

**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.

**NCVET Code**

**2022/CCM/DGT/06209**

**Name and address of submitting body:**

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Government of India, Ministry of Skill Development and Entrepreneurship,  
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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**

1. Competency-based curriculum with following details:

Model Curriculum to be added which will include the following:

- a) Indicative list of tools/equipment to conduct the training: Enclosed with curriculum
- b) Trainers qualification: Indicated in the curriculum
- c) 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.
- d) Distribution of training duration into theory/practical/OJT component: Indicated in the curriculum.

2. Curriculum for Core Skills (Employability Skills).

● **SUMMARY**

<b>1</b>	<b>Qualification Title</b>	<b>‘DRAUGHTSMAN MECHANICAL’</b>
<b>2</b>	<b>Qualification Code, if any</b>	<b>DGT/1015</b>
<b>3</b>	<b>NCO code and occupation</b>	3118.0401 - Draught person, Mechanical 3118.0402 - Draughtsman – Mechanical
<b>4</b>	<b>Nature and purpose of the qualification (Please specify whether qualification is short term or long term)</b>	Prepare skilled Technician to undertake the job roles of Draughtsman Mechanical and will enable the trainee to prepare drawings of machines, plants, mechanical components, equipments etc. from sketches, notes, data or sample for purposes of manufacture or repairs etc. It is a long term qualification.
<b>5</b>	<b>Body/bodies which will award the qualification</b>	Directorate General of Training (DGT).
<b>6</b>	<b>Body which will accredit providers to offer courses leading to the qualification</b>	Directorate General of Training (DGT) accredits the Training providers (ITIs/ NSTIs/ MSTIs/ BTCs/ BTPs / Industries / Establishments).
<b>7</b>	<b>Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)</b>	Yes. The accreditation/ affiliation norms and any amendments made from time to time are available on DGT web portal.
<b>8</b>	<b>Occupation(s) to which the qualification gives access</b>	● Draughtsman – Mechanical
<b>9</b>	<b>Job description of the occupation</b>	The Individual will be able to prepare drawings of machines, plants, mechanical components, equipments etc. from sketches, notes, data or sample for purposes of manufacture or repairs etc.
<b>10</b>	<b>Licensing requirements</b>	NOT REQUIRED
<b>11</b>	<b>Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)</b>	NOT APPLICABLE
<b>12</b>	<b>Level of the qualification in the NSQF</b>	Level 4

13	Anticipated volume of training/learning required to complete the qualification	<table border="1"> <thead> <tr> <th rowspan="2">S No</th> <th rowspan="2">Course Element</th> <th colspan="2">Notional Training Hours</th> </tr> <tr> <th>1<sup>st</sup> Year</th> <th>2<sup>nd</sup> Year</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Professional Skill (Trade Practical)</td> <td>840</td> <td>840</td> </tr> <tr> <td>2</td> <td>Professional Knowledge (Trade Theory)</td> <td>240</td> <td>300</td> </tr> <tr> <td>3</td> <td>Employability Skills</td> <td>120</td> <td>60</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td>1200</td> <td>1200</td> </tr> <tr> <td colspan="2">On the Job Training (OJT)/ Group Project</td> <td>150</td> <td>150</td> </tr> </tbody> </table>		S No	Course Element	Notional Training Hours		1 <sup>st</sup> Year	2 <sup>nd</sup> Year	1	Professional Skill (Trade Practical)	840	840	2	Professional Knowledge (Trade Theory)	240	300	3	Employability Skills	120	60	<b>Total</b>		1200	1200	On the Job Training (OJT)/ Group Project		150	150
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		1 <sup>st</sup> Year	2 <sup>nd</sup> Year																										
1	Professional Skill (Trade Practical)	840	840																										
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<b>Total</b>		1200	1200																										
On the Job Training (OJT)/ Group Project		150	150																										
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	Passed 10th class examination with Science and Mathematics or with vocational subject in same sector or its equivalent. Minimum age 14 years as on first day of academic session.																											
16	Progression from the qualification (Please show Professional and academic progression)	An Individual can proceed for: <table border="1" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <b>Professional</b> <ul style="list-style-type: none"> <li>● Draughtsman Mechanical</li> <li>● Senior Draughtsman</li> <li>● Supervisor</li> <li>● Manager</li> <li>● Entrepreneur</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <b>Technical / Academic</b> <table style="width: 100%; border: none;"> <tr> <td style="border: none; text-align: center;"> </td> <td style="border: none; text-align: center;"> </td> </tr> <tr> <td style="border: none; text-align: center;"> </td> <td style="border: none; text-align: center;"> </td> </tr> <tr> <td style="border: none; text-align: center;">ATS CITS</td> <td style="border: none; text-align: center;">Diploma/ Advance Diploma (Vocational)</td> </tr> </table> </td> </tr> </table>		<b>Professional</b> <ul style="list-style-type: none"> <li>● Draughtsman Mechanical</li> <li>● Senior Draughtsman</li> <li>● Supervisor</li> <li>● Manager</li> <li>● Entrepreneur</li> </ul>	<b>Technical / Academic</b> <table style="width: 100%; border: none;"> <tr> <td style="border: none; text-align: center;"> </td> <td style="border: none; text-align: center;"> </td> </tr> <tr> <td style="border: none; text-align: center;"> </td> <td style="border: none; text-align: center;"> </td> </tr> <tr> <td style="border: none; text-align: center;">ATS CITS</td> <td style="border: none; text-align: center;">Diploma/ Advance Diploma (Vocational)</td> </tr> </table>					ATS CITS	Diploma/ Advance Diploma (Vocational)																		
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17	Arrangements for the Recognition of Prior learning	<ul style="list-style-type: none"> <li>● Yes (For more details refer “Guidelines for Private candidate” in DGT website MIS</li> </ul>																											

	(RPL) portal).			
18	International comparability where known (research evidence to be provided)	-		
19	Date of planned review of the qualification.	3 Yrs from the Date of Approval		
20	Formal structure of the qualification  Mandatory components			
	Title of component and identification code/NOSs/ Learning Outcomes	Estimated size (learning hours)		Level
		Skills	Knowledge	
<b>TRADE SPECIFIC</b>				
(i)	Construct different Geometrical figures using drawing Instruments following safety precautions. (CSC/NO402)	120	26	4
(ii)	Draw orthographic Projections giving proper dimensioning with title block and heading using appropriate line type and scale. (CSC/NO402)	60	15	4
(iii)	Construct free hand sketches of simple machine parts with correct proportions. (CSC/NO402)	15	06	4
(iv)	Construct plain scale, comparative scale, diagonal scale and vernier scale. (CSC/NO402)	15	06	4
(v)	Draw Sectional views showing orthographic projections. (CSC/NO402)	30	12	4
(vi)	Develop surface and interpenetration of solid in orthographic projection. (CSC/NO402)	82	20	4
(vii)	Draw isometric projection from orthographic views (and vice-versa)	82	20	4

	and draw oblique projection from orthographic views. (CSC/NO402)			
(viii)	Draw and indicate the specification of different types of fasteners, welds and locking devices as per SP-46:2003(CSC/NO402)	130	30	4
(ix)	Acquire basic knowledge on tools and equipment of Allied trades viz. Fitter, Turner, Machinist, Sheet Metal Worker, Welder, Foundry man, Electrician and Maintenance Motor Vehicles. (CSC/NO402)	130	30	4
(x)	Construct different types of gears, couplings and bearings with tolerance dimension and indicating surface finish symbol. (CSC/NO402)	120	26	4
(xi)	Perform computer application and Create 2D objects on CAD drawing space using commands from ribbon, menu bar, toolbars and by typing in command prompt. (CSC/NO402)	56	15	4
(xii)	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (CSC/NO402)		34	4
(xiii)	Construct projection views of geometrical figures with dimension and annotation on CAD in model space and viewport in layout space. (CSC/NO402)	110	34	4
(xiv)	Draw in CAD detail and assembly drawing of machine parts viz., Pulleys, Pipe fittings, Gears and Cams applying range of cognitive and practical skills. (CSC/NO402)	140	50	4
(xv)	Construct drawing of engine parts with detailed and assembly in template layout applying quality concept in CAD. (CSC/NO402)	110	35	4
(xvi)	Create 3D solid by switching to 3D modeling workspace in CAD, generate views, Print Preview and Plotting. (CSC/NO402)	46	12	4

(xvii)	Construct detailed and assembled drawing applying conventional sign & symbols using CAD. (CSC/NO402)	260	90	4
(xviii)	Prepare drawing of machine part by measuring with gauges and measuring instruments.	20	08	4
(xix)	Draw a machine shop layout considering process path and ergonomics (human factor). (CSC/NO402)	20	06	4
(xx)	Create and plot assembly and detail views of machine part with Dimensions, Annotations, Title Block and Bill of materials in SolidWorks/AutoCAD Inventor/ 3D Modeling. (CSC/NO402)	110	35	4
(xxi)	Create production drawing of machine part. (CSC/NO402)	24	06	4
(xxii)	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study (CSC/NO402)		24	4

**CORE SKILL**

**EMPLOYABILITY SKILLS**

(i)	Introduction to Employability Skills	-	180	-
(ii)	Constitutional values - Citizenship	-		-
(iii)	Becoming a Professional in the 21st Century	-		-
(iv)	Basic English Skills	-		-
(v)	Career Development & Goal Setting	-		-
(vi)	Communication Skills	-		-
(vii)	Diversity & Inclusion	-		-
(viii)	Financial and Legal Literacy	-		-
(ix)	Essential Digital Skills	-		-
(x)	Entrepreneurship	-		-
(xi)	Customer Service	-		-

(xii)	Getting Ready for Apprenticeship & Jobs	-		-
			2400	
	<b>On the Job Training (OJT)/ Group Project</b>		300	

NSQC Approved

**SECTION 1**  
**ASSESSMENT**

21	<p><b>Body/Bodies which will carry out assessment:</b> Controller of Examinations, DGT</p>
22	<p><b>How will RPL assessment be managed and who will carry it out?</b> DGT will carry out the RPL assessment following the below mentioned eligibility criteria for Trainee:</p> <p>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:</p> <p>Category I: Ex-trainees (successful pass-outs) of ITI</p> <p>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.</p> <p>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.</p> <p>Category II: 'Ex-trainees (successful pass-outs) and current trainees under CoE scheme</p> <p>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.</p> <p>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.</p> <p>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</p>



	<p>Factories Act 1948 and Shops and Establishments Act applicable for the concerned State.</p> <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><b>23</b></p>	<p><b>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.</b></p> <p><b>(1) Assessment process:</b></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</p>

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 evaluating records and reports. Summative assessment is carried out by All India Trade Test on Trade Theory, Trade practical, 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	Formative assessment based on Learning Outcomes		200	200
<b>TOTAL:</b>			600	600

**(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

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 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, 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)

**Means of assessment**

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

<b>Serial No.</b>	<b>Terminal Competency</b>	<b>Maximum Weightage (%)</b>
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
	<b>Total Maximum Weightage (%)</b>	<b>100</b>

**Pass/Fail**

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

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**LEARNING OUTCOME WITH ASSESSMENT CRITERIA:**

<b>LEARNING OUTCOME (TRADE SPECIFIC)</b>	
<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>FIRST YEAR</b>	
1. Construct different Geometrical figures using drawing Instruments following safety precautions. (CSC/NO402)	Perform assignment using drawing instruments: Draw straight and parallel lines, triangles, polygons, circles, parallelogram, angle bi-sector and line bi-sector.
	Construct regular polygons (up to 8 sides) on equal base.
	Layout a A3 drawing sheet as per Sp -46 : 2003 with margin and name plate.
	Fold a sheet of A0 size for filing Cabinets or binding as per SP: 46-2003.
	Write block letters & numerals in single & double stroke.
	Write name of the drawing title on heading at centre alignment in double stroke 5:4 block letter.
	Draw a sample title block as used in industry.
	Label a drawing views showing the types of line are used.
	Construct ellipse, parabola & hyperbola.
Construct involutes, cycloid curves, helix & spiral.	
2. Draw Orthographic Projections giving proper dimensioning with title block using appropriate line type and scale. (CSC/NO402)	Generate views in orthographic projection by placing object between horizontal and vertical plane of axes.
	Generate side view of laminar objects in different inclination on VP and HP by auxiliary vertical plane.
	Provide dimension on object as per SP-46:2003
	Draw orthographic projection of points, lines and plain laminar figures.
	Draw orthographic projection of solids viz. prism, cones, pyramids and their frustums in 1st angle and 3rd angle method.
3. Construct free hand sketches of simple machine parts with correct proportions. (CSC/NO402)	Sketch Free hand drawing viz. straight lines, curved lines polygons, circles, elliptical figures with irregular contour.
	Sketch free hand of a machine part such as tool post of a Lathe, Bench Vice, Cutting Tools, Bolts, Studs & Nuts, gland, Pipe Flange, Hand Wheel, Crane hook, Steel bracket.
	Give dimensions of machine parts in accordance with as specified proportion.

4. Construct plain scale, comparative scale, diagonal scale and vernier scale. (CSC/NO402)	Draw different types of scales.
	Find out R.F of the scale; calculate the length of scale on drawing.
	Construct Scale- plain scales, diagonal scales. Comparative scales, vernier scale & scale of chords and apply RF indrawing.
5. Draw sectional views showing orthographic projections. (CSC/NO402)	Sketch Conventional signs and symbols for section.
	Draw sectional views with adjacent object showing cutting plane and direction of view.
	Sketch different types of section lines and abbreviations for different materials as per SP-46:2003.
	Draw Orthographic drawing of solids (viz., cube, prisms, cone and pyramids) finding out the true shape surfaces cut by oblique planes.
6. Develop surface and interpenetration of solid in orthographic projection. (CSC/NO402)	Develop the surface of cylinder, prisms, cone, pyramids and their frustum.
	Draw development of an oblique cone with elliptical base.
	Draw the development of a 45° single cut pipe elbow, 3-pieces pipe elbow, a pipe hole through it, bucket and a funnel.
	Draw development of solids intersecting each other.
	Draw orthographic projection of interpenetrated two prisms with their axes intersecting at different angles.
	Draw orthographic projection of interpenetrated cone, cylinder & pyramids intersecting each other.
	Draw the curves of intersection of cylinder penetrating in a sphere and a cylinder offset from their center.
7. Draw isometric projection from orthographic views (and vice-versa) and draw oblique projection from orthographic views. (CSC/NO402)	Construct an Isometric scale to a given length.
	Draw the isometric projection of regular solids.
	Draw the isometric views for the given solids with hollow and cut sections.
	Draw the orthographic views of hanger, bracket & support from their isometric view.
	Draw isometric view of machine elements (viz. V-block, Angle plate, Sliding block, Journal bearing).
Draw oblique projection of circular lamina in receding axis at 30° & 45°.	

	Draw oblique projection of crank lever and V-block.
8. Draw and indicate the specification of different types of fasteners, welds and locking devices as per SP-46:2003. (CSC/NO402)	<p>Draw different Screw threads with SP-46:2003conventions.</p> <p>Draw bolts, studs, nuts, washers and other fasteners as per SP-46:2003 conventions.</p> <p>Draw different locking arrangement of nuts, machine screws, caps screw set screw as per convention.</p> <p>Draw a half sectional view of a coupler nut.</p> <p>Draw eye foundation bolt, rag foundation bolt and Lewis foundation bolt.</p> <p>Draw welded joints giving welding symbols in welded structures.</p> <p>Draw section of welded steel structural column &amp; bracket fabricated by plate.</p> <p>Draw keys, cotters, circlips and pins as per convention.</p> <p>Draw different types of pipe fittings and pipe joints (flanged, welded, threaded, socket and spigot).</p> <p>Draw structural steel sections with dimension as per ISspecification.</p> <p>Draw rivets and riveted joints with conventional specification.</p> <p>Draw a double strap, double riveted zig-zag butt joint.</p>
9. Acquire basic knowledge on tools and equipments and their application in Allied trades viz. Fitter, Turner, Machinist, Sheet Metal Worker, Welder, Foundry man, Electrician and Maintenance Motor Vehicles. (CSC/NO402)	<p>Identify different types of fitters hand tools, use centre punch different types of files, calipers, hacksaws, chisels and hammers.</p> <p>Identify Plain turning , stepped turning ,Taper turning with different method.</p> <p>Identify and use of jigs and fixtures Simple operations on milling machine such as plain milling and key waycutting.</p> <p>Check how to mark out castings and forgings, setting up and operation of shaping, slotting and planning machines.</p> <p>Identify anduse of hand tools such as planishing hammers, stakes, mallet, bricks prick punch etc. evaluatedevelopment of surfaces.</p> <p>Identify the hand tools used in gas and electric welding of object according to drawing.</p> <p>Acquaint with different types of mould, cores and coredressing and use of moulding tools.</p> <p>Identify the measuring instruments, machinery and panels used in electrician trade. Electrical and electronic symbols used in simple wiring diagrams.</p>

	Identify different parts of IC Engines (Both spark ignition & compression ignition in 2 stroke & 4 stroke engines).
10. Construct different types of gears, couplings and bearings with tolerance dimension and indicating surface finish symbol. (CSC/NO402)	Draw the diagram illustrating basic size deviations and tolerances.
	Draw symbols for machining and surface finishes (grades and micron values).
	Draw the system of indication of geometrical tolerances of form and position as per standard.
	Draw muff coupling, flanged coupling, friction grip coupling, pin type flexible coupling, universal coupling, Oldham's coupling, claw coupling, cone friction clutch.
	Draw details and assembly of simple bearing and foot step bearing, Plummer Block and self-aligning bearing (swivel bearing).
	Construct tooth profile of a spur gear above 30 teeth.
	Draw two spur gears and bevel gears in mesh.
11. Perform computer application and create 2D objects on CAD drawing space using commands from ribbon, menu bar, toolbars and by typing in command prompt. (CSC/NO402)	Perform file management in Windows operating system.
	Create, save and print a document, worksheet and pdf file.
	Start drawing in CAD from: new, template wizard and existing drawing file.
	Select Drawing limit of the CAD drawing space.
	Select proper setting of ribbon and toolbars, choice of workspace, scale.
	Draw object in CAD drawing space using commands from icons in the ribbon, from menu bar, from floating toolbar and by typing command at the command prompt.
	Use functional keys to access certain commands.
	Input or locate point by Absolute Coordinate system, Polar Co-ordinate System and Relative Co-ordinate System.
Create geometrical figures using draw tools.	
12. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (CSC/NO402)	Solve different mathematical problems
	Explain concept of basic science related to the field of study



<b>SECOND YEAR</b>	
13. Construct projection views of geometrical figures with dimension and annotation on CAD in model space and viewport in layout space. (CSC/NO402)	Draw object CAD drawing space using line, polyline, polygon, circle, rectangle, arc, ellipse commands.
	Modify object using Break, Erase, Trim, Offset, Fillet, Chamfer, Commands.
	Manage object using Move, Copy, Array, Insert Block, Make Block, Scale, Rotate, Hatch Commands.
	Create templates, Insert drawings, Layers, Modify Layer properties.
	Provide dimension, annotation on object and customized different Dimension and Text styles.
	Construct orthographic drawing using shortcut keyboard command.
	Construct isometric drawing of machine blocks.
	Create viewports in layout space to view drawings in model space.
14. Draw in CAD detail and assembly Drawing of machine parts viz., Pulleys, Pipe fittings, Gears and Cams applying range of cognitive and practical skills. (CSC/NO402)	Draw Pulleys-solid, stepped built up and pulley with different types of arms, rope pulleys, belt pulleys.
	Draw Pipe fittings: tee, flanges, unions, valves. Different types of pipes layout systems. Different types of pipe joints.
	Draw gears such as spurs helical, bevel & worm, worm and worm wheel.
	Draw Cams with different motions to followers, different types of follower and involute tooth profile of a gear.
15. Construct drawing of engine parts with detailed and assembly in template layout applying quality concept in CAD. (CSC/NO402)	Draw Eccentrics, Piston, Cross Head, Connecting rod of I.C. Engines with the application of tolerances using CAD.
	Construct detailed drawing of an air valve and a fuel injector of IC engine.
16. Create 3D solid by switching to 3D modeling workspace in CAD, generate views, Print Preview and Plotting(CSC/NO402)	Identify 3D toolbars, menus, co-ordinate system by switching 3D modeling workspace.
	Identify three axes of the object.
	Change origin to create aligned objects under supervision.
	Create 3D solid objects using command from 3D primitives, Extrude, Revolve, subtract, union. Create 3D drawing by

	changing User co-ordinate systems.
	Annotate and dimension of the 3D model.
	Generate orthographic views from model space to layout space.
	Generate Print preview and Plotting.
	Customize page set up, Print preview and Plotting of 3D drawing.
17. Construct detailed and assembled drawing applying conventional sign & symbols using CAD. (CSC/NO402)	Construct detailed drawing of a lever safety valve.
	Construct detailed drawing of a gate valve.
	Construct detailed drawing of a blow off cock.
	Create library folder containing blocks of Hydraulic and pneumatic conventional signs and symbols.
	Draw a sectional view of a hydraulic jack and a pneumatic valve actuator.
	Draw detailed view of a volute casing centrifugal pump.
	Draw assembled and detailed drawing of tool post of a lathe.
	Construct detailed & assembly drawing of tail stock and revolving centre.
	Construct detailed drawing of a milling fixture.
	Construct detailed & assembly drawing of shaper tool head slide.
	Draw a simple drilling jig for drilling holes in a given component.
	Draw Press Tool giving nomenclature of each part and dies & punches.
	Construct detailed drawing of a simple carburetor.
	Construct detailed and assembly drawing of a simple pressure vessel.
18. Prepare drawing of machine part by measuring with gauges and measuring instruments. (CSC/NO402)	Identify proper measuring tools and gauges to measure the part.
	Check the accuracy of the instruments.
	Measure with the help of different types of gauges, such as plug, snap, thread, taper, measuring instruments etc.
	Prepare detailed drawing of a C-clamp or machine vice.
19. Draw a machine shop layout considering process path and	Draw a machine shop layout of small production industry showing process path from raw material inflow to finished product store.

ergonomics (human factor). (CSC/NO402)	Draw walk-way inside the workshop.
20. Create and plot assembly and detail views of machine part with Dimensions, Annotations, Title Block and Bill of materials in SolidWorks/AutoCAD Inventor/ 3D Modeling. (CSC/NO402)	Draw 3D solid figures by Sketching features & applied features.
	Sketch an angle plate and a block – Create / Modify constraints.
	Create a sketch of a new part.
	Create 3D solid and edit solid.
	Create a new assembly, Insert components into an assembly, Add mates (degree of freedom) and perform components configuration in an assembly.
	Create a 3D model putting: Driving dimensions, Bill of materials, Driven (Reference) Dimensions and Annotations.
	Prepare drawings & detailing: Named views, standard 3 views, auxiliary views, section views and detail views.
	Create a 3D transition figure.
	Create 3D model by annotating Holes and Threads, centerlines, symbols and leaders.
	Create simulation.
Plot the 3D model.	
21. Create production drawing of machine part. (CSC/NO402)	Create a simple Drill jig with Part model and assembly-detailing.
	Create a screw jack with Part model and assembly-detailing.
	Create a check list by self-assessment and provide Revision mark by noting in the Revision table.
22. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (CSC/NO402)	Solve different mathematical problems
	Explain concept of basic science related to the field of study

<b>EMPLOYABILITY SKILLS (CORE SKILL)</b>	
<b>LEARNING OUTCOME</b>	<b>ASSESSMENT CRITERIA</b>
1. Introduction to Employability	Outline the importance of Employability Skills for the

Skills	current job market and future of work.
	List different learning and employability related GOI and private portals and their usage.
	Research and prepare a note on different industries and the available opportunities.
<b>2. Constitutional values - Citizenship</b>	
2. Constitutional values - Citizenship	Explain the essential civic rights and duties required to be followed to become a responsible citizen.
	Discuss the role of personal values and ethics in personal and social development.
	Identify and practice different environmentally sustainable practices.
<b>3 Becoming a Professional in the 21st Century</b>	
3 Becoming a Professional in the 21st Century	Discuss relevant 21st century skills required for employment
	Highlight the importance of practicing 21st century skills like Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem solving, and time management skills in personal or professional life
	Create a pathway for adopting a learning mindset for personal and professional development
<b>4. Basic English Skills</b>	
4. Basic English Skills	Use appropriate grammar and sentences while interacting with others
	Read English text with appropriate articulation
	Role play a situation on how to talk appropriately to a customer in English, over the phone or in person
	Write a short note/paragraph / letter/e-mail using correct English
<b>5. Career Development &amp; Goal Setting</b>	
5. Career Development & Goal Setting	Research and identify trends and different skills required to match the current market requirement for a job
	Create a career development plan with well-defined short- and long-term goals
<b>6. Communication Skills</b>	
6. Communication Skills	Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette
	Write a short note/paragraph on a familiar topic
	Explain the importance of communication etiquette including active listening for effective communication
	Role play a situation on how to work collaboratively with

	others in a team
7. Diversity and Inclusion	Exhibit how to behave, communicate and conduct oneself appropriately with all genders and PwD
	Discuss the POSH Act and its significance
8. Financial and Legal Literacy	Discuss various financial institutions, products, and services
	Demonstrate how to carry out offline and online financial transactions, safely and securely and check passbook/statement
	Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deductions
	Calculate income and expenditure for budgeting
	Discuss the legal rights, laws, and aids
9. Essential Digital Skills	Describe the role of digital technology in day-to-day life and the workplace
	Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
	Demonstrate how to connect devices securely to internet using different means
	Follow the dos and don'ts of cyber security to protect against cyber crimes
	Discuss the significance of displaying responsible online behaviour while using various social media platforms
	Create an e-mail id and follow e- mail etiquette to exchange e -mails
	Show how to create documents, spreadsheets and presentations using appropriate applications
10. Entrepreneurship	Describe the types of entrepreneurship and enterprises
	Discuss the process of identifying opportunities for potential business and relevant regulatory and statutory requirements
	Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
	Create a sample business plan, for the selected business opportunity
	Discuss various sources of funding and identify associated financial and legal risks with its mitigation plan

11. Customer Service	Describe different types of customers
	Role play a situation on how to identify customer needs and respond to them in a professional manner
	Explain various tools used to collect customer feedback
12. Getting ready for apprenticeship & Jobs	Draft a professional Curriculum Vitae (CV)
	Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
	Demonstrate how to apply to identified job openings using offline /online methods as per requirement
	Discuss the significance of maintaining hygiene and dressing appropriately
	Discuss how to prepare for an interview
	Role play a mock interview
	List the steps for searching and registering for apprenticeship opportunities

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**SECTION 2**

**25. EVIDENCE OF LEVEL**

**OPTION A**

Title/Name of qualification/component: Draughtsman Mechanical			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
Process	<p><b>Requires Well Developed Skill</b></p> <ul style="list-style-type: none"> <li>• Create 3D solid by switching to 3D modelling workspace in CAD, generate views, Print Preview and Plotting.</li> <li>• Draw a machine shop layout considering process path and ergonomics (human factor).</li> </ul> <p><b>Clear choice of procedures in familiar context</b></p> <ul style="list-style-type: none"> <li>• Draw orthographic Projections giving proper dimensioning with title block and heading using appropriate line type and scale.</li> <li>• Draw isometric projection from orthographic views (and vice-versa) and draw oblique projection from orthographic views.</li> <li>• Draw and indicate the specification of different types of fasteners, welds and</li> </ul>	<p>The learner requires to demonstrate a well-developed skill as indicated in the learning outcomes for example " Create 3D solid by switching to 3D modelling workspace in CAD, generate views, Print Preview and Plotting, Draw a machine shop layout considering process path and ergonomics (human factor)" to achieve the best possible finished drawing by applying conventional and latest drawing tools and softwares. The learner requires to apply clear choice of procedures in familiar context as indicated in the learning outcomes like 'Draw isometric projection from orthographic views (and vice-versa) and draw oblique projection from orthographic views'. In all these learning outcomes the learner has to apply ones knowledge and decide what Drawing Tools and processes to be utilized to achieve desirable</p>	4

Title/Name of qualification/component: Draughtsman Mechanical			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	locking devices as per SP-46:2003 <ul style="list-style-type: none"> <li>Acquire basic knowledge on tools and equipment of Allied trades viz. Fitter, Turner, Machinist, Sheet Metal Worker, Welder, Foundry man, Electrician and Maintenance Motor Vehicles.</li> </ul>	Drawing and plan as per requirements and resources available.  Hence NSQF Level is 4 for this descriptor.	
Professional knowledge	<p><b>Knowledge of facts in the field of work or study</b></p> <ul style="list-style-type: none"> <li>Lay out and designation of a drawing sheet as per Sp -46 : 2003</li> <li>Orthographic projection.</li> <li>Screw threads, terms nomenclature, types of screw thread, proportion and their uses, threads as per SP-46:2003 conventions.</li> </ul> <p><b>Knowledge of Principles and general concepts in the field of work or study.</b></p> <ul style="list-style-type: none"> <li>Principle of isometric projection and Isometric drawing. Methods of isometric projection and dimensioning.</li> <li>Knowledge of different pipe materials and specifications of Steel, W.I. &amp; PVC pipes.</li> <li>Working principle of valves and their description.</li> </ul> <p><b>Knowledge of processes in the field of</b></p>	The learner requires to demonstrate knowledge of facts, principles, processes and general concepts, in a field of work or study which is Nomenclature, description and use of Drawing Instruments & Various equipments used in Drawing, First and Third angle projection, Types of sectional views & their uses, Cutting plane and its representation, Screw threads, terms nomenclature, types of screw thread, proportion and their uses, threads as per SP-46:2003 conventions , Difference between Isometric drawing & Isometric projection, 3D Modelling, CAD etc. The learner requires to demonstrate knowledge of principle in the concept of Drawing and Projection, and various aspects of Isometric and Orthographic Drawing by use of conventional and Modern Drawing Tools and	4



Title/Name of qualification/component: Draughtsman Mechanical			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<p><b>work or study</b></p> <ul style="list-style-type: none"> <li>• Drawing of Line, polyline, ray, polygon, circle, rectangle, arc, ellipse using different options.</li> <li>• Knowledge of shortcut keyboard command. Customization of keyboard command.</li> </ul>	<p>Softwares.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	
Professional skill	<ul style="list-style-type: none"> <li>• Draw orthographic Projections giving proper dimensioning with title block and heading using appropriate line type and scale.</li> <li>• Draw isometric projection from orthographic views (and vice-versa) and draw oblique projection from orthographic views.</li> <li>• Perform computer application and Create 2D objects on CAD drawing space using commands from ribbon, menu bar, toolbars and by typing in command prompt.</li> <li>• Create 3D solid by switching to 3D modelling workspace in CAD, generate views, Print Preview and Plotting.</li> <li>• Construct detailed and assembled</li> </ul>	<p>The learning outcomes for example 'Draw orthographic Projections giving proper dimensioning with title block and heading using appropriate line type and scale, Draw isometric projection from orthographic views (and vice-versa) and draw oblique projection from orthographic views, Perform computer application and Create 2D objects on CAD drawing space using commands from ribbon, menu bar, toolbars and by typing in command prompt, Create 3D solid by switching to 3D modelling workspace in CAD, generate views, Print Preview and Plotting' etc. require cognitive and practical skills to accomplish tasks that involve understanding requirements; then as per requirements deciding which</p>	4

Title/Name of qualification/component: Draughtsman Mechanical			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<p>drawing applying conventional sign &amp; symbols.</p> <ul style="list-style-type: none"> <li>• Prepare drawing of machine part by measuring with gauges and measuring instruments.</li> <li>• Create and plot assembly and detail views of machine part with Dimensions, Annotations, Title Block and Bill of materials in Solid Works/AutoCAD Inventor/ 3D Modeling.</li> <li>• Prepare drawing of machine part by measuring with gauges and measuring instruments.</li> <li>• Create production drawing of machine part.</li> </ul>	<p>operations/procedure/tools will achieve desired result; planning the sequence of operations to maximum effectiveness; constantly checking and reviewing plan etc., all of which involve problem solving and decision making. These are done by selecting and applying basic methods like, Constructing a plain scale, comparative scale, diagonal scale and vernier scale, Develop surface and interpenetration of solid in orthographic projection and Draw Sectional views showing orthographic projections etc.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	
Core skill	<p><b>Desired Mathematical Skills</b></p> <ul style="list-style-type: none"> <li>• Explain science in the field of study including simple machine.</li> </ul> <p><b>Understanding of social/political skill</b></p> <ul style="list-style-type: none"> <li>• Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for</li> </ul>	<p>The learning outcomes for example 'Explain science in the field of study including simple machine' and 'Interpret &amp; 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</p>	4

Title/Name of qualification/component: Draughtsman Mechanical			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<p>personal &amp; societal growth.</p> <p><b>Organizing information and communication</b></p> <ul style="list-style-type: none"> <li>Interpret &amp; use formal and technical communication.</li> </ul>	<p>skill of collecting and organising information, communication.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	
Responsibility	<ul style="list-style-type: none"> <li>Construct different Geometrical figures using drawing Instruments.</li> <li>Draw Sectional views showing orthographic projections.</li> <li>Draw and indicate the specification of different types of fasteners, welds and locking devices as per SP-46:2003</li> <li>Draw detail and assembly drawing of machine parts viz., Pulleys, Pipe fittings, Gears and Cams applying range of cognitive and practical skills.</li> <li>Construct drawing of engine parts with detailed and assembly in template layout applying quality concept in CAD.</li> <li>Create 3D solid by switching to 3D modelling workspace in CAD, generate views, Print Preview and Plotting.</li> <li>Create production drawing of machine</li> </ul>	<p>The role of Draughtsman Mechanical is independently responsible to perform the mechanical drawing work as per specifications followed by analysis of what needs to be done based on their understanding of various Drawing tools, develop orthographic and isometric projection and construct 2D/3D Drawings of Different Mechanical Components used in Production &amp; Manufacturing in conjunction with various principles and standards to achieve desired outcome and they have got some responsibility for other's works and learning as well; Learning outcomes like "Draw detail and assembly drawing of machine parts viz., Pulleys, Pipe fittings, Gears and Cams applying range of cognitive and practical skills " etc. reveal the same.</p>	4

Title/Name of qualification/component: Draughtsman Mechanical			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	part.	Hence NSQF Level is 4 for this descriptor.	

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**SECTION 3****EVIDENCE OF NEED**

26	<p><b>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?</b></p> <table border="1" data-bbox="338 548 1390 1738"> <thead> <tr> <th data-bbox="338 548 625 689"><b>Basis</b></th> <th data-bbox="625 548 1390 689"><b>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="338 689 625 1115">Need of the qualification</td> <td data-bbox="625 689 1390 1115"> <p><b>Capital Goods and Manufacturing</b> 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="338 1115 625 1541">Industry Relevance</td> <td data-bbox="625 1115 1390 1541"> <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="338 1541 625 1666">Usage of the qualification</td> <td data-bbox="625 1541 1390 1666"> <p>The Proposed qualification will create skilled Technician for various establishments in different Sectors.</p> </td> </tr> <tr> <td data-bbox="338 1666 625 1738">Estimated uptake</td> <td data-bbox="625 1666 1390 1738"> <p>The present seating capacity is 32500.</p> </td> </tr> </tbody> </table>	<b>Basis</b>	<b>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</b>	Need of the qualification	<p><b>Capital Goods and Manufacturing</b> 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>	Industry Relevance	<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>	Usage of the qualification	<p>The Proposed qualification will create skilled Technician for various establishments in different Sectors.</p>	Estimated uptake	<p>The present seating capacity is 32500.</p>
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Usage of the qualification	<p>The Proposed qualification will create skilled Technician for various establishments in different Sectors.</p>										
Estimated uptake	<p>The present seating capacity is 32500.</p>										
27	<p><b>Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences.</b></p> <p>The qualification, originally designed for Craftsman Training Scheme is in</p>										

	existence for many years and approved by DGT (Regulatory Body) under Ministry of Skill Development and Entrepreneurship, Govt. of India.
28	<p><b>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</b></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><b>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</b></p> <ul style="list-style-type: none"> <li>• The research wing of CSTARI &amp; DGT reviews and updates the qualification, in consultation with industries and other stakeholders, on a regular basis by conducting trade committee meetings.</li> <li>• DGT will monitor any duplicity by comparing existing qualifications with upcoming ones in the National Qualifications Register (NQR) and relevant sectors.</li> </ul>

**SECTION 4**

**EVIDENCE OF PROGRESSION**

**30** **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**

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.

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    graph LR
      A[Draughtsman Mechanical] --> B[Senior Draughtsman]
      B --> C[Supervisor]
      C --> D[Manager]
      B --> E[Entrepreneur]
  
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