



Please refer Guidelines for STT/LTT/Apprenticeship/OEM Qualification File

QUALIFICATION FILE

CHEMICAL PLANT TECHNOLOGY (CRAFT INSTRUCTOR)

- Short Term Training (STT) Long Term Training (LTT) Apprenticeship
 Upskilling Dual/Flexi Qualification For ToT For ToA
- General Multi-skill (MS) Cross Sectoral (CS) Future Skills OEM

NCrF/NSQF Level: 4.5

Submitted By:

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.

Table of Contents

Section 1: Basic Details	3
Section 2: Module Summary.....	5
NOS/s of Qualifications.....	5
Mandatory NOS/s:	5
Elective NOS/s:.....	5
Optional NOS/s:	6
Assessment - Minimum Qualifying Percentage.....	6
Section 3: Training Related	6
Section 4: Assessment Related.....	6
Section 5: Evidence of the need for the Qualification.....	7
Section 6: Annexure & Supporting Documents Check List	7
Annexure: Evidence of Level	8
Annexure: Tools and Equipment (Lab Set-Up).....	8
Annexure: Industry Validations Summary	9
Annexure: Training & Employment Details.....	9
Annexure: Blended Learning	10
Annexure: Detailed Assessment Criteria.....	10
Annexure: Assessment Strategy	11
Annexure: Acronym and Glossary.....	12

Section 1: Basic Details

1.	Qualification Name	CHEMICAL PLANT TECHNOLOGY (CRAFT INSTRUCTOR)							
2.	Sector/s	CHEMICALS & PETROCHEMICALS							
3.	Type of Qualification: <input type="checkbox"/> New <input checked="" type="checkbox"/> Revised <input type="checkbox"/> Has Electives/Options <input type="checkbox"/> OEM	NQR Code & version of existing/previous qualification: 2020/CP/DGT/03921	Qualification Name of existing/previous version: CHEMICAL PLANT TECHNOLOGY (CITS)						
4.	a. OEM Name b. Qualification Name (Wherever applicable)	NA							
5.	National Qualification Register (NQR) Code & Version (Will be issued after NSQC approval)	QG-4.5-CP-03171-2024-V2-DGT	6. NCrF/NSQF Level: 4.5						
7.	Award (Certificate/Diploma/Advance Diploma/Any Other) (Wherever applicable specify multiple entry/exits also & provide details in annexure)	National Craft Instructor Certificate (NCIC)							
8.	Brief Description of the Qualification	The individual will be able to impart theoretical instructions, demonstrate practical skills, evaluate and grade trainees of Attendant Operator (Chemical Plant), Maintenance Mechanic (Chemical Plant) and related trades in ITIs/ Vocational Training Institutes, industrial workshops, etc.							
9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: <table border="1" data-bbox="981 943 1982 1412"> <thead> <tr> <th>S. No.</th> <th>Academic/Skill Qualification (with Specialization - if applicable)</th> <th>Required Experience (with Specialization - if applicable)</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Degree in Chemical Technology/Engineering from AICTE/ UGC recognized Engineering College/ University OR 03 Years Diploma in Chemical Technology/Engineering after class 10th from AICTE/ recognized board of technical education. OR Ex-serviceman from Indian Armed forces with 15 years of service in related field as per equivalency</td> <td></td> </tr> </tbody> </table>		S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1.	Degree in Chemical Technology/Engineering from AICTE/ UGC recognized Engineering College/ University OR 03 Years Diploma in Chemical Technology/Engineering after class 10th from AICTE/ recognized board of technical education. OR Ex-serviceman from Indian Armed forces with 15 years of service in related field as per equivalency	
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)							
1.	Degree in Chemical Technology/Engineering from AICTE/ UGC recognized Engineering College/ University OR 03 Years Diploma in Chemical Technology/Engineering after class 10th from AICTE/ recognized board of technical education. OR Ex-serviceman from Indian Armed forces with 15 years of service in related field as per equivalency								

			through DGR OR 10th class with 2 year NTC/ NAC in the Attendant Operator (Chemical Plant) or Maintenance Mechanic (Chemical plant) trades.																
		b. Age: Minimum age 16 years as on first day of academic session.																	
10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	45	11. Common Cost Norm Category (I/II/III) (wherever applicable): N/A																
12.	Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)	NA																	
13.	Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)	<input checked="" type="checkbox"/> Offline <input type="checkbox"/> Online <input type="checkbox"/> Blended <table border="1"> <thead> <tr> <th>Training Delivery Modes</th> <th>Theory (Hours)</th> <th>Practical (Hours)</th> <th>OJT Mandator y (Hours)</th> <th>Total (Hours)</th> </tr> </thead> <tbody> <tr> <td>Classroom (offline)</td> <td>450</td> <td>750</td> <td>150</td> <td>1350</td> </tr> <tr> <td>Online</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> (Refer Blended Learning Annexure for details)			Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandator y (Hours)	Total (Hours)	Classroom (offline)	450	750	150	1350	Online				
Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandator y (Hours)	Total (Hours)															
Classroom (offline)	450	750	150	1350															
Online																			
14.	Aligned to NCO/ISCO Code/s (if no code is available mention the same)	2356.0100, 7233.1100, 3111.0100, 3111.0300, 3133.0100, 7233.0301, 8131.3700, 3134.0300, 8131.3600, 3134.0100, 8131.0100, 8131.3501, 3133.0400, 3133.0500, 8131.2100, 8131.7700, 3139.0100, 8131.0400, 8131.2300, 8131.2700, 8131.1400, 8131.8500																	
15.	Progression path after attaining the qualification (Please show Professional and Academic progression)	Professional <ul style="list-style-type: none"> • Technical Instructor in a vocational training Institute/ technical Institution • Supervisor in Industries Academic <ul style="list-style-type: none"> • Diploma • Advance Diploma (Vocational) • Degree • PG 																	
16.	Other Indian languages in which the Qualification & Model Curriculum are being submitted	Hindi																	
17.	Is similar Qualification(s) available on NQR-if yes, justification for this qualification	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No URLs of similar Qualifications:																	
18.	Is the Job Role Amenable to Persons with Disability	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If "Yes", specify applicable type of Disability: LD, CP, LC, DW, AA, DEAF, HH, AUTISM, ID,																	

		SLD, MI	
19.	How Participation of Women will be Encouraged	The courses will empower women by creating self-employment opportunities and enabling them to get jobs as this course offers specialized skilling.	
20.	Are Greening/ Environment Sustainability Aspects Covered <i>(Specify the NOS/Module which covers it)</i>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
21.	Is Qualification Suitable to be Offered in Schools/Colleges	Schools <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Colleges <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
22.	Name and Contact Details of Submitting / Awarding Body SPOC <i>(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</i>	Name: Shri Ishwar Singh, Deputy Director General Email: ishwar.singh25@gov.in Contact No.: 011-25802140 Website: https://dgt.gov.in/	
23.	Final Approval Date by NSQC: 22th Oct. 2024	24. Validity Duration: 3 Yrs. from the Date of Approval	25. Next Review Date: 21 Oct. 2027

NSQC Applied

Section 2: Module Summary

NOS/s of Qualifications

(In exceptional cases these could be described as components)

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

Th.-Theory Pr.-Practical OJT-On the Job Man.-Mandatory Training Rec.-Recommended Proj.-Project

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T- Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	Weightage (%) (if applicable)
TRADE TECHNOLOGY																
1.	Demonstrate related safety and general awareness in chemical industry. [viz. application of fire extinguishers, use of PPE'S with general and chemical hazards, interpretation of data from MSDS, detect dust percentage in Air etc.].	CP/N9440 V1.0	Core	4.5	0.5	5	10			15	2	4	1	1	8	N/A
2.	Demonstrate procedures to make job / component as per specification, assembling them and checking of dimensional/ functional accuracy following safety precautions. [Fitting operation – marking, punching, Hack-sawing, Filing, Drilling, countersinking, counter boring, reaming, Taping,	CP/N9441 V1.0	Core	4.5	1	8	22			30	3	9	1	3	16	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T-Ma n.	OJT - Rec.	Total	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Total	Weightage (%) (if applicable)
	dieing, fitting, polishing, assembling, etc. Accuracy: $\pm 0.05\text{mm}$].															
3.	Transfer skill of welding – by Setting Gas and Electric Arc welding plant, joining metal components observing safety precautions. [Different Operations – select and operate fire extinguisher, straight line beads, single V-butt joint].	CP/N9442 V1.0	Core	4.5	1	8	22			30	3	9	1	3	16	N/A
4.	Demonstrate experiments in Physics laboratory to determine physical constants, verify laws, etc.	CP/N9443 V1.0	Core	4.5	1	8	22			30	3	10	1	3	17	N/A
5.	Demonstrate experiments in Chemistry laboratory to determine concentration of solutions, PH, melting point, boiling point, flash point of oil, viscosity of oil, selection of oil for particular application at certain temperature, Reynold's Number to predict flow pattern in a conduit, compare properties of metals & alloys, prepare	CP/N9444 V1.0	Core	4.5	1	8	22			30	4	11	1	3	19	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T-Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	Weightage (%) (if applicable)
	chemicals, etc.															
6.	Exhibit production of component on conventional lathe machine observing standard operation practice. [Different operations: - plain turning, facing, step turning, through & step drilling, knurling, threading, etc].	CP/N9445 V1.0	Core	4.5	1	8	22			30	4	10	2	3	19	N/A
7.	Execute pipe joints, & fittings with pipes, apply lagging materials in accordance with job condition - hot/cold and test for leakages. [Range of skills – Cutting, Threading, gasket cutting, lagging of pipeline, Joining and use of locking devices]	CP/N9446 V1.0	Core	4.5	0.5	5	10			15	2	4	1	1	8	N/A
8.	Demonstrate installation /connection of instrument/devices to measure pressure, temperature, flow rate and level, pressure drop due to friction, effect of pipe roughness on friction, frictional loss in fittings and valves, coefficient of discharge, density and record	CP/N9447 V1.0	Core	4.5	1.5	15	30			45	4	10	1	3	18	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T-Ma n.	OJT - Rec.	Total	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Total	Weightage (%) (if applicable)
	readings. [Different instrument/devices – Bourdon tube pressure gauge, capsule type gauge, mercury in glass thermometer, bimetal thermometer, RTD, thermocouple, orifice meter, venture meter, Rotameter, sight glass level indicator, air purge level indicator, capacitance type level indicator, hydrometer, control valve]															
9.	Demonstrate different types of maintenance (viz. Online, Predictive, Preventive and breakdown) and Trouble shoot, dismantle, repair & assemble / Align different mechanical components for power transmission & check their functionality. (Different Mechanical Components viz. Belt, Pulleys. shaft, motor, coupling, Gearbox, bearings, Hydraulic jack).	CP/N9448 V1.0	Core	4.5	1.5	15	30			45	4	11	1	3	19	N/A
10.	Demonstrate overhauling of different types of valve.	CP/N9449 V1.0	Core	4.5	2	15	45			60	5	15	2	4	26	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T-Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	Weightage (%) (if applicable)
11.	Trouble shoot, dismantle, Overhaul / repair & reassemble different machine, pumps & components for transportation of liquid, check their functionality and plot the graphs for characteristic curve of different types of pump. [Different Machines & Components – Pumps - centrifugal, gear pump, metering pump, screw pump, multistage compressor, vacuum pump, mechanical seals]	CP/N9450 V1.0	Core	4.5	1.5	15	30			45	4	10	2	4	20	N/A
12.	Demonstrate machinery handling, installation, operations, maintenance, troubleshooting of various types of conveyors as per standard procedure, it's planning & implementation.	CP/N9451 V1.0	Core	4.5	1.5	15	30			45	4	10	1	3	18	N/A
13.	Demonstrate function of pressure vessel, various pipe fittings, valves, parameters, trouble shoot, dismantle, repair / overhauling & reassemble different machine & components	CP/N9452 V1.0	Core	4.5	1.5	15	30			45	4	11	2	3	20	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T-Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	Weightage (%) (if applicable)
	for transportation of Gases, Air dryers & Air filters and check their functionality															
14.	Trouble shoot, dismantle, clean scale formation & reassemble Electrode & Oil fired boiler and Air handling unit and check their functionality.	CP/N9453 V1.0	Core	4.5	1	10	20			30	4	10	1	3	18	N/A
15.	Demonstrate operation of different Heat exchange equipment, Evaporators & calculate heat transfer rate, trouble shoot, dismantle, clean & reassemble different types of Heat exchangers, Evaporators and check functionality. [Heat exchange equipment's-Double Pipe Heat exchanger, Shell & tube Heat exchanger, plate heat exchanger] [Evaporation equipment's-Vertical tube evaporator, multiple effect evaporator]	CP/N9454 V1.0	Core	4.5	1	10	20			30	4	11	1	3	19	N/A
16.	Demonstrate operation of different types of distillation column, filtration unit, Dryer used for loading wet material	CP/N9455 V1.0	Core	4.5	1	7	23			30	4	10	1	4	19	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T- Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	Weightage (%) (if applicable)
	in tray dryer, cyclone separator, packed distillation column, sieve tray column, different types of extraction unit and troubleshoot, dismantle, clean and reassemble components and check for proper functionality.															
17.	Operate an absorption column & determine flooding velocity, explain gas absorption, packed tower, types of packing. Demonstrate operation of crystallization equipment.	CP/N9456 V1.0	Core	4.5	0.5	5	10			15	2	5	1	1	9	N/A
18.	Exhibit different modules of DC'S and PLC's, their function, Wire and connect I/OS field devices to the I/O Modules.	CP/N9457 V1.0	Core	4.5	0.5	5	10			15	2	5	1	1	9	N/A
19.	Demonstrate operation of different types of mixing equipment like ribbon blender, different size reduction machines (Hammer mill, Ball mill), Screening Equipment & troubleshoot, dismantle, clean and maintenance of different mechanical components.	CP/N9458 V1.0	Core	4.5	0.5	5	10			15	2	5	1	2	10	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T-Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	Weightage (%) (if applicable)
20.	Explain selection of appropriate Dryer and demonstrate operation of Tray dryer and carry out its cleaning, maintenance, trouble shooting for proper functionality.	CP/N9459 V1.0	Core	4.5	0.5	5	10			15	2	5	1	1	9	N/A
21.	Explain operation of cooling tower, perform humidification & dehumidification operations, find out relative humidity by measuring dry bulb & wet bulb temperatures	CP/N9460 V1.0	Core	4.5	0.5	5	10			15	2	5	1	1	9	N/A
22.	Explain sedimentation operation and differentiate between settling, sedimentation and decantation operations.	CP/N9461 V1.0	Core	4.5	0.5	5	10			15	2	5	1	2	10	N/A
23.	Manufacture different chemical products	CP/N9462 V1.0	Core	4.5	1	8	22			30	4	10	1	3	18	N/A
24.	Explain function of various types of Chemical reactor and their accessories.	CP/N9463 V1.0	Core	4.5	0.5	5	10			15	2	5	1	2	10	N/A
25.	Read and apply engineering drawing for different application in the field of work.	ASC/N9410 V1.0	Non-core	4.5	1	30				30	12		6		18	N/A
26.	Demonstrate basic	ASC/N9411	Non-	4.5	1	30				30	12		6		18	N/A

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJ T- Ma n.	OJT - Rec.	Total	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Total	Weightage (%) (if applicable)
	mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study.	V1.0	core													
27.	On the Job Training				5			150		150						
Duration (in Hours) / Total Marks					30	270	480	150		900	100	200	40	60	400	
TRAINING METHODOLOGY																
28.	Plan & prepare the learners for the class using basics of educational psychology & motivational techniques.	MEP/N9401 V1.0	Core	4.5	1.5	12	33			45	7	24	2	4	37	
29.	Analyze the syllabus of the Course.	MEP/N9405 V1.0	Core	4.5	1	10	20			30	6	15	1	2	24	
30.	Plan & prepare the training session using various methods viz. 4 step method, question & questioning technique etc.	MEP/N9406 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	
31.	Communicate effectively with the trainees both verbally and nonverbally.	MEP/N9407 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	
32.	Use Instructional Technology & facilitate the training program.	MEP/N9408 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	
33.	Design written instructional materials and implement for imparting training.	MEP/N9409 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core / Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					Weightage (%) (if applicable)
						Th.	Pr.	OJ T- Ma n.	OJT - Rec.	Tota l	Th.	Pr.	Proj . / Int. AM. Th.	Viv a / Int. AM. Pr.	Tota l	
34.	Assess, evaluate and certify the tests.	MEP/N9410 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	
35.	Organize workshop and classroom learning observing instructional methods.	MEP/N9426 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	
36.	Counsel & mentor the trainees by identifying their Strength & Weaknesses.	MEP/N9428 V1.0	Core	4.5	1	10	20			30	5	15	1	2	23	
37.	Develop Entrepreneurship skills.	MEP/N9438 V1.0	Core	4.5	1	12	18			30	7	13	1	2	23	
38.	Apply ICT & Internet in training (computer-based training) and various types of Distance learning programmes.	MEP/N9439 V1.0	Core	4.5	1	10	20			30	5	15	1	2	23	
39.	Plan and conduct sessions to impart competency based skills and knowledge.	MEP/N9440 V1.0	Core	4.5	1	10	20			30	6	15	1	2	24	
40.	Apply Adult Learning Principles.	MEP/N9441 V1.0	Core	4.5	0.5	7	8			15	3	7	1	1	12	
41.	Develop and implement continuous professional development plan.	MEP/N9442 V1.0	Core	4.5	0.5	7	8			15	3	7	1	1	12	
42.	Develop employability skills for the industrial needs.	MEP/N9475 V1.0	Core	4.5	1	15	15			30	8	11	3	2	24	
43.	Develop future skills in Emerging Technology.	MEP/N9476 V1.0	Core	4.5	0.5	15	0			15	8		2		10	
Duration (in Hours) / Total Marks					15	180	270			450	100	200	20	30	350	
Grand Total					45	450	750	150		1350	200	400	60	90	750	

Elective NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/NSQ F Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th	Pr.	OJT - Man	OJT - Rec.	Total	Th.	Pr.	Proj	Viva	Total	Weightage (%) (if applicable)
1.																
2.																
Duration (in Hours) / Total Marks																

Optional NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/NSQ F Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th	Pr.	OJT - Man	OJT - Rec.	Total	Th.	Pr.	Proj	Viva	Total	Weightage (%) (if applicable)
1.																
2.																
Duration (in Hours) / Total Marks																

Note: Distribution of marks shown above are indicative only

Assessment - Minimum Qualifying Percentage

Please specify **any one** of the following:

Minimum Pass Percentage –Aggregate at qualification level: The minimum pass percent for Trade Practical, TM practical and Formative assessment is 60% & for all other subjects (Theory) is 40%. There will be no Grace marks. (Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)

Minimum Pass Percentage –NOS/Module-wise: % (Every Trainee should score specified minimum passing percentage in each mandatory and selected elective NOS/Module to successfully clear the assessment.)

Section 3: Training Related

1.	Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	<p>B.Voc/Degree in Chemical Technology/Engineering from AICTE / UGC recognized University with two years' experience in relevant field.</p> <p>OR</p> <p>03 years Diploma in Chemical Technology/Engineering from AICTE/ recognized Board/ University with five years' experience in relevant field.</p> <p>OR</p> <p>Ex-serviceman from Indian Armed forces with 15 years of service in related filed as per equivalency through DGR. Candidate should have undergone methods of instruction course or minimum 02 years of experience in technical training institute of Indian armed forces.</p> <p>OR</p> <p>NTC/ NAC passed in the Attendant Operator (Chemical Plant) or Maintenance Mechanic (Chemical plant) trade with seven years' experience in relevant field.</p> <p>AND</p> <p>Essential Qualification: National Craft Instructor Certificate (NCIC) in CHEMICAL PLANT TECHNOLOGY Trade in any of the variants under DGT.</p>
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	N/A
3.	Tools and Equipment Required for Training	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (If "Yes", details to be provided in Annexure)
4.	In Case of Revised Qualification, Details of Any Upskilling Required for Trainer	NA

Section 4: Assessment Related

1.	Assessor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Same as point 1 of Section 3 (Trainer's qualification and experience)
2.	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	N/A
3.	Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	N/A
4.	Assessment Mode (Specify the assessment)	Summative Assessment and Formative Assessment

	mode)	
5.	Tools and Equipment Required for Assessment	<input checked="" type="checkbox"/> Same as for training <input type="checkbox"/> Yes <input type="checkbox"/> No (details to be provided in Annexure-if it is different for Assessment)

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	Latest Skill Gap Study (not older than 2 years) (Yes/No): N/A
2.	Latest Market Research Reports or any other source (not older than 2years) (Yes/No): N/A
3.	Government /Industry initiatives/ requirement (Yes/No): YES
4.	Number of Industry validation provided: NA
5.	Estimated nos. of persons to be trained and employed:150 per year
6.	Evidence of Concurrence/Consultation with Line Ministry/State Departments: YES If "No", why:

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	Annexure: NCrF/NSQF level justification based on NCrF level/NSQF descriptors (Mandatory)	Annexure: Evidence of Level
2.	Annexure: List of tools and equipment relevant for qualification (Mandatory, except in case of online course)	Annexure: Tools and Equipment (Lab Set-Up)
3.	Annexure: Detailed Assessment Criteria (Mandatory)	Annexure: Detailed Assessment Criteria
4.	Annexure: Assessment Strategy (Mandatory)	Annexure: Assessment Strategy
5.	Annexure: Blended Learning (Mandatory, in case selected Mode of delivery is "Blended Learning")	N/A
6.	Annexure: Multiple Entry-Exit Details (Mandatory, in case qualification has multiple Entry-Exit)	Yes
7.	Annexure: Acronym and Glossary (Optional)	Yes
8.	Supporting Document: Model Curriculum (Mandatory – Public view)	Yes

9.	Supporting Document: Career Progression (Mandatory - Public view)	Yes
10.	Supporting Document: Occupational Map (Mandatory)	N/A
11.	Supporting Document: Assessment SOP (Mandatory)	https://dgt.gov.in/sites/default/files/Modified%20CITS-Prospectus%202022.pdf
12.	Any other document you wish to submit:	

Annexure: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Processes	<p>Demands Wide Range of Specialized Technical Skill, Clarity of Knowledge and Practice in Broad Range of Activity.</p> <ul style="list-style-type: none"> Exhibit different modules of DC'S and PLC's, their function, Wire and connect I/OS field devices to the I/O Modules. Manufacture different chemical products Trouble shoot, dismantle, Overhaul / repair& reassemble different machine, pumps & components for transportation of liquid, check their functionality and plot the graphs for characteristic curve of different types of pump. Demonstrate installation /connection of instrument/devices to measure pressure, temperature, flow rate and level, pressure drop due to friction, effect of pipe roughness on friction, frictional loss in fittings and valves, coefficient of discharge, density and record readings. 	<p>The learner demonstrates wide range of specialized technical skills, clarity of knowledge and undertakes responsibility of work for example "Exhibit different modules of DC'S and PLC's, their function", "Demonstrate installation /connection of instrument/devices" as indicated in the learning outcomes to achieve the skill levels and accuracy demanded as per the job.</p> <p>The learner explains broad range of activities as indicated in the learning outcomes like "Manufacture different chemical products" and "Trouble shoot, dismantle, Overhaul / repair& reassemble different machine". The learner has to apply ones knowledge and decide what needs to be done and decide how to repair it or plan for manufacturing as per requirements of industrial standards.</p> <p>Hence NSQF Level is 4.5 for this descriptor.</p>	4.5
Professional and Technical Skills/ Expertise/ Professional Knowledge	<p>Factual and theoretical knowledge in broad contexts within a field of work or study.</p> <ul style="list-style-type: none"> Manufacturing process of different chemical product. characteristics of programmable controllers, limitation of PLCs, method of developing PLC programming 	<p>The learner requires demonstrating factual and theoretical knowledge in broad contexts within this field of work or study which is related to Chemical Plant trade which involves Manufacturing process of different chemical product, characteristics of programmable controllers, limitation of PLCs, method of developing PLC programming etc. The</p>	4.5

	<ul style="list-style-type: none"> Humidification & Dehumidification Mechanism of Heat Transfer in solid, liquid and gases and their application in industries 	<p>learner is expected to possess knowledge about the Manufacturing process, information about the characteristics of programmable controllers, limitation of PLCs, method of developing PLC programming etc. The learner applies factual and theoretical knowledge in broad contexts within a field of work or study.</p> <p>Hence NSQF Level is 4.5 for this descriptor.</p>	
<p>Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill</p>	<ul style="list-style-type: none"> Operate an absorption column & determine flooding velocity, explain gas absorption, packed tower, types of packing. Demonstrate operation of crystallization equipment. Demonstrate operation of different Heat exchange equipment, Evaporators & calculate heat transfer rate, trouble shoot, dismantle, clean & reassemble different types of Heat exchangers, Evaporators and check functionality. Trouble shoot, dismantle, clean scale formation & reassemble Electrode & Oil fired boiler and Air handling unit and check their functionality. 	<p>The learning outcome for example “Operate an absorption column & determine flooding velocity, explain gas absorption, packed tower, types of packing. Demonstrate operation of crystallization equipment, etc” requires a range of cognitive and practical skills to operate and demonstrate in this field of study; then as per requirements decide which operations/procedures/tools will achieve desired result. In the learning outcome for example “Trouble shoot, dismantle, clean scale formation & reassemble Electrode & Oil fired boiler and Air handling unit and check their functionality” the learner is expected to plan the sequence of operations to maximum effectiveness; constantly checking and reviewing plan etc., all of which involve problem solving and decision making.</p> <p>Hence NSQF Level is 4.5 for this descriptor.</p>	<p>4.5</p>
<p>Broad Learning Outcomes/Core Skill</p>	<p>Reasonably good in mathematical calculation and understanding of social/political</p> <ul style="list-style-type: none"> Demonstrate mathematical concept and principles to perform practical operations. Explain science in the field of study including simple machines. <p>Reasonably good in data collecting organizing information and logical communication</p> <ul style="list-style-type: none"> Communicate effectively with the trainees both verbally and non-verbally. Plan & prepare the training session using various methods 	<p>The learning outcomes for example “Demonstrate mathematical concept and principles to perform practical operations” and “Communicate effectively with the trainees both verbally and non-verbally” displays the need where the learner is required to be reasonably good in mathematical calculation, needs to possess sound understanding of associated social & political issues, data collecting, organising information and logical communication in order to analyze and solve problems.</p> <p>Hence NSQF Level is 4.5 for this descriptor.</p>	<p>4.5</p>

	viz. 4 step method, question & questioning technique etc.		
Responsibility	<ul style="list-style-type: none"> ● Explain operation of cooling tower, perform humidification & dehumidification operations, find out relative humidity by measuring dry bulb & wet bulb temperatures. ● Explain sedimentation operation and differentiate between settling, sedimentation and decantation operations. ● Demonstrate installation /connection of instrument/devices to measure pressure, temperature, flow rate and level, pressure drop due to friction, effect of pipe roughness on friction, frictional loss in fittings and valves, coefficient of discharge, density and record readings. 	<p>This job role is independently responsible for planning, execution and commissioning etc. for arranging, operating& maintaining various equipment of chemical plant, supervising and ensuring prescribed performance standards followed by analysis of what needs to be done based on their understanding of various industrial processes/equipment, selection of best parameters and working practices to achieve the desired standards of product / equipment used in chemical plant.</p> <p>While “Demonstrate installation /connection of instrument/devices to measure pressure, temperature, flow rate and level, pressure drop due to friction, effect of pipe roughness on friction, frictional loss in fittings and valves, coefficient of discharge, density and record readings” shows responsibility for own work and learning as well as full responsibility for other’s works and learning.</p> <p>Hence NSQF Level is 4.5 for this descriptor.</p>	4.5

NSQC

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 25

S No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
A: TRAINEES TOOL KIT			
1.	Safety shoes	Regular size	25 Nos.
2.	Safety hand gloves Rubber	Regular size	25 Nos.
3.	Safety hand gloves PVC	Regular size	25 Nos.
4.	Ear plug	Standard	25 Nos.
5.	Helmet	Standard	25 Nos.
6.	Dust Mask/Nose Mask	Standard	5 Nos.
7.	Steel Rule	300 mm, Graduated both in Metric and English Unit	7 Nos.
8.	Try Square	150 mm	7 Nos.
9.	Caliper - Inside Spring	150 mm	7 Nos.
10.	Caliper - Outside Spring	150 mm	7 Nos.
11.	Jenny Caliper/Odd Leg Caliper/Morphy Caliper	150 mm	7 Nos.
B. GENERAL SHOP OUTFIT			
12.	First Aid Box	Standard	1 No.
13.	Divider Spring Type	150 mm	6 Nos.
14.	Punch Centre	Diameter - 10 mm and Length - 100 mm	6 Nos.
15.	Punch Prick	100 mm	6 Nos.
16.	Letter and Number Punch	5mm	1 No.
17.	Scriber- Straight	150 mm	6 Nos.
18.	Hand Hacksaw Frame - Fixed	300 mm	6 Nos.
19.	File - Flat - Bastard	250 mm	6 Nos.
20.	File - Flat - Second Cut	250 mm	6 Nos.
21.	File - Flat - Smooth	250 mm	6 Nos.
22.	File - Half Round - Second Cut	250 mm	6 Nos.
23.	File - Round - Smooth	250 mm	6 Nos.
24.	File - Triangular - Smooth	150 mm	6 Nos.
25.	File - Square - Second Cut	200 mm	6 Nos.
26.	Hammer - Ball Pain	250 grams	6 Nos.
27.	Hammer - Ball Pain	500 grams	6 Nos.
28.	Screw Driver	9 X 300 mm	4 Nos.
29.	Drill Twist Set - Straight Shank	3 mm to 13 mm by 0.5 mm	1 No.

30.	Drill Twist Set - Straight Shank	9.8 mm	1 No.
31.	Hand Reamer Parallel	10 mm	2 Nos.
32.	Tap set	12 mm	2 Nos.
33.	Gauge Screw Pitch	Metric -0.25 to 6 mm	1 No.
34.	Wire Gauge - Metric	Standard	1 No.
35.	Allen Key Set - Hexagonal	1 - 12 mm, set of 12 Keys	1 No.
36.	Combination Set	300 mm	2 Nos.
37.	V Block	75 x 75 x 50 mm with Clamp (Hardened & Ground)	1 Pair.
38.	Bench Vice	125 mm	6 Nos.
39.	Anvil	50 Kg - with stand	1 No.
40.	Scraper	Flat- 250 mm	6 Nos.
41.	Scraper	Half Round - 250 mm	6 Nos.
42.	Scraper	triangular 250 mm	6 Nos.
43.	Oil stone	Standard	1 No.
44.	Surface Plate - Granite	600 x 600 mm with Stand and Cover	1 No.
45.	Angle Plate	Standard	1 No.
46.	Surface Gauge (Universal/Fixed Type)	Standard	1 No.
47.	Snips(Straight & Bend Type)	250 mm	1 no. each
48.	Specific Gravity bottle	Standard	2 Nos.
49.	Joules Calorimeter	Standard	1 No.
50.	Bunsen Burners	Standard	10 Nos.
51.	Tripods Stand	Standard	10 Nos.
52.	Asbestos wire gauge	Standard	10 Nos.
53.	Gauge Wire without asbestos	Standard	10 Nos.
54.	Burettes	25ml	10 Nos.
55.	Pipettes	10ml	10 Nos.
56.	H.D.P. Distill water bottle	Standard	10 Nos.
57.	Clamp holders	Standard	12 Nos.
58.	Stands with clamps for burette	Standard	12 Nos.
59.	Triangles clay	Standard	10 Nos.
60.	Measuring cylinder	25 ml Glass(borosilicate)	10 Nos.
61.	Measuring cylinder	50 ml Glass (borosilicate)	10 Nos.
62.	Measuring cylinder	100 ml Glass (borosilicate)	10 Nos.
63.	Volumetric flask	100 ml(borosilicate)	10 Nos.
64.	Volumetric flask	500 ml(borosilicate)	10 Nos.
65.	Volumetric flask	1000 ml(borosilicate)	10 Nos.
66.	Funnels Dia	4cms(borosilicate)	10 Nos.
67.	Beaker	250ml corining(borosilicate)	10 Nos.
68.	Beaker	400ml (borosilicate)	10 Nos.
69.	Bottles for solutions	1000 ml(borosilicate)	6 Nos.

70.	Bottles for solutions	2000 ml(borosilicate)	6 Nos.
71.	Bottles for solutions	500 ml(borosilicate)	6 Nos.
72.	Conical flask	150 ml(borosilicate)	20 Nos.
73.	Conical flask	250 ml(borosilicate)	20 Nos.
74.	China dish	50 ml (borosilicate)	12 Nos.
75.	Watch Glass	3" dia(borosilicate)	10 Nos.
76.	Tong - Flat	300 mm	10 Nos.
77.	Spatula	8"	10 Nos.
78.	Distilled water still	10 lit.	1 No.
79.	Glass test tubes	15 ml	50 Nos.
80.	Round Bottom Distillation flask with side neck	500ml	6 Nos.
81.	Condenser for distillation lebig	30 cm long	6 Nos.
82.	Rubber cork	2.5 cm, 3cm size	10 Nos.
83.	Rubber Tubing (ID- 5mm)	MOC: Borosilicate glass	10 Nos.
84.	Rubber Bulbs for pipettes	Standard	6 Nos.
85.	Arc Welding Table -	Metal - 900 X 600 X 750 mm with Positioner	1 No.
86.	Safety google (white)	Standard	6 Nos.
87.	Double ended Open spanners set	6x7,8x9,10x11,12x13,14x15,16x17,18x19,20x22,21x23,24x27,25x28,30x32 mm.	1 Set.
88.	Double ended Ring spanners set	6x7,8x9,10x11,12x13,14x15,16x17,18x19,20x22,21x23,24x27,25x28,30x32 mm.	1 Set.
89.	Circlip Plier	8"(internal)	1 No.
90.	Circlip Plier	8"(External)	1 No.
91.	Oil Can	½ pt	1 No.
92.	Spanner - Adjustable	200 mm	1 No.
93.	Socket Spanner With Ratchet Handle	6 mm to 30 mm	1 Set
94.	Torque Wrench	6 mm to 30 mm	1 Set
95.	Pipe Wrench	450 mm	1 No.
96.	Hole Punch	6 mm to 30 mm	1 Set
97.	Spirit Level	300 mm	1 No.
98.	Hydraulic Bearing puller	Standard	1 No.
99.	Grease Gun	Standard	1 No.
100.	Gate Valve 50 mm Cut section	Size 50mm, Body material -S.S, connection form- Flanged, Pneumatic Actuator, Direct Acting, Normally Open, operation method -manual	1 No.
101.	Globe valve 50 mm Cut section	Made up S.S. of 50mm Size, Body Design - Globe body, Pneumatic Actuator, Direct Acting, Normally Open, With flange connection. operation method -manual	1 No.
102.	Safety Valve (Spring Type) 50 mm Cut section	Made up cast steel/forged steel of 50mm Size, Body Design - Globe body, Pneumatic Actuator, Direct Acting, Normally Open, With flange	1 No.

		connection.	
103.	Needle valve 50 mm Cut section	25 mm Cut section made up S.S. of 300 series (forged body). Seal material- Nitrile. Pattern Straight, Pneumatic Actuator, Direct Acting, Normally Open, With flange connection.	1 No.
104.	Butter fly valve 50 mm Cut section	Made up S.S. of 50 mm Size, Pneumatic Actuator, Direct Acting, Normally Open, With flange connection.	1 No.
105.	Non-return valve (swing check type, Lift check & Ball check type) 50 mm Cut section	Made up S.S. of 50 mm Size, Pneumatic Actuator, Direct Acting, Normally Open, With flange connection.	1 each
106.	Pneumatically operated diaphragm valve. Cut section connection.	Made up S.S. of 50 mm Size, Pneumatic Actuator, Direct Acting, Normally Open, With flange	1 No.
107.	Ball valve 50 mm Cut section	Made up S.S. of 50 mm Size, Pneumatic Actuator, Direct Acting, Normally Open, With flange connection. Seat and seal-Teflon, Port-full port	1 No.
108.	Solenoid valve	Made up S.S. of 50 mm Size, Direct Acting, With flange connection. Direct lift diaphragm, Seal material NBR, Coil power 40W. Electric connection DIN Operating voltage 230V/ 50Hz, Normally closed.	1 No.
109.	Diaphragm valve 50 mm Cut section	Made up S.S. of 50 mm Size, Body Design - Globe body, Pneumatic Actuator, Direct Acting, With flange connection. Diaphragm specialized polyimide, Normally closed,	1 No.
110.	Control valve. 25mm Cut section	Size 25mm Type-Globe Straight Body, body material SS with pneumatic actuator, Normally open. Direct Acting, With flange connection.	1 No.
111.	Cut section of Internal gear pump	Standard	1 No.
112.	Cut section of External gear pump	Standard	1 No.
113.	Chisel - Cold - Cross Cut	9 mm X 150 mm	4 Nos.
114.	Chisel - Cold - Flat	20 mm X 150 mm	4 Nos.
115.	Double Ended Spanner set	Metric 6 X 7 to 30 X 32	1 set
116.	Pipe wrench	14"	1 set
117.	Die & Die stock complete (BSP)	½" & 1"	1 set each
118.	Pipe vice	50 mm / 2"	1 set
119.	Work bench (Wooden Top)	6' X 3' X 3'	1 No.
120.	Combination Plier	6"	2 Nos.
121.	Tap set	M 8, M10, M12	2 Nos.
122.	Solid die	10 / 12 mm with die stock	2 Nos.
123.	Gauge Screw Pitch - Metric	0.25 to 6 mm	1 No.
124.	Wire Gauge - Metric	Standard	1 No.
125.	Allen Key Set	Hexagonal - 1 - 12 mm, set of 12 Keys	1 No.
126.	Different types of pipe fittings	Standard	1 No.
127.	Locking devices Lock nut, Castle nut	Standard	1 No.
128.	Thermometers:	Standard	

	(1) 0 to 110° C	Standard	6 Nos.
	(2) 0 to 250° C	Standard	6 Nos.
	(3) 0 to 360 ° C	Standard	6 Nos.
C. LAB EQUIPMENT & GLASSWARE			
129.	Rheostat	Standard	
	(a) Rheostat 25 ohms	Standard	2 Nos.
	(b) Rheostat 100 ohms	Standard	2 Nos.
130.	Resistance box 0 to 500 ohms	Standard	2 Nos.
131.	Resistance coils (2 ohms, 5 ohms, 10 ohms, 100 ohms)	Standard	2 Nos.
132.	Ammeter	Standard	
	0 to 1000 mA. (DC)	Standard	2 Nos.
	0 to 10 Amp. (AC, DC)	Standard	2 Nos.
133.	Voltmeter	Standard	2 Nos.
	0 to 1 volt (DC)	Standard	2 Nos.
	0 to 5 volt (DC)	Standard	2 Nos.
	0 to 10 volt (DC)	Standard	2 Nos.
134.	Battery eliminator	Input: 240 volts Output: 4.5 -6 volts	2 Nos.
135.	Specific Gravity bottle 25 cc	Standard	2 Nos.
136.	Multi meter(digital)	Standard	2 Nos.
137.	Milli voltmeter 1) 0 - 5mv 2) 0- 500mv	Standard	2 Nos.
138.	Hydrometer	Standard	1 No.
139.	Inclined plane with pulley, pan, weights etc.	Standard	1 No.
140.	Simple machines - Screw Jack with Accessories.	Standard	1 No.
141.	Calorimeter for determining Joule's mechanical Equivalent of heat by electric method.	Standard	1 No.
142.	Capsule type pressure gauge.	Range: 0- 1kg/cm ²	1 No.
143.	Thermocouple	J, K, E, R, T, S types	1 No.
144.	Digital Viscometer	LED display/LCD • Measurement range in mpa.s/cp with 4 spindles, • 6/12/30/60 rotor speed (rpm), • Provided with RS 232 C interface.	1 No.
145.	Steam generator (copper) Cap. 1000ml Lab equipment & glassware	Standard	2 Nos.
146.	Burette clamp	Standard	12 Nos.
147.	Bunsen Burners	Standard	8 Nos.
148.	Tripods Stand	Standard	8 Nos.
149.	Asbestos wire gauge	Standard	8 Nos.
150.	Gauge Wire without asbestos	MOC: Borosilicate	8 Nos.

151.	Burettes 25ml boro flow	MOC: Borosilicate	8 Nos.
152.	Pipettes 10ml	MOC: Borosilicate	8 Nos.
153.	Measuring Pipette 5 ml	MOC: Borosilicate	8 Nos.
154.	Pipette Rubber Bulb	Standard	8 Nos.
155.	H.D.P. Distil water bottle	Standard	8 Nos.
156.	Clamp holders	Standard	12 Nos.
157.	Stands with clamps for burette	Standard	12 Nos.
158.	Triangles clay	Standard	8 Nos.
159.	Measuring cylinder 250 ml Glass	MOC: Borosilicate	8 Nos.
160.	Measuring cylinder 500 ml Glass/ Plastic	MOC: Borosilicate/Plastic	8 Nos.
161.	Measuring cylinder 1000 ml Glass/ Plastic	MOC: Borosilicate/Plastic	8 Nos.
162.	Volumetric flask 100 ml	MOC: Borosilicate	8 Nos.
163.	Volumetric flask 500 ml	MOC: Borosilicate	8 Nos.
164.	Volumetric flask 1000 ml	MOC: Borosilicate	8 Nos.
165.	Funnels Dia 7.5cms	MOC: Borosilicate	8 Nos.
166.	Beaker 250ml corning	MOC: Borosilicate	8 Nos.
167.	Beaker 500 ml corning	MOC: Borosilicate	8 Nos.
168.	Bottles for solutions 1000 ml	MOC: Borosilicate	6 Nos.
169.	Bottles for solutions 2000 ml	MOC: Borosilicate	6 Nos.
170.	Bottles for solutions 500 ml	MOC: Borosilicate	6 Nos.
171.	Conical flask –500 ml	MOC: Borosilicate	25 Nos.
172.	Conical flask - 250 ml	MOC: Borosilicate	25 Nos.
173.	Evaporating dish - 50 ml	MOC: Borosilicate	12 Nos.
174.	Watch Glass - 3" dia.	MOC: Borosilicate	8 Nos.
175.	Tongs for laboratory - Flat - 200 mm	300 mm	8 Nos.
176.	Distilled water still 10 lit.	S.S. made, low water level cutoff	1 No.
177.	Glass test tubes - 15 ml	MOC: Borosilicate	50 Nos.
178.	Round bottom Distillation flask with side neck	500ml	6 Nos.
179.	Condenser for distillation lebig	30 cm long	6 Nos.
180.	Rubber cork of (2.5 cm, 3 cm) size various size	Standard	10 Nos.
181.	Rubber Tubing (ID-5mm)	8/10 ml	10 Nos.
182.	Rubber Bulbs for pipettes	Standard	6 Nos.
183.	Fire alarm system with air tight chamber	Standard	1 No.
184.	Gas detector with air tight chamber	Standard	1 No.
185.	Bourdon tube (C-type) pressure gauge	Standard	1 No.
186.	R.T.D. thermometer PT100	Standard	1 No.
187.	Flash point apparatus	This apparatus is made as per IP 34, ASTM D-93 and IS 1448 (Part I) 1270 (P.21) and IS 1209-1953 method B. Ready to use.	1 No.
188.	Bimetallic thermometer	Standard	1 No.
189.	Instrument for determining 'g' (Simple Pendulum)	Standard	1 No.

190.	Mechanical board for testing triangle and parallelogram of force including all accessories.	Standard	2 Nos.
191.	Searle's apparatus for young's Modulus	Standard	2 Nos.
192.	Apparatus for measurement of co-efficient of expansion (thermal) of solid (plunger's apparatus)	It will consist of a half-meter long chromium plated rod, Steam prepared in copper steam boiler of 2-liter capacity, 2 Thermometers, 1 hot plate of 1kw. Ready to use.	2 Nos.
193.	Apparatus for measurement of thermal conductivity of good and bad conductors	Made up of S.S. with heater assembly of 1000 watt, 300 mm (D) test specimen, 8 J type sensors, Dimmer state, Voltmeter and Ampere meter.	1 No.
194.	Digital Stop Watch 1/10 Second	Standard	1 No.
195.	pH Meter Digital	Microprocessor base, Auto calibration facility with electrode, Auto & Manual temperature compensation. Ready for use.	1 No.
196.	Redwood viscometer		1 No.
197.	Digital Balance 200 gm	Accuracy: ± 1 mg	1 No.
198.	Digital Balance 10 kg	Accuracy: ± 1 gm	1 No.
199.	Test tube stand for 12 tubes metallic	Standard	1 No.
200.	Test tube Holder	Standard	12 Nos.
201.	Fire Extinguisher (CO ₂)	Standard	1 No.
202.	Fire extinguishers (Dry chemical powder)	Capacity: 4 kgs.	1 No.
203.	Sand Bucket	10 – 12 liters	2 Nos.
204.	Fire bucket	10 – 12 liters	2 Nos.
D. UNIT OPERATION MACHINERY & EQUIPMENT			
205.	Hammer mill	Made up of M.S. diameter 8", S.S. 6 hammer, electric motor 2 HP, V pulleys& belt system, starter, energy meter, Filter bag, Feed Hooper, suitable size metallic screen. Capacity 15 -20 kg/hr.	1 No.
206.	Ball mill	Made up of S.S. of 450 mm (L) 300 mm (D), 50 S.S. balls, Dual starter, energy meter, RPM indicator, proximate sensor, variable speed.	1 No.
207.	Sieve shaker and sieves	Sieve shaker machine with sieves Made up of Brass with different sieves, with vibrator/rotap and timer.	1 No.
208.	Pressure vessel with all accessories	Made up of M.S. with glass line jacketed vessel capacity with agitation facility, Electrical Baby boiler, pressure transmitter, PLC module, HMI module, control valve, I/P converter, Pressure vessel, air regulator, pressure gauge, air compressor, current meter, safety valve, pressure relief valve.	1 No.
209.	Cut model of different types of pumps	Centrifugal pump, Reciprocating pump, screw pump, Vane pump, gear pump.	1 No. each

210.	Various type of valve	like Safety valve, Gate valve, globe valve, check valve, diaphragm valve. Ball valve, needle valve, butterfly valve (Flanged and Thread End) 2"/4" dia	1 Each
211.	Venturimeter, orifice meter, rota meter test rig	Made up of S.S. sump tank, S.S. measuring tank, S.S. pump, venturimeter, orifice meter of 10 mm (D) of orifice with flange, rotameter of 3 - 30 LMP, manometer with pressure tapings as required with suitable piping. Mounted on Suitable Frame Structure.	1 No.
212.	Capacitance Level indicator	Made up of S.S. sump tank, Acrylic measuring tank, S.S. pump, Level transmitter – Range : 0 – 500 mm WC Accuracy: +/- 3 % With HART version 6. Output : 4-20 mA DC Probe: fully insulated rod probe with pre-amplifier with necessary piping arrangement, mounted on suitable frame structure.	1 No.
213.	Sight glass level indicator	Made up of S.S. tank with sight glass, scale, drain valve.	1 No.
214.	Air purge Level Indicator	Made up of S.S. tank, Casing of Aluminum with Front Transparent Cover, glass tube, S.S. purge pipe.	1 No.
215.	Sedimentation Equipment	Sedimentation Tank Material: Acrylic Size: 1000 X 400 X 200 mm Rotameter 2 nos., Sump Tank of PVC, Feed pump: Compatible capacity for slurry, Circulation with suitable piping, mounted on suitable frame structure.	1 No.
216.	Metering Pump	Capacity 2 LPH, HP/RPM: 0.5/1440	1 Each
217.	Common Effluent Treatment Plant laboratory size	Includes operations like different treatments like Preliminary, Primary, Secondary, Tertiary, Flocculent feed flow rate control by Rotameter, Aeration tank, Feed pump, All pumps start/stopped from control panel with lamp indication.	1 No.
218.	Petroleum Plant Simulator	Study following operations of petroleum in simulator 1. Atmospheric Distillation Unit (ADU) 2. Vacuum Distillation Unit (VDU) 3. Fluid Catalytic Cracking Unit (FCCU) 4. Catalytic Reforming Unit 5. Hydrocracking Unit (HCU) 6. Sulphur Recovery Unit (SRU) 7. Diesel hydrotreater unit (DHDT) 8. Kerosene hydrotreater unit (KHT) 9. Gas Oil Separation Plant (GOSP) 10. LPG Unit and LNG Plant	1 No.
219.	Multistage Reciprocating compressor fitted with intercooler & after cooler	Fitted with intercooler & after cooler with 3 HP electric motor, pressure gauge 2 Nos. energy meter, Pressure relief valve, pressure switch, Air	1 No.

		damping tank, orifice, manometer.	
220.	Pitot Tube Setup	Made up of copper/ S.S. of compatibles size, Fitted with Vernier scale. Test Section: Material M.S, compatible to 2" Diameter pipe. Water Circulation: 0.5. Pump. Flow Measurement: Using Measuring Tank with Piezometer, Capacity, S.S. Sump Tank, Stop Watch. With suitable piping arrangement, mounted on suitable frame structure.	1 No.
221.	Boiling Point and Melting Point Apparatus	Microprocessor temp. range: Ambient to 300°C, Digital type, Memory: up to 100 samples	1 No.
E. GENERAL MACHINERY & EQUIPMENT			
MACHINERY:			
222.	Drilling Machine - Bench Type	13 mm Motorized with Standard Accessories	1 No.
223.	Power Saw Machine	Stroke length 160 mm No of speed stroke 3 Range of speed stroke 80-100-125 Blade size 525 x 45 x 2.25 Power of motor 1.5 kw	1 No.
224.	Pedestal Grinder	Double Ended - 200 mm	1 No.
225.	Welding Transformer -	300 A, OCV 60 - 100 V, 60% Duty Cycle with Standard Accessories	1 No.
226.	Lathe Machine -	All Geared, Center Height 150 mm, Between Centers 1200 mm, 4 Jaw Chuck, Taper Turning Attachment and all Standard Accessories	1 No.
227.	Pilot plan for flow measurement through, Orifice meter, rotameter, venturi meter	Made up of S.S sump tank, S.S. measuring tank, ½"centrifugal pump, rotamter, orifice, venturi, U tube manometer with suitable piping.	1 No.
228.	Centrifugal pump Back pullout type with motor and base plate		1 No.
229.	Multistage centrifugal pump	With Balance drum or disk without motor with Type - Two stage centrifugal pump, Capacity of Up to 20 LPM, total Head of Up to 60 Meters, Pump Speed of 2800 RPM.	1 No.
230.	Diaphragm Pump (Air Operated)	made up of polypropylene with C-1500N diaphragm pump series with heavy duty head with bullet cartridge valves, Maximum working pressure: 8.6 Bar, Maximum fluid temperature: 54°C, Maximum ambient temperature: -10 to 50° C, Maximum viscosity: 1000 CP, Maximum suction lift: 10 Ft, Output adjustment range: 5-100% stroke length, Duty cycle: continuous, Size: 6"	1 No.
231.	Metering Pump	Made up of S.S. Plunger (MM) 5, Size (MM) 8 x 8, capacity (LPH): 2HP/RPM : 0.5/1440	1 No.
232.	Lazer alignment kit for pump & motor shaft (wireless 3 axis system)	With Wireless Integrated Bluetooth standard on all systems, Simple Step-by-Step Laser Alignment Procedure, Industry's Highest Laser Measurement Accuracy, "Live-Track" Dynamic Graphics, either 3-Axis, Fastest Auto-Sweep Laser Measurement, Full Colour 8" or 10" Touch Tablet, Long Life LiPO Batteries for up to 15H+ operation Rugged	1 No.

		Design, water resistant and dustproof to IP67, Distance/Range: 3m/6m, Extensive Software Features and Options.	
233.	Hydraulic jack		1 No.
234.	Hydraulic Trainer	With Equipment trays - 2nos., Pressure gauge – 2 nos., Hydraulic Motor -1 no., 4/2-way hand lever valve - 3no.s, 4/3-way hand lever valve with relieving mid-position - 3nos., 4/3-way hand lever valve with closed mid-position - 3nos., 4/3-way hand lever valve with recirculating mid-position - 3nos., Pressure sequence valve, pressure relief valve – 3nos., 3-way pressure reducing valve – 2nos., 2-way flow control valve – 2nos., One-way flow control valve - 4nos., Non-return valves – 4nos., Shut-off valve- 4nos., Diaphragm accumulator with shut-off block – 1no., Weight upto 10 kg- 1no., 2/2 way plunger / stem actuated – 2nos., Standard hoses with quick connectors, Flow dividing valve – 1no., 5-way distributor with pressure gauge - 1no.s, mounted on suitable frame structure.	1 No.
235.	Pressure Vessel with Control and Maintenance of Plant like Transmitters, Valves, Pumps and All Parameters Simulation Software and all accessories	Made up of M.S. with pressure transmitter, PLC module, HMI module, control valve, I/P converter, Pressure vessel, air regulator, pressure gauge, air compressor, current meter, safety valve, pressure relief valve, mounted on suitable frame structure.	1 No.
236.	Multistage compressor fitted with inter-cooler and after coolers (Cut model)	Made up of Transparent acrylic casing, with M.S. air compressor, 2 H.P. motor.	1 No.
237.	Screw Compressor	Rotary screw type compressor with 4 HP motor.	1 No.
238.	Lobe Compressor	Standard	1 No.
239.	Centrifugal blower	Standard	1 No.
240.	Final control element (control valves) Pneumatically & Electrically Unit Operation.	Globe Valve: (Pneumatically Operated) Body Type: 2 way Size: 1" Operating Pressure: 3-15 psi (0.2-1kg/cm ²) Diaphragm Control valve: (Pneumatically Operated) Type: Pneumatic Size: 1/2" Input: 3-15 psig, Action: Air to close Ball Type (Electrically Operated) Body Type: 2 Way Size: 1"	1 No.
241.	Reactor trainer with all controlling accessories	With all Controlling Accessories.	1 No.
242.	DCS Kit	True distributed control system having dedicated redundant function controller, power supply, communication modules and integrated software modules, algorithms for complex process control. consist of	1 No.

		small pilot plant with different control action using basic parameters like level, temperature, flow, pressure, ratio, feed forward, cascade, with 4-20 mA input single pan circular chart recorder.	
243.	PLC Kit	With 8 DI/DO, 8 AI/AO with necessary hardware & software to understand PLC functioning.	1 No.
244.	Centrifugal pump.	Centrifugal pump coupled with 2 HP electrical motor. With suitable piping arrangement.	1 No.
245.	Gear pump	Gear Pump coupled with 2 HP electric motor. With necessary piping.	1 No.
246.	Screw pump	with 1 HP electric motor.	1 No.
247.	Bearing removing and fitting kit		1 No.
248.	Gear box	Ratio: 1:10 To study the power transmission.	1 No.
249.	Reynold's equipment	With S.S. sump tank with bell mouth discharge, Glass tube of 1 meter of 1" diameter with Flow control valve, measuring cylinder, stop watch, mounted on suitable frame structure.	1 No.
250.	Centrifugal pump test rig	With S.S. sump tank, S.S. measuring tank, Variable speed DC drive, RPM regulator, RPM indicator, Pressure gauge, vacuum gauge, energy meter and suitable piping, mounted on Suitable Frame Structure.	1 No.
251.	Gear pump test rig	With S.S. sump tank, S.S. measuring tank, Variable speed DC drive, RPM regulator, RPM indicator, Pressure gauge, vacuum gauge, energy meter. With piping arrangement mounted on Suitable Frame Structure.	1 No.
252.	Reciprocating pump test rig	With S.S. sump tank, S.S. measuring tank, Variable speed DC drive, RPM regulator, RPM indicator, Pressure gauge, vacuum gauge, energy meter and suitable piping, mounted on Suitable Frame Structure.	1 No.
253.	Apparatus for determine Frictional losses in straight pipe, pipe fitting	With S.S. sump tank, S.S. measuring tank, S.S. pump, Manometer & suitable piping & fittings with pressure tapplings.	1 No.
254.	Double pipe Heat exchanger	Made up of S.S. 1000 mm (L) 75 mm (D) heat exchanger with S.S. hot water tank with heater, S.S. cold water tank, 2 rotameters, 2 S.S. pumps, Multi zone temperature indicator, PID and suitable piping. Mounted on Suitable Frame Structure.	1 No.
255.	Electrical Baby Boiler	Made up of S.S. with electrical heater with thermostatic switch, Temperature indicator, thermally insulated, pressure relief valve, safety valve, pressure gauge, low level alarm, level gauge, drain valve, inlet valve.	1 No.
256.	Forced draft cooling	Tower made up of Acrylic of minimum 1meter height, S.S. hot water tank with heater, S.S. pump, rotameter, manometer, blower, PID, multi zone temperature indicator, packings, PID with suitable piping, mounted on suitable frame structure.	1 No.
257.	Shell and tube heat	Exchanger made up of S.S. 300 mm long, 75 mm (D), S.S. hot water	1 Each

		tank with heater, S.S. cold water tank, S.S. pump, rotameters 2 nos. PID, temp. indicator, temperature sensors 4 nos. with necessary piping, mounted on suitable frame structure.	
258.	Plate heat exchanger,	Made up of Acrylic of minimum 1-meter height, S.S. hot water tank with heater, S.S. pump, rotameter, manometer, blower, PID, multi zone temperature indicator, packings, PID with suitable piping, mounted on suitable frame structure.	1 Each
259.	Vertical tube evaporator	Made up of S.S. single effect evaporator of 900 mm (H) 100 mm (D), with steam generator, S.S. feed tank, collecting tank 2 Nos., 2 nos. pumps, rotameters 2 nos., vacuum pump, shell & tube type condenser, PID, temp. indicator with suitable piping, mounted on suitable frame structure.	1 No.
260.	Packed distillation Column	Made up of S.S. of 1000 mm (H) 75 mm (D) with sight glasses, feed tank, cold water tank, steam generator, 4 rotameters, multi temperature indicator, Shell & Tube type heat exchanger, 2 S.S. pumps, reflux pump, distillate pump, Reflux drum, solenoid valve, product collection tank with necessary piping, mounted on suitable frame structure.	1 No.
261.	Plate and frame filter Press	Made up of Cast iron structure with plate and frame made up of P.P. of 300 mm x 300 mm size, S.S. slurry tank, S.S. pump, S.S. water tank, 2 cake trays, stirrer with suitable piping, mounted on suitable frame structure.	1 No.
262.	Bottom-driven centrifuge	Made up of S.S. 450 mm Diameter x 225 mm H, basket shell: 450 mm (D), Height of basket shell: 225 mm, Basket capacity, Filter area of basket: 0.32 Sq. Mtrs. Basket speed: 1350 RPM, Drive motor: 1 H.P. 1440 RPM, 50 Hz with dual starter, Filter cloth, bottom discharge 1" valve. Ready to use.	1 No.
263.	Tray drier	Made up of S.S. from inside, with heaters, variable speed DC motor, Multi zone temperature indicator, weighing scale, PID. Ready to use instrument.	1 No.
264.	Vibrating screen	Made up of M.S. of 18" width, 24" length, with 3 nos. of vibrating screens, motor, feed Hooper, filter cloth. Ready to use instrument.	1 No.
265.	Belt conveyor	Made up of nylon of 8" width, 60" length, FHP motor with gear box, bins 2 nos.	1 No.
266.	Vernier Caliper	0 - 200 mm with least count 0.02mm	1 No.
267.	Vernier Height Gauge	0 - 300 mm with least count = 0.02 mm	1 No.
268.	Vernier Bevel Protractor	300 mm Blade with Acute Angle Attachment	1 No.
269.	Vernier Depth Gauge	300 mm (L.C. 0.02mm)	1 No.
270.	Universal Dial Test Indicator -	Plunger Type - Range 0 - 10 mm, Graduation 0.01 mm & 0.001mm Reading 0 - 10 with Revolution Counter complete with Clamping Devices and Magnetic Stand	2 Nos.

271.	Micrometer - Outside	0 - 25 mm	1 No.
272.	Micrometer - Outside	25 - 50 mm	1 No.
273.	Micrometer- Outside	0 - 1"	1 No.
274.	Micrometer- Inside	50 mm - 200 mm	1 No.
275.	Sine Bar with Slip Gauge Box	Standard	1 Set (41 Pcs.)
276.	Acetylene Cylinder	Standard	1 No.
277.	Oxygen Cylinders	Standard	1 No.
278.	Electric Spark Lighter	Standard	6 Nos.
279.	Oxygen Gas Pressure Regulator Double Stage	Standard	1 No.
280.	Acetylene Gas Pressure Regulator Double Stage	Standard	1 No.
281.	Rubber Hose - Acetylene,	Diameter = 8 mm, Length = 10 meters	1 No.
282.	Rubber Hose - Oxygen,	Diameter = 8 mm, Length = 10 meters	1 No.
283.	Rubber Hose Clips - 1/2 inch	Standard	6 Nos.
284.	Tong - Flat - 300 mm	Standard	4 Nos.
285.	cylinder Key	Standard	4 Nos.
286.	Gas welding torch with nozzle set with Input voltage 415 (\pm 10%), Frequency – 50/60, Current range – 30/300, Efficiency - >85	Standard	1 No.
287.	Instrument for determining 'g' (Simple Pendulum)	Standard	1 No.
288.	Mechanical board for testing triangle and parallelogram of forces including all accessories	Standard	1 No.
289.	Inclined plane with pulley, pan, Hanger weights etc.	Standard	1 No.
290.	Simple machines - Screw Jack	Standard	1 No.
291.	Searle's Apparatus for young's Modulus	Standard	2 Nos.
292.	Calorimeter for determining Joule's mechanical Equivalent of heat and specific heat	Standard	1 No.
293.	Apparatus for measurement of co-efficient of expansion (thermal) of solid (pullinger's apparatus) with hot plate with heater, thermometer 2 nos. Ready to use instrument.	Standard	2 Nos.
294.	Apparatus for measurement of thermal conductivity of good and bad conductors made up of Diameter 300 mm M.S. 20 mm, Asbestos 15 mm, Wooden Slab 10 mm, J type sensors 8 nos.	Standard	1 No.
295.	Milli voltmeter	1) 0 - 5mv, 2) 0- 500mv	2 Nos.
296.	Digital Stop Watch 1/10 Second	Standard	1 No.
297.	Steam generator (copper)	Cap. 500ml	2 Nos.
298.	Arc Welding Cables	Multi Cored Copper - 400 A, 50 Meter	1 No.
299.	Tip Cleaner Set	Standard	17 Nos.

300.	Welding goggle	Standard	6 Nos.
301.	Auto Darkening Welding Helmet	Standard	2 Nos.
302.	Gauge Feeler / Thickness	0.05 mm to 1 mm by 0.05 and	1 No.
303.	Pliers – combination	8"/20 cm	4 Nos.
304.	Phillips head screw driver set	1-4 sizes	1 No.
305.	Lapping Plate	300 x 300mm	1 No.
306.	Stud Extractor	Set of 8	1 No.
307.	Single row deep groove Ball Bearing	no.6309	1 No.
308.	Cylindrical Roller Bearing	NU307	1 No.
309.	Taper Roller Bearing	30208	1 No.
310.	Needle Roller Bearing	RNA 4908	1 No.
311.	Spherical Roller Bearing	22211 EKC3	1 No.
312.	3 leg Bearing puller	6"	1 No.
313.	Bearing fitting kit	including standard sleeve, mallet, Bearing induction heater	1 No.
314.	Bearing Testing Kit	Standard	1 No.
315.	Gear Box Reduction Type (Cut Section)	Made up of M.S Internal Part Transparent acrylic casing, 8" (D), Input-1400 RPM, Output 140 RPM, Reduction Ratio - 10:1, Rated Torque - 630 Nm, Rated power - 5.0 KW at 1400 Rpm, Radial load - 7460 N, Thermal rating - 7.5 KW, Cut Section - 25 % of the casing, mounted on suitable frame structure.	1 No.
316.	Gear Box Planetary Bevel Gear Type (Cut Section)	Made up of Cast iron Casing, transparent Acrylic Casing, Size - 6", Input - 1400 Rpm, Output - 140 Rpm, Reduction Ratio - 10:1, Rated Torque - 630 Nm, Rated Power - 5.0 Kw At 1400 Rpm, Radial Load - 7460 N, Thermal Rating - 7.5 Kw, Cut Section of 25 % of the Casing, mounted on suitable frame structure.	1 No.
317.	Cut section of Centrifugal pump of back pullout type	Standard	1 No.
318.	Mechanical seal (multiple spring)	Standard	1 No.
319.	Mechanical seal (Bellows seal)	Standard	1 No.
320.	Mechanical seal (single spring)	Standard	1 No.
321.	Pressure sensor with transmitter and display unit	Standard	1 No.
322.	Temperature sensor with transmitter and display unit	Standard	1 No.
323.	Level sensor with transmitter and display unit	Standard	1 No.
324.	Flow Meter	Standard	1 No.
F. FURNITURE			
325.	Steel cupboard with 8 pigeon lockers	Standard	03 nos.
326.	Chair with arm	Standard	02 nos.
327.	Table for trainer	Standard	01 no.
328.	Steel cupboard	180 x 90 x 45cm	02 nos.
329.	Steel cupboard	120 x 60 x 45cm	02 nos.
330.	White board with magnetic duster	6'x4'	01 no.

331.	Metal rack	182 x 182 x 45cm	01 no.
G. LIST OF TOOLS & EQUIPMENTS for Engg. Drawing			
332.	Drawing table for A1 sheet	Standard	25 nos.
333.	Stools (Revolving type) Adjustable height	Standard	25 nos.
334.	T.O's Table	6ft X 4ft	1 no
335.	T.O's chair revolving	Standard	1 no.
336.	D.L.P Projector	2000 lumen or higher	
337.	White board	6FT. x 4FT.	
338.	Computer 3GHz or latest with 1GB Or higher RAM with compatible motherboard	DVD combo drive with latest x version, hard disk with 160 GB or above, 19" TFT Monitor, 1 GB AGP card, 10/100 Ethernet card, Internal modem, UPS with 800 VA / Latest Version	12 nos.
339.	Software:	MS-Office XP or latest version of operating software Auto-CAD with power pack or latest version	12 nos.
340.	Laser Jet printer	Latest model – Print, Copy and Scan 1200x1200dpi, 16MB	1 no.
341.	Computer table	Standard	12 nos.
342.	Printer table	Standard	1 No
343.	Almirah Steel	6 feet height or higher	1 no.
F. ACCESSORIES FOR TRAINING METHODOLY / AUDIO VISUAL ROOM (Common for all Trades)			
344.	Class Room Chairs	armless / Dual desk may also be allowed	25 /13nos.
345.	Class Room Tables	3ft X 2ft / Dual desk may also be allowed	25 /13nos.
346.	Chair for Trainer (armed) movable	Standard	01 no.
347.	Table for Trainer	4 ft X 2 ft with Drawer and cupboard	01 no.
348.	LCD / LED Projector	Standard	01 no.
349.	Multimedia Computer System with all accessories with UPS	0.5 KVA	01 set
350.	White Board	6ft X 4 ft.	01 no.
351.	LCD Projector Screen	Standard	01 no.
352.	Digital Video Camera (hard Disk) with Tripod stand	Standard	01 no.
353.	Air Conditioner for computer room	1.5Ton	As required
354.	Wall charts, Transparencies and DVDs	related to the trade	As required
Note:			
1. All the tools and equipment are to be procured as per BIS specification.			
2. Internet facility is desired to be provided in the class room.			

Classroom Aids

The aids required to conduct sessions in the classroom are:

1.

Annexure: Industry Validations Summary

Provide the summary information of all the industry validations in table. This is not required for OEM qualifications.

Annexure: Training & Employment Details

Training and Employment Projections: N/A

Year	Total Candidates		Women		People with Disability	
	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities

Data to be provided year-wise for next 3 years

Training, Assessment, Certification, and Placement Data for previous versions of qualifications: N/A

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed

Applicable for revised qualifications only, data to be provided year-wise for past 3 years.

List Schemes in which the previous version of Qualification was implemented: N/A

- 1.
- 2.

Content availability for previous versions of qualifications:

Participant Handbook Facilitator Guide Digital Content Qualification Handbook Any Other:

Languages in which Content is available: English/ Hindi

Annexure: Blended Learning

Blended Learning Estimated Ratio &Recommended Tools: N/A

Refer NCVET “Guidelines for Blended Learning for Vocational Education, Training & Skilling” available on:

<https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education,%20Training%20&%20Skilling.pdf>

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline: Online Ratio
1	<input type="checkbox"/> Theory/ Lectures - Imparting theoretical and conceptual knowledge		
2	<input type="checkbox"/> Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners		
3	<input type="checkbox"/> Showing Practical Demonstrations to the learners		
4	<input type="checkbox"/> Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training		
5	<input type="checkbox"/> Tutorials/ Assignments/ Drill/ Practice		
6	<input type="checkbox"/> Proctored Monitoring/ Assessment/ Evaluation/ Examinations		
7	<input type="checkbox"/> On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training		

Annexure: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

NOS/Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks/ Internal Assessment (Theory)	Viva Marks/ Internal Assessment (Practical)
TRADE TECHNOLOGY					
1. Demonstrate related safety and general awareness in chemical industry. [viz. application of fire extinguishers, use of PPE'S with general and chemical hazards, interpretation of data from MSDS, detect dust percentage in Air, etc.]. (NOS: CP/N9440)	Demonstrate use of appropriate PPE	0.3	0.6	0.1	0.2
	Demonstrate First aid methods on different types of injury.	0.4	0.8	0.3	0.3
	Demonstrate fire fighting	0.4	0.6	0.1	0.1
	Illustrate Safety signs and symbols, Fire, gas detector & smock alarm system.	0.3	0.6	0.1	0.1
	Demonstrate disposal of workshop wastes, 5's concept and Housekeeping.	0.3	0.6	0.2	0.2
	Demonstrate determination of dust percentage in Air.	0.3	0.8	0.2	0.1
	Total Marks	2	4	1	1
2. Demonstrate procedures to make job / component as per specification, assembling them and checking of dimensional/functional accuracy following safety precautions. [Fitting operation – marking, punching, Hack-sawing, Filing, Drilling, countersinking, counter boring, reaming, Taping,	Demonstrate production of components as per given drawing	0.7	2.2	0.2	0.7
	Demonstrate inspection of dimensional accuracy of produced components and record keeping	0.9	2.3	0.3	0.8
	Demonstrate assembly of parts as per drawing and check for functionality	0.7	2.2	0.3	0.7
	Demonstrate levelling of machine	0.7	2.3	0.2	0.8
	Total Marks	3	9	1	3

fitting, polishing, assembling, etc. Accuracy: $\pm 0.05\text{mm}$. (NOS: CP/N9441)					
3. Transfer skill of welding – by Setting Gas and Electric Arc welding plant, joining metal components observing safety precautions. [Different Operations – select and operate fire extinguisher, straight line beads, single V-butt joint]. (NOS: CP/N9442)	Demonstrate welding of components by gas welding as per drawing	2	5	0.4	1
	Demonstrate welding of components by arc welding as per drawing	1	4	0.6	2
	Total Marks	3	9	1	3
4. Demonstrate experiments in Physics laboratory to determine physical constants, verify laws, etc. (NOS: CP/N9443)	Demonstrate experiment on simple pendulum to calculate acceleration due to gravity(g) and Plotting graph of L & T ² .	0.4	1.1	0.1	0.3
	Demonstrate finding resultant force by Law of parallelogram and calculation of resultant.	0.3	1.2	0.1	0.4
	Demonstrate determination of weights for upward and downward motion of roller for different inclination of plane	0.3	1.1	0.2	0.3
	Demonstrate calculation of Mechanical Advantage, velocity ratio by putting load on screw jack.	0.3	1.1	0.1	0.4
	Demonstrate calculation of Young's Modulus for wire.	0.4	1.1	0.1	0.3
	Demonstrate experiment to prove ohm's law	0.3	1.1	0.1	0.3
	Demonstrate calculation of electrochemical equivalent of copper and finding electrolytic property of copper sulphate solution.	0.3	1.1	0.1	0.3
	Demonstrate calculation of Mechanical equivalent of heat 'J'.	0.3	1.1	0.1	0.4
	Demonstrate calculation of coefficient of expansion of solid, liquid and thermal conductivity of a metal rod	0.4	1.1	0.1	0.3
Total Marks	3	10	1	3	
5. Demonstrate experiments in Chemistry laboratory to	Demonstrate titration of solution of acid and base and find normality & strength of acid / base.	0.5	1.5	0.2	0.4
	Demonstrate comparison of properties of mixture and compound	0.7	1.5	0.1	0.4

determine concentration of solutions, PH, melting point, boiling point, flash point of oil, viscosity of oil, selection of oil for particular application at certain temperature, Reynold's Number to predict flow pattern in a conduit, compare properties of metals & alloys, prepare chemicals, etc. (NOS: CP/N9444)	Demonstrate preparation of soap	0.5	2	0.2	0.6
	Determine pH of given solutions (acidic, basic, neutral) and Calibrate PH meter	0.6	1.5	0.1	0.4
	Demonstrate determination of boiling point of a liquid and melting point of a substance	0.5	1.5	0.1	0.4
	Demonstrate determination of flash point and viscosity for given oil sample	0.5	1.5	0.1	0.4
	Explain calculation of Reynold's number and determine the nature of flow rate /flow pattern of liquid	0.7	1.5	0.2	0.4
	Total Marks	4	11	1	3
6. Exhibit production of component on conventional lathe machine observing standard operation practice. [Different operations: - plain turning, facing, step turning, through & step drilling, knurling, threading, etc.]. (NOS: CP/N9445)	Demonstrate grinding of cutting tools for different lathe operations and checking of different angles.	1	3	0.5	0.7
	Demonstrate lubrication and maintenance of machine for trouble free performance.	0.5	2	0.3	0.8
	Demonstrate manufacturing of component as per drawing performing lathe operations (Viz. Facing, Plain turning, step turning, Drilling, Taper turning, knurling, threading, etc.).	1.5	4	1	0.7
	Demonstrate checking / inspection of manufactured component for its dimensional accuracy	1	1	0.2	0.8
	Total Marks	4	10	2	3
7. Execute pipe joints & fittings with pipes, apply lagging materials in accordance with job condition - hot/cold and test for leakages. [Range of skills – Cutting, Threading, gasket cutting, lagging of pipeline, Joining and use	Demonstrate construction of pipeline using different joints as per drawing with different conditions. (viz. closed at one end, blind flange, etc)	0.8	1.4	0.4	0.3
	Demonstrate Lagging, Cladding and fitting of Gasket on pipelines.	0.6	1.3	0.3	0.4
	Demonstrate checking of pipelines for leakage.	0.6	1.3	0.3	0.3
	Total Marks	2	4	1	1

of locking devices] (NOS: CP/N9446)					
8. Demonstrate installation /connection of instrument/devices to measure pressure, temperature, flow rate and level, pressure drop due to friction, effect of pipe roughness on friction, frictional loss in fittings and valves, coefficient of discharge, density and record readings. [Different instrument/devices – Bourdon tube pressure gauge, capsule type gauge, mercury in glass thermometer, bimetal thermometer, RTD, thermocouple, orifice meter, venture meter, Rotameter, sight glass level indicator, air purge level indicator, capacitance type level indicator, hydrometer, control valve] (NOS: CP/N9447)	Demonstrate installation and measuring pressure with different types of pressure measuring instruments (viz. Bourdon type and capsule type) and recording of readings.	0.5	1.4	0.1	0.4
	Demonstrate installation and measuring temperature with different types of temperature measuring instruments (viz. mercury in glass thermometer, bimetal thermometer, RTD thermometer) and recording of readings.	0.7	1.4	0.3	0.5
	Demonstrate connection and measuring flow rate and coefficient of discharge with different types of flow measuring instruments (viz. orifice meter, venturi meter, Rota meter) and recording of readings.	0.5	1.6	0.1	0.4
	Explain Graphical representation of flow rate & differential pressure (⊗H).	0.5	1.4	0.1	0.4
	Demonstrate installation and calculation of Back pressure and quantity of liquid in the container with different types of level measuring instruments (viz. float type, Air purge and capacitance type level indicator) and recording of readings.	0.6	1.4	0.2	0.4
	Explain working principle and operation of Hydrometer, Flow control valve and pilot tube.	0.5	1.4	0.1	0.5
	Demonstrate trouble shooting and maintenance of different types of pressure measuring, temperature measuring, flow measuring and level measuring instruments.	0.7	1.4	0.1	0.4
	Total Marks	4	10	1	3
9. Demonstrate different types of maintenance	Explain different types of maintenance (viz. Online, Predictive, Preventive and breakdown), check list and Maintenance record of equipment.	0.5	1.5	0.1	0.4

(viz. Online, Predictive, Preventive and breakdown) and Trouble shoot, dismantle, repair & assemble / Align different mechanical components for power transmission & check their functionality. (Different Mechanical Components viz. Belt, Pulleys, shaft, motor, coupling, Gearbox, bearings, Hydraulic jack]. (NOS: CP/N9448)	Demonstrate removal of bearing, cleaning, lubrication, mounting on shaft and checking of proper functionality.	0.7	1.5	0.3	0.5
	Demonstrate dismantling of gear box, removing of parts, cleaning, lubrication, assembling and checking of proper functionality.	0.5	1.5	0.1	0.4
	Demonstrate aligning of motor, coupling, pump and checking of proper functionality.	0.5	2	0.1	0.4
	Demonstrate removal of pulley from shaft, cleaning hub, keyways, shaft, mounting of pulley on shaft and checking of proper functionality.	0.6	1.5	0.1	0.4
	Demonstrate operation, working, use and Construction details of Hydraulic Jack and Hydraulic Trainer.	0.7	1.5	0.2	0.4
	Demonstrate dismantling of Hydraulic Jack, trouble shooting, cleaning and Overhauling, Check oil level and grade, reassembling and check for proper functioning.	0.5	1.5	0.1	0.5
	Total Marks	4	11	1	3
10. Demonstrate overhauling of different types of valve. (NOS: CP/N9449)	Explain Construction, Operating and working of different valve (viz. Gate valve, Globe valve, Needle valve, diaphragm valve, Ball valve, Plug valve, NR valve, Stop Cock valve, Butterfly valve, etc.)	3	8	1	2.5
	Demonstrate dismantling, servicing and assembling of different valve (viz. Gate valve, Globe valve, Needle valve, diaphragm valve, Ball valve, Plug valve, NR valve, Stop Cock valve, Butterfly valve, etc.) and checking for proper functioning.	2	7	1	1.5
	Total Marks	5	15	2	4
11. Trouble shoot, dismantle, Overhaul / repair & reassemble different machine, pumps & components for transportation of liquid, check their functionality and plot the graphs for characteristic curve of different types of pump.	Demonstrate inspection of different pumps (viz. centrifugal pump, reciprocating pump, Gear pump, Lobe pump, vacuum pump, etc.) noting down defects, dismantling, servicing, replacing worn out / damaged parts, assembling of different pumps and checking for proper functioning.	1	3	0.5	0.5
	Explain calculation of flow rates at different valve positions, Co-relation of head developed and capacity of the pump, interpretation of graph of head vs. capacity.	1	3	0.5	2
	Explain working, application and maintenance of different types of screw pump and metering pump.	1	2	0.5	0.5
	Explain working, application and preventive maintenance of	1	2	0.5	1

[Different Machines & Components – Pumps - centrifugal, gear pump, metering pump, screw pump, multistage compressor, vacuum pump, mechanical seals] (NOS: CP/N9450)	multistage compressor.				
	Total Marks	4	10	2	4
12. Demonstrate machinery handling, installation, operations, maintenance, troubleshooting of various types of conveyors as per standard procedure, it's planning & implementation. (NOS: CP/N9451)	Demonstrate machinery handling and its installation as per standard procedure – (viz. preparation of foundation plan, Layout, template of foundation, fixing of foundation bolts, moving and setting machine onto foundation bolt, levelling and installation of machine).	2	4	0.4	1.5
	Explain Constructional details and working of various types of conveyors like belt conveyor, screw conveyer and bucket elevators	1	3	0.3	0.5
	Demonstrate inspection of Belt Conveyor, noting down defects, dismantling, trouble shooting, servicing, Overhauling, assembling of different parts and checking for proper functioning.	1	3	0.3	1
	Total Marks	4	10	1	3
13. Demonstrate function of pressure vessel, various pipe fittings, valves, parameters, trouble shoot, dismantle, repair / overhauling & reassemble different machine & components for transportation of Gases, Air dryers & Air filters and check their functionality. (NOS: CP/N9452)	Demonstrate Inspection of pressure vessel and its structural attachment and connections, noting down leakage, inadequate insulation, corrosion and wear, repairing / rectification, testing of pressure and maintaining log book.	1	2.5	0.4	0.5
	Demonstrate inspection of different Compressor (viz. Reciprocating Compressor, Centrifugal Compressor, Screw Compressor, etc.) noting down defects, dismantling, trouble shooting, servicing and overhauling, assembling of different parts and checking for proper functioning.	0.8	2	0.5	0.6
	Demonstrate inspection of Fan and blower, noting down defects, dismantling, trouble shooting, servicing and overhauling, assembling of different parts and checking for proper functioning.	0.8	2.2	0.4	0.7
	Demonstrate inspection of Air filter and Air dryer, noting down defects, dismantling, trouble shooting, servicing and overhauling, assembling of different parts and checking for proper functioning.	0.8	2.1	0.4	0.6

	Demonstrate inspection of cooling tower, noting down defects, dismantling, cleaning scale formation, trouble shooting, servicing and overhauling, assembling of different parts and checking for proper functioning.	0.6	2.2	0.3	0.6
	Total Marks	4	11	2	3
14. Trouble shoot, dismantle, clean scale formation & reassemble Electrode & Oil fired boiler and Air handling unit and check their functionality. (NOS: CP/N9453)	Explain operation, working and construction details of different boilers (viz. Electrical Boiler, Oil-fired Boiler, etc.).	0.8	2	0.2	0.6
	Demonstrate inspection of different boilers (viz. Electrical Boiler, Oil-fired Boiler, etc.), noting down defects, dismantling, cleaning scale formation, trouble shooting, servicing and overhauling, assembling of different parts and checking for proper functioning.	0.9	2	0.2	0.5
	Explain Refrigeration system, Refrigerant, vapor absorption and vapor compression and Air Handling Unit system.	0.8	1.5	0.3	0.6
	Demonstrate Handling of Refrigerants, Inspection of Refrigeration unit, noting down defects, dismantling, trouble shooting, cleaning and overhauling, reassembling and checking for proper functioning.	0.8	2	0.2	0.6
	Demonstrate inspection of Air Handling Unit, noting down defects, dismantling, trouble shooting, cleaning and overhauling, reassembling and checking for proper functioning.	0.7	2.5	0.1	0.7
	Total Marks	4	10	1	3
15. Demonstrate operation of different Heat exchange equipment, Evaporators & calculate heat transfer rate, trouble shoot, dismantle, clean & reassemble different types of Heat exchangers, Evaporators and check functionality. [Heat exchange equipment's-Double Pipe Heat exchanger, Shell & tube Heat exchanger,	Explain working, use and Construction details of different types of Heat Exchanger (viz. Double Pipe Heat exchanger, Shell & tube Heat exchanger, plate heat exchanger).	0.8	2.2	0.2	0.6
	Demonstrate noting of inlet & outlet temperatures of cold and hot stream in Heat Exchanger, noting mass flow rate and calculation of heat transfer rate.	0.9	2.2	0.3	0.5
	Demonstrate inspection of different types of Heat Exchanger (viz. Double Pipe Heat exchanger, Shell & tube Heat exchanger, plate heat exchanger) noting down defects, dismantling, trouble shooting, cleaning and overhauling, reassembling and checking for proper functioning.	0.8	2.3	0.2	0.6
	Explain working, use and Construction details of different types of Evaporator (Vertical tube evaporator, multiple effect evaporator)	0.7	2.1	0.2	0.7
	Demonstrate inspection of different types of Evaporator (Vertical tube evaporator, multiple effect evaporator) noting down defects,	0.8	2.2	0.1	0.6

plate heat exchanger] [Evaporation equipment's-Vertical tube evaporator, multiple effect evaporator] (NOS: CP/N9454)	dismantling, trouble shooting, cleaning and overhauling, reassembling and checking for proper functioning.				
	Total Marks	4	11	1	3
16. Demonstrate operation of different types of distillation column, filtration unit, Dryer used for loading wet material in tray dryer, cyclone separator, packed distillation column, sieve tray column, different types of extraction unit and troubleshoot, dismantle, clean and reassemble components and check for proper functionality. (NOS: CP/N9455)	Explain working, use and Construction details of different types of Distillation column	0.6	1.8	0.2	0.6
	Demonstrate inspection of different types of Distillation column, noting down defects, dismantling, trouble shooting, cleaning and overhauling, reassembling and checking for proper functioning.	0.8	1.6	0.1	0.8
	Explain working, use and Construction details of different types of Filtration equipment	0.6	1.6	0.1	0.6
	Demonstrate inspection of different types of Filtration equipment, noting down defects, dismantling, trouble shooting, cleaning scale formation and overhauling, reassembling and checking for proper functioning.	0.6	1.8	0.3	0.6
	Explain measurement of air flow, weight of dust particles, Calculation of ppm in cyclone separator.	0.8	1.6	0.1	0.6
	Explain analysis of feed & solvent, Stirring, Settling, Separation, extraction and test in different types of extraction unit.	0.6	1.6	0.2	0.8
	Total Marks	4	10	1	4
17. Operate an absorption column & determine flooding velocity, explain gas absorption, packed tower, types of packing. Demonstrate operation of crystallization equipment. (NOS: CP/N9456)	Demonstrate absorption – analysis of gas mixture & solvent, maintaining flow rates & pressure, preparation of Result.	0.5	1	0.3	0.4
	Demonstrate flooding velocity – Setting of liquid flow rate, gas flow rate, noting manometer reading, preparation of Graphical representation of flow rate & differential pressure (\otimes H).	1	3	0.4	0.3
	Demonstrate crystallization – preparation of saturated solution, Formation of crystals, Separation of crystal & mother liquor, Crystal drying	0.5	1	0.3	0.3
	Total Marks	2	5	1	1
18. Exhibit different modules of DC'S and PLC's, their	Explain functions and modules of DCS system, different process instruments, connection of I/O Module and Installation of DCS Programming software and establishing communication with PC	1.5	3	0.6	0.7

function, Wire and connect I/OS field devices to the I/O Modules. (NOS: CP/N9457)	and DCS.				
	Demonstrate connection of digital I/OS to the I/O Module of PLC.	0.5	2	0.4	0.3
Total Marks		2	5	1	1
19. Demonstrate operation of different types of mixing equipment like ribbon blender, different size reduction machines (Hammer mill, Ball mill), Screening Equipment & troubleshoot, dismantle, clean and maintenance of different mechanical components. (NOS: CP/N9458)	Demonstrate working, use and Construction details of different size reduction machines (viz. Hammer mill & Ball mill), crushing operation and collection of crushed material.	0.5	1	0.3	0.5
	Explain working, use and Construction details of Vibratory sieve shaker, Loading, Operating, Collection & weighing of sample.	0.5	1	0.2	0.5
	Demonstrate working, use and Construction details of Agitator, Homogeneous mixing of substances, unloading of mixer, Washing & cleaning.	0.5	1	0.3	0.7
	Demonstrate inspection of different types of size reduction machines (viz. Hammer mill & Ball mill), Vibratory sieve shaker and Agitator, noting down defects, dismantling, trouble shooting, cleaning and overhauling, reassembling and checking for proper functioning.	0.5	2	0.2	0.3
	Total Marks	2	5	1	2
20. Explain selection of appropriate Dryer and demonstrate operation of Tray dryer and carry out its cleaning, maintenance, trouble shooting for proper functionality. (NOS: CP/N9459)	Explain working, use and construction details of Tray dryer, material loading, drying, Collection & weighing of sample.	0.5	2	0.4	0.3
	Demonstrate inspection of Tray dryer, noting down defects, dismantling, trouble shooting, cleaning scale formation and overhauling, reassembling and checking for proper functioning.	1.5	3	0.6	0.7
	Total Marks	2	5	1	1
21. Explain operation of cooling tower, perform humidification &	Explain operation of cooling tower	1.5	2	0.4	0.3
	Demonstrate humidification & dehumidification operations, find out relative humidity by measuring dry bulb & wet bulb temperatures	0.5	3	0.6	0.7

dehumidification operations, find out relative humidity by measuring dry bulb & wet bulb temperatures. (NOS: CP/N9460)	Total Marks	2	5	1	1
22. Explain sedimentation operation and differentiate between settling, sedimentation and decantation operations. (NOS: CP/N9461)	Demonstrate settling, sedimentation and decantation operations.	2	5	1	2
	Total Marks	2	5	1	2
23. Manufacture different chemical products (NOS: CP/N9462)	Demonstrate Manufacturing of Sulphuric Acid by Contact Process	0.6	1.4	0.1	0.4
	Demonstrate Manufacturing process of Soda Ash	0.5	1.4	0.1	0.4
	Demonstrate Manufacturing process of Caustic soda	0.6	1.5	0.2	0.5
	Demonstrate Manufacturing process of Ammonia	0.6	1.5	0.2	0.4
	Demonstrate Manufacturing of Nitric acid by ammonia oxidation process	0.6	1.4	0.2	0.5
	Demonstrate Manufacturing process of Urea	0.6	1.4	0.1	0.4
	Demonstrate Manufacturing process of Ethyl Alcohol	0.5	1.4	0.1	0.4
Total Marks	4	10	1	3	
24. Explain function of various types of Chemical reactor and their accessories. (NOS: CP/N9463)	Explain function and use of various types of Chemical reactor, their fittings and accessories.	2	5	1	2
	Total Marks	2	5	1	2
25. Read and apply engineering drawing for different application in the field of work. (NOS: CP/N9464)	Read & interpret the information on drawings and apply in executing practical work.	4		2	
	Read & analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters.	4		2	
	Encounter drawings with missing/unspecified key information and	4		2	

ASC/N9410)	make own calculations to fill in missing dimension/parameters to carry out the work.				
	Total Marks	12		6	
26. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: ASC/N9411)	Solve different mathematical problems	6		3	
	Explain concept of basic science related to the field of study	6		3	
	Total Marks	12		6	

TRAINING METHODOLOGY					
1. Plan & prepare the learners for the class using basics of educational psychology & motivational techniques. (NOS: MEP/N9401)	Implement techniques based on psychological parameters like Personality, Aptitude, Skills, values and Potentials.	1.4	4.8	0.4	0.8
	Use different experiments on theories of learning by the different psychologists and their effect in learning situation and relation with Laws of learning.	1.4	4.8	0.4	0.8
	Demonstrate on Modality Learning (Auditory, Visual and Kinesthetic modality).	1.4	4.8	0.4	0.8
	Set Questionnaire on personality development for assessing the psychological attributes.	1.4	4.8	0.4	0.8
	Motivate trainees for the training session.	1.4	4.8	0.4	0.8
	Total Marks	7	24	2	4
1. Analyze the syllabus of the Course. (NOS: MEP/N9405)	Select salient points on designing a training curriculum.	1	2.5	0.2	0.3
	Analyse a sample syllabus.	1	2.5	0.1	0.3
	Discuss Elements of skills, Outlines of a syllabus.	1	2.5	0.2	0.4
	Make project work on making break up of syllabus and list of topics - Video show/PPT of ADDIE Model.	1	2.5	0.2	0.4
	Design schedule of instructions.	1	2.5	0.1	0.3
	Construct a sample course using principles of teaching.	1	2.5	0.2	0.3
	Total Marks	6	15	1	2
2. Plan & prepare the training	Set questions on different levels of learning in psychomotor	1.75	3.25	0.25	0.5

session using various methods viz. 4 step method, question & questioning technique etc. (NOS: MEP/N9406)	domain according to Bloom Taxonomy.				
	Demonstrate the steps of imparting skills.	1.75	3.25	0.25	0.5
	Prepare lesson plan and demonstration plan using 4 Step methods.	1.75	3.25	0.25	0.5
	Use questioning techniques.	1.75	3.25	0.25	0.5
Total Marks		7	13	1	2
3. Communicate effectively with the trainees both verbally and nonverbally. (NOS: MEP/N9407)	Identify the process of communication.	2.5	4.5	0.3	0.7
	Use verbal & non-verbal communication to convey messages, pre-listening activity and respond to them.	2	4	0.4	0.6
	Communicate effectively with the trainees in training session.	2.5	4.5	0.3	0.7
Total Marks		7	13	1	2
2. Use Instructional Technology & facilitate the training program. (NOS: MEP/N9408)	Use various instructional Technologies viz. OHP, Digital Camera, LCD projector, smart board etc.	2.5	4.5	0.3	0.7
	Plan and design charts, transparencies, slides, posters, mock-ups etc.	2	4	0.4	0.6
	Conduct micro teaching sessions.	2.5	4.5	0.3	0.7
Total Marks		7	13	1	2
3. Design written instructional materials and implement for imparting training. (NOS: MEP/N9409)	Plan & prepare different WIM viz. Operation sheet, Job sheet, Information Sheet, Assignment Sheet, Experiment Sheet, Experiment Sheet, Final Job Check Sheet etc.	3.5	6.5	0.5	1
	Maintain various records viz. Daily Dairy, Progress Chart, Theory & Practical records etc.	3.5	6.5	0.5	1
	Total Marks		7	13	1
4. Assess, evaluate and certify the tests. (NOS: MEP/N9410)	Identify different types of test & its necessity.	1	2	0.1	0.3
	Set different types of question on different levels of learning in cognitive domain according to Bloom Taxonomy.	1	2	0.2	0.3
	Set an ideal question paper & evaluate.	1.5	2.5	0.2	0.4
	Apply various evaluation techniques & marking schemes.	1.5	2.5	0.2	0.4
	Undertake competence-based assessment as per standards.	1	2	0.2	0.3
	Conduct formative assessment and summative assessment.	1	2	0.1	0.3
Total Marks		7	13	1	2
5. Organize workshop and classroom learning observing instructional methods.	Carry out management of Workshop & Class room.	1.75	3.25	0.25	0.5
	Demonstrate group teaching and learning.	1.75	3.25	0.25	0.5
	Explain housekeeping & safety rules in Instructional area.	1.75	3.25	0.25	0.5
	Conduct debate on quality Concept & 5'S.	1.75	3.25	0.25	0.5

(NOS: MEP/N9426)	Total Marks	7	13	1	2
4. Counsel & mentor the trainees by identifying their Strength & Weaknesses. (NOS: MEP/N9428)	Handle trainee's grievances.	1	3	0.2	0.4
	Boost Morale of trainees.	1	3	0.2	0.4
	Conduct SWOT analysis for identifying their Strength & Weaknesses.	1	3	0.2	0.4
	Plan and Prepare the parameters for skills required to become a good trainer.	1	3	0.2	0.4
	Write a good CV.	1	3	0.2	0.4
	Total Marks	5	15	1	2
5. Develop Entrepreneurship skills. (NOS: MEP/N9438)	Use effective leadership Traits.	1.4	2.6	0.2	0.4
	Apply Stress management techniques.	1.4	2.6	0.2	0.4
	Plan & Use Time management techniques.	1.4	2.6	0.2	0.4
	Interpret the sequence of operation for setting up a small business from the flow sequence diagram	1.4	2.6	0.2	0.4
	Analyze the impact of quality and list the importance of quality.	1.4	2.6	0.2	0.4
	Total Marks	7	13	1	2
6. Apply ICT & Internet in training (computer-based training) and various types of Distance learning programmes. (NOS: MEP/N9439)	Use internet, Email application, Fax etc.	1	3	0.2	0.4
	Prepare transparency sheet with the help of computer.	1	3	0.2	0.4
	Prepare Slides by Power Point.	1	3	0.2	0.4
	Conduct Interactive Class on Video Conference.	1	3	0.2	0.4
	Install and commission equipments at Spokes level.	1	3	0.2	0.4
	Total Marks	5	15	1	2
7. Plan and conduct sessions to impart competency based skills and knowledge. (NOS: MEP/N9440)	Interpret one LO, QP, NOS for NSQF alignment.	1.5	3.75	0.25	0.5
	Explain learning outcomes.	1.5	3.75	0.25	0.5
	Identify different roles of NSDA, NSDC and SSC.	1.5	3.75	0.25	0.5
	Apply techniques to create and maintain a positive learning environment.	1.5	3.75	0.25	0.5
	Total Marks	6	15	1	2
8. Apply Adult Learning Principles. (NOS: MEP/N9441)	Apply adult learning in simulated environment.	0.75	1.75	0.25	0.25
	Identify various factors affecting adult learning	0.75	1.75	0.25	0.25
	Use role plays using the principles of adult learning.	0.75	1.75	0.25	0.25
	Apply techniques to create and maintain a positive learning environment.	0.75	1.75	0.25	0.25

	Total Marks	3	7	1	1
9. Develop and implement continuous professional development plan. (NOS: MEP/N9442)	Develop a professional development plan to enhance professional capabilities.	1.5	3.5	0.5	0.5
	Implement CPD in instructor career.	1.5	3.5	0.5	0.5
	Total Marks	3	7	1	1
6. Develop employability skills for the industrial needs. (NOS: MEP/N9475)	Implement sentences for different situations and rearrange words to create meaningful sentences.	3	4	1	0.7
	Exhibit communications skills to manage conflicts & handle criticism in work place.	2	3	1	0.6
	Demonstrate report to become a good entrepreneur.	3	4	1	0.7
	Total Marks	8	11	3	2
7. Develop future skills in Emerging Technology. (NOS: MEP/N9475)	Explain common types of cyber-attacks	0.7		0.2	
	Explain the applications of Data Analytics	0.7		0.2	
	Explain Artificial Intelligence and its different types.	0.6		0.1	
	Explain what AI can do and can't do	0.7		0.2	
	Applications of AI in different fields.	0.7		0.2	
	Explain Machine Learning steps	0.6		0.1	
	Explain features/types/benefits of Robotic Process Automation software tools	0.7		0.2	
	Features, benefits and applications of IoT	0.7		0.2	
	Explain types of block chain	0.6		0.1	
	Basic concepts of Cloud Computing	0.7		0.2	
	Types of 3D printing, advantages and disadvantages.	0.7		0.2	
	Basic concepts of AR/VR/XR	0.6		0.1	
	Total Marks	8	0	2	0
Grand Total		100	200	20	30

Note: Distribution of marks shown above are indicative only

Annexure: Assessment Strategy

(1) Assessment process:

Assessment and Certification of all the trainees will be carried out as per Directorate General of Training (DGT) norms for the trade theory including practical portion conducted in NSTI/IToT workshop. The assessment for the qualification is carried out by conducting formative assessments and summative assessment (end-of-year examination). The internal assessment for each learning outcome is carried out by the concerned trainer for evaluating the knowledge and skill

acquired by trainees and the behavioural transformation of the trainees. This internal 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 evaluating records and reports, and internal assessment marks are awarded to them. Theory and practical examinations are conducted in Trade Technology, Engineering Technology and Training Methodology. The question papers for the theory Examinations contain objective type questions. The practical examination at the end of training is conducted at NSTI / IToTs and the marks are uploaded in the portal accordingly.

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

Sl. No.	Subject	Marks	Internal Assessment	Full Marks	Pass Marks		
					Exam	Internal Assessment	
1.	Trade Technology	Trade Theory	100	40	140	40	24
		Trade Practical	200	60	260	120	36
2.	Training Methodology	TM Theory	100	20	120	40	12
		TM Practical	200	30	230	120	18
Total Marks		600	150	750	320	90	

(2) Minimum pass marks:

The minimum pass percent for Trade Practical, TM practical Examinations and Formative assessment is 60% & for all other subjects is 40%. There will be no Grace marks.

(3) Testing and certifications for the course:

Controller of examinations, DGT carries out the assessment and issues National Craft Instructor Certificates (NCIC) 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 and impart 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 formative discussions to assess understanding and evaluating 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 Technology, Engineering Technology and Training Methodology.
- While Trade Theory and Trade Practical are used for assessing Trade-related jobs, Workshop Calculation and Science is used to test trainee's numerical skills, Drawing is used to test the ability of the trainee to draw and read sketches and Training Methodology is used to test teaching skills.
- In addition to demonstration of theory and practical knowledge, overall personality of the trainees is also assessed.

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 Training Methodology is done by third-party agency.
- Trade Practical is examined by External Examiner.

NSQC Approved

Annexure: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf