Model Curriculum

QP Name: Design Engineer - Marine Piping and Engineering

QP Code: CSC/Q0407

QP Version: 2.0

NSQF Level: 7

Model Curriculum Version: 2.0

Capital Goods Skill Council || 1st Floor, L-29, Outer Circle, Connaught PlaceNew Delhi – 110001 ||
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Training Parameters

Sector	Capital Goods
Sub-Sector	Strategic Manufacturing – Ship Building
Occupation	Design
Country	India
NSQF Level	7
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0201
Minimum Educational Qualification and Experience	Completed 3-year UG degree with 3 years of relevant experience OR Completed 4-year UG degree with 2 years of relevant experience OR Completed 2-year PG degree after 3-year UG with 1 year of relevant experience OR Pursuing 2nd year of 2-year PG after 4 year UG program
Pre-Requisite License or Training	NA
Minimum Job Entry Age	23 years
Last Reviewed On	31/03/2022
Next Review Date	31/03/2025
NSQC Approval Date	31/03/2022
QP Version	2.0
Model Curriculum Creation Date	31/03/2022
Model Curriculum Valid Up to Date	31/03/2025
Model Curriculum Version	2.0
Minimum Duration of the Course	780 Hours
Maximum Duration of the Course	780 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Demonstrate the steps involved in preparing for designing of marine piping and engineering naval ships.
- Demonstrate the designing procedures for marine piping and engineering of naval ships.
- Perform the various post-designing activities for ships and marine systems
- Apply appropriate health and safety practices at the workplace
- Discuss the importance of working effectively in a collaborative environment
- Demonstrate sustainable practices to be adopted at the workplace

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
CSC/N0414: Prepare for designing marine systems for naval ships NSQF Level: 7	**80:00 Hours**	**100:00 Hours**	**00:00 Hours**	**00:00 Hours**	**180:00 Hours**
Module 1: Introduction to the sector and the job role	05:00 Hours	00:00 Hours	00:00 Hours	00:00 Hours	05:00 Hours
Module 2: Basics of naval ship and marine systems design	25:00 Hours	00:00 Hours	00:00 Hours	00:00 Hours	25:00 Hours
Module 3: Information gathering	25:00 Hours	50:00 Hours	00:00 Hours	00:00 Hours	75:00 Hours
Module 4: Planning and organising	25:00 Hours	50:00 Hours	00:00 Hours	00:00 Hours	75:00 Hours
CSC/N0413: Design marine systems NSQF Level: 7	**80:00 Hours**	**130:00 Hours**	**00:00 Hours**	**00:00 Hours**	**210:00 Hours**
Module 5: Preliminary Design	40:00 Hours	70:00 Hours	00:00 Hours	00:00 Hours	110:00 Hours
Module 6: Design verification and modification	40:00 Hours	60:00 Hours	00:00 Hours	00:00 Hours	100:00 Hours

CGC/N0412: Perform post-designing activities for ships and marine systems NSQF Level: 7	**20:00 Hours**	**40:00 Hours**	**00:00 Hours**	**00:00 Hours**	**60:00 Hours**
Module 7: Post-design activities	20:00 Hours	40:00 Hours	00:00 Hours	00:00 Hours	60:00 Hours
CSC/N1337: Maintain a healthy, safe and secure working environment NSQF Level: 4	**10:00 Hours**	**20:00 Hours**	**00:00 Hours**	**00:00 Hours**	**30:00 Hours**
Module 8: Healthy, safe and secure environment	06:00 Hours	14:00 Hours	00:00 Hours	00:00 Hours	20:00 Hours
Module 9: Fire safety and emergencies	04:00 Hours	06:00 Hours	00:00 Hours	00:00 Hours	10:00 Hours
CSC/N1338: Work effectively in a collaborative environment NSQF Level: 4	**10:00 Hours**	**20:00 Hours**	**00:00 Hours**	**00:00 Hours**	**30:00 Hours**
Module 10: Team effectiveness and respecting diversity	05:00 Hours	10:00 Hours	00:00 Hours	00:00 Hours	15:00 Hours
Module 11: Effective communication and good behaviour	05:00 Hours	10:00 Hours	00:00 Hours	00:00 Hours	15:00 Hours
SGJ/N1703: Adopt sustainable practices at workplace NSQF Level: 5	**10:00 Hours**	**20:00 Hours**	**00:00 Hours**	**00:00 Hours**	**30:00 Hours**
Module 12: Sustainable practices	10:00 Hours	20:00 Hours	00:00 Hours	00:00 Hours	30:00 Hours
DGT/VSQ/N0103 - Employability Skills (90 hours) NSQF Level – 5	**36:00 Hours**	**54:00 Hours**			**90:00 Hours**
Module 13: Introduction to Employability Skills	1:00 Hours	2:00 Hours			3:00 Hours
Module 14: Constitutional values - Citizenship	0.5:00 Hours	1:00 Hours			1.5:00 Hours
Module 15: Becoming a Professional in the 21st Century	2:00 Hours	3:00 Hours			5:00 Hours
Module 16: Basic English Skills	4:00 Hours	6:00 Hours			10:00 Hours
Module 17: Career Development & Goal Setting	1.5:00 Hours	2.5:00 Hours			4:00 Hours

Module 18: Communication Skills	4:00 Hours	6:00 Hours			10:00 Hours
Module 19: Diversity & Inclusion	1:00 Hours	1.5:00 Hours			2.5:00 Hours
Module 20: Financial and Legal Literacy	4:00 Hours	6:00 Hours			10:00 Hours
Module 21: Essential Digital Skills	8:00 Hours	12:00 Hours			20:00 Hours
Module 22: Entrepreneurship	3:00 Hours	4:00 Hours			7:00 Hours
Module 23: Customer Service	4:00 Hours	5:00 Hours			9:00 Hours
Module 24: Getting ready for apprenticeship & Jobs	3:00 Hours	5:00 Hours			8:00 Hours
Total Duration	**246:00 Hours**	**384:00 Hours**	**150:00 Hours**	**00:00 Hours**	**780:00 Hours**

Module Details

Module 1: Introduction to the sector and the job role
Bridge Module

Terminal Outcomes:

- Provide and overview of the ship building segment of strategic manufacturing industry.
- List the key responsibilities of a design engineer – marine piping and engineering.

Duration: _05:00_	Duration: _00:00_
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance of ship building segment of strategic manufacturing industry. • Discuss the scope of employment and career progression in the ship building segment of strategic manufacturing. • List the key responsibilities of a design engineer – marine piping and engineering . • Explain the importance of referring to relevant sources for information pertaining to employment terms, entitlements, job role and responsibilities in an organisation. • Explain the importance of reading and following legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions. • Outline the relevant people that work with a design engineer – marine piping and engineering along with their key responsibilities. • Explain the importance of identifying and following reporting structure, inter-dependent functions, lines and procedures in the work area.	
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Nil	

Module 2: Basics of naval ship and marine systems design
Mapped to CSC/N0414, v 1.0

Terminal Outcomes:

- Explain basic concepts of naval ship and marine systems design.

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Duration: *25:00*	Duration: *00:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Describe various types of naval ships and their layout. - Describe various types of marine systems used in Naval ships and their purposes and common performance requirements such as propulsion systems, pneumatic and hydraulic systems, habitability and life support systems, rescue and safety systems, ship's gears and devices, weapon engineering systems, etc. - Explain the key steps involved in the ship designing process. - Explain the broad steps involved in the marine system designing process. - Explain key naval architecture concepts. - State the international system (SI) of measurement relevant to naval ship design. - Discuss the rules and guidelines specified in standards applicable to naval marine systems.	
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Naval ships for a field visit	

Module 3: Information gathering
Mapped to CSC/N0414, v 1.0

Terminal Outcomes:

- Demonstrate the steps involved in gathering of information required to initiate marine systems design for naval ships.

Duration: *25:00*	Duration: *50:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- List the information and level of detail to be included in a design brief of marine systems and their sources. - Describe the relevant information available in the statement of qualitative requirements laid by the customer and ship hull and structure design. - Explain how to extract and use information from engineering drawings and related specifications in relation to work undertaken. - Interpret isometric drawings, imperial and metric systems of measurement, work-piece reference points and system of tolerance. - Describe the process of measuring internal and external dimensions, measuring geometric features. - Explain the importance of identifying design constraints. - List the authorised sources of information on latest technologies, standards and guidance for compliances and improvements in naval marine systems design.	- Demonstrate the steps involved in identifying the marine systems to be designed, their purpose and performance requirements from specified statement of qualitative requirements, which is laid by the customer and the ship hull and structure design. - Demonstrate the identification design constraints for specified marine systems design requirements. - Extract relevant information on the latest technologies, standards and guidance for compliances and improvements in design from authorised sources. - Identify resources required at various stages of designing.
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Computers, printers, access to internet, ERP system, stationary, reference designs for various types of Naval ships, Project requirements, Rules and guidelines specified in Standards, Books, Journals, NPTEL Lectures, Published Papers	

Module 4: Planning and organising
Mapped to CSC/N0414, v 1.0

Terminal Outcomes:

- Demonstrate the steps involved in planning and organising for naval ship design for marine systems.

Duration: *25:00*	Duration: *70:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List the information and level of detail to be included in a design brief. • Describe key project management tools and concepts used in planning and organising for a naval marine systems designing project. • List the 2D/3D software and drafting workstations applicable to naval marine systems design activities. • Describe the steps involved in organising for the availability of equipment, materials and human resources at various stages of the designing process.	• Prepare a design brief based on marine systems design specifications. • Prepare a list of specific tasks required for designing requirements across various marine systems design phases. • Produce work measurement records, progress reports and output PERT charts templates based on design brief. • Prepare the software and drafting workstations for various design activities such as 2D/3D drafting, flow analysis, FE analysis, etc.

Classroom Aids:
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements
Computers, printers, access to internet, ERP system, stationary, Reference designs for various types of Naval ships, Project requirements, Rules and guidelines specified in Standards, Books, Journals, NPTEL Lectures, Published Papers, Software used for naval ship design activities such as 2D Drafting- AutoCAD; 3D Drafting-UGNx, CATIA (for all except hull), Solidworks, Rhino (for only hull modelling); Stability-MAXSURF, NAPA, Aveva Marine; Structural Design-NAPA, Aveva Marine, SM 3D; FE Analysis-ANSYS, Hypermesh, Femap; CFD (Computation Fluid Dynamic / Manouvering) Analysis - Star CCM+, Fluent)

Module 5: Preliminary Design
Mapped to CSC/N0413, v 1.0

Terminal Outcomes:

• Design marine systems for naval ships based on design brief and plan.

Duration: *40:00*	Duration: *70:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

• Describe the marine systems preliminary designing process.	• Prepare a concept design based on design brief.
• Explain the fundamentals of fluid mechanics and structural dynamics in relation to marine systems design.	• Identify the major equipment required for system operation.
• Explain marine mechanics of materials and theory of vibration.	• Demonstrate the steps involved in reviewing the layout or general arrangement of the platform/vessel for system design.
• State the design principles for marine propulsion systems, pneumatic and hydraulic systems, habitability and life support systems, rescue and safety systems, ship's gears and devices, weapon engineering systems, etc.	• Prepare a preliminary schematic diagram of the system, keeping in mind the layout.
• List the machinery and equipment used in marine propulsion systems, pneumatic and hydraulic systems, habitability and life support systems, rescue and safety systems, ship's gears and devices, weapon engineering systems, etc.	• Identify secondary equipment required for the system, its proper functioning and integration.
	• Perform calculations to finalise the specifications like capacity, size and materials of the primary and secondary equipment.
• Explain the key elements and be able to understand the integration of the numerous systems of a naval ship during the design process.	• Finalise the piping design; diameter, thickness and materials of the pipes and pipe fittings.
• State the importance of learning the company systems for recording design information.	

• Classroom Aids:
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook
Tools, Equipment and Other Requirements
Computers, printers, access to internet, ERP system, stationary, Software used for naval ship design activities such as 2D Drafting- AutoCAD; Stability-MAXSURF, NAPA, Aveva Marine; Structural Design-NAPA, Aveva Marine, SM 3D

Module 6: Design verification and modification
Mapped to CSC/N0413, v 1.0

Terminal Outcomes:

• Perform design verification and modifications based on analysis.

Duration: *40:00*	**Duration**: *60:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

• Describe the design verification and modification process.	• Prepare an updated schematic that will form the input for the 3D Modelling team.
• List the computer-aided design (CAD) software to make 2D schematics for marine systems	• Review 3D model and identify changes to be made in the design and equipment specifications based on the 3D modelling output.
• Describe the features and operation of CAD software used to make 2D schematics for marine systems.	• Run simulations on the 3D model to check whether results match with the requirement.
• Explain the purpose, input and output of 3D Modelling.	• Perform finite element analysis using appropriate software.
• Describe the various activities involved in reviewing of 3D Model of marine systems.	• Perform computational fluids dynamics (CFD) analysis for the systems using appropriate software.
• List the simulation software used for the analysis of marine systems design and it's relevant features.	• Perform flow/kinematic analysis for the systems using appropriate software.
• Explain the applications of FE and flow/kinematic analysis for marine systems.	• Demonstrate the modification of design and equipment specifications based on the results of analysis.
• Explain the applications of CFD flow analysis for marine systems.	
• Describe the process of conducting CFD, FE and flow analysis using software.	

Classroom Aids:
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook
Tools, Equipment and Other Requirements
Computers, printers, access to internet, ERP system, stationary, Software used for naval ship design activities such as 2D Drafting- AutoCAD; Stability-MAXSURF, NAPA, Aveva Marine; CFD (Computation Fluid Dynamic / Manouvering) Analysis - Star CCM+, Fluent)

Module 7: Post-design activities
Mapped to CSC/N0412, v 1.0

Terminal Outcomes:

- Perform post-designing activities for ships and marine systems.

Duration: *20:00*	**Duration**: *40:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

	Demonstrate good practices for corresponding with customer and classification society for approval of the designs.
• List various post-design activities that a ship and marine design engineer undertakes.	• Demonstrate good practices for corresponding with customer and classification society for approval of the designs.
• State the information included in technical and logistics documentation related to recommended design and performance requirements.	• Produce technical reports and procedures, final schematics, statement of technical requirements, logistics documentation, performance requirements and bill of materials for the production team.
• Describe various tests performed by the quality team on a ship that could lead to design modifications.	• Prepare of material specification, material take-off (MTO), end connection fitting details, piping information list and piping and instrumentation diagram (P&ID) for piping systems
• Explain the importance of performing design iterations for further improvement.	• Prepare the list of handing over items, drawings, onboard spares and operating manuals of equipment which will be handed over to ship's crew.
• Explain the importance of proper maintenance of all design and analysis related records for easy retrieval in future.	• Prepare standard operating procedures of systems and machinery.
	• Demonstrate good practices for interacting with vendors to approve machinery.
	• Prepare the protocol for pre-dispatch inspection, installation and commissioning trials.
	• Review and analyse records of quality team tests, inspections and performance feedback.
	• Demonstrate the activities involved in maintaining all design and analysis related records for easy retrieval and reference in future.

Classroom Aids:
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook
Tools, Equipment and Other Requirements
Computers, printers, access to internet, ERP system, stationary, documents and file storage units

Module 8: Healthy, safe and secure environment
Mapped to CSC/N1337, v 1.0

Terminal Outcomes:

- Demonstrate the common repair work performed on fire protection systems.

Duration: *06:00*	**Duration**: *14:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

- List the responsibilities commonly listed under the organisation's health, safety and security standards.
- Explain the importance of working in a healthy, safe and hygienic way.
- List common sources of information about health, hygiene and safety at the workplace.
- Explain the importance of maintaining the names of all the people responsible for health and safety in a workplace.
- State common recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask.
- Explain the importance and process of checking the work conditions, assessing the potential health and safety risks, and take appropriate measures to mitigate them.
- State the precautions to be taken to be taken while working in heights like safety nets, length of rope and other safety practices in marine industry.
- Explain the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions.
- Describe the recommended techniques to be followed while lifting and moving heavy objects to avoid injury.
- Explain the importance of following the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment.
- Explain the importance and process of identifying existing and potential hazards at work.
- Describe the process of assessing the potential risks and injuries associated with the various hazards.
- Explain how to prevent or minimise different types of hazards.
- Describe safety aspects related to marine accommodation, machine spaces and deck area.
- Describe how to handle and store hazardous materials safely.
- Explain the importance of following the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment.

- Demonstrate good practices to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask.
- Demonstrate how to check the work conditions, assess the potential health and safety risks, and take appropriate measures to mitigate them.
- Select and use the appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions.
- Apply the recommended techniques while lifting and moving heavy objects to avoid injury.
- Identify existing and potential hazards at work.
- Assess the potential risks and injuries associated with the identified hazards
- Demonstrate how to handle hazardous materials safely and store them in the designated storage.
- Ensure marine accommodation related safety aspects, such as, marine accommodation related safety aspects: All emergency lights operational, colour coded and marked with "E"; escape routes unobstructed; exits clearly marked; safety signs and placards posted and clearly readable; life jackets, immersion suits and EEBDs correctly stowed and marked; internal communications equipment tested and operating correctly and muster list signed and properly displayed at appropriate locations.
- Ensure machinery spaces related safety aspects, such as, machinery spaces related safety aspects: escape routes, ladders and emergency exits unobstructed and clearly marked; all handrails, guard-rails and safety guards correctly fitted and secured to protect against fall; spare life-jackets marked and in good order, emergency equipment accessible and operational; all lights operational, stairways and work areas adequately lit, emergency lighting in E/R checked; safety signs and placards posted and clearly readable; switchboard area clear and free of obstructions and rubber mats in position; all portable fire extinguishers correctly stowed, accessible and inspection

- List the criteria for segregating waste into appropriate categories.
- Describe appropriate methods for recycling the recyclable waste.
- Describe process of disposing of the non-recyclable waste safely and the applicable regulations.
- Explain the importance of coordination with the supervisor or other relevant personnel to prevent or minimise the identified hazards.
- Describe the appropriate documentation to be carried out following a health and safety incident at work, and the relevant information to be included.
- State the appropriate documentation to be carried out following a health and safety incident at work, and the relevant information to be included.
- Explain the importance and process of reviewing the health and safety conditions at work regularly or following an incident.
- Explain the importance and process of implementing appropriate changes to improve the health and safety conditions at work.
- State steps that can be taken to assist in implementing appropriate changes to improve the health and safety conditions at work.

dated; all fixed fire-fighting equipment unobstructed and in good condition; high voltage areas clearly marked; protective guards for rotating machinery properly secured in place; steering gear space free from oil, gratings or non-slip surfaces in place; around the steering gear; shielding of high pressure fuel pipes in place, steam pipes properly insulated; self-closing device on sounding pipes and glass level gauges functional and not tied in open position; low clearance limits stripe marked; oil soaked rags and other flammable materials kept in covered non-combustible bins; supplies and materials properly stored; chemicals properly labelled and stored, acids and alkalis segregated, MSDS and PPE available at site and approved First Aid supplies readily available, accessible and clearly marked.

- Ensure deck area related safety aspects, such as, deck area related safety aspects: Escape routes and embarking areas marked, unobstructed and no slipping and tripping hazards; "Danger-Enclosed Space" marked outside all such spaces having access; other than via manholes; all deck lights operational and in sound enclosures; all safety and hazard zone identification signs posted and readable, fire plan wallets updated; all lifebuoys correctly stowed, life buoy lights and smoke markers valid and in good condition; lifeboats in good condition; decks and walkways free form oil / grease and is there anti-slip paint at mooring areas; piping systems on deck are properly clamped; watertight doors closing properly with packing in good condition; all weather tight hatches closing properly with packing in good condition; good health of oil pollution clean-up equipment and their storage locations clearly marked; supplies and materials are properly stored and all cans in paint store are closed, cargo and bunker samples on tankers are stowed in paint store; provision and easy accessibility of Material Safety Data Sheet (MSDS)
- Segregate waste into appropriate categories.
- Recycle the recyclable waste appropriately.

	• Dispose of the non-recyclable waste in an environment-friendly manner, complying with the applicable regulations. • Assess the outcome post implementation of safety procedures. • Demonstrate the how to carry out appropriate documentation following a health and safety incident at work, including all the required information.

Classroom Aids:

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements

Personal protective equipment (such as eye protector, hard hats, safety belts, gloves, protective clothing), ladders, hand tools, power tools

Module 9: Fire safety, first aid and emergencies
Mapped to CSC/N1337, v 1.0

Terminal Outcomes:

• Describe the various risks and hazards at the workplace and their preventive and corrective measures

- Employ preventive and corrective measures to protect self and others from common workplace hazards and risk

Duration: *04:00*	Duration: *06:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- State the different types of fire extinguishers used to extinguish different types of fires. - Explain the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition. - State the recommended practices to be followed for a safe rescue during a fire emergency. - State how to request assistance from the fire department to extinguish a serious fire. - State the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property. - Describe entry and exit of vessel and evacuation procedures in case of an emergency. - Describe methods of prevention of fires like proper and safe disposal of inflammable material, maintenance of proper ventilation in enclosed spaces, temperature control in working areas. - State the common health and safety hazards present in a work environment, associated risks, and how to mitigate them. - List safe working practices to be followed while working at various hazardous sites and using electrical equipment. - State the ratings of motors and precautions to taken while dealing with electrical equipment. - Explain the importance of ensuring easy access to firefighting and safety equipment. - List the various causes of fire in different work environments and the recommended precautions to be taken to prevent fire accidents. - Describe different methods of extinguishing fire. - List different materials used for extinguishing fire, such as sand, water, foam, CO2, dry powder, etc. - State the points to be kept in mind while coordinating with the fire department to	- Check and test the firefighting and various safety equipment to ensure they are in usable condition. - Ensure all portable fire extinguishers and stowage locations numbered in place and inspection dated for safety reasons. - Ensure that the fire station is not locked but only sealed. - Demonstrate the steps performed for the repair and replacement of firefighting and safety equipment in co-ordination with the supervisor. - Demonstrate the use the appropriate type of fire extinguisher to extinguish different types of fires safely. - Demonstrate common recommended practices for a safe rescue during a fire emergency. - Demonstrate the recommended procedure to free a person from electrocution. - Check the first aid box to ensure it is updated with the relevant first aid supplies. - Demonstrate the administration of appropriate first aid to the injured personnel. - Demonstrate cardiopulmonary Resuscitation (CPR). - Demonstrate through role play the steps involved in coordination with the emergency services to request medical assistance for seriously injured/ ill personnel requiring professional medical attention or hospitalisation. - Demonstrate the recommended practices to minimise loss to organisational property during an emergency.

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request assistance to extinguish a serious fire.

- Explain the importance of ensuring the first aid box is updated with the relevant first aid supplies.
- State the different types of first aid treatment to be provided for different types of injuries.
- List the potential injuries associated with incorrect manual handling.
- Describe how to move an injured person safely.
- List the various hazards associated with the use of various machinery, tools, implements, equipment and materials.
- Describe how to free a person from electrocution safely.
- Explain how to administer appropriate first aid to an injured person.
- List the indicators to identify a potential victim of cardiac arrest.
- State the steps involved in performing Cardiopulmonary Resuscitation (CPR).
- Explain the importance of coordinating with the emergency services to request urgent medical assistance for persons requiring professional medical attention or hospitalisation.
- State the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous chemicals and gases.
- State the applicable rescue techniques to be followed during a fire emergency.
- Explain the importance of follow the organisational health and safety guidelines during workplace emergencies to ensure own and co-workers' safety.
- Explain the importance of placing safety signs and instructions at strategic locations in a workplace and following them.
- Explain the importance of ensuring no obstruction and free access to fire exits.

Classroom Aids:

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements

Personal protective equipment (such as eye protector, hard hats, safety belts, gloves, protective clothing), fire extinguisher, first aid kit.

Module 10: Team effectiveness and respecting diversity
Mapped to CSC/N1338, v 1.0

Terminal Outcomes:

- Apply effective communication techniques with team and stakeholders.
- Describe approaches to handle queries, concerns and welfare of workers.

- Role play a situation on how to demonstrate behaviours indicating respect for all genders and PwD.

Duration: *05:00*	**Duration**: *10:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the importance of teamwork in organisational and individual success. - Explain the importance of clarifying individual, team and organisational goals and responsibilities. - Explain the existence of organisation's policies and procedures for working with colleagues and dealing with conflict and the need to be familiar with them. - State some common reasons for interpersonal conflict. - Explain the importance of expressing and addressing grievances appropriately and effectively and some good practices with respect to the same. - State some common reasons for interpersonal conflict and ways of managing it effectively. - Explain the importance of resolving individual disagreements with the concerned person. - Explain the importance of following the organisation's policies and procedures to resolve conflicts. - Explain the importance of developing effective working relationships for professional success and some good practices for the same. - Explain the importance of consulting with and assisting others to maximise effectiveness and efficiency in carrying out tasks and solving problems. - List different types of disabilities and some challenges faced by persons with disability (PwD). - State the key laws, acts and provisions defined for PwD by the statutory bodies. - State government and private schemes and benefits available for PwD. - Explain the importance of gender sensitivity and equality. - Explain stereotyping based on gender, disability and cultural biases, and its impact on others.	- Demonstrate the ability to take initiative to identify and solve team and work related problems in a positive manner. - Demonstrate the application of initiatives to develop understanding, goodwill and trust with team members. - Recognize when a conflict situation exists. - Demonstrate the ability to take initiative to resolve a conflict situation amicably. - Demonstrate ability to manage discussions to keep verbal, non-verbal and written communication gender, disability, age and culturally sensitive and respectful. - Demonstrate the ability to transact with all people without any personal bias based on gender, disability, caste, religion, colour, sexual orientation or culture and in accordance with their legal rights. - Recognize indicators of harassment and discrimination based on gender, disability, caste, religion, colour, sexual orientation or culture at workplace. - Suggest workplace design and accessibility improvements to make it friendly for persons with disabilities (PwD).

• Describe gender and its concepts such as gender roles, gender spectrum, gender as an identity. • State common inclusive practices and policies following in gender neutral and PwD sensitive organisations. • State the legislations, grievance redressal mechanisms, and penalties against harassment in the workplace. • Explain the importance of following organisational policy for reporting the indicators of harassment and discrimination. • Explain the importance of ensuring all group processes follow inclusive practices.	

Classroom Aids:
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook
Tools, Equipment and Other Requirements
Nil

Module 11: Effective communication and good behaviour
Mapped to CSC/N1338, v 1.0

Terminal Outcomes:

- Apply effective communication techniques with team and stakeholders.
- Describe approaches to handle queries, concerns and welfare of workers.

- Role play a situation on how to demonstrate behaviours indicating respect for all genders and PwD.

Duration: 05:00	Duration: 10:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- List various categories of people that one is required to communicate and coordinate with in an organisation. - State the importance of give feedback of work done and reporting problems identified in the field. - Explain the importance of effective communication in the workplace. - Describe the various components of effective communication. - State the key elements of active listening. - Explain the value and importance of active listening and assertive communication. - List the barriers to effective communication. - Explain the importance of tone and pitch in effective communication. - Explain the importance of avoiding casual expletives and unpleasant terms while communicating professional circles. - State how poor communication practices can disturb people, environment and cause problems for the employee, the employer and the customer. - Explain the importance of ethics for professional success. - Explain the importance of discipline for professional success. - State what constitutes disciplined behaviour for a working professional. - Explain the importance of disciplined and responsible behaviour.	- Demonstrate the ability to communicate with other people clearly and effectively. - Use digital and virtual tools for collaboration and communication. - Demonstrate the use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism. - Display workplace etiquettes such as using appropriate titles, terms of respect, polite language and avoiding casual expressions. - Display active listening skills while interacting with others at work. - Demonstrate responsible and disciplined behaviour.
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Nil	

Module 12: Sustainable practices
Mapped to SGJ/N1703, v 1.0

Terminal Outcomes:

- Conduct material and energy audit of workplace
- Apply material conservation strategies and use of environment friendly materials.

- Apply energy/electricity conservation practices.
- Apply effective waste management/recycling practices.

Duration: *10:00*	**Duration**: *20:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- State the legislative requirements and organisations procedures for waste management and disposal. - Describe some organisational procedures for safe handling of equipment and machine operations. - Explain the importance of following reporting protocol and documentation. - List the parameters and data required for material and energy audit. - List latest methods of energy and material conservation. - List environment friendly materials available to replace conventional materials. - Describe methods of reducing electrical consumptions. - Name renewable energy sources which can be deployed at the workplace. - Describe the steps involved in planning the implementation of energy efficient systems in a phased manner. - Describe methods of optimum utilization of waste and best practices for waste disposal. - Describe methods of treating wastewater and recycling of water.	- Demonstrate how to check for compliance with applicable environmental, waste management and disposal regulations. - Demonstrate how to collect information about usage of different materials including water. - Demonstrate how to collect information on the pattern of electricity and fuel consumption. - Prepare material and energy audit reports. - Analyse material audit report to decipher excessive consumption of material and water. - Identify materials which can be replaced by environment friendly substitutes. - Identify processes where material utilization can be optimised. - Demonstrate how to plan the introduction of revised processes and environment friendly materials in a phased manner. - Demonstrate how to plan and implement ways to conserve and re-use water. - Monitor material and water conservation processes. - Analyse energy/electricity audit report to identify high energy/electricity consumption areas. - Identify processes where energy/electricity utilization can be optimised. - Identify possibilities of using renewable energy and environment friendly fuels. - Ensure electrical equipment and appliances are switched off when not in use. - Identify recyclable, non-recyclable and hazardous waste. - Ensure recyclable, non-recyclable and hazardous waste are segregated as per standard operating procedures. - Ensure proper mechanism is followed while collecting and disposing recyclable and nonrecyclable waste. - Ensure proper mechanism is followed while collecting and disposing hazardous waste as per standard operating procedure. - Ensure reuse and recycling of waste wherever applicable.

	• Ensure proper mechanism is followed for treatment of wastewater in the unit.
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Energy-saving devices, non-recyclable, recyclable and reusable waste	

Annexure

Trainer Requirements

Trainer Prerequisites				
Minimum Educational	Specialization	Relevant Industry Experience	Training Experience	Remarks

Qualification *<Select the minimum educational requirements, such as 12th Pass, Graduate or NSQF certified.>*	*<Specify the areas of specialization that are desirable.>*	Years	Specialization	Years	Specialization	
B.E	Marine Engineering	3	Marine Engineering	1	Marine Engineering	
B.Tech	Marine Engineering	3	Marine Engineering	1	Marine Engineering	
B.E	Mechanical	5	Marine Engineering	1	Marine Engineering	
B.Tech	Mechanical	5	Marine Engineering	1	Marine Engineering	

Trainer Certification	
Domain Certification	**Platform Certification**
"Design Engineer – Marine Piping and Engineering" mapped to QP: "CSC/Q0407, v1.0". Minimum accepted score is 80%.	"Trainer", mapped to the Qualification Pack: "MEP/Q2601". Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification *<Select the minimum educational requirements, such as 12th Pass, Graduate or NSQF certified.>*	**Specialization** *<Specify the areas of specialization that are desirable.>*	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
B.E	Marine Engineering	**3**	Marine Engineering	1	Marine Engineering	
B.Tech	Marine Engineering	3	Marine Engineering	1	Marine Engineering	
B.E	Mechanical	5	Marine Engineering	1	Marine Engineering	
B.Tech	Mechanical	5	Marine Engineering	1	Marine Engineering	

Assessor Certification	
Domain Certification	**Platform Certification**
"Design Engineer – Marine Piping and Engineering" mapped to QP: "CSC/Q0407, v1.0". Minimum accepted score is 80%.	Certified for the Job Role: "Assessor"(VET and skills, mapped to the Qualification Pack: "MEP/Q2701, v2.0", with a minimum score of 80%.

Assessment Strategy

1. Assessment System Overview:
   - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
   - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
   - Assessment agency deploys the ToA certified Assessor for executing the assessment
   - SSC monitors the assessment process & records

2. Testing Environment:
   - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
   - Check the duration of the training.
   - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
   - If the batch size is more than 30, then there should be 2 Assessors.
   - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
   - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
   - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
   - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:
   - Question papers created by the Subject Matter Experts (SME)
   - Question papers created by the SME verified by the other subject Matter Experts
   - Questions are mapped with NOS and PC
   - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
   - Assessor must be ToA certified & trainer must be ToT Certified
   - Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:
   - Time-stamped & geotagged reporting of the assessor from assessment location
   - Centre photographs with signboards and scheme specific branding
   - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
   - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:
   - Surprise visit to the assessment location
   - Random audit of the batch
   - Random audit of any candidate

6. Method for assessment documentation, archiving, and access
   - Hard copies of the documents are stored
   - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
   - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module.** A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards