 3.2 Methods of maintaining the transformer;

8. Record the main appendix data. 9. Observe health occupational and environmental safety rules and regulations	3.3 Methods of analyzing the information content of abnormal equipment in the data; 3.4 Methods of comparative analysis of manual and automatic observation data; 3.5 Methods of recording the original data and basic information of electrical equipment; 3.6 Methods of recording the main appendix data. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The operation management of monitoring systems is carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT THE OPERATION MANAGEMENT OF MANAGEMENT SYSTEMS	**DUTY NO.**	**706**
TASK TITLE	CARRY OUT THE OPERATION MANAGEMENT OF COMMUNICATION SYSTEMS	**TASK NO.**	**7062**
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the operation management of communication systems in accordance with technical requirements and operation specifications to ensure safe and stable operation.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Safety protection equipment and emergency tools; 2. Parts of the communication system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Operate the instation communication network; 2. Operate the protection device of the existing strata; 3. Operate the measurement and control device; 4. Operate the automatic device; 5. Operate the tele-control communication interface; 6. Collect the protection, measurement and control, and IED device information; 7. Send the corresponding device to execute. 8. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Operate the communication system; 1.2 Manage the communication system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Operating principles of communication systems; 2.2 Management principles of communication systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of operating the protection device of the existing strata;

	3.2 Methods of operating the measurement and control device; 3.3 Methods of operating the automatic device; 3.4 Methods of collecting the protection, measurement and control, and IED device information; 3.5 Methods of sending the corresponding device to execute. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The operation management of communication systems is carried out in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	OPTIMIZE THE HYDROPOWER STATION OPERATION MANAGEMENT	**DUTY NO.**	**707**
TASK TITLE	REGULATE OPTIMALY THE RESERVOIRS OF THE HYDROPOWER STATION	**TASK NO.**	**7071**
PERFORMANCE CRITERIA	The person performing this task must be able to regulate optimally the reservoirs of hydropower station in accordance with technical requirements and operation specifications.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Computer and its operating system; 2. Statistical analysis software. 3. Safety gear		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Carry out reservoir regulation in accordance with the optimal regulation principle of reservoirs; 2. Draw the reservoir regulation map; 3. Formulate the reservoir regulation scheme; 4 Optimize the power generation dispatching scheme; 5. Prepare the reservoir regulation operation plan; 6. Calculate and evaluate the operation benefit indicator of hydropower stations. 7. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Carry out the optimal regulation of reservoirs; 1.2 Formulate the regulation scheme. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Characteristics of reservoir regulation and principles of regulation operation; 2.2 Principles of the optimal regulation of reservoirs. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Water balance analysis theories; 3.2 Mathematical statistics theories;

	3.3 Regulation map drawing methods; 3.4 Hydro-energy calculation and analysis methods; 3.5 Calculation theories of flood control regulation; 3.6 Linear/dynamic programming theories. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The reservoirs of the hydropower stations are optimally regulated in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

OCCUPATION	RENEWABLE ENERGY ENGINEER (HYDRO)	**OCCUPATION CODE**	
DUTY TITLE	OPTIMIZE THE POWER STATION OPERATION MANAGEMENT	**DUTY NO.**	**707**
TASK TITLE	ENSURE ECONOMIC OPERATION IN HYDROPOWER STATIONS	**TASK NO.**	**7072**
PERFORMANCE CRITERIA	The person performing this task must be able to ensure the economic operation in hydropower stations in accordance with relevant national laws and regulations.		
RANGE STATEMENT	The task can be performed in the power house of hydropower stations under the supervision of water conservancy and hydropower engineer. The tools and equipment to be used include: 1. Computer and its operating system; 2. Statistical analysis software. 3. Safety gear		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Draw the dynamic property curve of the generator set; 2. Carry out the dynamic property test of the generator set; 3. Allocate the optimal load of the generator set; 4. Formulate the work plan of the generator set. 5. Observe health occupational and environmental safety rules and regulations	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Carry out the economic operation in hydropower stations. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of economic operation in hydropower stations; 2.2 Theories of dynamic properties of generator sets; 2.3 Principles of optimal load allocation of generator sets; 2.4 Preparation procedures of the work plan of generator sets. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Judging methods of dynamic properties of generator sets in hydropower stations; 3.2 Methods of optimal load allocation of generator sets. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The economic operation in hydropower stations is ensured in accordance with technical requirements and the operation and maintenance manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Regulations and detailed rules of the local government; 3. Operation procedures of equipment maintenance; 4. Hydro-geographical environment and climate.

APPENDIX: DACUM CHART FOR RENEWABLE ENERGY ENGINEER (HYDRO) – NTA LEVEL 7

DUTIES	TASKS	ENABLERS
1.0 Conduct the operation management of hydraulic structures	1.1 Monitor and analyze seepage pressure of hydraulic structures. 1.2 Monitor and analyze the external deformation of the dam surface of the hydraulic structures.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings. · Office software operation skills **Tools and equipment** · Computer and its operating system · Safety protection equipment and emergency tools · Piezometer tubes · osmometers · Strain meters; joint meters **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Teamwork spirit · Honesty and trustworthiness

DUTIES	TASKS	ENABLERS
		· Time management · Better safety consciousness · High professional ethics
2.0 Carry out the management and maintenance of metal structures of the hydropower stations	2.1 Carry out the of overhaul and maintenance of the penstocks of the hydropower stations. 2.2 Carry out the overhaul and maintenance of gates, hoists and trash racks of the hydropower stations.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings · Office software operation skills **Tools and equipment** · Computer and its operating system · Safety protection equipment and emergency tools · Strain meters; flowmeters · Metal structure parts **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Teamwork spirit · Honesty and trustworthiness · Time management

DUTIES	TASKS	ENABLERS
		· Better safety consciousness · High professional ethics
3.0 Carry out the environmental quantity monitoring of hydropower stations	3.1 Carry out the environmental quantity monitoring of hydropower stations.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings · Office software operation skills **Tools and equipment** · Computer and its operating system · Statistical analysis software · Safety protection equipment and emergency tools · Water gauges · Rain gauges **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Teamwork spirit · Honesty and trustworthiness · Time management

DUTIES	TASKS	ENABLERS
		· Better safety consciousness · High professional ethics
4.0 Carry out the operation management of electromechanical equipment	4.1 Carry out the output monitoring of hydraulic turbines and cause analysis. 4.2 Carry out the monitoring of generator parameters and cause analysis. 4.3 Analyze the operating state of generator sets and carry out troubleshooting.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings · Office software operation skills **Tools and equipment** · Computer and its operating system · Safety protection equipment and emergency tools · Components and parts of generators · Hydraulic turbine parts **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Teamwork spirit · Honesty and trustworthiness · Time management

DUTIES	TASKS	ENABLERS
		· Better safety consciousness · High professional ethics
5.0 Carry out the management and maintenance of auxiliary equipment	5.1 Carry out the overhaul and maintenance of speed control systems. 5.2 Carry out the overhaul and maintenance of the excitation systems. 5.3 Carry out the overhaul and maintenance of the main valves and cranes. 5.4 Carry out the overhaul and maintenance of the booster systems. 5.5 Carry out the overhaul and maintenance of the power distribution systems. 5.6 Carry out the overhaul and maintenance of water-oil-gas systems. 5.7 Carry out the overhaul and maintenance of the relay protection system. 5.8 Carry out the overhaul and maintenance of the DC system. 5.9 Carry out the Lightning protection and grounding system maintenance.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings · Office software operation skills **Tools and equipment** · Computer and its operating system · Safety protection equipment and emergency tools · Components and parts of generators · Hydraulic turbine parts **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Honesty and collaboration · Teamwork spirit · Better safety consciousness

DUTIES	TASKS	ENABLERS
6.0 Carry out the operation management of management systems	6.1 Carry out the operation management of monitoring systems. 6.2 Carry out the operation management of communication systems.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings · Office software operation skills **Tools and equipment** · Computer and its operating system · Safety protection equipment and emergency tools **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Teamwork spirit · Honesty and trustworthiness · Time management · Better safety consciousness · High professional ethics
7.0 Optimize the hydro power	7.1 Regulate optimally the reservoirs of the hydropower stations.	**General skills and knowledge** · Communication skills

DUTIES	TASKS	ENABLERS
station operation management	7.2 Ensure economical operation in hydropower stations.	· Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings · Office software operation skills **Tools and equipment** · Computer and its operating system · Safety protection equipment and emergency tools **Materials** · Office software · Printers and calculators · Drawings and documents · Corresponding specifications · Operation and maintenance manual **Requirements for employees** · Diligence in learning · Hard working · Scientific spirit and rigor · Teamwork spirit · Honesty and trustworthiness · Time management · Better safety consciousness · High professional ethics