

Model Curriculum

15. Designer-Mechanical

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: Design
REF ID: CSC/Q0405, V1.0
NSQF LEVEL: 5



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: '**Designer - Mechanical**' QP No. '**CSC/Qo405, NSQF Level 5**'

Date of Issuance: April 14th, 2014

Valid up to : August 30th, 2016

*Valid up to the next review date of the Qualification Pack, or the
Valid up to' date mentioned above (whichever is earlier)



Authorised Signatory
Tourism & Hospitality Skill Council

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Designer-Mechanical

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Designer-Mechanical”, in the “Capital Goods” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Designer Mechanical		
Qualification Pack Name & Reference ID. ID	CSC/Q0405, v1.0		
Version No.	1.0	Version Update Date	
Pre-requisites to Training	Diploma-Mechanical Engineering, Degree preferred Minimum 1 year apprenticeship		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Identify customer’s requirement and create an engineering design brief: identify the engineering design requirements of the customer and creating an engineering design brief, as per approved procedures and using cost optimization techniques. • Develop plan for engineering design process: plan for engineering design process as per approved processes, for a smooth and timely delivery of the final design. It covers the identification of the design activities that needed to be undertaken, to allocate responsibilities and resources to each activity, and ensure that the complete designing process is completed with agreed deadlines, delivering output that complies with all relevant regulations, directives and guidelines. • Create and evaluate mechanical engineering design options: creation of engineering design options and their evaluation against a design brief, in accordance with approved procedures. It covers understanding the design requirements from the design brief, identifying design options, evaluation of design options and their presentation in suitable formats. • Make or modify 2D mechanical engineering drawings using CAD: set up and operate a computer aided drawing (CAD) system to produce detailed drawings for engineering activities, in accordance with approved procedures. • Make or modify 3D mechanical engineering drawings using CAD: create or modify 3D mechanical engineering models using CAD system. • 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 7 out of 7 National Occupational Standards (NOS) of “Designer - Mechanical” Qualification Pack issued by “Capital Goods Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Identify Customer's Requirement and Create Design brief</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N0405</p>	<ul style="list-style-type: none"> State the purpose of design brief and its importance Choose right methods to obtain design specifications Identify sources to obtain information to develop design brief Interact with customers confidently to gather information Interpret legislative and regulatory documentation List types of design features required for unique or specific design Identify design constraints List different types of design briefs Explain the importance of safety practices Collect accurate information on the design requirement by referring to various sources Interpret Purchase Order, quotation and customer interaction notes Identify critical parameters in the design process that needs special attention Carryout a feasibility study to check whether the customer's requirements can be achieved Record all relevant information in the appropriate information systems for future use Create the design brief in a draft form and discuss any changes required with the relevant people. The design brief to include confirmation of objectives, design calculations, overall functionality, feasibility, special features and specific issues for consideration 	Training Kit (PowerPoint, Trainer Guide)
2	<p>Develop Plan for Engineering Design Process</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code</p>	<ul style="list-style-type: none"> Explain various procedures used in the design process Identify factors that should be taken into account for information dissemination Examine problems that might occur during the design process Develop contingency plans and explain its importance Plan and schedule design activities List resources required for the design activity List design activities to be undertaken-confirmation of requirements, 	Training Kit (PowerPoint, Trainer Guide)

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	CSC/N0406	<p>production and reviews of detailed design, review of reference material, development of models, production and review of high level design, final approval etc.</p> <ul style="list-style-type: none"> List detailed specifications to be incorporated in the design Develop a schedule for the design process Establish version control for the document 	
3	<p>Create and Evaluate Mechanical Engineering Design Options</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N0407</p>	<ul style="list-style-type: none"> Interpret national and international standards and conventions used in the design Explain engineering or manufacturing concepts and principles-Material properties, heat treatment techniques, stress analysis(Thermal and Mechanical), FEA (Finite Element Analysis), manufacturing methods, welding principles, fabrication principles, kinematics and design calculations and design calculations Carryout cost estimation for the design process Identify various design formats Analyze potential risks to a design and put in place risk mitigation plan Establish design amendment process Identify patent, copy right and intellectual issues Review existing design with reference to the specific design requirement Identify design options to meet specifications Prepare design outline and seek approval from the relevant people Carry out the design process using suitable technology Document all activities as per the standards Produce final design in the suitable format as per organization's standards Develop specific reports on the design process and communicate to the stake holders Evaluate the design against the established criteria using appropriate evaluation methods Store design as per the standard policy 	<p>Training Kit (PowerPoint, Trainer Guide) Computer system with latest configuration, CADD Software</p>
4	<p>Make or Modify 2D Mechanical Engineering Drawings using CAD</p>	<ul style="list-style-type: none"> Analyse various types of projections Explain various symbols used in drawing Distinguish between component/layout 	<p>Training Kit (PowerPoint, Trainer Guide) Computer system</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N0402</p>	<p>and assembly drawing</p> <ul style="list-style-type: none"> • Select appropriate projection for the drawing as per the standards • Explain standards and conventions used in engineering drawings • Explain basic principles of engineering manufacturing operations – casting, forging, machining, joining process, assembly and installation methods and kinematic principles • Identify Input and output devices of a system • Identify design features, as appropriate to the drawing being produced – function, material, clearances, operational environment, quality, aesthetics, interferences, tolerances etc. • Select appropriate drawing tool (software) • Customize system variables, menus and drawing defaults to produce the drawing to the appropriate scale • Develop macros as per the approved procedure • Check the functioning of input/output devices • Set the drawing datum at a convenient point • Set up drawing parameters (eg. layers, line types, color, text styles) to company procedures or to suit the drawing produced • Create a drawing template to the required standards, which includes all necessary detail using various drawing tools –layer, scale, paper size, colour setup, line types, dimension system, title, drawing number, date , text ,style etc. • Explore CAD system – Keyboard commands, pull down menu etc. • Draw temporary fasteners and rivets, piping layouts, gears, machine foundations, working drawings of jigs and fixtures, dies, moulds and press tools • Carryout dimensioning and labelling • Identify component part list, material specification or part number etc. • Prepare bill of material • Produce hardcopy of the drawing 	<p>with latest configuration, CADD Software</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
5	<p>Make or Modify 3D Mechanical Engineering Models using CAD system</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N0408</p>	<ul style="list-style-type: none"> • Explain national and international and organizational standards and conventions used for the models or drawing • Explain applications of different 3D Modelling programs – Surface modelling, solid modelling and wire frame modelling • Setup the equipment for 3D modelling • Choose the right application for 3D modelling • Set the drawing datum at a convenient point to create a modelling template with title, file number, material, date etc. • Establish coordinate system, view and orientation • Identify and use key features of solid modelling software package to produce models- extrude, extrude cut, solid model, revolve, wire frame, radius/chamfer, hide, rectangular pattern, fillet, cut/remove, circular pattern, shell, development view, motion analysis, animation, defining material properties, exploded view etc. • Create 3-D views on the screen by manipulating drawing planes and inserting 3-D geometric shapes • Create swept, extruded and revolved solids in 3-D space • Extract mass and area properties from solid model • Extract physical properties as per job requirement, including volume, mass and centre of gravity • Use PAN, isometric and Zoom CAD operations to highlight design areas in the modelling environment • Modify parts in the assembly environment using the listed features – constrained parts and assemblies, straight lines, insertion of standard components, hidden details, dimensions, symbols and abbreviations, hatching and shading, angular surfaces, parts lists, texts, circles or ellipses, material colour, surface texts etc. • Produce 3 –D drawings incorporating section views with all necessary annotations • Produce a model for export to the manufacturing systems – DNC and CNC machines, 3D printer and other specific systems 	<p>Training Kit (PowerPoint, Trainer Guide) Computer system with latest configuration, CADD Software</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Fill up appropriate technical forms ,activity logs as per the requirement Use ERP software and other organizational software specific to quality function Perform numerical operations, geometry and calculations Perform basic operations on a computer Demonstrate problem solving abilities Plan, organize and sequence work operations as per the job requirement Work in a team to achieve better results 	
6	<p>Health and safety</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 08:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> 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 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes</p>
7	<p>Fire Safety</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> 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 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Class A, B, C, D and K fire extinguishers</p>
8	<p>Emergencies, rescue and first aid procedure</p> <p>Theory Duration (hh:mm) 09:00</p> <p>Practical Duration (hh:mm) 18:00</p> <p>Corresponding NOS</p>	<ul style="list-style-type: none"> 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 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>First aid kit with all contents</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Code CSC/N1335	<ul style="list-style-type: none"> Explain stages of crisis and crisis management Prepare an incident report 	
9	Work effectively with others Theory Duration (hh:mm) 20:00 Practical Duration (hh:mm) 60:00 Corresponding NOS Code CSC/N1336	<ul style="list-style-type: none"> Explain the importance of team work and team dynamics State 4Cs of working in a team Explain types of communication Apply effective communication 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 	Training kit (Trainer guide, PowerPoint)
10	Final Assessment Theory Duration (hh:mm) 04:00 Practical Duration (hh:mm) 06:00 Corresponding NOS Code	<ul style="list-style-type: none"> To test skills and knowledge 	
	Total Duration Theory Duration 188:00 Practical Duration 422:00	Unique Equipment Required: Computers with latest configuration, CADD software	

Grand Total Course Duration: **610 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Capital Goods Skill Council](#))

Trainer Prerequisites for Job role: “Designer-Mechanical” mapped to Qualification Pack: “CSC/Q0405 v1.0”

Sr. No.	Area	Details
1	Description	Identifying customer’s requirements, creating a design brief, planning design activities, creating and evaluating design options, creating detailed design and models using 2D and 3D softwares for design.
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	Degree in Mechanical Engineering
4a	Domain Certification	Certified for Job Role: “Designer-Mechanical” mapped to QP: “CSC/Q0405, 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: “SSC/Q1402”. Minimum accepted 70 % as per respective SSC guidelines is 70%.
5	Experience	<ul style="list-style-type: none"> 3-4 years of industry experience in the relevant field 3-4 years of teaching experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Designer-Mechanical
Qualification Pack	CSC/Q0405, 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 centre(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 60% in aggregate and 40% in each NOS
6	The marks are allocated PC wise; however, every NOS will carry a weight age in the total marks allocated to the specific QP

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
1.CSC/N0405 Identify customer's requirement and create an engineering design brief	PC1.work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines	100	6	2	4
	PC2.check that all safety mechanisms are in place and that the equipment is set correctly for the required operations		5	2	3
	PC3.adhere to procedures or systems in place for health and safety, including personal protective equipment and other relevant safety regulations and procedures to contribute to a safe work environment		6	2	4
	PC4.wear the appropriate protective clothing and equipment, and keep the work area clean and tidy		6	2	4
	PC5.follow safe practice/approved setting up procedures at all times		5	2	3
	PC6.gather accurate information on the requirements of the customer from various sources		5	2	3
	PC7.confirm the customer's objectives for the engineering products or processes		6	2	4
	PC8.identify any unique or specific features that need particular consideration		6	2	4
	PC9.determine the feasibility of achieving the customer's requirements		6	2	4
	PC10. confirm the requirements and other relevant issues with the customer		6	2	4
	PC11.record all relevant information in the appropriate information systems for future use		5	2	3
	PC12.confirm the operational and functional requirements and quality criteria of the design		6	2	4
	PC13.obtain clarification from relevant people any aspect of the requirement that is not clear		5	2	3
	PC14.identify clearly any design constraints		6	2	4
	PC15.create the design brief in a draft form and discuss any changes required with the relevant people		6	2	4
	PC16.ensure that the design brief captures all the requirements of the customer		5	2	3
	PC17.ensure that the design brief and specification meets relevant regulations, directives and guidelines		5	2	3
	PC18.save the design brief and communicate it to the relevant people, as per organizational process		5	2	3

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	Total		100	36	64
2.CSC/N0406 Develop plan for engineering design process	PC1.work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines	100		2	3
	PC2.check that all safety mechanisms are in place and that the equipment is set correctly for the required operations		4	2	2
	PC3.adhere to procedures or systems in place for health and safety, including personal protective equipment and other relevant safety regulations and procedures to contribute to a safe work environment		5	2	3
	PC4.wear the appropriate protective clothing and equipment, and keep the work area clean and tidy		5	2	3
	PC5.follow safe practice/approved setting up procedures at all times		4	1	3
	PC6.identify the design activities to be undertaken		5	2	3
	PC7.identify specifications to be incorporated in the design		5	2	3
	PC8.establish the responsibilities for developing specific aspects of the design process		6	2	4
	PC9.identify the activities that make up the design process		5	2	3
	PC10.establish the responsibility for each activity		6	2	4
	PC11.identify the resources necessary to undertake the design process agree procedures for disseminating information on the designs		5	2	3
	PC12.identify any potentially critical problems and include contingency plans for the same		5	2	3
	PC13.develop a schedule for the design process		5	2	3
	PC14.agree the schedule with the appropriate people		6	2	4
	PC15.establish priorities for completion of the design process within deadlines		5	2	3
	PC16.ensure that the design process complies with all relevant regulations, directives and guidelines		5	2	3
	PC17.obtain approvals of the relevant people for the design plan		6	2	4
	PC18.establish version control for the document		5	2	3
	PC19.save and store the design documentation as per organizational guidelines		4	2	2
	PC20.communicate information to the appropriate people using various company specific media		4	1	3
	Total		100	38	62

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
3.CSC/N0407 Create and evaluate mechanical engineering design options	PC1.obtain and review existing information with reference to the specified design requirements	100	3	1	2
	PC2.prepare outline ideas for the designs		4	1	3
	PC3.obtain agreement from relevant people		3	2	1
	PC4.carry out the design process, utilizing the appropriate technology		5	2	3
	PC5.document all facets of the design activity		4	2	2
	PC6.communicate the outcomes of the design process to the appropriate people via various media used in the organisation		3	1	2
	PC7.deliver the designs in the appropriate format		5	2	3
	PC8.ensure that the design cannot be changed or amended without authorization		3	1	2
	PC9.confirm and agree understanding of the design requirements		4	2	2
	PC10.deal with problems relating to the design requirements and agreed solutions		3	1	2
	PC11.identify design options which will meet requirements and the design Specification		4	1	3
	PC12.create designs that meet the customer's requirements as specified in the design brief for the engineering product or process		5	1	4
	PC13.apply approved general and sub-sector specific engineering concepts, processes, principles to achieve the design brief		5	1	4
	PC14.apply the principles of dynamics and kinematics to ensure that design options will work		5	1	4
	PC15.ensure that the design options are practical		4	2	2
	PC16.prepare costing's and timescale and ensure they are acceptable		4	1	3
	PC17.obtain suitable advice and guidance to assist in the design work		4	2	2
	PC18.present the designs in suitable formats and with sufficient information to allow the customer to assess them		4	1	3
	PC19.ensure that the designs comply with all relevant regulations, standards directives or codes of practice		4	1	3
	PC20.deal promptly and effectively with problems within your control and seek help and guidance from the relevant people if you have problems that you cannot resolve		4	2	2
	PC21.ensure that the designs are protected in line with organizational procedures		2	1	1
	PC22.obtain clear criteria on which to base the evaluation		4	1	3
	PC23.obtain the necessary information from the		4	1	3

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	available sources				
	PC24.evaluate the design against the established criteria, using appropriate evaluation methods		5	2	3
	PC25.make recommendations on various design options, and communicate the results of the evaluation to the relevant people		5	2	3
	Total		100	35	65
4.CSC/N0402 Make or modify 2D mechanical engineering drawings using CAD system	PC1.use appropriate sources to obtain the technical information relevant to the drawing to be created	100	2	0	2
	PC2.identify design features, as appropriate to the drawing being produced		4	2	2
	PC3.ensure that the data and information received is complete and correct		2	0	2
	PC4.establish the drawing requirements from the data and information received		3	1	2
	PC5.report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		3	1	2
	PC6.access and use the correct drawing software		2	1	1
	PC7.select drafting equipment appropriate to the drawing method chosen		3	1	2
	PC8.check that all the equipment is correctly connected and in a safe and usable working condition		1	0	1
	PC9.power up the equipment and activate the appropriate drawing software		1	0	1
	PC10.customize system variables, menus and drawing defaults to produce the drawing to the appropriate scale		3	1	2
	PC11.develop macros as per approved procedures		4	2	2
	PC12.set up and check that all peripheral devices are connected and correctly operating and interface with ERP if required is available		2	0	2
	PC13.set the drawing datum at a convenient point		2	0	2
	PC14.set up drawing parameters (eg. layers, line types, color, text styles) to company procedures or to suit the drawing produced		3	1	2
	PC15.interpret and produce mechanical drawings, using first angle orthographic projections, isometric/oblique projections, third angle orthographic projections, sectional views		5	2	3
	PC16.apply drafting principles to produce various types of drawings that are consistent with applicable standards and		5	2	3

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	procedures for use in various engineering activities				
	PC17.create a drawing template to the required standards, which includes all necessary detail (eg.) using various drawing tools		5	2	3
	PC18.use appropriate terminologies and techniques to create drawings, in the required formats, that are sufficiently and clearly detailed		4	2	2
	PC19.use keyboard command and pull down menus available in common CAD systems		2	1	1
	PC20.use codes and other references that follow the required conventions		3	1	2
	PC21.draw temporary fasteners and rivets		3	1	2
	PC22.draw components details and assembly drawings		4	1	3
	PC23.draw piping layouts, gears and machine foundation or base		4	1	3
	PC24.draw working drawings of jigs and fixtures		4	1	3
	PC25.draw detailed drawings of dies, moulds and press tools		4	1	3
	PC26.dimension and label the drawing as per approved procedures		4	1	3
	PC27.create detailed views using various scales to meet job requirements		3	1	2
	PC28.ensure that drawings are checked and approved by the appropriate person		1	0	1
	PC29.produce hard copies of the finished drawings		1	0	1
	PC30.check that the drawing is correctly titled and referenced; sawing is correctly titled and referenced		2	0	2
	PC31.save the drawing to an appropriate storage medium (eg. hard drive, CD/DVD, external storage device)		1	0	1
	PC32.create a separate backup copy and place it in safe storage		1	0	1
	PC33.identify component parts list with part name, description of part, material specification or part number, quantities and other details to prepare bill of materials as per organizational guidelines		4	2	2
	PC34.deal promptly and effectively with problems within control and seek help and guidance from the relevant people if you have problems that they cannot resolve		2	0	2
	PC35.ensure that changes are completed as required by organizational procedures		2	1	1
	PC36.shut down the CAD system to a safe		1	0	1

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	condition on completion of the drawing activities				
	Total		100	30	70
5.CSC/N0408 Make or modify 3D mechanical engineering models using CAD system	PC1.plan the modeling activities before starting them		3	1	2
	PC2.use appropriate sources to obtain the required information		3	1	2
	PC3.access and use the correct modeling software and tools		3	1	2
	PC4.check that all the equipment is correctly connected and in a safe and usable working condition		2	0	2
	PC5.power up the equipment and activate the appropriate modeling tools		2	1	1
	PC6.set up the modeling environment and select a suitable template/folder		4	1	3
	PC7.set up and check that all peripheral devices are connected and correctly operating (such as keyboard, mouse, light pen, digitizer/tablet, scanner, printer, plotter)		4	1	3
	PC8.set the drawing datum at a convenient point to create a modeling template with title, file number, material, date		4	1	3
	PC9.establish coordinate system, orientation and views as per the job requirement		4	1	3
	PC10.create entities in 3D space as per job requirement		3	1	2
	PC11.modify entities in 3D space as per job requirement		2	1	1
	PC12.create 3-D views on the screen by manipulating drawing planes and inserting 3-D geometric shapes		4	1	3
	PC13.creating swept, extruded and revolved solids in 3-D space		4	1	3
	PC14.produce sectioned models (cutting planes and cross hatching)		4	1	3
	PC15.use pre-drawn library files and primitives to produce a 3-D model		2	0	2
	PC16.extracting mass and area properties from solid model		3	1	2
	PC17.identify and use key features of solid modeling software package to produce models		2	0	2
	PC18.perform drawing for solid modeling		3	1	2
	PC19.extract physical properties as per job requirement, including volume, mass and centre of gravity		3	1	2
	PC20.take into account the following factors, as appropriate to the model being		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	produced				
	PC21.use pan, isometric and zoom CAD operations to highlight design areas in the modeling environment		3	1	2
	PC22.modify parts in the assembly environment using the following features		3	1	2
	PC23.produce 3-D drawings incorporating section views with all necessary annotation		3	1	2
	PC24.produce a model for export to the following manufacturing systems		3	1	2
	PC25.produce models which comply with organizational guidelines; statutory regulations and codes of practice; CAD software standards; national and international standards		3	1	2
	PC26.confirm that the model is as per job specifications and contains all relevant information		3	1	2
	PC27.use appropriate techniques to create models that are sufficiently and clearly detailed		3	1	2
	PC28.use codes and other references that follow the required conventions		3	1	2
	PC29.make sure that models are checked and approved by the appropriate person		2	0	2
	PC30.save the models in the appropriate file type and location		2	0	2
	PC31.produce hard copies of the finished models, with sufficient detail to allow production		3	1	2
	PC32.deal promptly and effectively with problems within your control, and seek help and guidance from the relevant people if you have problems that you cannot resolve		4	1	3
	PC33.shut down the CAD system to a safe condition on completion of the modeling activities		3	1	2
	Total		100	28	72
6.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

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	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 was required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		4	1	3
	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		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (700)	Out Of	Marks Allocation	
				Theory	Skills Practical
	of emergency services in real or simulated cases				
	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
7.CSC/N1336 Work effectively with others	PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required		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
	Grand Total	700	700	233	467
	Percentage Weightage:			33	67
	Minimum Pass% to qualify (aggregate):				60