Model Curriculum

Production Engineer

SECTOR:	**CAPITAL GOODS**
SUB-SECTOR:	**1. Machine Tools**
	2. Dies, Moulds and Press Tools
	3. Plastics Manufacturing Machinery
	4. Textile Manufacturing Machinery
OCCUPATION:	**Shop Floor Management**
REF ID:	**CSC/Q1201, V1.0**
NSQF LEVEL:	**5**

Skill India
कौशल भारत-कुशल भारत

CGSC
CAPITAL GOODS SKILL COUNCIL

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CAPITAL GOODS SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **'Production Engineer'** QP No. **'CSC/ Q 1201, NSQF Level 5'**

Date of Issuance: April 24th, 2014

Valid up to : August 30th, 2016

Authorised Signatory
Tourism & Hospitality Skill Council

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Production Engineer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Production Engineer", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Production Engineer**		
Qualification Pack Name & Reference ID. ID	CSC/Q1201, v1.0		
Version No.	1.0	**Version Update Date**	
Pre-requisites to Training	Diploma – Mechanical/Production, Degree preferred		
Training Outcomes	**After completing this programme, participants will be able to:** • **Plan and organize machinery production and assembly processes:** planning and organizing of workplace, resources and processes required for the production and assembly of machinery and components, in accordance with approved procedures. The range of production processes could include manufacturing operations such as machining, fabrication, welding, material finishing or manufacture, assembly, joining or other activities, such as productivity, performance and process improvement. • **Basic health and safety practices at the workplace:** identify risks and hazards at workplace, use of PPE, and apply good housekeeping practices, etc., • **Work effectively with others:** effectively communicate with others and demonstrate good ethical practices and discipline.		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "Production Engineer" Qualification Pack issued by "Capital Goods Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required

1	**Plan and organize machinery production and assembly processes**
	
	Theory Duration
	(hh:mm)
	40:00
	
	Practical Duration
	(hh:mm)
	100:00
	
	Corresponding NOS Code
	CSC/N1201
		• Define terms like work, power and energy
		• Use trigonometry to solve problems
		• Define moment of a force
		• Explain the meaning of torque and couple
		• List SI units for work, power energy, voltage, current, torque, couple
		• Evaluate the impact of friction
		• Define types of heat
		• Describe various quality systems used by the industry
		• Explain methods and procedures used for different types of production processes and activities
		• Assess the site for suitability of the production process
		• Distinguish between abbreviations and notations used in the manufacturing
		• Interpret engineering drawings, circuit diagrams and piping layouts
		• Interpret charts, tables, graphs and applicable standards
		• Explain principles of document control
		• Identify right material for the production
		• List various forms and types of material used in the production
		• State physical properties of commonly used metals and non metals
		• Describe heat treatment process and its necessity
		• Describe various fastening methods
		  ○ Bolting methods
		  ○ Mechanical fastening
		  ○ Classification of joint configuration
		• State benefits of jigs and fixtures
		• Describe adhesive bonding in the joining of fabricated assemblies
		• Infer weld dimensions and weld symbols
		• Define limits and tolerances
		• List range of machine tools used in the production
		• Analyze specifications of various machine tools
		• Inspect alignment of machine tools and take necessary action in case of any misalignment
		• Compare NC and CNC machine tools
			Training kit (Trainer guide, PowerPoint), charts, graphs, standards, jigs and fixtures, various commonly used machine tools, CAD/CAM environment, commonly used machine tools, Work holding devices, material handling equipment

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Recall CAD/CAM design concepts • Use simulation software effectively to prove the part program • Identify various types of cutting tools used in NC and Non NC machine tools • Develop preventive maintenance schedule for each machine • Describe the use of coolants and lubrication • List various documents used in production activities • Evaluate the efficiency of the production department and take measures to enhance the production capacity • State the requirements of material handling equipment • Analyze the critical production requirements and quality criteria for each production and assembly activity • Assess the production facility and ensure that the facility meets required standards • Organize resources required for the production by coordinating with various departments • Resolve any resource supply or control issues • Develop cards for production, resources used etc. • Ensure that the production area is safe and train team on the importance of following safety practices • Implement and monitor quality assurance systems • Develop plans to improve the processes • Carry out inspection of the finished goods, processes, incoming material as per the schedule • Train technicians and production staff on safety, process efficiency, quality control, inspection etc. • Communicate with various departments and vendors to achieve the set target to meet required quality standards • Use basic office applications like spreadsheet, word processor and presentations • Feed the required data in the ERP • Demonstrate problem solving abilities • Plan production sequence as per the component to be manufactured	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Evaluate the performance of the self and team members • Participate in all activities and realize the importance of a team	
2	**Health and safety** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** CSC/N1335	• Explain the importance of personal protective equipment (PPE) required for gas cutting operation • State the causes for accidents • Identify job site hazardous work and state possible causes of risk or accident at the workplace • Explain the importance of '5S' at the workplace	Training kit (Trainer guide, PowerPoint) Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes
3	**Fire Safety** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** CSC/N1335	• Explain types of fires - Class A, B, C and D • Select appropriate fire extinguisher to control fire • Use PASS method to operate a fire extinguisher • Follow fire safety signs and safe evacuation method in case of a fire • Identify the location of assembly point, fire exit, fire alarm • Follow reporting procedure in case of a fire	Training kit (Trainer guide, PowerPoint) Class A, B, C, D and K fire extinguishers
4	**Emergencies, rescue and first aid procedure** **Theory Duration** (hh:mm) 09:00 **Practical Duration** (hh:mm) 18:00 **Corresponding NOS Code** CSC/N1335	• Follow electrical safety procedures • Use approved method to rescue a person from electrocution • State the importance of first aid • Identify the contents of a first aid kit and their application • Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc. • Use of CPR process • Bandage wounds • Explain stages of crisis and crisis management • Prepare an incident report	Training kit (Trainer guide, PowerPoint) First aid kit with all contents
5	**Work effectively with others** **Theory Duration** (hh:mm)	• Explain the importance of team work and team dynamics • State 4Cs of working in a team • Explain types of communication • Apply effective communication	Training kit (Trainer guide, PowerPoint)

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	20:00 **Practical Duration** (hh:mm) 60:00 **Corresponding NOS Code** CSC/N1336	technique • Overcome barriers to effective communication • Demonstrate active listening skills • Demonstrate good customer service skills • Explain the importance of ethical behaviour in your day-to-day work • State the importance of discipline in life and apply the same at workplace	
	Total Duration **Theory Duration** **84:00** **Practical Duration** **216:00**	**Unique Equipment Required:** Charts, graphs, standards, jigs and fixtures, various commonly used machine tools, CAD/CAM environment, commonly used machine tools, Work holding devices, material handling equipment, apron, gloves, safety boots, overalls, eye shields, goggles, ear plugs, measuring instruments,, Class A, B, C, D and K fire extinguishers, PPE, First aid kit with all contents	

Grand Total Course Duration: **300 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Capital Goods Skill Council)***

Trainer Prerequisites for Job role: "Production Engineer" mapped to Qualification Pack: "CSC/Q1201 v1.0"

Sr. No.	Area	Details
1	**Description**	Plan and organise workplace, resources and processes required for the production and assembly of machinery and components in accordance with approved procedures.
2	**Personal Attributes**	Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness
3	**Minimum Educational Qualifications**	Diploma /Degree in Mechanical Engineering
4a	**Domain Certification**	Certified for Job Role: "Production Engineer" mapped to QP: "CSC/Q1201, v1.0". Minimum accepted score is 80%
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". Minimum accepted as per respective SSC guidelines is 80%.
5	**Experience**	• 3-4 years of industry experience in the relevant field • 3-4 years of teaching experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Production Engineer
Qualification Pack	CSC/Q1201, v1.0
Sector Skill Council	Capital Goods Skill Council

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5	To pass the Qualification Pack , every trainee should score a minimum of 70% in every NOS
6	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.

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
1.CSC/N1201 Plan and organize machinery production and assembly processes	PC1.obtain specification of the product to be produced from an appropriate authority	100	1	0	1
	PC2.obtain details of the required production and assembly activities		1	0	1
	PC3.review the critical requirements and quality criteria for each production and assembly activity		2	0	2
	PC4.obtain clarification from relevant people on any aspects of the activities that are unclear		1	0	1
	PC5.discuss and facilitate any changes needed to suit the operational requirements with the relevant people		4	1	3
	PC6.ensure that methods and procedures used meet relevant regulations and guidelines		3	1	2
	PC7.define the production requirements and communicate them to the relevant people		2	0	2
	PC8.record the requirements in the appropriate information systems		2	0	2
	PC9.identify production team personnel and contractors required and check for their availability		2	0	2
	PC10.obtain the resources, based on required skills, using the appropriate organizational procedures and authorizations		3	1	2
	PC11.identify materials, tools, equipment, jigs and other resources required using workplace job information		2	0	2
	PC12.resolve any resource supply or quality issues		2	0	2
	PC13.inspect and prepare the materials, tools, equipment, jigs for safe operation		3	0	3
	PC14.report faulty material, tools, equipment and jigs to appropriate personnel		2	0	2
	PC15.record all resource data on the appropriate company information system		2	1	1
	PC16.develop job cards showing personnel, consumables and resource costs		2	0	2
	PC17.develop production schedules showing job sequence and estimated start and completion dates		3	1	2
	PC18.submit job cards and production schedules to the appropriate personnel for approval		2	0	2
	PC19.confirm that appropriate authorization is Obtained		2	0	2
	PC20.confirm the availability of resources to relevant team members		2	0	2
	PC21.confirm to appropriate personnel that materials, processes and the site are duly prepared		2	0	2
	PC22.confirm that the health, safety and		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	environmental requirements applicable to the production activities are being adhered to				
	PC23.provide clear and accurate instructions to all the relevant people		3	1	2
	PC24.ensure that all support and control systems operate effectively		2	0	2
	PC25.ensure that quality assurance systems are correctly implemented		2	0	2
	PC26.ensure that engineering support systems are operating correctly		2	0	2
	PC27.control the use of resources to achieve the most effective results		2	0	2
	PC28.implement production processes that comply with organizational guidelines and procedures, customer standards and requirements or national and international standards or directives		2	1	1
	PC29.identify opportunities to improve the production processes and activities and forward to relevant authorities		2	0	2
	PC30.report and communicate production processes and activities implemented through various company media		2	0	2
	PC31.record the implementation process on appropriate company media		3	1	2
	PC32.conduct an evaluation of the effectiveness of the implementation process		2	0	2
	PC33.identify and record any deviations from specifications of the implemented activity		3	1	2
	PC34.ensure that the implementation of production processes and activities complies with all relevant regulations, directives and guidelines		2	1	1
	PC35.inspect personnel, resources and timelines for production and confirm according to workplace procedures and requirements		4	1	3
	PC36.identify potential production problems and action according to workplace procedures		4	1	3
	PC37.put permanent corrective action in place to resolve production problems as per organizational Procedure		4	1	3
	PC38.enhance productivity by adopting a number of appropriate measures (eg. automation, motivation, process planning, resource planning)		4	1	3
	PC39.inform appropriate personnel of production progress in a timely manner		2	0	2
	PC40.monitor production for quality, budget and time schedule		2	0	2
	PC41.ensure that work area and tools are cleaned and inspected according to workplace procedures		2	1	1
	PC42.complete job documentation according to		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	workplace procedures				
	Total		**100**	**17**	**83**
2.CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	**100**	5	2	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		4	2	2
	PC6.state location of general health and safety equipment in the workplace		3	2	1
	PC7.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC8.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC9.lift heavy objects safely using correct procedures		5	2	3
	PC10.apply good housekeeping practices at all times		4	2	2
	PC11.identify common hazard signs displayed in various areas		5	2	3
	PC12.retrieve and/or point out documents that refer to health and safety in the workplace		3	1	2
	PC13.use the various appropriate fire extinguishers on different types of fires correctly		4	1	3
	PC14.demonstrate rescue techniques applied during fire hazard		4	1	3
	PC15.demonstrate good housekeeping in order to prevent fire hazards		3	1	2
	PC16.demonstrate the correct use of a fire extinguisher		4	1	3
	PC17.demonstrate how to free a person from electrocution		4	1	3
	PC18.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		4	1	3

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC19.demonstrate basic techniques of bandaging		3	1	2
	PC20.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		4	1	3
	PC21.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC22.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC23.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC24.participate in emergency procedures		3	2	1
	PC25.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26.demonstrate correct method to move injured people and others during an emergency		4	1	3
	Total		**100**	**36**	**64**
3.CSC/N1336 Work effectively with others	PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	**100**	10	3	7
	PC2.accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3.give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4.display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5.consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6.display appropriate communication etiquette while working		10	3	7
	PC7.display active listening skills while interacting with others at work		10	3	7
	PC8.use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9.demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10.escalate grievances and problems to		10	3	7

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	appropriate authority as per procedure to resolve them and avoid conflict				
	Total		**100**	**30**	**70**
	Grand Total		**300**	**83**	**217**
	Percentage Weightage:			**28**	**72**
	Minimum Pass% to qualify (aggregate):		**70**		