Model Curriculum

QP Name: Production Engineer

QP Code: CSC/Q1201

Version: 2.0

NSQF Level: 5

Model Curriculum Version: 1.0

Capital Goods Skill Council || Awfice Space Solutions Pvt. Ltd, 1st Floor, L-29, Outer Circle, Connaught Place, New Delhi – 110001

Table of Contents

Training Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery,Electrical and Power Machinery, Light Engineering Goods
Occupation	Shop Floor Management
Country	India
NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification and Experience	B.E/B.Tech (Mechanical) OR 3 Year Diploma (Mechanical) in the relevant field with 2 years of experience in the relevant field OR 10th + ITI (2 years) in the relevant field with 3 years of relevant experience in the relevant field OR 12th Class Pass with 4 years of experience OR Certified in NSQF-L4 Materials - Engineer with 2 years of experience in the relevant field
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	NA
NSQC Approval Date	NA
QP Version	2.0
Model Curriculum Creation Date	NA
Model Curriculum Valid Up to Date	NA
Model Curriculum Version	1.0

Minimum Duration of the Course	510 Hours
Maximum Duration of the Course	510 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 to:

- Explain the importance of following the health and safety practices at work.
- Demonstrate ways to coordinate with co-workers to achieve work efficiency.
- Describe the process of planning and managing the production process.

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	**04:00**	**00:00**	**0:00**	**00:00**	**04:00**
Module 1: Introduction to the role of a Production Engineer	04:00	0:00	0:00	00:00	04:00
CSC/N1335 Follow the health and safety practices at work **NOS Version- 2.0** **NSQF Level- 3**	**20:00**	**60:00**	**0:00**	**00:00**	**80:00**
Module 2: Health and safety practices	20:00	60:00	0:00	00:00	80:00
CSC/N1336 Coordinate with co-workers to achieve work efficiency **NOS Version-2.0** **NSQF Level- 3**	**20:00**	**60:00**	**0:00**	**00:00**	**80:00**
Module 3: Process of coordinating with co-workers to achieve work efficiency	20:00	60:00	0:00	00:00	80:00
CSC/N1201 Plan and manage the production process **NOS Version- 2.0** **NSQF Level- 5**	**106:00**	**240:00**	**0:00**	**00:00**	**346:00**

Module 4: Process of planning and managing the production process	106:00	240:00	0:00	00:00	346:00
Total Duration	**150:00**	**360:00**	**0:00**	**00:00**	**510:00**

Module Details

Module 1: Introduction to the role of a Production Engineer

Bridge Module

Terminal Outcomes:

- Discuss the job role of a Production Engineer.

Duration: 04:00	Duration: 0:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the size and scope of the capital good industry and its sub-sectors. • Discuss the role and responsibilities of a Production Engineer. • Identify various employment opportunities for a Production Engineer.	
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
NA	

Module 2: Health and safety Practices

Mapped to CSC/N1335 v2.0

Terminal Outcomes:

- Demonstrate ways to maintain personal health and safety.
- Describe the process of assisting in hazard management.
- Explain how to check the first aid box, firefighting and safety equipment.
- Describe the process of assisting in waste management.
- Explain the importance of following the fire safety guidelines.
- Explain the importance of following the emergency and first-aid procedures.
- Demonstrate the process of carrying out relevant documentation and review.

Duration: 20:00	**Duration: 60:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitizer 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. • Explain the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions. • Explain 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.	• Demonstrate the use of appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions. • Demonstrate how to handle hazardous materials safely. • Demonstrate the process of testing the firefighting and various safety equipment to ensure they are in usable condition. • Demonstrate the process of recycling and disposing different types of waste appropriately. • Demonstrate how to use the appropriate type of fire extinguisher to extinguish different types of fires safely. • Demonstrate how to administer appropriate first aid to the injured personnel. • Demonstrate the process of performing Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest. • Demonstrate the process of carrying out appropriate documentation following a health and safety incident at work, including all the required information.

• Explain how to handle and store hazardous materials safely. • Explain the importance of ensuring the first aid box is updated with the relevant first aid supplies. • Describe the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition. • Explain the criteria for segregating waste into appropriate categories. • Describe the appropriate methods for recycling the recyclable waste. • Describe the process of disposing of the non-recyclable waste safely and the applicable regulations. • Explain the use of different types of fire extinguishers to extinguish different types of fires. • State the recommended practices to be followed for a safe rescue during a fire emergency. • Explain how to request assistance from the fire department to extinguish a serious fire. • Explain the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property. • State the common health and safety hazards present in a work environment, associated risks, and how to mitigate them. • State the safe working practices to be followed while working at various hazardous sites and using electrical equipment. • Explain the importance of ensuring easy access to firefighting and safety equipment. • Explain the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous	

chemicals and gases. • Explain 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. • Explain the applicable rescue techniques to be followed during a fire emergency. • Explain the importance of placing safety signs and instructions at strategic locations in a workplace and following them. • Explain different types of first aid treatment to be provided for different types of injuries. • State the potential injuries associated with incorrect manual handling. • Explain how to move an injured person safely. • State various hazards associated with the use of various machinery, tools, implements, equipment and materials. • Explain the importance of ensuring no obstruction and free access to fire exits. • Explain how to free a person from electrocution safely. • Explain how to administer appropriate first aid to an injured person. • Explain how to perform 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 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.	
Classroom Aids	
Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator's Guide, Participant's Handbook.	
Tools, Equipment and Other Requirements	
Personal Protective Equipment, Cleaning Equipment and Materials, Sanitizer, Soap, Mask	

Module 3: Process of coordinating with co-workers to achieve work efficiency

Mapped to NOS CSC/N1336 v2.0

Terminal Outcomes:

- Demonstrate ways to Work and communicate effectively with co-workers.
- Discuss ways to promote diversity and inclusion at the workplace.

Duration: 20:00	Duration: 60:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance and process of effective communication in the workplace. • Explain the barriers to effective communication and how to overcome them. • Explain the importance of teamwork in an organisation's and individual's success. • Explain the importance of active listening in the work environment. • State the appropriate techniques to be followed for active listening. • Explain the importance of tone and pitch ineffective communication. • Explain the importance of avoiding casual expletives and unpleasant terms while communicating professional circles. • Explain the importance of maintaining discipline and ethical behaviour at work. • **State** the common reasons for interpersonal conflict and how to resolve them. • Explain the importance of developing effective working relationships for professional success. • Describe the process of expressing and addressing grievances appropriately and effectively. • Explain the importance and process of planning daily tasks to ensure their timely completion and efficient use of	• Demonstrate the process of preparing the relevant documents and reports as per the supervisor's instructions, providing appropriate information clearly and systematically. • Demonstrate how to mentor and assist subordinates in the execution of their work responsibilities. • Demonstrate the process of using various resources efficiently to ensure maximum utilisation and minimum wastage. • Demonstrate how to communicate clearly and politely to ensure effective communication with co-workers. • Demonstrate appropriate verbal and non-verbal communication that is respectful of genders and disability.

time. • Explain the importance of adhering to the limits of authority at work. • Explain the importance of following the applicable quality standards and timescales at work. • Explain the importance of coordinating with co-workers to achieve the work objectives efficiently. • Explain the relevant documentation requirements. • Explain the importance of providing appropriate information clearly and systematically in work documents. • State the escalation matrix to be followed to deal with out of authority tasks and concerns. • Explain the importance and process of mentoring and assisting subordinates in the execution of their work responsibilities. • Explain how to identify possible disruptions to work prevent them. • Explain how to use various resources efficiently to ensure maximum utilisation and minimum wastage. • Explain the recommended practices to be followed at work to avoid and resolve conflicts at work. • Explain the importance and process of efficient and timely dissemination of information to the authorised personnel. • Explain the procedure to report inappropriate behaviour e.g., harassment.	
Classroom Aids:	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
NA	

Module 4: Process of planning and managing the production process

Mapped to CSC/N1201 v2.0

Terminal Outcomes:

- Describe the process of planning and preparing for production.
- Describe the process of managing the production process.
- Demonstrate the process of carrying out documentation and data review.
- Describe the process of assisting in improving production and productivity.
- Explain the importance of using resources optimally.

Duration: 106:00	Duration: 240:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the concepts and benefits of Industry 4.0 and Industrial Internet of Things (IIoT). • State the relevant regulatory requirements with respect to production activities. • Describe the process of determining the production requirements through coordination with the relevant personnel. • Explain how to review the critical production requirements and quality criteria for each production and assembly activity. • List the appropriate changes that may be required in the production requirements according to the operational requirements. • Explain how to estimate the production costs and prepare the budget. • Describe the process of negotiating with the client and other stakeholders to agree on the budgets. • Describe the process of selecting an appropriate production method and the relevant regulations and guidelines to be adhered to. • List various resources required for production, such as raw materials, machinery, tools and equipment. • Explain the importance of ensuring the stock level of inputs is maintained	• Demonstrate the process of repairing/ replacing the faulty/ damaged raw material, machinery, tools and equipment. • Show how to prepare the job cards, allocating tasks with clear instructions to the production personnel/ workers according to their skills. • Prepare sample records with respect to production planning and preparation. • Demonstrate how to use resources optimally to maintain the productions costs within budget. • Demonstrate how to prepare the relevant reports with respect to the production and productivity of the personnel involved. • Show how to analyse and review the data through coordination with the relevant stakeholders to assess production. • Demonstrate the use of various industry 4.0 manufacturing technologies. • Demonstrate the process of optimising the usage of electricity and other resources in various tasks and processes.

according to the demand throughout the production process. • Explain how to plan and prepare the production schedule, and the importance of sequencing various production processes appropriately to ensure their completion as per the agreed timescales. • Describe the process of selecting the production team personnel/ workers in an appropriate number for efficient and timely production. • Describe the process of preparing the relevant raw materials, machinery, tools and equipment for safe operations. • Explain the importance of arranging the repair/ replacement of the faulty/ damaged raw material, machinery, tools and equipment. • Describe the process of preparing the job cards to allocate tasks to the production personnel/ workers according to their skills. • Explain the importance of assisting the production personnel with any doubts they may have regarding the production processes and their responsibilities. • Describe the process of getting approval for the job cards and production schedules. • Describe the process of allocating resources and consumables for various production processes. • Describe the process of site preparation for production. • Explain how to identify and address all the existing and potential hazards at the production facility. • Explain the importance and process of implementing the approved production processes to ensure compliance with the client's requirements along with applicable regulations, standards and	

organisational guidelines. • Explain the importance of adopting automation in production processes for enhanced production and quality of output. • Explain the importance of arranging appropriate assistance to enable workers to perform their duties effectively • Describe the process of monitoring the production processes and adjusting the schedules. • Explain the importance of ensuring that all support and control systems operate effectively during production. • Explain the importance of identifying problems in the production line and ensuring their quick resolution with minimum impact on production. • Explain the importance of ensuring production orders are completed on time and as per the set budget, ensuring adherence to the applicable quality standards. • Explain how to ensure compliance with the relevant environmental, health, safety guidelines, such as the use of PPE and effective waste management. • Explain the importance and process of monitoring the quality of product/output to ensure adherence to the applicable quality standards. • Explain the importance of maintaining cleanliness and hygiene in the work area. • Describe the process of collecting the appropriate data, and preparing the relevant reports with respect to the production and productivity of the production personnel. • Explain the importance of analysing and reviewing the production data through coordination with the relevant stakeholders.	

• Explain how to evaluate the effectiveness of the production processes to identify the scope of improvement/ streamlining. • Describe the process of reviewing the performance of production personnel/ workers against the relevant performance indicators. • Describe the process of developing plans to improve production, reduce costs and labour requirements according to reviews with the relevant stakeholders. • Explain the importance of arranging appropriate training for the production personnel/ workers to improve their skills and productivity. • Describe the process of assisting in developing health and safety procedures and protocols for ensuring the well-being of workers. • Explain how to reduce an organisation's carbon footprint. • Explain the benefits and methods of resource optimisation.	

Classroom Aids
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop
Tools, Equipment and Other Requirements
Charts, Graphs, Standards, Jigs and Fixtures, Various Commonly Used Machine Tools, CAD/CAM Environment, Commonly Used Machine Tools, Work Holding Devices, Material Handling Equipment.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma /Degree	Diploma /Degree in Mechanical Engineering	4	Production Engineer	0		Practical skills and knowledge required in the relevant field

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "**Production Engineer**" mapped to QP: "CSC/Q1201, v1.0". The minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". The Minimum accepted as per respective SSC guidelines is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma /Degree	Diploma /Degree in Mechanical Engineering	4	Production Engineer	0		Practical skills and knowledge required in the relevant field

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "**Production Engineer**" mapped to QP: "CSC/Q1201, v1.0". The minimum accepted score is 80%	Certified for the Job Role: "Assessor", mapped to the Qualification Pack: "MEP/Q2701, v1.0", 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
    - The assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records
2. Testing Environment

    To ensure a conducive environment for conducting a test, the trainer will:
    - 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 10 a.m. and 5 p.m. respectively
    - Ensure there are 2 Assessors if the batch size is more than 30.
    - 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 levels 1 to 3 are for the unskilled & semi-skilled individuals, and levels 4 and above are for the skilled, supervisor & higher management
    - The assessor must be ToA certified and the trainer must be ToT Certified
    - The 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:

    To verify the details submitted by the training centre, the assessor will undertake:
    - A surprise visit to the assessment location
    - A random audit of the batch
    - A random audit of any candidate
6. Method for assessment documentation, archiving, and access

    To protect the assessment papers and information, the assessor will ensure:
    - 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 on the Hard drive

References

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	The 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
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	The 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
NOS	National Skills Qualification Committee
NSQF	National Skills Qualification Framework
OJT	On-the-Job Training
OMR	Optical Mark Recognition
PC	Performance Criteria
PwD	Persons with Disabilities
QP	Qualification Pack
SDMS	Skill Development & Management System
SIP	Skill India Portal
SSC	Sector Skill Council
TC	Trainer Certificate
ToA	Training of Assessors
ToT	Training of Trainers
TP	Training Provider