

Basic Designer And Virtual Verifier (Mechanical)

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Directorate General of Training (DGT)
Government of India, Ministry of Skill Development and Entrepreneurship,
1st and 2nd Floor, CIRTES Building
Next to Pusa ITI, Pusa Campus
New Delhi – 110012.

Name and address of submitting body:

Directorate General of Training (DGT)
Government of India, Ministry of Skill Development and Entrepreneurship,
1st and 2nd Floor, CIRTES Building
Next to Pusa ITI, Pusa Campus
New Delhi – 110012.

Name and contact details of individual dealing with the submission

Name: Mrs. Sandhya Salwan

Position in the organisation: Deputy Director General

Address if different from above:

Tel number(s): 011-25802140

E-mail address: sandhya.salwan@nic.in

List of documents submitted in support of the Qualifications File

- Competency-based curriculum with following details:

Model Curriculum to be added which will include the following:

1. Indicative list of tools/equipment to conduct the training: Enclosed with curriculum
 2. Trainers qualification: Indicated in the curriculum
 3. Lesson Plan: All DGT curricula are designed indicating specific practical to be carried out during training along with details of trade theory. Based on this the concerned instructor prepares the Lesson Plan and demonstration plan with support of IMPs developed by NIMI, DGT.
 4. Distribution of training duration into theory/practical/OJT component: Indicated in the curriculum.
- Curriculum for Core Skills (Workshop Calculation & Science, Engineering Drawing and Employability Skills).

Basic Designer And Virtual Verifier (Mechanical)

• **SUMMARY**

1	Qualification Title	‘BASIC DESIGNER AND VIRTUAL VERIFIER (MECHANICAL)’
2	Qualification Code, if any	DGT/2025
3	NCO code and occupation	2523.0401 - Design Engineer 2144.0200 - Designer, Machine 2144.0301 - Equipment Designer 2144.0803 - Product Design Engineer 2152.0901 - Verification Engineer 2512.0601 - Design Engineer – Engineering Analysis
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	Prepare skilled Technician to undertake the job roles of Basic Designer and Virtual Verifier and will enable the trainee to design, create, edit and modify engineering drawings, create 2D sketches, 3D CAD models and detailed assembly models using CAD/CAE Software. It is a long-term qualification.
5	Body/bodies which will award the qualification	Directorate General of Training (DGT).
6	Body which will accredit providers to offer courses leading to the qualification	Directorate General of Training (DGT) accredits the Training providers (ITIs/ NSTIs/MSTIs/BTCs/BTPs / Industries / Establishments).
7	Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)	Yes. The accreditation/ affiliation norms and any amendments made from time to time are available on DGT web portal.
8	Occupation(s) to which the qualification gives access	<ul style="list-style-type: none"> • Design Technician • Mechanical Equipment Designer • Verification Engineer • Engineering Analyst
9	Job description of the occupation	The individual will be able to import the geometry from native CAD environment, clean up and edit the geometry for design modification following blueprints & specifications, creates finite element model

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

		of different components like Geometry cleanup to prepare geometry for FE modeling, concept of meshing, modelling 1D, 2D and 3D elements and performs modal analysis of component, brackets and assemblies and apply the concept about the mode shapes and frequencies.		
10	Licensing requirements	NOT REQUIRED		
11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)	NOT APPLICABLE		
12	Level of the qualification in the NSQF	Level 5		
13	Anticipated volume of training/learning required to complete the qualification	Sl. No.	Course Element	Notional Training Hours
		1	Professional Skill (Trade Practical)	2000
		2	Professional Knowledge (Trade Theory)	640
		3	Workshop Calculation & Science	160
		4	Engineering Drawing	160
		5	Employability Skills	240
			Total	3200
14	Indicative list of training tools required to deliver this qualification	As per Annexure-I of curriculum.		
15	Entry requirements and/or recommendations and minimum age	Class X Pass plus simultaneously enrolled for class XII through NIOS or Class XII pass or ITI plus class X Minimum age 14 years as on first day of academic session.		
16	Progression from the	An Individual can proceed for:		

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

	qualification (Please show Professional and academic progression)	Professional <ul style="list-style-type: none"> • Design Technician • Senior Technician • Supervisor • Manager • Entrepreneur 	Technical / Academic	
			ATS CITS	Diploma/ Advance Diploma (Vocational)
17	Arrangements for the Recognition of Prior learning (RPL)	<ul style="list-style-type: none"> • Yes (For more details refer “Guidelines for Private candidate” in DGT website MIS portal). 		
18	International comparability where known (research evidence to be provided)	-		
19	Date of planned review of the qualification.	June 2026		
20	Formal structure of the qualification			
	Mandatory components			
	Title of component and identification code/NOSs/ Learning Outcomes	Estimated size (learning hours)		Level
		Skills	Knowledge	
TRADE SPECIFIC				
(i)	Identify product concept, design, and development using computers to suit client requirements while adhering to safety precautions.	75	21	4
(ii)	Apply engineering drawing approaches and CAD/CAE software, create 2D drawings of simple components and perform finite element analysis viz. create and modify 2D and 3D models of the components in CAD/CAE software.	175	49	4
(iii)	Create 2D drawing of the assembly made up of individual components and perform sheet metal design for essential assembly components.	200	56	5

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

(iv)	Plan and execute 3D printing of a prototype and analyze the method for thermo-mechanical analysis for determining thermal effects of printing process.	75	21	5
(v)	Demonstrate the FEM (Finite Element Model) capabilities of CAE (Computer Aided Engineering) SOFTWARE.	100	28	5
(vi)	Create finite element model of different components like Geometry cleanup to prepare geometry for FE mode ling, concept of meshing, modelling 1D, 2D and 3D elements, creating mesh based on structures, setting element quality criteria and checking quality and updating the mesh.	200	56	5
(vii)	Prepare components for the simple analysis by applying appropriate loads and boundary conditions. [<i>Simple Analysis: - Linear static analysis</i>].	175	49	5
(viii)	Analyze component by inertial relief method and by non- linear analysis.	200	72	5
(ix)	Perform modal analysis of component, brackets and assemblies and apply the concept about the mode shapes (rigid and local body) and frequencies.	175	63	5
(x)	Execute basic thermal analysis of Simple components like plate, beam for conduction and convection in variable temperature.	300	108	5
(xi)	Perform frequency response analysis of beam and any suspension components.	150	54	5
(xii)	Perform Thermo-mechanical analysis of engine components, welded joints etc.	175	63	5
CORE SKILL				
EMPLOYABILITY SKILLS				
(i)	Apply safe working practices.	-	30	5
(ii)	Comply with environment regulation and housekeeping.	-	30	5
(iii)	Interpret & use formal and technical communication.	-	30	5

NSQF QUALIFICATION FILE**Approved in 14th NSQC Meeting – NCVET – 30th December 2021*****Basic Designer And Virtual Verifier (Mechanical)***

(iv)	Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	-	30	5
(v)	List and interpret various acts of labour welfare legislation.	-	30	5
(vi)	Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	-	30	5
(vii)	Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	-	30	5
(viii)	Utilize computer applications and internet to take benefit of IT developments in the industry.	-	30	5
WORKSHOP CALCULATION & SCIENCE				
(i)	Demonstrate mathematical concept and principles to perform practical operations.	-	80	5
(ii)	Explain science in the field of study including simple machine.	-	80	5
ENGINEERING DRAWING				
(i)	Read and apply engineering drawing for different application in the field of work.	-	160	5
	Total		3200	

Basic Designer And Virtual Verifier (Mechanical)

SECTION 1

ASSESSMENT

21	<p>Body/Bodies which will carry out assessment: Controller of Examinations, DGT</p>
22	<p>How will RPL assessment be managed and who will carry it out? DGT will carry out the RPL assessment following the below mentioned eligibility criteria for Trainee: Applicants aspiring to appear as Private Candidates in the AITT under CTS for award of NTC, have been categorized based on their educational background and experience. Subsequently ‘Private Candidates’ may be admitted under one of the following categories. Category wise ‘eligibility criteria’ for appearing as ‘Private Candidate’ in AITT under CTS has been listed below: Category I: Ex-trainees (successful pass-outs) of ITI A. Ex-trainees of ITI who already possess NTC in one of the trades under CTS, are eligible for applying as Private candidate for an allied trade, provided he/ she fulfils all the conditions regarding educational qualification etc. prescribed for that allied trade. B. In addition, the applicant should possess minimum of 1 year experience (as on date of submission of application) post the date of AITT result declaration in the desired allied trade in establishments implementing Apprenticeship Training Scheme (ATS)/ establishments registered under the Apprenticeship portal or registered MSMEs or Entities registered with any government/local authorities / shops covered under Factories Act 1948 and Shops and Establishments Act applicable for the concerned State. Category II: ‘Ex-trainees (successful pass-outs) and current trainees under CoE scheme A. The applicant should have the minimum prescribed entry qualification and should fulfil eligibility criteria for the desired trade under CTS, in which he/she intends to appear for AITT as Private Candidate. CoE candidates must register as ‘Private Candidate’ under CTS in the relevant/mapped CTS trade only. B. There should be a minimum gap of 1 year between successful completions of CoE training i.e. from the date of result declaration to the date of submission of application for ‘Private Candidate’ certification. C. During this gap of 1 year, the candidate must have undergone Industry training or gained experience in desired trade in establishments implementing Apprenticeship Training Scheme (ATS)/ establishments registered under the Apprenticeship portal or registered MSMEs or Entities registered with any government/local authorities / shops covered under Factories Act 1948 and Shops and Establishments Act applicable for the concerned State.</p>

Basic Designer And Virtual Verifier (Mechanical)

	<p>Category III: SCVT Candidates (admitted till August 2018 session)</p> <p>A. No special provisions have been made for SCVT Trainees to enrol as 'Private Candidate'. Going forward, SCVT trainees have been granted equivalence vide G.S.R 186(E) dated 2nd March 2017 for undergoing apprenticeship training under the Apprentices Act 1961 to obtain 'NAC'.</p> <p>B. Only for SCVT trainees admitted till August 2018 batch, provision has been made for obtaining NTC by appearing in AITT under 'Private Candidate'. Such trainees will continue to be governed by old guidelines for 'Private Candidate'.</p> <p>Category IV: Other Candidates (candidate not falling in any of the above 3 categories, including SCVT trainees enrolled from admission session 2019 onwards)</p> <p>A. The applicant should have the minimum prescribed entry qualification and should fulfil eligibility criteria for the relevant trade under CTS, in which he/she desires to appear for AITT as Private Candidate.</p> <p>B. Applicant should be minimum 21 years of age on the date of submission of application. There is no upper age limit.</p> <p>C. The applicant should possess minimum of 3 years' experience (on the date of submission of application) in the relevant trade in establishments implementing Apprenticeship Training Scheme (ATS)/ establishments registered under the Apprenticeship portal or registered MSMEs or Entities registered with any government/local authorities / shops covered under Factories Act 1948 and Shops and Establishments Act applicable for the concerned State.</p> <p>For detail and updated information please refer to DGT web portal.</p>
<p>23</p>	<p>Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.</p> <p>(1) Assessment process:</p> <p>The assessment for the qualification is carried out by conducting formative assessments, and end of year examinations (Summative). The formative assessments in respect of each Learning Outcome for practical and related theory are conducted by the concerned instructors for evaluating the knowledge and skill acquired by trainees and the behavioural transformation of the trainees. This formative assessment is primarily carried out by collecting evidence of competence gained by the trainees by evaluating them at work based on assessment criteria, asking questions and initiating formative discussions to assess understanding and by</p>

Basic Designer And Virtual Verifier (Mechanical)

evaluating records and reports. Summative assessment is carried out by All India Trade Test on Trade Theory, Trade practical, Workshop Calculation & Science, Engineering Drawing and Employability Skills. The question papers for the theory Examinations contain objective type questions.

The marking pattern and distribution of marks for the qualification are as under:

Marking Pattern				
Sl. No.	Type of Assessment	Subject for the Trade Test	Marks for the 1st Year	Marks for the 2nd Year
1	Summative Assessment	Practical	250	250
2		Trade Theory	100	100
3		Employability Skills	50	50
4		Workshop Calculation and Science.	50	50
5		Engineering Drawing	50	50
6	Formative assessment based on Learning Outcomes		200	200
TOTAL:			700	700

(2) Minimum pass marks:

The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

Testing and certifications for the course:

Controller of examinations, DGT carries out the assessment and issues National Trade Certificate (NTC) following the norms and guidelines issued by the Directorate from time to time.

Overall assessment strategy:

Assessment of the qualification evaluates trainees to show that they can

Basic Designer And Virtual Verifier (Mechanical)

integrate knowledge, skills and values for carrying out relevant tasks as per the defined learning outcomes and assessment criteria. The trainees may choose the preferred language for assessment. The underlying principle of assessment is fairness and transparency. While assessing the trainee, assessor is directed to assess as per the defined assessment criteria against the learning outcomes. The evidence of the competence acquired by the trainees can be obtained by conducting theory and practical examinations, observing the trainees at work, asking questions and initiating discussions to assess, understand and evaluate records and reports. The ultimate objective of the assessment is to assess the candidates as per the defined assessment criteria for the learning outcomes.

Specific Arrangements for assessment:

- Assessment is outcome-based.
- There are formative and summative assessments in Theory and Practical.
- Assessment is carried out in Trade theory, Trade Practical, Workshop Calculation and Science, Engineering Drawing and Employability Skills.
- While Trade Theory and Trade Practical are used for assessing Trade-related jobs, Workshop Calculation and Science is used to test trainee's numerical and logical skills, Drawing is used to test the ability of the trainee to draw and read sketches and Employability skills is used to test the communication, professional language, leadership, entrepreneurship and team-work abilities of the trainee.
- In addition to demonstration of theory and practical knowledge, trainees get a chance to present total personality.

Quality assurance activities:

Question papers are set by external paper setters/ software generated. Evaluation of Theory Examinations in Trade, Workshop Calculation & Science, Engineering Drawing and Employability Skill is done by third-party agency.
Trade Practical is examined by External Examiner.

24. Assessment evidences**Title of Component: Formative Assessment Breakup**

(On half yearly average of the learning assessment covered)

Basic Designer And Virtual Verifier (Mechanical)

Means of assessment

Assessment will be evidence based comprising the following for each Learning Outcome:

Serial No.	Terminal Competency	Maximum Weightage (%)
1	Safety consciousness	15
2	Workplace hygiene	5
3	Attendance/ Punctuality	10
4	Ability to follow Manuals/ Written instructions	5
5	Application of Knowledge	10
6	Skills to handle tools / equipment/ Instruments/ Devices	10
7	Economical use of materials	5
8	Working Strategy	10
9	Quality in workmanship/ Performance	15
10	VIVA	15
	Total Maximum Weightage (%)	100

Pass/Fail

The minimum pass percentage is 60% marks for formative assessment.

LEARNING OUTCOME WITH ASSESSMENT CRITERIA:

LEARNING OUTCOME	ASSESSMENT CRITERIA
FIRST YEAR	
1. Identify product concept, design, and development using computers to suit client requirements while adhering to safety precautions.	Generating idea and defining the given problem.
	Brainstorming and generating different concepts for the problem.
	Presenting the market research report for appropriate concept.
	Making a report on the business feasibility of the concept.
	Developing the product design with detailed specification, testing and analysis methods using computer aided software and finite element method approach.
	Presentation on how to launch the product.
2. Apply engineering drawing approaches and CAD/CAE software, create 2D drawings of simple components and perform finite element	Create sketches of the parts, 2D drawings of parts using Engineering drawing methodologies using CAD/CAE software.
	Create 3D models of the parts ensuring the dimensional accuracy.
	Create a proper model tree.

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

analysis viz. create and modify 2D and 3D models of the components in CAD/CAE software.	Check for the geometric clashes and the model integrity, update as required to suit the specification.
	Perform the detailing of the design and create the various views in accordance with the prevailing standards.
3. Create 2D drawing of the assembly made up of individual components and perform sheet metal design for essential assembly components.	Perform the dimensioning activity for the 2D drawings and assembly.
	Create the Bill of Materials (BoM).
	Plan for the proper views ensuring capturing of all the details.
	Create assembly from individual parts and develop sheet metal design to ensure to arrive at FE method.
	Create the exploded view of the 3D model. Convert the drawing to identify the parts to update to sheet metal design.
	Edit the geometry if the geometry does not meet the correct size. Perform parametrization to update the model.
4. Plan and execute 3D printing of a prototype and analyze the method for thermo-mechanical analysis for determining thermal effects of printing process.	Select the design/part to be 3D printed.
	Create 3D model of the design and export the model in STL Format.
	Import the STL model in 3D printer software.
	Simulate the model for manufacturability by slicing the model. Model the part in CAE software to carry out FE analysis (thermal check).
	Estimate the time required to manufacture the component.
	Estimate the material required for the process.
	If the process parameters are not optimized, then fine tune the printing parameters.
	Generate G codes and M codes for the selected design.
	Carry out the simple thermo mechanical analysis to predict the stresses and deformation of the component while manufacturing.
5. Demonstrate the FEM (Finite Element Model) capabilities of CAE (Computer Aided Engineering) SOFTWARE.	Familiarization of GUI of CAE SOFTWARE.
	Building geometric models in the CAE software.
	Familiarization with the FEM capabilities of CAE software.
	Familiarization with types of finite element modules.
	Familiarization the various types of materials, properties, and elements, concept of discretization.
6. Create finite element model of different components like Geometry cleanup to prepare geometry for FE modeling,	Import the geometry of the design for the meshing. Critically assess the model with regard to the type of meshing required.
	Modify / edit the geometry to suit the requirement of the meshing. Extract mid surfaces if the meshing needs to be by

Basic Designer And Virtual Verifier (Mechanical)

concept of meshing, modelling 1D, 2D and 3D elements, creating mesh based on structures, setting element quality criteria and checking quality and updating the mesh.	2D elements.
	Create the mesh for the geometry by specified / exploring the meshing technique, associated the software.
	Check for free edges / free faces, element normal. If failed to meet the criteria, correct the mesh. .
	Check the element geometry check and compare it against the given specifications. Correct the geometry if required.
	Assign the appropriate material and element properties to the components of the model.
	Perform the sanity checks on the model.
7. Prepare components for the simple analysis by applying appropriate loads and boundary conditions. [Simple Analysis: - Linear static analysis]	Prepare the finite element model as required or use the finite element model that has been already created.
	Understand the physical behavior of the component.
	Based on the physical behavior, assign appropriate boundary conditions.
	Apply the specified loads on the finite element model.
	Export the model to the solver. Run the analysis. Once the results are obtained, check the validity of the results from first principles, verify the displacement behavior of the component, interpret the other parameters such as stress etc. Recommend a suitable change if the design is not meeting structural requirement.

CORE SKILL	
LEARNING OUTCOME	ASSESSMENT CRITERIA
EMPLOYABILITY SKILLS	
1. Apply safe working practices	Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	Recognize and report all unsafe situations according to site policy.
	Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	Identify, handle and store / dispose off dangerous goods and substances according to site policy and procedures following safety regulations and requirements.
	Identify and observe site policies and procedures in regard to illness or accident.
	Identify safety alarms accurately.
	Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	Identify and observe site evacuation procedures according to site

Basic Designer And Virtual Verifier (Mechanical)

	<p>policy.</p> <p>Identify Personal Protective Equipment (PPE) and use the same as per related working environment.</p> <p>Identify basic first aid and use them under different circumstances.</p> <p>Identify different fire extinguisher and use the same as per requirement.</p>
2. Comply with environment regulation and housekeeping	<p>Identify environmental pollution & contribute to the avoidance of instances of environmental pollution.</p> <p>Deploy environmental protection legislation & regulations</p> <p>Take opportunities to use energy and materials in an environmentally friendly manner.</p> <p>Avoid waste and dispose waste as per procedure</p> <p>Recognize different components of 5S and apply the same in the working environment.</p>
3. Interpret & use formal and technical communication.	<p>Obtain sources of information and recognize information.</p> <p>Use and draw up technical drawings and documents.</p> <p>Use documents and technical regulations and occupationally related provisions.</p> <p>Conduct appropriate and target oriented discussions with higher authority and within the team.</p> <p>Present facts and circumstances, possible solutions & use English special terminology.</p> <p>Resolve disputes within the team.</p> <p>Conduct written communication.</p>
4. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	<p>Explain the concept of productivity and apply during execution of job.</p> <p>Explain the concept of quality tools and apply during execution of job.</p>
5. List and interpret various acts of labour welfare legislation.	<p>Explain concept of labour welfare legislation, adhere to responsibilities and remain sensitive towards such laws.</p> <p>Knows benefits guaranteed under various acts.</p>
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	<p>Explain the concept of energy conservation, global warming, pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution.</p> <p>Explain standard procedure for disposal of waste.</p>

Basic Designer And Virtual Verifier (Mechanical)

7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	Explain personnel finance and entrepreneurship.
	Explain role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the policies/ programmes, procedure & the available scheme.
	Prepare a report to become an entrepreneur for submission to financial institutions.
8. Utilize computer applications and internet to take benefit of IT developments in the industry.	Explain the hardware of personal computer.
	Use common application software viz., word, excel, power point etc., in day to day work.
	Awareness about useful internet websites, search relevant information pertaining to the assigned tasks.
WORKSHOP CALCULATION & SCIENCE	
1. Demonstrate mathematical concept and principles to perform practical operations.	Solve different problems like phase angle, etc. with the help of a calculator.
	Demonstrate conversion of Fraction to Decimal and vice versa.
	Explain BCD code, conversion from decimal to binary and vice-versa, all other conversions.
2. Explain science in the field of study including simple machine.	Explain concept of science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
	Explain levers and its types.
	Explain relationship between Efficiency, velocity ratio and Mechanical Advantage.
	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	Solve simple problems on lifting tackles like crane-Solution of problems with the aid of vectors.
ENGINEERING DRAWING	
1. Read and apply engineering drawing for different application in the field of work.	Read & interpret the information on drawings and apply in executing practical work.
	Read & analyse the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.

SECTION 2

25. EVIDENCE OF LEVEL

OPTION A

Title/Name of qualification/component: Basic Designer And Virtual Verifier (Mechanical)			Level: 5
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
Process	<p>Requires Well Developed Skill</p> <ul style="list-style-type: none"> Apply engineering drawing approaches and CAD/CAE software, create 2D drawings of simple components and perform finite element analysis viz. create and modify 2D and 3D models of the components in CAD/CAE software. Create 2D drawing of the assembly made up of individual components and perform Sheet metal design for essential assembly components. <p>Clear choice of procedures in familiar context</p> <ul style="list-style-type: none"> Plan and execute 3D printing of a prototype and analyze the method for thermo-mechanical analysis for determining thermal effects of printing process. 	<p>The learner requires to demonstrate well developed skill for example in learning outcomes like 'Apply engineering drawing approaches and CAD/CAE software, create 2D drawings of simple components and perform finite element analysis viz. create and modify 2D and 3D models of the components in CAD/CAE software' and 'Create 2D drawing of the assembly made up of individual components and perform Sheet metal design for essential assembly components'.S/He needs to perform engineering drawing skill activities for performing these outcomes and there is no scope for making errors.</p> <p>The learner requires to apply clear choice of procedures in familiar context for example in learning outcomes like 'Plan and execute 3D printing of a prototype and analyze the method</p>	5

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

Title/Name of qualification/component: Basic Designer And Virtual Verifier (Mechanical)		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> Demonstrate the FEM (Finite Element Model) capabilities of CAE(Computer Aided Engineering) SOFTWARE. 	<p>for thermo-mechanical analysis for determining thermal effects of printing process', 'Demonstrate the FEM (Finite Element Model) capabilities of CAE(Computer Aided Engineering) SOFTWARE' etc. where the learner has to apply engineering designing knowledge and decide what needs to be done to meet the Process requirement and decide as per the layout and conditions available.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	
Professional knowledge	<p>Knowledge of facts in the field of work or study</p> <ul style="list-style-type: none"> Concept generation, concept selection and concept testing, relevance of computers in the product development. <p>Knowledge of Principles and general concepts in the field of work or study</p> <ul style="list-style-type: none"> Editing the 3D model using modifying tool and converting it to parametric model to modify model as per requirement. Use of Features like ribs, mirror, offsets thickening, 3D viewing styles. <p>Knowledge of processes in the field of</p>	<p>The learner requires to demonstrate knowledge of facts, principles, processes and general concepts in the engineering drawing field of work or study using CAD/CAE software to generate, select and test the relevance of the concept using various system software.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	5

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

Title/Name of qualification/component: Basic Designer And Virtual Verifier (Mechanical)		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
	<p>work or study</p> <ul style="list-style-type: none"> Importing CAD model and carrying out clean up using tools like disfeaturing, split, stitching, smoothing surfaces etc., to prepare model for finite element analysis. 		
Professional skill	<ul style="list-style-type: none"> Create finite element model of different components like Geometry cleanup to prepare geometry for FE modeling, concept of meshing, modelling 1D, 2D and 3D elements, creating mesh based on structures, setting element quality criteria and checking quality and updating the mesh.. Prepare components for the simple analysis by applying appropriate loads and boundary conditions. [<i>Simple Analysis: - Linear static analysis</i>]. Analyze component by inertial relief method and by non- linear analysis. 	<p>The learning outcomes indicated in the adjacent cell require cognitive and practical skills to accomplish tasks that involve creating finite element model of different components like Geometry cleanup to prepare geometry for FE modeling, concept of meshing, modelling 1D, 2D and 3D elements, creating mesh based on structures, setting element quality criteria and checking quality and updating the mesh etc. It requires planning as per conditions available or preparing components for the simple analysis by applying appropriate loads and boundary conditions by selecting and applying relevant methods, software, materials and information and analyzing component by inertial relief method and by non- linear analysis.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	5

NSQF QUALIFICATION FILE

Approved in 14th NSQC Meeting – NCVET – 30th December 2021

Basic Designer And Virtual Verifier (Mechanical)

Title/Name of qualification/component: Basic Designer And Virtual Verifier (Mechanical)		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
Core skill	<p>Desired Mathematical Skills</p> <ul style="list-style-type: none"> • Demonstrate mathematical concept and principles to perform practical operations. <p>Understanding of social/political skill</p> <ul style="list-style-type: none"> • Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth. <p>Organizing information and communication</p> <ul style="list-style-type: none"> • Interpret & use formal and technical communication. 	<p>The learning outcomes for example 'Demonstrate mathematical concept and principles to perform practical operations ' and 'Interpret & use formal and technical communication' etc. display the learning outcomes where the learner needs to display desired mathematical skill; understanding of social, political skill and some skill of collecting and organizing information, communication.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	5
Responsibility	<ul style="list-style-type: none"> • Perform modal analysis of component, brackets and assemblies and apply the concept about the mode shapes (Rigid and local body) and frequencies. • Execute basic thermal analysis of simple components like plate, beam for conduction and convection in variable temperature. • Perform frequency response analysis of beam and any suspension component. 	<p>The role of BASIC DESIGNER AND VIRTUAL VERIFIER is independently responsible to perform the works as per specifications and their own analysis of what needs to be done based on their understanding of various engineering drawings using system software and their applications and processes by applying basic principles and complying with the standards. Moreover, they have got some responsibility for other's works and learning as well; Learning outcome like "Execute basic thermal analysis of simple components like plate, beam for</p>	5

NSQF QUALIFICATION FILE**Approved in 14th NSQC Meeting – NCVET – 30th December 2021***Basic Designer And Virtual Verifier (Mechanical)*

Title/Name of qualification/component: Basic Designer And Virtual Verifier (Mechanical)		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none">Perform Thermo-mechanical analysis of engine components, welded joints etc	conduction and convection in variable temperature” etc. reveal the same. Hence NSQF Level is 5 for this descriptor.	

SECTION 3

EVIDENCE OF NEED

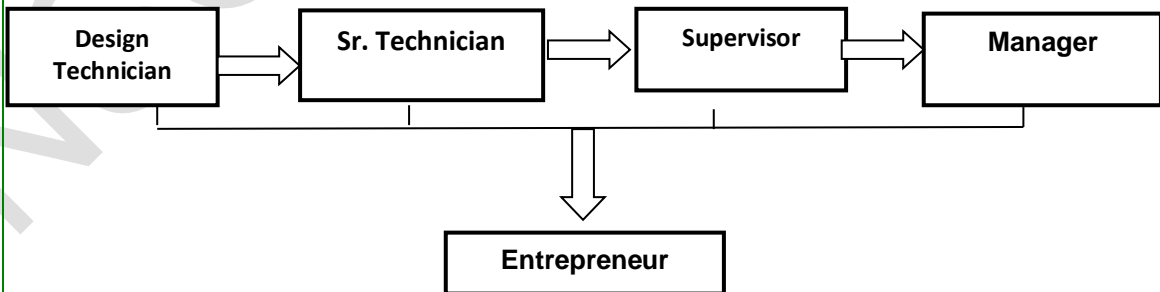
<p>26</p>	<p>What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?</p> <table border="1" data-bbox="339 544 1390 1641"> <thead> <tr> <th data-bbox="339 544 628 689"> <p>Basis</p> </th> <th data-bbox="628 544 1390 689"> <p>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</p> </th> </tr> </thead> <tbody> <tr> <td data-bbox="339 689 628 1048"> <p>Need of the qualification</p> </td> <td data-bbox="628 689 1390 1048"> <p>Capital Goods & Manufacturing Sector has a significant presence of organized as well as unorganized skilled manpower requirement. This sector is poised to grow exponentially in the years to come and is highly labour intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.</p> </td> </tr> <tr> <td data-bbox="339 1048 628 1451"> <p>Industry Relevance</p> </td> <td data-bbox="628 1048 1390 1451"> <p>The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/ NSTIs/ MSTIs/ BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.</p> </td> </tr> <tr> <td data-bbox="339 1451 628 1574"> <p>Usage of the qualification</p> </td> <td data-bbox="628 1451 1390 1574"> <p>The Proposed qualification will create skilled Technician for various establishments in different Sectors.</p> </td> </tr> <tr> <td data-bbox="339 1574 628 1641"> <p>Estimated uptake</p> </td> <td data-bbox="628 1574 1390 1641"> <p>3600</p> </td> </tr> </tbody> </table>	<p>Basis</p>	<p>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</p>	<p>Need of the qualification</p>	<p>Capital Goods & Manufacturing Sector has a significant presence of organized as well as unorganized skilled manpower requirement. This sector is poised to grow exponentially in the years to come and is highly labour intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.</p>	<p>Industry Relevance</p>	<p>The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/ NSTIs/ MSTIs/ BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.</p>	<p>Usage of the qualification</p>	<p>The Proposed qualification will create skilled Technician for various establishments in different Sectors.</p>	<p>Estimated uptake</p>	<p>3600</p>
<p>Basis</p>	<p>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</p>										
<p>Need of the qualification</p>	<p>Capital Goods & Manufacturing Sector has a significant presence of organized as well as unorganized skilled manpower requirement. This sector is poised to grow exponentially in the years to come and is highly labour intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.</p>										
<p>Industry Relevance</p>	<p>The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/ NSTIs/ MSTIs/ BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.</p>										
<p>Usage of the qualification</p>	<p>The Proposed qualification will create skilled Technician for various establishments in different Sectors.</p>										
<p>Estimated uptake</p>	<p>3600</p>										
<p>27</p>	<p>Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences.</p> <p>The qualification, originally designed for Craftsman Training Scheme is in existence for many years and approved by DGT (Regulatory Body) under Ministry of Skill Development and Entrepreneurship, Govt. of India.</p>										

Basic Designer And Virtual Verifier (Mechanical)

28	<p>What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification</p> <p>The qualification is originally designed and approved by DGT for the Craftsman Training Scheme and is in existence for many years. No such duplicate qualification of same duration and competencies exists.</p>
29	<p>What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here</p> <ul style="list-style-type: none"> • The research wing of CSTARI & DGT reviews and updates the qualification, in consultation with industries and other stakeholders, on a regular basis by conducting trade committee meetings. • DGT will monitor any duplicity by comparing existing qualifications with upcoming ones in the National Qualifications Register (NQR) and relevant sectors.

SECTION 4

EVIDENCE OF PROGRESSION

30	<p>What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector? Show the career map here to reflect the clear progression</p> <p>On completion of the training the trainee will have an opportunity to move in vertical/horizontal pathways to promote to higher designations. The learner can further undergo other specialised courses to excel in the relevant field.</p>  <pre> graph LR DT[Design Technician] --> ST[Sr. Technician] ST --> S[Supervisor] S --> M[Manager] DT --- L1[] ST --- L1 S --- L1 M --- L1 L1 --> E[Entrepreneur] </pre>
----	--