



# Model Curriculum

**QP Name: Tower Crane Operator**

**QP Code: IES/Q0112**

**QP Version: 3.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

Infrastructure Equipment Skill Council (IESC), Jubilee Building (Second Floor), No.45, Museum Road, Bengaluru - 560025

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## Training Parameters

Sector	Infrastructure Equipment
Sub-Sector	Equipment Operation
Occupation	Operator
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8343.0700
Minimum Educational Qualification and Experience	8th Grade pass with 2 year NTC plus 1 year NAC OR 10th Grade pass plus 1 year NTC/ NAC OR 10th Grade pass with 2 years of relevant experience OR 10th Grade pass and pursuing continuous schooling OR 11th Grade Pass OR IES/Q0123 - Junior Tower Crane Operator/Signalman NSQF Level 3 with minimum education as 5th Grade pass with 2 year relevant experience
Pre-Requisite License or Training	NIL
Minimum Job Entry Age	18 Years
Last Reviewed On	17/11/2022
Next Review Date	17/11/2025
NSQC Approval Date	17/11/2022
QP Version	3.0
Model Curriculum Creation Date	30/10/2022
Model Curriculum Valid Up to Date	17/11/2025
Model Curriculum Version	1.0

### 3| Tower Crane Operator

Minimum Duration of the Course	420 Hours
Maximum Duration of the Course	420 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 be able to:

- Elaborate the organization's operations, maintenance, and safety policies.
- Classify the various components of a tower crane and its functioning.
- Explain the procedure to operate the tower crane, use of controllers, levers and switches.
- Prepare the base for lifting equipment.
- Determine the load characteristics including centre of gravity and lifting points.
- Demonstrate the use of on-equipment operator assistance devices.
- Summarize the maintenance schedule of the equipment.
- Identify common defects and general causes of breakdown.

### 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
Bridge Module	4	0	0	0	4
NOS Code – IES/N 0164 NOS Name: Carry out pre-operational checks on a tower crane NOS Version - 2.0 NSQF Level - 4	30	30	60	0	120
NOS Code – IES/N 0165 NOS Name – Carry out tower crane operations NOS Version - 2.0 NSQF Level - 4	30	60	30	0	120

NOS Code - IES/N 0166 NOS Name - Carry out maintenance and troubleshooting of the tower crane NOS Version - 2.0 NSQF Level - 4	<b>30</b>	<b>30</b>	<b>60</b>	<b>0</b>	<b>120</b>
NOS Code - IES/N 7601 NOS Name - Comply with worksite health and safety guidelines NOS Version - 2.0 NSQF Level - 4		<b>30</b>	<b>0</b>	<b>0</b>	<b>30</b>
NOS Code - NG-Lx-ES-00001-2022-v1-DGT NOS Name - Employability Skills 30 hrs NOS Version 1.0	<b>0</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>30</b>
<b>Total Duration</b>	<b>90</b>	<b>180</b>	<b>150</b>	<b>0</b>	<b>420</b>

## Module Details

### Module 1: Orientation

#### Bridge Module

##### Terminal Outcomes:

- Describe the operations of the Infrastructure industry in India.
- Outline the skill training schemes in Skill Sector Councils.
- Know about the different types of job roles available in IESC.
- Explain the roles and responsibilities of the Tower Crane Operator.

<b>Duration:</b> <4:00>	<b>Duration:</b> <0:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the employment opportunities in the industry.</li> <li>• Explain the roles and responsibilities of a Tower Crane Operator.</li> <li>• Describe the different technical trainings conducted in SSC.</li> </ul>	NIL
<b>Classroom Aids:</b>	
Computer, projector, printer, student table, whiteboard, flip chart, markers and duster	
<b>Tools, Equipment and Other Requirements</b>	

## Module 2: Pre-op checks on Tower Crane Operator

Mapped to NOS Code – IES/N0164 v 2.0

### Terminal Outcomes:

- Outline the operational standards & procedures followed in the company.
- Classify the various components of a tower crane and their functioning.
- Explain the different types of motors and their uses.
- Demonstrate how to check that the base on which the tower crane is mounted is free of cracks.
- Demonstrate how to check the engine oil and radiator coolant temperature.

Duration: <30:00>	Duration: <90:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Know about the organization's operational, maintenance and safety policies.</li> <li>• Elaborate the crane technical specifications, features and performance.</li> <li>• Know how to scan the site for any impediments inside the circumference/check for nearby high-rise natural or man-made structures / high voltage lines / wind pattern.</li> <li>• Summarize the fundamentals of the electrical systems, including the control panel of the Tower Crane.</li> <li>• Describe the role of the wire rope, fittings, drums, hooks, sheaves and winch mounts in the smooth operation of the hoisting system.</li> <li>• Know how to maintain a pre-operational check notebook to document all actions before operating the tower crane.</li> <li>• Know the escalation matrix for reporting unresolved problems.</li> <li>• Identify the tools and equipment in the tool kit, their uses and place of storage of the kit.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate a walk-around visual examination to assess the overall condition of the equipment.</li> <li>• Explain the steps to check the tightness of the bolts and nuts.</li> <li>• Illustrate the procedure to examine the components of the operator station such as the seat, instrument panel, crane load chart and communication equipment.</li> <li>• Demonstrate how to check the levels of grease in components such as pulley, rope, trolley and swing gear parts.</li> <li>• Show how to inspect the hydraulic system components like the hydraulic fluid, filters, lines, pumps and fittings</li> <li>• Show to visually examine all mast parts for defects and rust.</li> <li>• Show how to check the panel board system for adequate power supply and switch function.</li> <li>• Demonstrate how to inspect the load bearing structure components such as boom pins, pendant lines, boom hoist, reeve or bridle, mast and base for wear</li> </ul>

<ul style="list-style-type: none"> <li>• Test the working condition of the communication device along with the signalman.</li> <li>• Know about the escalation matrix for a fault that is found outside the scope of operator's duty.</li> </ul>	<p>and tear.</p> <ul style="list-style-type: none"> <li>• Check the stabilising system components for counter and ballasted weight levels.</li> <li>• Check that the levers, hoist and trolley gears are in good working order before raising the load.</li> <li>• Create a logbook to record all activities performed.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Computer, projector, printer, student table, whiteboard, flip chart, markers and duster Manufacturer's Service and Repair Manual</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Safety Gear, Tool Kit, PPE</p>	

## Module 3: Tower Crane operations

Mapped to NOS Code – IES/N0165 v 2.0

### Terminal Outcomes:

- Outline the organization's operational, maintenance and safety policies.
- Explain the load chart reading and weight balance.
- Elaborate the procedure to operate the tower crane, controllers, levers and switches.
- Demonstrate the use of on-equipment operator assistance devices.
- Illustrate the steps to start the engine and check the controls of operating panel for normal functioning.
- Demonstrate control of the speed of the boom while moving it to the left or right by using a lever/joystick.

<b>Duration:&lt;30:00&gt;</b>	<b>Duration:&lt;90:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the operational standards &amp; procedures followed in the company.</li> <li>• Summarize the motion, balance and stability concepts such as fulcrum points, leverage, centre of gravity etc. used in the tower crane.</li> <li>• Elaborate the function of the guide cables and their importance in operations.</li> <li>• Elucidate the impact of wind speed, storms and other weather conditions on the equipment.</li> <li>• Explain relevance of ensuring that the weathervane is set in the desired position before shutting down the operation.</li> <li>• List elements that influence the equipment's stability.</li> </ul>	<ul style="list-style-type: none"> <li>• Illustrate the steps to start the engine and check the controls of operating panel for normal functioning.</li> <li>• Demonstrate how to control the boom's direction by moving the levers.</li> <li>• Show how to lower the rope with sufficient speed towards the weight.</li> <li>• Show how to watch the load movement indications and anti-collision sensors, while raising and slewing the load.</li> <li>• Demonstrate hoisting activities such as lifting and lowering the boom with the cargo from low to high altitudes.</li> <li>• Display dumping of material at the specified location in accordance with the signalman's instructions.</li> </ul>
<b>Classroom Aids:</b>	
Computer, projector, printer, student table, whiteboard, flip chart, markers and duster Manufacturer's Service and Repair Manual	
<b>Tools, Equipment and Other Requirements</b>	
Safety Gear, Tool Kit, PPE	



## Module 4: Routine maintenance and simple trouble shooting

Mapped to NOS Code: IES/N0166 v 2.0

### Terminal Outcomes:

- Explain the various controls and switches required to properly operate the tower crane..
- Schedule the maintenance of the equipment to suit operating demands.
- Elaborate the basics of engine and sub systems, fuel, lubrication and cooling system
- Understand the hazards at the site and how to overcome them.

<b>Duration: &lt;30:00&gt;</b>	<b>Duration: &lt;90:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the organization's operational standards and complaint resolution procedure.</li> <li>• Identify common defects and general causes of breakdown.</li> <li>• Narrate how to plan for regular daily maintenance before machine operation.</li> <li>• Know the scope of the position and when to escalate a problem to the supervisor.</li> <li>• Classify the types of motor and their uses.</li> <li>• Describe the use of various tools provided with the Tower crane, storage place of the tool kit and the importance of putting back the tools after use.</li> <li>• Read and understand basic signs, symbols, graphs, charts and decals on equipment and at the job site.</li> <li>• Describe importance of daily greasing of all greasing pins and pivot points.</li> <li>• Justify the importance of timely completion of all documents in accordance with the prescribed standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the process of greasing all greasing pins, trolley pins, hoist and rope and slewing bolts regularly as per the usage of the machine</li> <li>• Describe the steps for servicing the tower crane's service lubricating system, electrical service system, hoisting system and stabilising system.</li> <li>• Demonstrate the procedure to service Jib/boom and mast.</li> <li>• Identify the complaint and relevant repair techniques.</li> <li>• Show how to check the battery electrolyte levels and the quality of the terminals and make adjustments as needed.</li> <li>• Demonstrate how to replenish coolants, lubricants and fluids as needed or as directed by the operating manual.</li> </ul>
<b>Classroom Aids:</b>	
Computer, projector, printer, student table, whiteboard, flip chart, markers and duster Manufacturer's Service and Repair Manual	
<b>Tools, Equipment and Other Requirements</b>	
Safety Gear, Tool Kit, PPE	

## Module 5: Health and safety

Mapped to NOS Code: IES/N 7602 v2.0

Terminal Outcomes:

- Describe the guidelines for health, safety and security requirements.
- Identify common hazards and risks at site.
- Employ safe practices to use the tools and machines.
- Explain the emergency procedure to stop and shutdown machinery.
- Carry out basic first-aid treatment for common injuries.
- Demonstrate the operation of firefighting equipment.
- Elaborate the procedure for storage and disposal of hazardous materials and waste.
- Classify various safety signs, symbols and warnings used on site.

<b>Duration:</b> <10:00>	<b>Duration:</b> <20:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the Health, safety, environmental (HSE) policies.</li> <li>• Explain the reporting procedure for all HSE activities.</li> <li>• List down the contact details of HSE personnel, in case of emergencies.</li> <li>• Classify waste based on non-recyclable, hazardous and recyclable material.</li> <li>• Elucidate the procedure for waste storage and disposal.</li> </ul>	<ul style="list-style-type: none"> <li>• Show the correct use of Personal Protective Equipment (PPE).</li> <li>• Demonstrate how to lift loads safely.</li> <li>• Demonstrate how to operate the fire extinguishers.</li> <li>• Demonstrate the procedure to give basic first aid.</li> <li>• Show to prepare a hazard log register and report incidents and accidents.</li> <li>• Conduct a mock drill for dealing with emergencies like fires and other calamities.</li> </ul>
<b>Classroom Aids:</b>	
Computer, projector, printer, student table, whiteboard, flip chart, marker and duster	
<b>Tools, Equipment and Other Requirements</b>	
Fire Extinguishers, Personal Protective Equipment and other safety gears	

## Module 6: Employability Skills

Mapped to NOS: NG-Lx-ES-00001-2022-v1-DGT

### Terminal Outcomes:

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

- Discuss the importance of Employability Skills in meeting the job requirements
- Show how to practice different environmentally sustainable practices
- Display positive attitude, self -motivation, problem solving, time management skills and continuous learning mind-set in different situations
- Demonstrate how to communicate in a well -mannered way with others
- Demonstrate working with others in a team
- Show how to conduct oneself appropriately with all genders and PwD
- Discuss the significance of reporting sexual harassment issues in time
- Discuss the significance of using financial products and services safely and securely
- Explain the significance of approaching the concerned authorities in time for any exploitation as per legal rights and laws
- Show how to operate digital devices and use the associated applications and features, safely and securely
- Discuss the significance of using internet for browsing, accessing social media platforms, safely and securely
- Discuss the need for identifying opportunities for potential business, sources for arranging money and potential legal and financial challenges
- Explain the significance of identifying customer needs and addressing them
- Create a biodata
- Use various sources to search and apply for jobs
- Discuss the significance of dressing up neatly and maintaining hygiene for an interview
- Discuss how to search and register for apprenticeship opportunities
- Describe opportunities as an entrepreneur

<b>Duration: &lt;00:00&gt;</b>	<b>Duration: &lt;30:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>

<ul style="list-style-type: none"> <li>• NA</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss the importance of Employability Skills in meeting the job requirements</li> <li>• Show how to practice different environmentally sustainable practices</li> <li>• Display positive attitude, self -motivation, problem solving, time management skills and continuous learning mind-set in different situations</li> <li>• Demonstrate how to communicate in a well -mannered way with others</li> <li>• Demonstrate working with others in a team</li> <li>• Show how to conduct oneself appropriately with all genders and PwD</li> <li>• Show how to operate digital devices and use the associated applications and features, safely and securely</li> <li>• Explain the significance of identifying customer needs and addressing them</li> <li>• Create a biodata</li> <li>• Use various sources to search and apply for jobs</li> <li>• Discuss the significance of dressing up neatly and maintaining hygiene for an interview</li> <li>• Describe opportunities as an entrepreneur</li> </ul>
<b>Classroom Aids:</b>	
Computer, projector, printer, student table, whiteboard/flip chart, marker, duster	
<b>Tools, Equipment and Other Requirements</b>	

## Annexure

### Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
CLASS VIII		3	2	1		

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role: Tower Crane Operator Mapped to QP: IES/Q0122 Version2.0. Minimum accepted score 70%.	Certified for Job Role: Tower Crane Operator Minimum accepted score 70%.

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
CLASS VIII		3	2	1		

Assessor Certification	
Domain Certification	Platform Certification
<p>Certified for Job Role: Tower Crane Operator Mapped to QP: IES/Q0122–Version2.0 Minimum accepted score 70%.</p>	<p>Certified for Job Role: Tower Crane Operator Minimum accepted score 70%.</p>

## Assessment Strategy

Criteria for assessment for Qualification Pack have been laid down based on the NOS's.

Each Performance Criteria (PC) has been assigned marks proportional to its importance within NOS and weightages have also been given among the NOSs accordingly.

The assessment of the theory/knowledge will be based on written test/viva or both while skill test shall be hands on practical.

Behavior and attitude will be assessed while performing the assigned task.

The assessment shall be done as per the guidelines formulated by IESC.

The assessment agencies in consultation with IESC will create unique question papers for theory/knowledge and practical skills at each IESC accredited testing centers (as per assessment criteria below)

To pass the Qualification Pack, every trainee should score a minimum of 70%.

In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification pack.

## References

## Glossary

Term	Description
<b>Declarative Knowledge</b>	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.
<b>Key Learning Outcome</b>	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).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
<b>Procedural Knowledge</b>	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.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
<b>Terminal Outcome</b>	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
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
QRC	Qualification Review Committee
SSC	Sector Skill Council
SDMS	Skill Development Management System
SIP	Skill India Portal
HSE	Health Safety Environment
PPE	Personal Protective Equipment
PwD	Persons with disabilities