QUALIFICATION FILE

Water Technology

☒ Short Term Training (STT) ☐ Long Term Training (LTT) ☐ Apprenticeship

☐ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

☐General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☐ Future Skills

NCrF/NSQF Level: 4.5

Submitted By:

Skill Council for Green Jobs

Chief Executive Officer
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Contents

Section 1: Basic Details

1.	**Qualification Name**	**Water Technology**	
2.	**Sector/s**	**Environmental Science**	
3.	**Type of Qualification: ☒ New ☐ Revised ☐ Has Electives/Options**	**NQR Code & version of existing/previous qualification: Not Applicable**	**Type of Qualification: ☒ New ☐ Revised ☐ Has Electives/Options**
4.	**a. OEM Name** **b. Qualification Name** (Wherever applicable)	Not Applicable	
5.	**National Qualification Register (NQR) Code &Version**	**QG-4.5-ES-01816-2024-V1-SCGJ** & version 1	**6. NCrF/NSQF Level:** 4.5
7.	**Award (Certificate/Diploma/Advance Diploma/ Any Other**	Certificate	
8.	**Brief Description of the Qualification**	The individual on the qualification would be specialized to observe, identify, report, maintain, repair equipment and control processes at the water treatment plant and across the networks. The individual would work within sewer networks, for wastewater and sludge treatment in local or industrial wastewater treatment plants. He/She would carry out their work independently based on technical documents, regulations, and legal requirements. They acquire information, plan, and coordinate their work.	
9.	**Eligibility Criteria for Entry for Student/Trainee/Learner/Employee**	**a. Entry Qualification & Relevant Experience:**	

S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)
1	Completed 1st year of UG (UG Certificate)	NA
2	12th grade pass	1 year of relevant experience in concerned sector like water management

		3	10th equivalent (Academic)	1 year of relevant experience in concerned sector like water management
		4	Previous relevant Qualification of NSQF Level 4.0	1.5 year of relevant experience in concerned sector like water management

b. Age: 18

10	**Credits Assigned to this Qualification, Subject to Assessment** (as per National Credit Framework (NCrF))	17	**11. Common Cost Norm Category:** **I**
12	**Any Licensing requirements for Undertaking Training on This Qualification** (wherever applicable)	NA	
13	**Training Duration by Modes of Training Delivery** (Specify **Total Duration** as per selected training delivery modes and as per requirement of the qualification)	☒**Offline** ☐**Online** ☐**Blended**	

Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)
Classroom (offline)	245	205	60		510
Online					

(Refer Blended Learning Annexure for details)

14	**Aligned to NCO/ISCO Code/s** (if no code is available mention the same)	NCO-2015/3435.0500
15	**Progression path after attaining the qualification** (Please show Professional and Academic progression)	Vertical Progression: Not Applicable
16	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	**Hindi**
17	**Is similar Qualification(s) available on NQR-if yes, justification for this qualification**	**☐ Yes ☒ No**
18	**Is the Job Role Amenable to Persons with Disability**	**☒ Yes ☐ No** **If "Yes", specify applicable type of Disability:** **☒ Deaf ☒ Hard of Hearing ☒ Acid Attack Victims ☒ Dwarfism**
19	**How Participation of Women will be Encouraged**	The programme would be proposed to be incorporated in women ITIs and diploma colleges to train women candidates on the job role. TPs shall be encouraged to onboard at least a certain number of female candidates in each batch
20	**Are Greening/ Environment Sustainability Aspects Covered** (Specify the NOS/Module which covers it)	**☒ Yes ☐ No**
21	**Is Qualification Suitable to be Offered in Schools/Colleges**	**Schools ☐ Yes ☐ No Colleges ☒ Yes ☐ No**
22	**Name and Contact Details of Submitting / Awarding Body SPOC**	**Name:** Dr. Praveen Saxena **Email:** ceo@sscgj.in **Contact No.:** 9871119101 **Website: https://sscgj.in/**

	(In case of CS or MS, provide details of both Lead AB & Supporting ABs)		
23	**Final Approval Date by NSQC: 06.02.2024**	**24. Validity Duration:** 2 years	**25. Next Review Date: 05.02.2026**

Section 2: Module Summary

S. No	NOS/Module Name	NOS/Module Code & Version *(if applicable)*	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) *(if applicable)*
1.	Introduce water treatment fundamentals	SGJ/N4060 Version 1	Core	4.5	2	40	20			60	28	22			50	12
2.	Identify components of wastewater treatment plant	SGJ/N4061 Version 1	Core	4.5	2	30	30			60	23	27			50	13
3.	Assess water quality	SGJ/4062 Version 1	Core	4.5	3	45	45			90	25	25			50	12
4.	Operate and maintain water treatment plants	SGJ/N4063 Version 1	Core	4.5	3	45	45			90	21	29			50	13
5.	Identify and use tools and tackles used in water treatment facility	SGJ/N4064 Version 1	Core	4.5	2	30	30			60	25	25			50	12
6.	Explain environment protection regulations and sustainable practices in wastewater treatment	SGJ/N4065 Version 1	Core	4.5	1	15	15			30	30	20			50	13
7.	Perform health and safety measures in water treatment plant	SGJ/N4053 Version 1	Core	4.5	1	10	20			30	25	25			50	12
8.	Employability Skills(30 hours)	DGT/VSQ/N0101	Core	2	1	30				30	20	30			50	13
9.	On the Job Training				2			60		60						
Duration (in Hours) / Total Marks					17	245	205	60		**510**	197	203			400	100

NOS/s of Qualifications

(In exceptional cases these could be described as components)

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

***Th.**-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended **Proj.**-Project*

Assessment - Minimum Qualifying Percentage

Minimum Pass Percentage – Aggregate at qualification level: 70 % *(Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)*

Section 3: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	Graduate/Diploma (Technical) with Two years of experience in a water treatment/waste water treatment processes/relevant experience Or Certified under relevant Craft Instructor Training Scheme (CITS) course
2.	**Master Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	Engineering Graduate with 5 years of Water treatment
3.	**Tools and Equipment Required for Training**	☒Yes ☐No (*If "Yes", details to be provided in Annexure)*
4.	**In Case of Revised Qualification, Details of Any Upskilling Required for Trainer**	Not Applicable

Section 4: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Graduate/Diploma (Technical) with Ten years of relevant experience in Water Technology Or Have worked as a Jury member/expert in skill competitions and other competitions of similar nature at regional/national levels Or Trained/mentored competitors for India Skills/ WorldSkills competitions (national/ international)

2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Graduate/Diploma (Technical) with Three years of relevant experience in Water Technology Or Certified under relevant Craft Instructor Training Scheme (CITS) course
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Graduate/Diploma (Technical) with 12 years of relevant experience in Water Technology
4.	**Assessment Mode** *(Specify the assessment mode)*	Online and offline both
5.	**Tools and Equipment Required for Assessment**	☒ Same as for training ☒ Yes ☐ No *(details to be provided in Annexure-if it is different for Assessment)*

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	**Latest Skill Gap Study (not older than 2 years) (Yes/No):** No
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No):** Yes, following key documents are available in the public domain a. https://scroll.in/article/1020102/indias-water-management-programmes-havent-cultivated-water-security-or-meaningful-livelihoods b. https://www.niti.gov.in/sites/default/files/2022-09/Waste-Water-A4_20092022.pdf
3.	**Government /Industry initiatives/ requirement (Yes/No):** Yes, Various studies conducted in India have observed that people are hesitant to accept wastewater treatment due to a lack of awareness and education. Interestingly it has also been observed that the significant source of information for these households was their school-going kids (TERI, 2020). Thus, it is important to create awareness amongst school students to leverage wastewater management in this location as a model for others in India. Various school-level competitions and exhibitions can improve in expanding the knowledge and transfer this knowledge to individual households to educate and sensitize the issues related to wastewater management. Awareness raising is needed to involve a minimum level of citizens' cooperation. National awareness programs and fairs can help educate citizens and the Community towards sensitization of wastewater management. One way should be in the form of sanitation drives which can be conducted regularly to sensitize the Community, build engagement, and motivate them to adopt good health practices. The awareness program should also focus on two urgent reasons related to wastewater treatment, i.e., health and the environment, which are often neglected. According to the 2015 report of the CPCB, India can

	treat approximately only about 30% of its wastewater, most of it in urban India (CPCB 2015). An urgent need for community participation and government and private initiatives such as awareness programs are the needs of the hour.
4.	**Number of Industry validation provided:** Waived off as per Worldskills Requirement
5.	**Estimated nos. of persons to be trained and employed:** NA
6.	**Evidence of Concurrence/Consultation with Line Ministry/State Departments:** If "No", why: industry validation and line ministry concurrence for these skills may be waived off for World Skills Qualifications as per 33rd NSQC committee

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	**Annexure:** NCrF/NSQF level justification based on NCrF level/NSQF descriptors *(Mandatory)*	Annexure: Evidence of Level
2.	**Annexure:** List of tools and equipment relevant for qualification *(Mandatory, except in case of online course)*	Annexure: Tools and Equipment (Lab Set-Up)
3.	**Annexure:** Detailed Assessment Criteria *(Mandatory)*	Annexure: Detailed Assessment Criteria (Mandatory)
4.	**Annexure:** Assessment Strategy *(Mandatory)*	Annexure: Assessment Strategy
5.	**Annexure:** Acronym and Glossary *(Optional)*	Annexure: Acronym and Glossary
6.	**Supporting Document:** Model Curriculum *(Mandatory – Public view)*	Attached
7.	**Supporting Document:** Career Progression *(Mandatory - Public view)*	Annexure: Career progression and OM
8.	**Supporting Document:** Occupational Map *(Mandatory)*	Annexure: Career progression and OM
9.	**Supporting Document:** Assessment SOP *(Mandatory)*	Annexure: Assessment Strategy

Annexure: Evidence of Level

Title/Name of qualification/component: Water Technology		Level: 4.5	
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
Professional Theoretical Knowledge/ Process	The Job Holder would have a knowledge specific to water technology. • types of filter bed • types of ion exchangers • sampling and testing techniques, inspection procedures • chemicals used in plant (chlorine, PAC), process of sedimentation and • desludging carried out in small clari flocculator tank • regular and periodic inspection for unusual sound in pumps, leakages in pipes, soil in filter beds, back wash of filter beds · tools and equipment used in testing, repair and maintenance · isolation of system during emergency situations and steps to be taken · importance of reporting problems in a timely manner · meaning of "hazards" and "risks" · health and safety hazards commonly present in the work environment and related precautions · methods of accident prevention · various dangers associated with the use of electrical equipment · safe handling and disposal of hazardous power plant wastes · various safety procedures and equipment used to work at heights, trenches and confined places · importance of using protective clothing/equipment and other insulated work gear while handling electrical system and equipment · precautionary measures taken to prevent fire accident · different methods of extinguishing fire · different materials used for extinguishing fire · emergency rescue techniques applied during a fire hazard	The individual would have a knowledge specific to processes of Water Treatment and Wastewater facility Since the individual's working knowledge is limited in familiar, routine & predictable context of water treatment process rather than encompasses jobs for setting up various components of a plant providing relevant solutions. The job holder is not required to exhibit factual & and theoretical knowledge in contexts within the Water Treatment and Wastewater treatment and other associated components, etc. S/he is justified to be placed at NSQF Level 4.5. Since individual is required to have knowledge of procedure both in routine and non-routine contexts and required to have water treatment knowledge and quality of range of issues. He/she can't be placed at level 4.5. Since the individual doesn't require to have complete knowledge on quality of Water Treatment and Wastewater. Individual doesn't require to know various sub-sections of the Water Treatment and Wastewater plant. Thus, considering the scope of work the job holder cannot be placed at Level 4.5.	4.5

Title/Name of qualification/component: Water Technology		Level: 4.5	
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
	· various types of safety signs and what they mean · rescue techniques applied during fire hazards · good housekeeping in order to prevent fire hazards · correct use of a fire extinguisher		
Professional and Technical Skills/ Expertise/ Professional Knowledge	The individual is expected to exhibit basic skills to identify and use of specific tools required for monitor operating conditions, meters, and gauges to ensure smooth functioning of the overall system □ dispose waste water safely in an environment-friendly manner □ inspect the plant for any leakage along with water levels in the tank □ ensure quality of water by checking various impurities are within the permissible limits □ ensure turbidity, total dissolved solids within permissible limits after disinfection of water	The Job holder is expected to possess factual knowledge and skills related to Water Treatment and Wastewater treatment, he/she need not to demonstrate troubleshoot activities related to water treatment plant dysfunction. Therefore she/he is placed at level 4.5. Since the individual have to have specialized technical skill and would perform broad range of activities and need to possess specific skill and expertise about Water Treatment and Wastewater that required work with precision in estimated timeline, S/he can't be placed at level 4.5. Since he/she doesn't required to possess specialized skills or multidisciplinary approach to handle any problem like water leakage/seepage but only able to identify the leakage/seepage and communicate to senior official, this cannot be placed at level 4.5.	4.5

Title/Name of qualification/component: Water Technology		Level: 4.5	
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	The individual is expected to work within a team of one unit i.e Water Treatment and Wastewater unit, she/he would be having intermediate numeracy skill to read technical sheet of input and output of machineries. Water Technology work within sewer networks, for wastewater and sludge treatment in local or industrial wastewater treatment plants. As with Water Technology, they carry out their work independently based on technical documents, regulations, and legal requirements. They acquire information, plan, and coordinate their work. They document their work and take measures to ensure quality assurance, safety, good health, and environmental protection at work. They may be electro-technically qualified personnel. They may work in local or industrial wastewater treatment facilities in a wide range of technical roles, or as the manager	The Job holder is expected to possess a limited range of practical skills to accomplish tasks and communicate identified problems to senior officer. So it is placed at level 4.5. Since the individual will have to have good communication skill and good skill for accurate working with mathematical calculations and would require to use basic digital tool associated with Water and Wastewater treatment unit, S/he can't be placed at level 4.5. Since person is not expected to ensure effective functioning of water treatment process and only required to communicate local language. He/She is expected to build a team to cater specific problem. This cannot be placed at level 4.5.	4.5
Broad Learning Outcomes/ Core Skill	The individual is expected to carryout job in familiar context of specific tools/equipment. He/she able to understand risk and safety guideline with in the water treatment facility. Water Technology work in local water supply facilities and industrial Water Treatment and Wastewater plants.	The Job holder is expected to be perform required skills with little instruction. She/he not required rigorous training to perform job. Thus, considering the core skills, s/he can be placed at Level 4.5. Since the individual will have to carry out specialized job and should have clean understanding of safety guideline as output of a Water Treatment and Wastewater process which require necessary safety	4.5

Title/Name of qualification/component: Water Technology		Level: 4.5	
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
	They carry out their work independently based on technical documents, rules, and legal requirements. Water Technology collect information, plan, and coordinate their own work. They document their work and take measures to ensure quality assurance, safety, health, and environmental protection. They may work in large or small facilities for processing drinking water, performing a range of technical duties or management roles in the plants.	and follow specified safety guideline. He/she should possess information about associated risk, S/he can't be placed at level 4.5 She/he is not required to collect and organize information of the Water Treatment and Wastewater facility to prepare solutions. He/she not expected to exhibit core skills to understand socio-political environment. S/he can't be placed at Level 4.5.	
Responsibility	The individual is primarily responsible for handle and operate Water and Wastewater treatment plant safely and maintaining quality of water. Water and Wastewater treatment specialist work within sewer networks, for wastewater and sludge treatment in local or industrial wastewater treatment plants. As with Water and Wastewater Treatment specialist, they carry out their work independently based on technical documents, regulations, and legal requirements. They acquire information, plan, and coordinate their work.	Job Holder is responsible for his/ her own work as s/he has to perform water treatment and responsible in limited context. Considering the responsibilities, the individual can be placed at level 4.5. Since the individual works as a specialist, takes help from assistants and is also able to assist in planning of routine and predictable tasks of Water and Wastewater treatment plant. He/she also share the responsibility of Water and Wastewater treatment, he/she can't be placed at level 4.5 He/she is not to ensure proper operation of the Water and Wastewater treatment plant. She/he is not responsible for passing knowledge and skills to his/ her sub-ordinate. the individual cannot be placed at level 4.5.	4.5

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

S.No	Product and Specification	Quantity
1	Lab Table - complete set, with at least 3 drawers, at least 3 power sockets, at least 2 shelves	1 pc per Competitor
2	Table with sink and shelf in the bottom	1 pc per Competitor
3	Plastic container 20 L wit plastic tap	1 pc per Competitor
4	Plastic container 20 L	2 pc per Competitor
5	Wash bottle (plastic, 500 mL)	3 pc per Competitor
6	Burette Stand with a metal clamp	1 pc per Competitor
7	Pipette stand	1 pc per Competitor
8	Magnetic stirrer (with 6 magnetic bars, 1cm length)	1 pc per Competitor
9	Pump station incl. Pneumatic driven valve	1 pc per 2 Competitors
10	EDS Water Management "Wastewater transport station"	1 pc per Competitor
11	Water supply tank/ground water	1 pc per Competitor
12	EduKit PA Basic	1 pc per Competitor
13	EduKit PAAdvanced	1 pc per Competitor
14	EasyPort USB	1 pc per Competitor
15	I/O data cable with SysLink connectors	1 pc per Competitor
16	Analog cable, parallel	1 pc per Competitor
17	Trolley with plate	3 pc per Competitor
18	Tabletop power supply unit	2 pc per Competitor
19	Pipe and tubing cutter	1 pc per Competitor
20	Watering Can (5-101)	1 pc per Competitor
21	Hose (40 m)(0.5 inch in diameter)	3 pc per Skill
22	Crane	1 pc per 2 Competitors

23	Cylinder (1000 ml)	1 pc per Competitor
24	Plastic container (10L)	1 pc per Competitor
25	Metal clamp, at least, 15 cm length	1 pc per Competitor
26	Cuvette stand	1 pc per Competitor
27	Small timer	1 pc per Competitor
28	Sheckle screw pin	1 pc per 2 Competitor
29	Workbench with stainless steel frame for pump	1 pc per 2 Competitor
30	Pneumatic hose (silver Hose)	1 pc per Competitor
31	Box (container) for storage, size at least 400 x 400 x 300 mm	1 pc per Competitor
32	Sink siphon in PVC with (max. 50mm)	1 pc per Competitor
33	Compressor accessories	1 kit per Competitor
34	DC Wattmeter	1 pc per Competitor
35	Safebox for hazardous chemical substance	1 pc per Skill
36	EDS Water Management — Secret box granules	1 pc per Competitor
37	Table with sink and shelf in the bottom	2 pc per Skill
38	Emergency floor shower	2 pc per Skill
39	Burette (25 ml) with plastic tap	1 pc per Competitor
40	Modular Training Kit for water supply technology	1 kit per Competitor
41	Modular Training Kit for Wastewater Technology	1 kit per Competitor
42	Graduated pipette (20 mL)	5 pc per Competitor
43	Volumetric pipette (100 ml)	5 pc per Competitor
44	Suction Rubber for pipette. Three way suction ruber	1 pc per Competitor
45	Piston pipette (1 - 5mI)	1 pc per Competitor
46	pH meter with pH electrode (pH 4.00 pH 7.00)	1 pc per Competitor
47	Metal spoon for lab (16 to 22 cm in length)	1 pc per Competitor
48	Cylinder (250 ml)	3 pc per Competitor
49	Glass Pippete stand	1 pc per Competitor
50	Volumatic flask with lid (1000 ml)	1 pc per Competitor
51	Piston pipette (0.2 - 1mI)	1 pc per Competitor

52	Combination spanner 34mm	1 pc per Competitor
53	Double open end wrench width across flats 24 x 27 mm	1 pc per Competitor
54	Allen key set	1 kit per Competitor
55	Precision screwdriver assortment	1 kit per Competitor
56	Wire end ferrules crimper	1 pc per Competitor
57	Water pump pliers 10"	1 pc per Competitor
58	Water pump pliers 12"	1 pc per Competitor
59	Crimping tool for uninsulated connectors	1 pc per Competitor
60	Wire Stripping plier	1 pc per Competitor
61	Digital Multimeter	1 pc per Competitor
62	Yard stick	1 pc per Competitor
63	Carpet Knife	1 pc per Competitor
64	Isolated head screw driver set	1 kit per Competitor
65	Jaw Bench Vice (125mm)	1 pc per 2 Competitor
66	BIT ASSORTMENT	1 kit per Skill
67	VDE SCREWDRIVER SET	1 kit per Skill
67	Electrical insulation tape (Black)	15 pc per Skill
68	SET OF OFFSET SCREW KEYS	1 kit per Skill
69	SET OF TORX OFFSET SCREW KEYS	1 kit per Skill
70	SET OF TORX SOCKET SCREW KEYS	2 kit per Skill
71	Electric Drill (wireless)	1 kit per Skill
72	OIL BINDING CLOTH	5 boxes per Skill
73	Protective Glasses	5 pc per Skill
74	WORKING GLOVE	15 pc per Skill
75	Teflon tape-PRp	20 pc per Skill
76	Teflon tape	15 pc per Skill
77	Drills Set	2 kit per Skill
78	Electric Drill	2 kit per Skill
79	Silicone - 300mI	5 pc per Skill
80	Glass Funnel	5 pc per Competitor
81	Brush for glassware cleaning	1 pc per Competitor
82	Sponge for glassware cleaning	1 pc per Competitor
83	Glassware soap (5 L, phosphate-free)	3 bottles per Skill
84	Ambar glass bottle (500 mL with lid)	5 pc per Competitor

85	Ambar glass bottle (1000 mL with lid)	5 pc per Competitor
86	Clear glass bottle 500 mL with lid	5 pc per Competitor
87	Clear glass bottle (1000 mL with lid)	5 pc per Competitor
88	Vaseline	20 g per Skill
89	Buffer pH 4.0 (350 ml)	2 bottles per Competitor
90	Buffer pH 7.0 (350mI)	2 bottles per Competitor
91	Hellerman tape package, with at least 10 cm length (100pc/pck)	40 pc per skill
92	High absorption towel (mop towel)	3 pes per competitor
93	Plastic flask 20 mL for buffer solution	2 pc per Competitor
94	Eyewash bottle (500 mL)	1 pc per Competitor
95	Glass cuvette, square, 1 cm light path	2 pc per Competitor
96	PVC pipes kit for EDS and EduKit	2 kit per Competitor
97	Buffer pH 4.0 (350 ml)	2 bottles per Skill
98	Buffer pH 7.0 (350mI)	2 bottles per Skill
99	Sedimentation granules	1 bottle per Competitor
100	Methylene blue powder	300 g per Skill
101	Test Kit Hach 339 Nitrate	1 kit per Competitor
102	Test Kit Hach 350 Phosphate	1 kit per Competitor
103	Glass beaker 250mI for probe and waste	4 pc per Competitor
104	Hydrochloric acid (HCI) 0,1 mot/I	1 I per Skill
105	Distilled water	3 bottles per Competitor
106	Distilled water	10 bottles per Skill
107	Glass Beaker (1 Liter)	10 pc per Competitor
108	Glass Beaker (100 ml)	10 pc per Competitor
109	Erlenmeyer flask (250 ml)	10 pc per Competitor
110	Volumetric Flask with lid (100mI)	10 pc per Competitor
111	Plastic dropper for, at least, 3 mL	5 pc per Competitor
112	Box with 100 pipette tips 0.2 - 1mI	2 boxes per Skill
113	Alcohol Prep Pad (100 pc/box)	30 boxes per Skill
114	Anionic flocculant polymer - powder	50 g per Skill

115	Cationic flocculant polymer - powder	50 g per Skill
116	Sulfuric acid (0.5 mol/L)	12 I per Skill
117	Standard phosphate solution 1.0 mg/L	3 I per Competitor
118	Standard Nitrate solution 1.0 mg/L	3 I per Competitor
119	Box with 100 pipette tips (1-5mI)	2 boxes per Skill

Classroom Aids

The aids required to conduct sessions in the classroom are:

Marker, chart and visual aid, Water treatment flowchart, raw material supply chain flow chart, Schematics of Water treatment plant;

Annexure: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

Refer NCVET "Guidelines for Blended Learning for Vocational Education, Training & Skilling" available on:
https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education,%20Training%20&%20Skilling.pdf

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline : Online Ratio
1	☒Theory/ Lectures - Imparting theoretical and conceptual knowledge	Not Applicable	Not Applicable
2	☒Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners		
3	☒Showing Practical Demonstrations to the learners		
4	☒Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training		
5	☒Tutorials/ Assignments/ Drill/ Practice		
6	☒Proctored Monitoring/ Assessment/ Evaluation/ Examinations		
7	☒On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training		

Annexure: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

NOS/Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks/Judgement	Practical Marks/Measurement	Project Marks	Viva Marks
SGJ/N4060.Introduce water treatment fundamentals	*Basics of water treatment processes*	**19**	**13**	**-**	**-**
	PC1. explain Overview of the water cycle and sources of wastewater and depict water cycle and sources of wastewater through pictures or videos	1	2	-	-
	PC2. discuss basics of Water Chemistry	2	-	-	-
	PC3. explain Objectives of water treatment	2	-	-	-
	PC4. explain parameters for water quality assessment	2	-	-	-
	PC5. discuss chemical properties of water	1	-	-	-
	PC6. discuss demineralization flow diagram, cation and anion exchangers mixed bed, regeneration of cation and anion exchangers and degasser and illustrate them through pictures or videos	1	3	-	-
	PC7. explain basic principles of electricity and illustrate with electrical control of machines and actuators	1	2	-	-
	PC8. discuss roles and responsibilities of a water treatment plant technician and prepare a list of roles and responsibilities	1	3	-	-
	PC9. discuss functions and objectives of a water treatment plant and showcase the stages of treatment along with flow diagram, schematic and layout of wastewater treatment plant	2	3	-	-
	PC10. discuss importance of wastewater treatment for environmental and public health protection	2	-	-	-
	PC11. give an overview of global water challenges	2	-	-	-
	PC12. discuss historical perspective and evolution of water treatment	2	-	-	-
	Sources of Waste water	**9**	**9**	**-**	**-**
	PC13. provide an overview of domestic wastewater generation	1	-	-	-

	PC14. discuss industrial wastewater generation and its diversity	2	-	-	-
	PC15. discuss types of industries producing wastewater (chemical, food processing, textile, etc.) and document the types and volumes of wastewater generated from these locations	1	2	-	-
	PC16. discuss characteristics of industrial wastewater: pollutants, toxic substances, pH variations, and temperature	2	-	-	-
	PC17. discuss industrial processes contributing to wastewater generation and show how residential wastewater is collected, treated, and disposed of in on-site septic systems	1	3	-	-
	PC18. discuss agricultural wastewater sources: irrigation, livestock farming, and crop processing	2	-	-	-
	PC19. organize field trips to different sources of wastewater such as residential areas, industrial sites, agricultural fields, and commercial establishments	-	2	-	-
	PC20. construct small models representing residential areas with different wastewater treatment systems (septic tanks, centralized sewer systems)	-	2	-	-
	NOS Total	**28**	**22**	**-**	**-**

SGJ/N4061.Identify components of wastewater treatment plant	*Introduce Wastewater Treatment Plant Components*	**23**	**27**	-	-
	PC1. discuss water cycle and its components and create scaled-down small models or diagrams representing various treatment plant components (e.g., primary clarifiers, aeration tanks, filtration systems)	2	4	-	-
	PC2. discuss groundwater and surface water interactions	2	-	-	-
	PC3. discuss and show materials required as metals, composites, plastics, etc. required for wastewater treatment	2	5	-	-
	PC4. discuss the basics of mechanical engineering (mechanics, sealing methods, gear technology, etc.)	2	-	-	-
	PC5. explain the primary treatment components and demonstrate the operation of primary and secondary clarifiers	2	3	-	-
	PC6. discuss types of filtration equipment and their application	2	-	-	-
	PC7. explain the Biological Treatment Systems and depict through pictures or Videos	2	5	-	-
	PC8. explain Tertiary Treatment Components	3	-	-	-
	PC9. discuss chemical addition processes like coagulation and disinfection	3	-	-	-
	PC10. discuss the Control and Automation Systems required in wastewater treatment	3	-	-	-
	PC11. set up a model demonstrating the aeration process	-	5	-	-
	PC12. show working of various Control and Automation Systems required in waste water treatment	-	5	-	-
	NOS Total	**23**	**27**	-	-

SGJ/N4062.Assess water quality		*Sampling techniques and testing Methods for water treatment*	**25**	**25**	**-**	**-**
		PC1. explain grab sampling and demonstrate techniques using sample bottles or containers	1	2	-	-
		PC2. discuss principles and procedures of grab sampling and show how to mix and create a composite sample for analysis	1	2	-	-
		PC3. discuss types of grab samples	2	-	-	-
		PC4. discuss Parameters for assessing water quality	2	-	-	-
		PC5. discuss drinking water treatment methods like filtration, disinfection and purification	2	-	-	-
		PC6. discuss water quality standards and Regulations	2	-	-	-
		PC7. discuss the process of membrane preparation	2	-	-	-
		PC8. explain sample container selection and preparation and Set up small automated sampling equipment (if available) and showcase its operation.	1	4	-	-
		PC9. discuss the importance of proper labeling and documentation	1	-	-	-
		PC10. explain physical testing methods	1	-	-	-
		PC11. discuss methods and instruments for physical parameter analysis and demonstrate different methods for sample preservation, such as adding preservatives or controlling temperature, to maintain sample integrity during transportation and storage	2	4	-	-
		PC12. explain laboratory techniques and equipment for chemical parameter analysis	2	-	-	-

	PC13. discuss Advanced Water Treatment Technologies like Membrane filtration (Reverse Osmosis, Ultrafiltration), Advanced oxidation processes, Desalination technologies	2	-	-	-
	PC14. discuss microbiological testing methods: membrane filtration, multiple tube fermentation, and other techniques	2	-	-	-
	PC15. discuss metals and toxic substances testing	2	-	-	-
	PC16. explain variations in sampling techniques at different stages of treatment	-	4	-	-
	PC17. perform tests for physical parameters like temperature, turbidity, and color using appropriate meters or instruments	-	4	-	-
	PC18. conduct chemical tests for parameters like pH, dissolved oxygen, and chemical oxygen demand (COD)	-	5	-	-
	NOS Total	**25**	**25**	**-**	**-**

SGJ/N4063.Operate and maintain water treatment plants	*Operation and Maintenance of water Treatment Plant*	**21**	**29**	-	-
	PC1. explain protocols for starting up and shutting down treatment processes	2	-	-	-
	PC2. discuss water supply systems and networks	2	-	-	-
	PC3. discuss overview of process control systems and their importance	2	-	-	-
	PC4. discuss about the monitoring of parameters for different treatment stages (pH, flow rates, etc.)	2	-	-	-
	PC5. discuss and monitor operating conditions, record instruments and gauges reading/operation data in the daily log sheets and maintain records	2	-	-	-
	PC6. explain daily, weekly and monthly checks list for equipment and process performance	2	-	-	-
	PC7. discuss O&M and troubleshooting of pumps & valves and conduct demonstrations to operate various equipment used in wastewater treatment plants, such as pumps, blowers, mixers, and valves	1	4	-	-
	PC8. discuss inspection and maintenance of conveyance systems (pipelines, channels) and show cleaning, lubrication and inspection procedures	1	4	-	-
	PC9. discuss the basic principles of sensor technology	1	-	-	-
	PC10. discuss basic calculations required within water and wastewater treatment network	1	-	-	-
	PC11. discuss the basic principles and functionality of closed loop technology	1	-	-	-
	PC12. discuss the basic principles of actuators	1	-	-	-
	PC13. discuss the water loss, leakage and its potential causes with solutions for prevention	1	-	-	-

	PC14. explain preventive and corrective maintenance practices for filters, tanks, gauges, pump, and valves, etc. in waste water treatment in time bound manner	1	4	-	-
	PC15. discuss recording and documentation of operational data	1	-	-	-
	PC16. demonstrate circuit, P&I-diagrams, operating manuals and instruction manuals	-	4	-	-
	PC17. operate the ion exchangers viz. anion exchanger, cation exchanger and mixed bed exchanger	-	4	-	-
	PC18. showcase the operation of pumps used in wastewater treatment	-	4	-	-
	PC19. prepare standard procedures for startup, shutdown of waste water treatment plant	-	3	-	-
	PC20. demonstrate maintenance tasks of treatment components like clarifiers, aeration tanks, filters, and disinfection systems	-	2	-	-
	NOS Total	**21**	**29**	**-**	**-**

SGJ/N4064.Identify and use tools and tackles used in water treatment facility	*Tools and tackles used in water treatment facility*	**25**	**25**	**-**	**-**
	PC1. discuss basic hand tools used in wastewater treatment and demonstrate the use of essential hand tools such as wrenches, screwdrivers, pliers, hammers, and saws	2	5	-	-
	PC2. discuss about the measuring and testing instruments used in wastewater treatment	4	-	-	-
	PC3. discuss about power tools such as drills, grinders and sanders and machinery used in wastewater treatment and showcase their usages	2	5	-	-
	PC4. discuss and demonstrate pipe cutting and welding tools and equipment used in wastewater treatment	2	5	-	-
	PC5. discuss about cleaning and maintenance tools used in wastewater treatment and demonstrate proper lubrication techniques using grease guns, oil dispensers, and lubrication systems	2	5	-	-
	PC6. discuss about lubrication tools and equipment used in wastewater treatment	3	-	-	-
	PC7. discuss about tool maintenance and storage practices	3	-	-	-
	PC8. discuss checking and detection of damaged tools	3	-	-	-
	PC9. explain the importance of tool maintenance and regular inspections	4	-	-	-
	PC10. demonstrate the calibration and use of measuring instruments like pressure gauges, flow meters, pH meters, and conductivity meters	-	5	-	-
	NOS Total	**25**	**25**	**-**	**-**

SGJ/N4065.Explain environment protection regulations and sustainable practices in wastewater treatment		*Overview of environmental regulations and sustainable practices in wastewater treatment*	**30**	**20**	-	-
		PC1. discuss and show the environmental impact of untreated wastewater through pictures or videos	2	5	-	-
		PC2. explain the impact of wastewater discharge on aquatic ecosystems	3	-	-	-
		PC3. discuss water conservation strategies and reduce, reuse, and recycle of water resources	3	-	-	-
		PC4. explain the methods and tools used in assessing environmental impacts	3	-	-	-
		PC5. give an overview of local, national and international regulations and present case studies or real-world examples of past regulatory violations related to wastewater	2	5	-	-
		PC6. discuss and showcase list of eco-friendly treatment methods for treating wastewater treatment	2	5	-	-
		PC7. discuss rainwater harvesting and storm water management	3	-	-	-
		PC8. discuss the concept of zero liquid discharge	4	-	-	-
		PC9. discuss and showcase the successful examples of environmentally friendly wastewater treatment projects	2	5	-	-
		PC10. discuss challenges in adopting sustainable wastewater treatment practices	3	-	-	-
		PC11. explain the importance of environmental protection and sustainability in wastewater treatment	3	-	-	-
		NOS Total	**30**	**20**	-	-

SGJ/N4053.Perform health and safety measures in water treatment plant	*Perform health and safety measures in water treatment plant*	**25**	**25**	**-**	**-**
	PC1. explain the requirements for safe work area at wastewater treatment plant	3	-	-	-
	PC2. explain the importance of occupational health & Safety standards and regulations	2	-	-	-
	PC3. discuss importance of different detectors and safety tools used in wastewater treatment plant	2	-	-	-
	PC4. review the Material Safety Data Sheet(MSDS) and labels of chemicals contained in cylinders in order to be aware of their hazards and precautionary measures	2	-	-	-
	PC5. explain the importance of administering first aid and demonstrate how to administer first aid	2	5	-	-
	PC6. identify and use the personal protective equipment used for the specific purpose	2	5	-	-
	PC7. identify potential hazards (chemical, biological, physical) in wastewater treatment plants and demonstrate how to follow necessary and adequate safety measures	1	5	-	-
	PC8. discuss mock testing of firefighting system and demonstrate the use of fire extinguishers, fire detection and alarm system	1	4	-	-
	PC9. explain the meaning of relevant danger and safety symbols/signage	2	-	-	-
	PC10. discuss all applicable statutory requirements along with safety regulations in terms of fire protection	2	-	-	-
	PC11. discuss basics principles and practices of hygiene	2	-	-	-
	PC12. incorporate good housekeeping practices and infection control & prevention guidelines	2	3	-	-

	PC13. explain reporting procedures for accidents, potential hazards, near misses, permit to work and show how to comply with all applicable statutory requirements	2	3	-	-
	NOS Total	**25**	**25**	**-**	**-**

DGT/VSQ/N0101.Employability Skills (30 Hours))	*Introduction to Employability Skills*	**1**	**1**	-	-
	PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
	Constitutional values – Citizenship	**1**	**1**	-	-
	PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
	Becoming a Professional in the 21st Century	**1**	**3**	-	-
	PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
	Basic English Skills	**2**	**3**	-	-
	PC4. speak with others using some basic English phrases or sentences	-	-	-	-
	Communication Skills	**1**	**1**	-	-
	PC5. follow good manners while communicating with others	-	-	-	-
	PC6. work with others in a team	-	-	-	-
	Diversity & Inclusion	**1**	**1**	-	-
	PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
	PC8. report any issues related to sexual harassment	-	-	-	-
	Financial and Legal Literacy	**3**	**4**	-	-
	PC9. use various financial products and services safely and securely	-	-	-	-
	PC10. calculate income, expenses, savings etc.	-	-	-	-

		PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
		Essential Digital Skills	**4**	**6**	**-**	**-**
		PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
		PC13. use internet and social media platforms securely and safely	-	-	-	-
		Entrepreneurship	**3**	**5**	**-**	**-**
		PC14. identify and assess opportunities for potential business	-	-	-	-
		PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
		Customer Service	**2**	**2**	**-**	**-**
		PC16. identify different types of customers	-	-	-	-
		PC17. identify customer needs and address them appropriately	-	-	-	-
		PC18. follow appropriate hygiene and grooming standards	-	-	-	-
		Getting ready for apprenticeship & Jobs	**1**	**3**	**-**	**-**
		PC19. create a basic biodata	-	-	-	-
		PC20. search for suitable jobs and apply	-	-	-	-
		PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
		NOS Total	**20**	**30**	**-**	**-**
	Grand Total		**197**	**203**		

Annexure: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform. Expert assessment practice lies at the heart of the WorldSkills Competition. For this reason, it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the WorldSkills Competition falls into two broad types: Measurement and Judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding. The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, to demonstrate their quality and conformity with the Standards. Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

Annexure: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf

Annexure: Annexure: Career Progression and OM

Not Applicable