Model Curriculum

CNC Setter cum Operator-Turning

SECTOR:	**CAPITAL GOODS**
SUB-SECTOR:	**1. Machine Tools**
	2. Dies, Moulds and Press Tools
	3. Plastics Manufacturing Machinery
	4. Textile Manufacturing Machinery
	5. Process Plant Machinery
	6. Electrical and Power Machinery
	7. Light Engineering Goods
OCCUPATION:	**Machining**
REF ID:	**CSC/Q0120, v1.0**
NSQF LEVEL:	**4**

Skill India
कौशल भारत-कुशल भारत

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: **'CNC Setter Cum Operator - Turning'** QP No. **'CSC/Q0120 NSQF Level 4'**

Date of Issuance: Nov 24th,2017
Valid up to : Nov 24th,2021
**Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)*

Authorised Signatory
(Capital Goods Skills Council)

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CNC Setter cum Operator-Turning

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "CNC Setter cum Operator-Turning", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**CNC Setter cum Operator-Turning**		
Qualification Pack Name & Reference ID. ID	CSC/Q0120, v1.0		
Version No.	1.0	**Version Update Date**	
Pre-requisites to Training	10th Standard passed, preferably Minimum 1 year as a CNC Turning Machine Operator		
Training Outcomes	**After completing this programme, participants will be able to:** • Set computer numerically controlled (CNC) machines for turning operations of metal components. • Prepare for performing turning operation on CNC machine. • Perform turning operation using CNC machine. • Apply basic health and safety practices at the workplace. • Work effectively with colleagues and supervisors.		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of "CNC Setter cum Operator-Turning" Qualification Pack issued by "Capital Goods Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction** **Theory Duration** (hh:mm) 03:00 **Practical Duration** (hh:mm) 00:00 **Corresponding NOS Code** CSC/N0120	• State the various opportunities available in fabrication industry. • Describe the role and responsibilities for a computer numerical control (CNC) setter cum operator. • Explain the importance of using CNC machines over conventional machines.	Training Kit (Trainer guide, Presentation), sample drawing, vernier caliper, micrometer screw gauge, depth gauge, CNC machine with all accessories, facing tool, turning tool, grooving tool, parting off tool, threading tool, reamers, twist drills.
2	**Units, measurement and engineering drawing** **Theory Duration** (hh:mm) 06:00 **Practical Duration** (hh:mm) 02:00 **Corresponding NOS Code** CSC/N0120	• Identify various systems of measurements. • Read and interpret 'First angle' and 'Third angle' projections. • Identify dimensioning methods. • Read manufacturing notes as per the standards specified. • Define 'Limits', 'Fits' and 'Tolerances'. • Use precision measuring instruments correctly. Measuring equipments: steel rules, micrometer (external, internal, depth), vernier (digital, dial; length, depth; protractors), gauges (slip, bore/hole, thread, plug, radius/profile), dial test indicators (DTI), surface finish equipment (such as comparison plates), height master. • Perform numerical calculations.	Training Kit (Trainer guide, Presentation).
3	**Material properties** **Theory Duration** (hh:mm) 03:00 **Practical Duration** (hh:mm) 00:00 **Corresponding NOS Code** CSC/N0120	• Classify materials as Ferrous and Non-ferrous. Ferrous metals: e.g. steel, stainless steel cast iron; nonferrous metals: e.g. aluminium, aluminium alloys, copper and copper alloys; non-metals: e.g. plastics. • Describe physical properties of most common ferrous materials.	Training Kit (Trainer guide, Presentations).
4	**Introduction to CNC** **Theory Duration** (hh:mm) 08:00	• Explain terminologies used in CNC turning. • Identify the parts of a CNC machine. • Describe various turning operations that can be performed on a CNC. Turning operations: turning (OD and ID), facing, contour turning with	Training Kit (Trainer guide, Presentations)

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 15:00 **Corresponding NOS Code** CSC/N0120	roughing, finish turning using stock removal cycles (OD and ID), grooving (face, OD and ID), thread cutting (OD and ID), drilling, boring, rigid tapping and tapping with attachment. • Identify various types of cutting tool materials and describe their properties. • Identify various types of tools based on the operations. Cutting tools: turning tool (OD and ID), grooving tool (OD and ID), parting tool, threading tool, form tools, centre drills, twist/insert drills, reamers. • Hand tools: hammer (ball peen, mallet), magnifying glass, allen keys, spanner, wrenches, deburring tools. • Identify various types of work holding devices. Work-holding devices: chucks with hard jaws, chucks with soft jaws, fixtures, drive centres, collet chucks, faceplates, magnetic/pneumatic devices, other work-holding devices. • Identify tool posts, magazines and carousels. • Describe the method to position and identify tools in relationship to the operating program.	
5	**Working safely** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 06:00 **Corresponding NOS Code** CSC/N0120	• Explain the importance of safe working practices at the work place. • Apply electrical safety practices at the work place. • Comply with health and safety legislation, regulations and other guidelines. • Follow general safety practices at the workplace. • Identify hazards at the workplace to avoid accidents. Hazards associated with the use of CNC machines: automatic machine operations; revolving/moving parts of machinery; airborne and hot metal particles; sharp cutting tools; lifting and handling work-holding devices; burrs and sharp edges on component; use of power operated chucks; moving machinery; hot and airborne metal and particles and fluid. • Follow the stated procedure for material handling. • List the personal protective equipment (PPE) required for CNC operation.	Training Kit (Trainer guide, Presentations), overalls, safety glasses, safety shoes, face mask, work holding devices, CNC machine with all accessories.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		Personal protective equipment: correctly fitting overalls; safety glasses; long hair is tied back or netted; removing any jewellery or other items that can become entangled in the machinery; covered shoes; face mask. • Follow the safety recommendations while handling CNC machine. Safe working practices and procedures: ensuring the correct isolation of the machine before mounting work-holding devices and tooling; fitting and adjusting machine guards; ensuring that the work-piece is secure and that tooling is free from work-piece before starting the machine; the personal protective equipment (PPE) to be worn for the CNC turning activities; as correctly fitting overalls and safety glasses; ensuring that, if they have long hair, it is tied back or netted; removing any jewellery or other items that can become entangled in the machinery. • Check that all safety mechanisms are in place and the equipment is set correctly for the required operation. • State the importance of '5S's.	
6	**Preparing CNC machine for operation** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS Code** CSC/N0120	• Establish job requirements from the document accurately. Job requirements: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; operations required (list, sequence and procedures where applicable); work-holding devices; instruments and tools to be used; interdependencies; form tolerances; cycle time. • Perform primary checks on the CNC machine. Preliminary check ensuring readiness: e.g. machine is clean, lubrication is functioning, coolant level is correct, sub-systems are working correctly, confirmation received from the machine setter that the machine is ready for production, received necessary instruction/training on specific operation of the machine, etc. CNC machines: 2-axis CNC lathe machine. • Identify suitable work holding or fixture as per the work requirement.	Training Kit (Trainer guide, Presentations), overalls, safety glasses, safety shoes, face mask, work holding devices, CNC machine with all accessories, engineering drawings, sample instruction sheets, sample daily check sheet, turning tool, threading tool, centre drills, threading tools, reamers, vernier caliper, micrometer screw gauge, depth gauge, work holding devices.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Check tools, fixtures for any damage, breakage and calibration. • Ensure that the correct program is being used and the tool is set properly. • Pre-set the tooling appropriately using setting jigs / fixtures.	
7	**Tool setting for CNC operations** **Theory Duration** (hh:mm) 6:00 **Practical Duration** (hh:mm) 150:00 **Corresponding NOS Code** CSC/N0120	• Use appropriate method to mount tool in the correct tool post, turret, magazines, or carousel. • Identify tool number in relation to the operating program. • Produce components of various features. • Feed the relevant tool data to the program. Tool data: e.g. tool types, tool lengths, tool offsets, radius compensation, etc. Part-program commands: axes convention, co-ordinates, (absolute, incremental); basic motion commands G00, G01, G02/03; tool radius compensation; F, S, T commands; program transfer to CNC machine. • Set tool datum, position, length, offset and radius compensation. • Position the work holding device in relationship to the machine datum and reference points. • Adjust machine tool operating parameters. Mode of machine control: machine / Operator Control Panel. CNC - MDI Panel. • Perform trial run using single block run, dry run and feed and speed overdrive controls. • Verify critical parameters of the job. Critical parameters: linear dimensions (such as lengths, depths), slots (position, width, depth), flatness, squareness, parallelism, hole size/fit, angles, recesses, thread fit (suit to gauges / masters), runout, concentricity, contour/profile. • Perform necessary checks before proceeding for the full mode operation. Checks: after proving the program, measure the dimensions of the component on the machine and correct tool offsets accordingly; unload the component after all the	Training Kit (Trainer guide, Presentations), overalls, safety glasses, safety shoes, face mask, work holding devices, CNC machine with all accessories, engineering drawings, sample instruction sheets, sample daily check sheet, turning tool, threading tool, centre drills, threading tools, reamers, vernier caliper, micrometer screw gauge, depth gauge, work holding devices.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		dimensions are as per specifications; inspect the component for all dimensions and record findings in specified formats; make a note of the corrections to be made in the tool wear offsets and correct accordingly; run the next component; ensure that all dimensions are within specifications; correct if required; repeat this till parts come within specifications without any correction requirement.	
8	**Routine checks for CNC Turning machine** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 90:00 **Corresponding NOS Code** CSC/N0115	• Collect job specifications from valid sources. Valid sources: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; instructions from supervisor. • Establish job requirements from the document accurately. Job specification documents: detailed component drawings; approved sketches/illustrations; national and organisational standards; reference tables and charts. • Perform primary checks on the machine. • Secure the work piece in the work holding device and position correctly as per operation. • Ensure that the correct program is being used and the tool is set properly. • Perform daily maintenance activities.	Training Kit (Trainer guide, Presentations), overalls, safety glasses, safety shoes, face mask, work holding devices, CNC machine with all accessories, engineering drawings, sample instruction sheets, sample daily check sheet, turning tool, threading tool, centre drills, threading tools, reamers, vernier caliper, micrometer screw gauge, depth gauge, work holding devices.
9	**Turning operation using CNC machine** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 90:00 **Corresponding NOS Code** CSC/N0115	• Gather relevant information from the drawing. Drawings, dimensioning and labeling: projections (orthographic [first angle, third angle]; isometric [including exploded], sectional view); reference points, lines, edges and surfaces. • Explain various displays shown on the CNC panel. • Secure the work piece in suitable work holding device. • Check correctness of the program through dry run and single block check. • Perform first cut by setting tool offsets to get an oversized part. • Measure critical parameters without removing the work piece from the machine.	Training Kit (Trainer guide, Presentations), overalls, safety glasses, safety shoes, face mask, work holding devices, CNC machine with all accessories, engineering drawings, sample instruction sheets, sample daily check sheet, turning tool, threading tool, centre drills, threading tools, reamers, vernier caliper, micrometer screw gauge, depth gauge, work holding devices.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		Critical parameters: linear dimensions (such as lengths, depths), slots (position, width, depth), flatness, surface finish, squareness, parallelism, hole size/fit, angles, recesses, thread fit, runout and roundness. • Ensure that the machine settings are adjusted as and when required either by self or by a setter. • Follow machining sequence while producing components. • Produce various features as per the drawing. Features of machined components produced: diameters (parallel, stepped, tapered), faces, undercuts (internal and external), profiles (internal and external), holes (reamed, tapped, drilled, bored), parting-off, threads (internal, external), chamfers and radii, grooves. • Follow inspection plan to inspect produced components. Produce components standards: components to be free from false tool cuts, burrs and sharp edges; general dimensional tolerance +/- 0.1mm; specific dimensional tolerances within +/- 0.02mm; surface finish within 1.6µm; reamed holes within H8; screw threads 6G/6H; angles/tapers within +/- 15 sec; flatness and squareness 0.025mm. • Inspect tools and specific intervals and decide on the tool change. • Check the dimensional tolerance of the finished component. • Perform documentation during post operations as per procedure. • Store finished products as per norms. • Perform documentation as per guidelines. • Read and interpret information from various sources. • Convey and share information. • Perform basic numerical operations and calculations. • Plan and organize the work to meet expected outcomes.	
10	**Health and safety** **Theory Duration**	• Explain the importance of Personal Protective Equipment (PPE). • Identify appropriate PPE for the	Training kit (Trainer guide, Presentation), leather gloves, leather

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 10:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** CSC/N1335	various tasks performed. • Identify job site risks and hazards to avoid accidents at the work place. Hazards: sharp edged and heavy tools; heated metals; gas cylinders; welding radiation; ○ hazardous surfaces (sharp, slippery, uneven, chipped, broken, etc.); ○ hazardous substances (chemicals, gas, fumes, dust, etc.); ○ physical hazards (working at heights, large and heavy objects and machines, sharp and piercing objects, tools and machines, intense light, load noise, obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc.) ○ electrical hazards (power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.). Possible causes of risk and accident: physical actions; reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness). • Identify the names and locations of people responsible for health and safety in the workplace. • Identify documents that refer to health and safety in the workplace and where they are located. • Carry out safe working practices while dealing with hazards to ensure the safety of self and others. Safe working practices: using protective clothing and equipment; ○ putting up and reading safety signs; ○ handle tools in the correct manner and store and maintain them properly; ○ keep work area clear of clutter, spillage and unsafe object lying casually; ○ while working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of	apron, welding screen – helmet types, hand screen welding and safety shoes.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		control equipment, dry work area, switch off the power supply when not required, etc.; ○ safe lifting and carrying practices; ○ use equipment that is working properly and is well maintained; ○ take due measures for safety while working in confined places, trenches or at heights, etc. including safety harness, fall arrestors, etc. • Inspect steps and ladders for faults, set them and use them safely. Ladder faults: corrosion of metal components, deterioration, splits and cracks timber components, imbalance, loose rungs, missing/ unfixed nuts or bolts, etc. Ladders set up: firm/level base, clip/lash down, leaning at the correct angle, etc. • Work safely in and around trenches, elevated places and confined areas. • Lift heavy objects safely using correct procedures. • Apply good housekeeping practices at all times. Good housekeeping practices: clean/tidy work areas, removal/disposal of waste products, protect surfaces. • Identify common hazard signs displayed in various areas. Various areas: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc.	
11	**Fire Safety** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** CSC/N1335	• Identify causes of fire accidents. • Recognise required fire extinguisher based on the type of fire. Types of fires: ○ Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; ○ Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; ○ Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated	Training kit (Trainer guide, Presentation), Class A, B, C and D fire extinguishers.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		the fire is no longer receiving electricity); ○ Class D: combustible metals such as magnesium, titanium, and sodium (These fires burn at extremely high temperatures and require special suppression agents). • Use the various appropriate fire extinguishers on different types of fires correctly. • Interpret fire safety signs. • Inspect evacuation plan in case of fire. • Identify the location of assembly point, fire exit and fire alarm. • Follow reporting procedure in case of a fire. • Participate in fire safety drills at the workplace. • Demonstrate good housekeeping in order to prevent fire hazards.	
12	**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. • Administer first aid in case of minor injuries, bleeding, burns, choking, electrical shock, poisoning, etc. • Demonstrate the artificial respiration and CPR process. • Follow correct method to move injured people and others during an emergency. • Explain stages of crisis and crisis management. • Participate in emergency procedures as per role. Emergency procedures: raising alarm, safe/efficient evacuation, correct means of escape, correct assembly point, roll call, correct return to work. • Prepare an accident/incident report or dictate a report to another person and send report to person responsible. Incident Report includes details of: name, date/time of incident, date/time of report, location, environment conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified.	Training kit (Trainer guide, Presentation), First aid kit with all contents.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
13	**Working effectively with others** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 60:00 **Corresponding NOS Code** CSC/N1336	• State various categories of people that one is required to communicate and co-ordinate within the organization. • Explain the importance of effective communication in the workplace. • Explain the importance of teamwork in organizational and individual success. • Describe various components of effective communication and active listening. • Describe the barriers to effective communication. • Provide and receive information to and from authorized persons accurately and within agreed timescale. • Communicate information to others clearly, at a pace and in a manner that helps them to understand. • Work with colleagues in a positive and helpful manner, where required and possible. • Take measures to maximize effectiveness and efficiency in carrying out tasks by consulting with and assisting others. • Follow appropriate communication etiquette while working. Communication etiquette: do not use abusive language; use appropriate titles and terms of respect; do not eat or chew while talking (vice versa), use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism, etc. • Apply active listening skills while interacting with others at work. • Explain the importance of ethics and discipline for professional success. • Describe common reasons for interpersonal conflict and ways of managing interpersonal conflict effectively. • Explain the importance of developing effective working relationships for professional success. • Display responsible and disciplined behaviors at the workplace. Disciplined behaviors: e.g. punctuality; completing tasks as per given time and standards; not gossiping and idling time; eliminating waste, honesty, etc.	Training kit (Trainer guide, Presentation)

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict.	
	Total Duration **Theory Duration 106:00** **Practical Duration 494:00**	**Unique Equipment Required:** overalls, safety glasses, safety shoes, face mask; fire extinguishers - dry powder fire extinguisher; fire bucket with sand, first aid kit; , work holding devices, CNC machine with all accessories; turning tool, threading tool, centre drills, threading tools, reamers, surface plate - standard size; scriber - 15 cm; dividers 20 cm; caliper outside 15 cm; prick punch; chisel cold flat - 19 mm; centre punch – 9 mm x 127 mm; rule 60 cm; two fold; brass toped to read inches and mm; hammer scaling 0.25 kg with handle; steel rule - 30 cm to read inch and millimetre; Vernier caliper (digital) - 0-150 mm; ball peen hammer with handle - 0.25 kg; cross peen hammer with handle - 0.25 kg; holding tongs - 30 cm; wire brush – 15 cm x 3.7 cm and double ended spanner, depth gauge etc.	

Grand Total Course Duration: **600 Hours, 0 Minutes**

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

Trainer Prerequisites for Job role: "CNC Setter cum Operator-Turning" mapped to Qualification Pack: "CSC/Q0120 v1.0"

Sr. No.	Area	Details
1	**Description**	It involves setting up the CNC turning machine, its work holding devices, tooling, loading the machine operating programmes, conducting trial runs and correcting faults, in order to ensure that the work output is produced as per specification
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: "CNC Setter cum Operator-Turning" mapped to QP: "CSC/Q0120, 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

Criteria For Assessment Of Trainees

Job Role: CNC Setter cum Operator-Turning

Qualification Pack: CSC/Q0120

Sector Skill Council: Capital Goods Skill Council

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. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS **Total Marks: 400**				**Marks Allocation**	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
CSC/N0120 Set computer numerically controlled (CNC) machines for turning operations on metal components	PC1.work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines	**100**	2	1	1
	PC2.check that all safety mechanisms are in place and that the equipment is set correctly for the required operations		2	0	2
	PC3.adhere to procedures or systems in place for health and safety, personal protective equipment and other relevant safety regulations and procedures to realize a safe system of work		3	1	2
	PC4.keep the work area clean and tidy		1	0	1
	PC5.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		1	0	1
	PC6.ensure that the components used are free from foreign objects, dirt or other contamination		1	0	1

	PC7.obtain job specification from a valid and approved source		1	0	1
	PC8.read and establish job requirements from the job specification document accurately		2	1	1
	PC9.follow job instructions, assembly drawings and laid down procedures at all times		2	1	1
	PC10.report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		2	0	2
	PC11.prepare the work area for the turning operations as per procedure or operational specification		2	1	1
	PC12.conduct a preliminary check of the readiness of the CNC turning machine		1	0	1
	PC13.obtain appropriate cutting tools and hand tools and measuring tools as per job requirements		2	1	1
	PC14.ensure that all measuring equipment is calibrated and approved for usage		1	0	1
	PC15.determine what operational objectives and targets need to be achieved and how best the machine will be set to achieve this		2	1	1
	PC16.extract and use information from engineering drawings and relate specifications in relation to work undertaken		3	1	2
	PC17.identify tool requirements from tooling layout and assess their suitability		3	1	2
	PC18.identify suitable work-holding or fixturing device as per the job requirement		2	1	1
	PC19.ensure that the tools and fixtures are in usable condition (free from breakage, damage, calibration, etc.)		1	0	1
	PC20.ensure the correct and latest part-program is uploaded onto the CNC system		3	1	2
	PC21.pre-set the tooling appropriately using setting jigs/fixtures		3	1	2
	PC22.seek any necessary instruction/training on the operation of the machine where required		1	0	1
	PC23.mount tools in the correct position in the tool posts, turrets, magazine or carousel		3	1	2
	PC24.check that the tools have a specific tool number in relation to the operating program		2	0	2
	PC25.produce machined components that combine different turning operations and have a range of features		5	2	3

	PC26.enter all relevant tool data to the operating program and also part-program for cutting a part using limited set-of commands		3	1	2
	PC27.set tool datums, positions, lengths, offsets and radius compensation		3	1	2
	PC28.mount the work-holding device/fixture onto the machine		3	1	2
	PC29.set the work-holding device/fixture in relationship to the machine datum's and reference points		3	1	2
	PC30.set the machine tool operating parameters (eg. hydraulic pressure, clamping) as per the component requirements		3	1	2
	PC31.place the machine into the correct operating mode, and access the program edit facility in order to enter tooling data		3	1	2
	PC32.conduct trial runs using single block run, dry run and feed and speed override controls		2	1	1
	PC33.measure the critical parameters of the machined component on the machine		3	0	3
	PC34.prove the program tool by tool in single block mode including transferring program to machine		5	2	3
	PC35.perform the necessary checks before allowing the machine to operate in full program run mode		3	0	3
	PC36.hand-over the machine after set-up to the machine operator along with relevant instructions and documentation		4	2	2
	PC37.complete relevant documentation as per organizational procedure		2	1	1
	PC38.handle the typical problems that can occur with the setting up of the tooling, work-holding devices and proving the program		2	1	1
	PC39.switch the CNC turning/lathe machine on and off in normal and emergency situations		1	0	1
	PC40.return the old cutting tools, workholding device/ fixtures/ instruments/ drawings back to store and verified tapes and programs, safely and correctly		1	0	1
	PC41.ensure that there is no damage to the tool/fixture while doing the prove-out		1	0	1
	PC42.complete documentation during and post operations as per organizational procedures		2	1	1

	PC43.deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve		2	0	2
	PC44.shut down the equipment to a safe condition on conclusion of the activities		1	0	1
	PC45.leave the work area in a safe and tidy condition on completion of the fitting activities		1	0	1
	PC46.return all tools and equipment to the correct location on completion of the turning activities		1	0	1
		Total	**100**	**29**	**71**
CSC/N0115 Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work	100	2	1	1
	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing CNC turning operations		3	1	2
	PC3. read and understand safety instructions, warning signs on the CNC machines used		2	0	2
	PC4. work following laid down procedures and instructions		2	1	1
	PC5. ensure work area is clean and safe from hazards		1	0	1
	PC6. ensure that all tools and equipment are in a safe and usable condition		1	0	1
	PC7. obtain job specification from a valid source		1	0	1
	PC8. read and establish job requirements from the job specification document accurately		2	1	1
	PC9. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		3	1	2
	PC10. prepare the work area for the turning operations as per procedure or operational specification		2	1	1
	PC11. perform daily maintenance of machine according to defined checklist, at the beginning of day's shifts		3	1	2
	PC12. ensure that the components used are free from foreign objects, dirt or other contamination		1	0	1
	PC13. conduct a preliminary check of the readiness of the CNC turning machine used		2	0	2

	PC14. obtain correct work-pieces/raw materials and consumables as per job requirements		2	1	1
	PC15. obtain appropriate cutting tools and hand tools and measuring tools as per job requirements		2	1	1
	PC16. ensure that all measuring equipment is calibrated and approved for usage		2	0	2
	PC17. set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms		3	1	2
	PC18. seek necessary instruction/training on the operation of the machine where required from appropriate sources		2	0	2
	PC19. check that the operating program is at the correct start point and the tool is at a safe position clear of the part		2	0	2
	PC20. perform basic daily maintenance activities as per the checklist given		2	1	1
	PC21. obtain the component drawings, specifications and/or job instructions required for the components to be machined		1	0	1
	PC22. use and extract information from engineering drawings, dimensioning and labeling data		2	0	2
	PC23. use and extract information from reference charts, tables, graphs and standards		2	0	2
	PC24. interpret the visual display and the various messages displayed correctly		2	0	2
	PC25. find the correct restart point in the program when the machine has been stopped before completion of the program		2	0	2
	PC26. load and unload component(s) using pre-determined fixtures or work holding devices as per work instructions		3	1	2
	PC27. check correctness of program through dry run and single block check		2	0	2
	PC28. do first part cutting trial by setting tool offsets to get oversize part		3	0	3
	PC29. measure the critical parameters of the machined component on the machine (without removing from the machine) after the trial run		3	0	3
	PC30. correct the offsets based on the measurements by accessing program edit facility in order to enter tooling data		3	0	3

	PC31. measure the component after unloading to check for accuracy in the critical parameters as per job specifications		4	1	3
	PC32. produce machined components that combine different turning operations and have a range of features		4	1	3
	PC33. follow the specified machining sequence and procedure as per job specifications		2	1	1
	PC34. interpret in-built machine alarms and respond to the same as per operating manual/organizational guidelines		2	1	1
	PC35. inspect as per frequency of inspection mentioned in the inspection plan (part of the job specifications)		2	1	1
	PC36. record the measured values as per organizational procedure		1	0	1
	PC37. observe for inconsistency in dimensions due to tool wear and correct the offsets accordingly		3	1	2
	PC38. ensure that machine settings are adjusted as and when required, either by self or the setter, to maintain the required accuracy		2	0	2
	PC39. identify when tools need replacing		2	0	2
	PC40. replace worn tool with new tool		1	0	1
	PC41. cut a trial part and adjust tool offsets after each tool change		1	0	1
	PC42. store finished components as well as raw material as per organizational procedure		2	1	1
	PC43. produce components as per standards applicable to the process		3	1	2
	PC44. report problems and seek appropriate assistance in a timely manner		2	0	2
	PC45. deal with finished components as per organizational guidelines		2	1	1
	PC46. complete documentation during and post operations as per organizational procedures		2	1	1
	PC47. return the machine and all tools and equipment to the correct location on completion of activities		1	0	1
	PC48. leave the work area in a safe and tidy condition on completion of job activities		1	0	1
		Total	**100**	**22**	**78**
CSC/N1335 Use basic	PC1.use protective clothing/equipment for specific tasks and work conditions	**100**	4	1	3

health and safety practices at the workplace	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		4	2	2
	PC6.state methods of accident prevention in the work environment of the job role		3	2	1
	PC7.state location of general health and safety equipment in the workplace		5	2	3
	PC8.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC9.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC10.lift heavy objects safely using correct procedures		4	2	2
	PC11.apply good housekeeping practices at all times		5	2	3
	PC12.identify common hazard signs displayed in various areas		3	1	2
	PC13.retrieve and/or point out documents that refer to health and safety in the workplace		4	1	3
	PC14.use the various appropriate fire extinguishers on different types of fires correctly		3	1	2
	PC15.demonstrate rescue techniques applied during fire hazard		3	1	2
	PC16.demonstrate good housekeeping in order to prevent fire hazards		4	1	3
	PC17.demonstrate the correct use of a fire extinguisher		4	1	3
	PC18.demonstrate how to free a person from electrocution		4	1	3
	PC19.administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC20.demonstrate basic techniques of bandaging		3	1	2
	PC21.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2

	PC22.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC23.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
	PC24.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC25.participate in emergency procedures		4	1	3
	PC26.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC27.demonstrate correct method to move injured people and others during an emergency		**4**	**2**	**2**
		Total	**100**	**36**	**64**
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 appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
		Total	**100**	**30**	**70**