

<b>NSDA Code</b> <b>2020/POW/DGT/03732</b>
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**CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE**

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

**Name and address of submitting body:**

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

**Name and contact details of individual dealing with the submission**

Name: Shri Deepankar Mallick

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**List of documents submitted in support of the Qualifications File**

1. Competency-based curriculum with following details:

Model Curriculum to be added which will include the following:

- a. Indicative list of tools/equipment to conduct the training: Enclosed with curriculum
- b. Trainers qualification: Indicated in the curriculum
- c. Lesson Plan: All DGT curricula are designed indicating specific practical to be carried out during training along with details of trade theory. Based on this the

concerned instructor prepares the Lesson Plan and demonstration plan with support of IMPs developed by NIMI,DGT.

- d. Distribution of training duration into theory/practical/OJT component: Indicated in the curriculum.
2. Curriculum for Core Skills (Workshop Calculation & Science, Engineering Drawing and Employability Skills).

NSQC Approved

**e. SUMMARY**

<b>1</b>	<b>Qualification Title</b>	<b>'ELECTRICIAN'</b>
<b>2</b>	<b>Qualification Code, if any</b>	<b>DGT/1001</b>
<b>3</b>	<b>NCO code and occupation</b>	7411.0100 - Electrician General 7412.0200 - Electrical Fitter
<b>4</b>	<b>Nature and purpose of the qualification (Please specify whether qualification is short term or long term)</b>	Prepare skilled Technician to undertake the job roles of Electrician and will enable the trainee to install, maintain and repair electrical machineries, equipment and fittings in factories, workshops power houses, businesses and residential premises etc. It is long term qualification.
<b>5</b>	<b>Body/bodies which will award the qualification</b>	Directorate General of Training (DGT).
<b>6</b>	<b>Body which will accredit providers to offer courses leading to the qualification</b>	Directorate General of Training (DGT) accredits the Training providers (ITIs/ NSTIs/ MSTIs/ BTCs/ BTPs / Industries / Establishments).
<b>7</b>	<b>Whether accreditation/affiliation norms are already in place or not, if applicable (if yes, attach a copy)</b>	Yes. The accreditation/ affiliation norms and any amendments made from time to time are available on DGT web portal.
<b>8</b>	<b>Occupation(s) to which the qualification gives access</b>	<ul style="list-style-type: none"> <li>• 7411.0100 - Electrician General</li> <li>• 7412.0200 - Electrical Fitter</li> </ul>
<b>9</b>	<b>Job description of the occupation</b>	Electrician will be able to install, maintain and repair electrical machineries, equipment and fittings in factories, workshops, power houses, businesses and residential premises etc. and the technician generally fits and assembles electrical machineries and equipment such as motors, transformers, generators, switchgears, fans etc.
<b>10</b>	<b>Licensing requirements</b>	NOT REQUIRED
<b>11</b>	<b>Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)</b>	NOT APPLICABLE

12	<b>Level of the qualification in the NSQF</b>	Level 5				
13	<b>Anticipated volume of training/learning required to complete the qualification</b>	<b>Sl. No.</b>	<b>Course Element</b>	<b>Notional Training Hours</b>		
		1	Professional Skill (Trade Practical)	2000		
		2	Professional Knowledge (Trade Theory)	640		
		3	Workshop Calculation & Science	160		
		4	Engineering Drawing	160		
		5	Employability Skills	240		
			Total	3200		
14	<b>Indicative list of training tools required to deliver this qualification</b>	As per Annexure-I of curriculum.				
15	<b>Entry requirements and/or recommendations and minimum age</b>	Passed 10 <sup>th</sup> class examination with Science and Mathematics or its equivalent. Minimum age 14 years as on first day of academic session.				
16	<b>Progression from the qualification (Please show Professional and academic progression)</b>	<p>An Individual can proceed for:</p> <table border="1" data-bbox="794 1496 1453 1845"> <tr> <td data-bbox="794 1496 1134 1845"> <b>Professional</b> <ul style="list-style-type: none"> <li>• Technician</li> <li>• Senior Technician</li> <li>• Supervisor</li> <li>• Manager</li> <li>• Entrepreneur</li> </ul> </td> <td data-bbox="1134 1496 1453 1845"> <b>Technical / Academic</b>    <div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <div style="position: absolute; top: 0; left: 0; right: 0; border-bottom: 1px solid black;"></div> <div style="position: absolute; bottom: 0; left: 0; right: 0; border-top: 1px solid black;"></div> </div>                       ATS                      CITS                      Diploma/                      Advance                      Diploma                      (Vocational)                 </td> </tr> </table>			<b>Professional</b> <ul style="list-style-type: none"> <li>• Technician</li> <li>• Senior Technician</li> <li>• Supervisor</li> <li>• Manager</li> <li>• Entrepreneur</li> </ul>	<b>Technical / Academic</b>  <div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <div style="position: absolute; top: 0; left: 0; right: 0; border-bottom: 1px solid black;"></div> <div style="position: absolute; bottom: 0; left: 0; right: 0; border-top: 1px solid black;"></div> </div> ATS CITS Diploma/ Advance Diploma (Vocational)
<b>Professional</b> <ul style="list-style-type: none"> <li>• Technician</li> <li>• Senior Technician</li> <li>• Supervisor</li> <li>• Manager</li> <li>• Entrepreneur</li> </ul>	<b>Technical / Academic</b>  <div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <div style="position: absolute; top: 0; left: 0; right: 0; border-bottom: 1px solid black;"></div> <div style="position: absolute; bottom: 0; left: 0; right: 0; border-top: 1px solid black;"></div> </div> ATS CITS Diploma/ Advance Diploma (Vocational)					
17	<b>Arrangements for the Recognition of Prior learning (RPL)</b>	<ul style="list-style-type: none"> <li>• Yes (For more details refer “Guidelines for Private candidate” in DGT website MIS portal).</li> </ul>				
18	<b>International comparability</b>	-				

	<b>where known (research evidence to be provided)</b>			
<b>19</b>	<b>Date of planned review of the qualification.</b>	5 Yrs. from the Date of Approval		
<b>20</b>	<b>Formal structure of the qualification</b>			
	<b>Mandatory components</b>			
	<b>Title of component and identification code/NOSs/ Learning Outcomes</b>	<b>Estimated size (learning hours)</b>		<b>Level</b>
		<b>Skills</b>	<b>Knowledge</b>	
<b>TRADE SPECIFIC</b>				
(i)	Prepare profile with an appropriate accuracy as per drawing following safety precautions.	150	42	4
(ii)	Prepare electrical wire joints, carry out soldering, crimping and measure insulation resistance of underground cable.	125	35	4
(iii)	Verify characteristics of electrical and magnetic circuits.	200	56	5
(iv)	Install, test and maintenance of batteries and solar cell.	50	14	5
(v)	Estimate, Assemble, install and test wiring system.	175	49	5
(vi)	Plan and prepare Earthing installation.	25	7	5
(vii)	Plan and execute electrical illumination system and test.	50	14	5
(viii)	Select and perform measurements using analog / digital instruments.	50	14	5
(ix)	Perform testing, verify errors and calibrate instruments.	25	7	5
(x)	Plan and carry out installation, fault detection and repairing of domestic appliances.	75	21	5

(xi)	Execute testing, evaluate performance and maintenance of transformer.	75	21	5
(xii)	Plan, Execute commissioning and evaluate performance of DC machines.	50	18	5
(xiii)	Execute testing, and maintenance of DC machines and motor starters.	100	36	5
(xiv)	Plan, Execute commissioning and evaluate performance of AC motors.	75	27	5
(xv)	Execute testing and maintenance of AC motors and starters.	75	27	5
(xvi)	Plan, execute testing, evaluate performance and carry out maintenance of Alternator / MG set.	50	18	5
(xvii)	Execute parallel operation of alternators.	50	18	5
(xviii)	Distinguish, organise and perform motor winding.	125	45	5
(xix)	Assemble simple electronic circuits and test for functioning.	150	54	5
(xx)	Assemble accessories and carry out wiring of control cabinets and equipment.	100	36	5
(xxi)	Perform speed control of AC and DC motors by using solid state devices.	50	18	5
(xxii)	Detect the faults and troubleshoot inverter, stabilizer, battery charger, emergency light and UPS etc.	50	18	5
(xxiii)	Plan, assemble and install solar panel.	25	9	5
(xxiv)	Erect overhead domestic service line and outline various power plant layout.	75	27	5
(xxv)	Examine the faults and carry out repairing of circuit breakers.	25	9	5
<b>CORE SKILL</b>				
<b>EMPLOYABILITY SKILLS</b>				
(i)	Apply safe working practices.	-	30	5
(ii)	Comply with environment regulation and housekeeping.		30	5
(iii)	Interpret & use formal and technical communication.		30	5
(iv)	Apply the concept in productivity & quality		30	5

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

**SECTION 1**  
**ASSESSMENT**

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



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

theory are conducted by the concerned instructors for evaluating the knowledge and skill acquired by trainees and the behavioural transformation of the trainees. This formative assessment is primarily carried out by collecting evidence of competence gained by the trainees by evaluating them at work based on assessment criteria, asking questions and initiating formative discussions to assess understanding and by evaluating records and reports. Summative assessment is carried out by All India Trade Test on Trade Theory, Trade practical, Workshop Calculation & Science, Engineering Drawing and Employability Skills. The question papers for the theory Examinations contain objective type questions.

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

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

**(2) Minimum pass marks:**

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

**Testing and certifications for the course:**

Controller of examinations, DGT carries out the assessment and issues National Trade Certificate (NTC) following the norms and guidelines issued

by the Directorate from time to time.

**Overall assessment strategy:**

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

**Specific Arrangements for assessment:**

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

**Quality assurance activities:**

Question papers are set by external paper setters/ software generated.

Evaluation of Theory Examinations in Trade, Workshop Calculation & Science, Engineering Drawing and Employability Skill is done by third-party agency.

Trade Practical is examined by External Examiner.

**24. Assessment evidences**

**Title of Component: Formative Assessment Breakup**  
 (on half yearly average of the learning assessment covered)

<b>Means of assessment</b>		
Assessment will be evidence based comprising the following for each Learning Outcome:		
<b>Serial No.</b>	<b>Terminal Competency</b>	<b>Maximum Weightage (%)</b>
1	Safety consciousness	15
2	Workplace hygiene	5
3	Attendance/ Punctuality	10
4	Ability to follow Manuals/ Written instructions	5
5	Application of Knowledge	10
6	Skills to handle tools / equipment/ Instruments/ Devices	10
7	Economical use of materials	5
8	Working Strategy	10
9	Quality in workmanship/ Performance	15
10	VIVA	15
	<b>Total Maximum Weightage (%)</b>	<b>100</b>
<b>Pass/Fail</b>		
The minimum pass percentage is 60% marks for formative assessment.		

**LEARNING OUTCOME WITH ASSESSMENT CRITERIA:**

<b>LEARNING OUTCOME(TRADE SPECIFIC)</b>	
<b>LEARNING OUTCOME</b>	<b>ASSESSMENT CRITERIA</b>
<b>FIRST YEAR</b>	
1. Prepare profile with an appropriate accuracy as per drawing.	Identify the trade tools; demonstrate their uses with safety, care & maintenance.
	Prepare a simple half lap joint using firmer chisel with safety.
	Prepare tray using sheet metal with the safety.
	Demonstrate fixing of surface mounting type of accessories.
	Perform connections of electrical accessories.
	Make and wire up of a test board and test it.
2. Prepare electrical wire joints, carry out soldering, crimping and measure insulation resistance of underground cable.	Observe safety/ precaution during joints & soldering.
	Make simple straight twist and rat-tail joints in single strand conductors.
	Make married and 'T' (Tee) joint in stranded conductors.
	Prepare a Britannia straight and 'T' (Tee) joint in bare conductors.
	Prepare western union joint in bare conductor.
	Solder the finished copper conductor joints with precaution.
	Prepare termination of cable lugs by using crimping tool.
	Make straight joint in different types of underground cables.
	Measure insulation resistance of underground cable.
3. Verify characteristics of electrical and magnetic circuits.	Identify types of wires, cables and verify their specifications.
	Verify the characteristics of series, parallel and its combination circuit.
	Analyze the effect of the short and open in series and parallel circuits.
	Verify the relation of voltage components of RLC series circuit in AC.
	Determine the power factor by direct and indirect methods in an AC single phase RLC parallel circuit.
	Identify the phase sequence of a 3 $\phi$ supply using a phase-sequence meter.
	Prepare/ connect a lamp load in star and delta and determine relationship between line and phase values with precaution.
	Connect balanced and unbalanced loads in 3 phase star system

	and measure the power of 3 phase loads.
	Make the solenoid and determine its polarity for the given direction of current.
	Group the given capacitors to get the required capacity and voltage rating.
4. Install, test and maintenance of batteries and solar cell.	Assemble a DC source 6V/500 mA using 1.5V cells.
	Determine the internal resistance of cell and make grouping of cells.
	Explain charging of battery and test for its condition with safety/precaution.
	Carry out installation and maintenance of batteries.
	Determine total number of cells required for a given power requirement.
5. Estimate, Assemble, install and test wiring system.	Comply with safety & IE rules when performing the wiring.
	Prepare and mount the energy meter board.
	Draw and wire up the consumers main board with ICDP switch and distribution fuse box.
	Draw and wire up a bank/hostel/jail in PVC conduit.
	Identify the types of fuses their ratings and applications.
	Identify the parts of a relay, MCB & ELCB and check its operation.
	Estimate the cost of material for wiring in PVC channel for an office room having 2 lamps, 1 Fan, one 6A socket outlet and wire up.
	Estimate the requirement for conduit wiring (3 phase) and wire up.
	Estimate the materials and wire up the lighting circuit for a godown.
	Estimate the materials and wire up a lighting circuit for a corridor in conduit.
	Test, locate the fault and repair a domestic wiring installation.
6. Plan and prepare Earthing installation.	Plan work in compliance with standard safety norms related with earthing installation.
	Install the pipe earthing and test it.
	Install the plate earthing and test it.
	Measure the earth electrode resistance using earth tester.
	Carry out earth resistance improvement.

7. Plan and execute electrical illumination system and test.	Plan work in compliance with standard safety norms related with electrical illumination system.
	Install light fitting with reflectors for direct and indirect lighting.
	Assemble and connect a single twin tube fluorescent light.
	Connect, install and test the HPMV & HPSV lamp with accessories.
	Prepare and test a decorative serial lamp set for 240 V using 6V bulb and flasher.
	Install light fitting for show case window lighting.
8. Select and perform measurements using analog / digital instruments	Identify the type of electrical instruments.
	Extend the range of MC voltmeter and ammeter.
	Measure the frequency by frequency meter.
	Measure the power and energy in a single & three phase circuit using wattmeter and energy meter with CT and PT.
	Measure the value of resistance, voltage and current using digital multimeter.
	Measure the power factor in poly-phase circuit and verify the same with voltmeter, ammeter, watt-meter readings.
9. Perform testing, verify errors and calibrate instruments.	Test single phase energy meter for its errors.
	Determine the measurement errors while measuring resistance by voltage drop method.
	Calibrate the analog multimeter.
10. Plan and carry out installation, fault detection and repairing of domestic appliances.	Plan work in compliance with standard safety norms related with domestic appliances.
	Service and Repair of calling bell/ buzzer/ Alarm.
	Service and repair an automatic iron.
	Repair and service of oven having multi-range heat control.
	Replace the heating element in a kettle and test.
	Service and repair an induction heater.
	Service and repair a geyser.
	Service and repair a mixer.
	Service and repair of washing machine.
	Install a pump set.
Service and repair of table fan.	
	Service, repair and install a ceiling fan.
11. Execute testing, evaluate performance	Plan work in compliance with standard safety norms related with transformer.

and maintenance of transformer.	Identify the types of transformers and their specifications.
	Identify the terminals; verify the transformation ratio of a single-phase transformer.
	Connect and test a single-phase auto- transformer.
	Determine the losses (iron loss and copper loss) and the regulation of a single-phase transformer at different loads.
	Measure the current and voltage using CT and PT.
	Carry out winding for small transformer of 1KVA rating.
	Test the transformer oil with oil testing kit.
	Connect 3 single phase transformers for 3 phase operation of delta-delta /delta-star /star-star /star-delta.
	Connect the given two single phase transformers in parallel /series (secondary only) and measure voltage.
Connect & test 3 phase transformer in parallel.	
<b>SECOND YEAR</b>	
12. Plan, execute commissioning and evaluate performance of DC machines.	Plan work in compliance with standard safety norms related with DC machines.
	Determine the load performance of a different type of DC generator on load.
	Connect, start, run and reverse direction of rotation of different types of DC motors.
	Conduct the load performance tests on different type of DC motor.
	Control the speed of a DC motor by different method.
13. Execute testing, and maintenance of DC machines and motor starters.	Test a DC machine for continuity and insulation resistance.
	Maintenance, troubleshooting & servicing of DC machines.
	Test armature by using growler.
	Maintain, service and troubleshoot the DC motor starter.
14. Plan, execute commissioning and evaluate performance of AC motors.	Plan work in compliance with standard safety norms related with AC motors.
	Draw circuit diagram and connect forward & reverse a 3 phase squirrel cage induction motor.
	Start, run and reverse an AC 3 phase squirrel cage induction motor by different type of starters.
	Measure the slip of 3 phase squirrel cage induction motor by tachometer for different output. Draw slip/ load characteristics of the motor.
	Determine the efficiency of 3 phase squirrel cage induction motor by no load test/ blocked rotor test and brake test.



	Plot the speed torque (Slip/Torque) characteristics of slip ring induction motor.
	Demonstrate speed control of 3 phase induction motor.
	Connect, start and run a 3-phase synchronous motor.
	Connect start, run, control speed and reverse the DOR of different type of single-phase motors.
	Install a single-phase AC motor.
15. Execute testing, and maintenance of AC motors and starters.	Test continuity and insulation of various AC motors.
	Maintain, service and troubleshoot of three phase AC motors.
	Maintain, service and troubleshoot of different types of single-phase AC motors.
	Maintain, service and troubleshoot the AC motor starter.
16. Plan, execute testing, evaluate performance and carry out maintenance of Alternator / MG set.	Plan work in compliance with standard safety norms related with Alternator & MG set.
	Connect start and run an alternator and build up the voltage.
	Determine the load performance of a 3-phase alternator.
	Start and load a MG set with 3 phase induction motor coupled to DC shunt generator and build up the voltage.
	Perform/ Explain alignment of MG set.
	Preventive and breakdown maintenance of alternator / MG set.
	Explain the effect of excitation current in terms of V-curves of synchronous motor.
17. Execute parallel operation of alternators.	Demonstrate parallel operation of an alternator Bright lamp method/ Dark lamp method/ Bright and dark lamp method
	Parallel operation of an alternator by using synchroscope.
18. Distinguish, organise and perform motor winding.	Rewind the field coil /armature winding/ table fan /ceiling fan.
	Draw winding diagram & rewind a single-phase split type motor (Concentric coil winding).
	Draw winding diagram& rewind a 3-phase squirrel cage induction motor (single layer distributed winding).
	Draw winding diagram & rewind a 3-phase induction motor (single layer concentric type half coil connection).
	Draw winding diagram & rewind a 3-phase squired cage induction motor. (Double layer distributed type winding)
19. Assemble simple	Perform soldering on components/ lug / board with safety.

electronic circuits and test for functioning.	Identify the passive /active components by visual appearance, code number and test for their condition.
	Identify the control and functional switches in CRO and measure the D.C. & A.C. voltage, frequency and time period.
	Construct and test a half & full wave rectifier with and without filter circuits.
	Construct circuit by using transistor as a switch.
	Construct and test a UJT as relaxation oscillator & electronic timer.
	Construct amplifier circuit using Transistor, FET and JFET and test.
	Construct and test lamp dimmer using TRIAC/DIAC.
	Test IGBT and use in circuit for suitable operation.
	Construct and test the universal motor speed controller using SCR with safety.
	Construct and test logic gate circuits.
20. Assemble accessories and carry out wiring of control cabinets and equipment.	Draw the layout diagram of 3 phase AC motor control cabinet.
	Mount the control elements & wiring accessories on the control panel.
	Carry out wiring in control cabinet for local and remote control of induction motor.
	Draw & wire up the control panel for forward/ reverse operation of induction motor.
	Perform wiring for automatic start delta starter.
	Draw & wire up control panel for sequential motor control for three motors.
	Draw & wire up the control panel for a given circuit diagram and connect the motor.
	Test the control panel for all the required logics.
21. Perform speed control of AC and DC motors by using solid state devices.	Control the speed of DC motor by using DC drive.
	Speed control of universal motor by using SCR.
	Control speed and reverse the direction of rotation of different type of three phase induction motors using VVVF control /AC drive
22. Detect the faults and troubleshoot inverter,	Operation and maintenance of inverter.
	Troubleshoot and service a voltage stabilizer.

stabilizer, battery charger, emergency light and UPS etc.	Identify the parts, trace the connection and test the DC regulated power supply with safety.
	Troubleshoot and service a DC regulated power supply.
	Test battery charger for its operation.
	Prepare an emergency light.
	Carryout maintenance of UPS.
<b>23. Plan, assemble and install solar panel.</b>	
23. Plan, assemble and install solar panel.	Plan work in compliance with solar panel installation norms.
	Combination of solar cells for given power requirement.
	Assemble and install solar panel.
	Check the functionality of solar panel.
<b>24. Erect overhead domestic service line and outline various power plant layout.</b>	
24. Erect overhead domestic service line and outline various power plant layout.	Prepare single line diagram of thermal/ hydel/ Solar /Wind power plants.
	Prepare layout plan and single line diagram of transmission line.
	Draw an overhead and domestic service line.
	Explain erection of an overhead service line pole for single phase 240V distribution system.
	Identify different type of insulator used in HT and LT line.
	Fasten jumper in insulators.
	Connect feeder cable with domestic service line.
<b>25. Examine the faults and carry out repairing of circuit breakers.</b>	
25. Examine the faults and carry out repairing of circuit breakers.	Prepare layout plan and single line diagram of Distribution substation.
	Illustrate application of relays in control circuits and examine its operation.
	Identify parts of circuit breaker and check its operation.

**LEARNING OUTCOME (CORE SKILL)**

<b>LEARNING OUTCOME</b>	<b>ASSESSMENT CRITERIA</b>
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<b>EMPLOYABILITY SKILLS</b>	
1. Apply safe working practices	Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	Recognize and report all unsafe situations according to site policy.
	Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	Identify, handle and store / dispose off dangerous goods and substances according to site policy and procedures following safety regulations and requirements.
	Identify and observe site policies and procedures in regard to illness or accident.
	Identify safety alarms accurately.
	Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	Identify and observe site evacuation procedures according to site policy.
	Identify Personal Protective Equipment (PPE) and use the same as per related working environment.
	Identify basic first aid and use them under different circumstances.
	Identify different fire extinguisher and use the same as per requirement.
2. Comply with environment regulation and housekeeping	Identify environmental pollution & contribute to the avoidance of instances of environmental pollution.
	Deploy environmental protection legislation & regulations
	Take opportunities to use energy and materials in an environmentally friendly manner.
	Avoid waste and dispose waste as per procedure
	Recognize different components of 5S and apply the same in the working environment.
3. Interpret & use formal and technical communication.	Obtain sources of information and recognize information.
	Use and draw up technical drawings and documents.
	Use documents and technical regulations and occupationally related provisions.
	Conduct appropriate and target oriented discussions with higher authority and within the team.

	Present facts and circumstances, possible solutions & use English special terminology.
	Resolve disputes within the team.
	Conduct written communication.
4. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	Explain the concept of productivity and apply during execution of job.
	Explain the concept of quality tools and apply during execution of job.
5. List and interpret various acts of labour welfare legislation.	Explain basic concept of labour welfare legislation, adhere to responsibilities and remain sensitive towards such laws.
	Knows benefits guaranteed under various acts.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	Explain the concept of energy conservation, global warming, pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution.
	Explain standard procedure for disposal of waste.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	Explain personnel finance and entrepreneurship.
	Explain role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the policies/ programmes, procedure & the available scheme.
	Prepare a report to become an entrepreneur for submission to financial institutions.
8. Utilize basic computer applications and internet to take benefit of IT developments in the industry.	Explain the basic hardware of personal computer.
	Use common application software viz., word, excel, power point etc., in day to day work.
	Awareness about useful internet websites, search relevant information pertaining to the assigned tasks.
<b>WORKSHOP CALCULATION &amp; SCIENCE</b>	
1. Demonstrate basic mathematical	Solve different problems like phase angle, etc. with the help of a calculator.

concept and principles to perform practical operations.	Demonstrate conversion of Fraction to Decimal and vice versa.
	Explain BCD code, conversion from decimal to binary and vice-versa, all other conversions.
2. Understand and explain basic science in the field of study including simple machine.	Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
	Explain levers and its types.
	Explain relationship between Efficiency, velocity ratio and Mechanical Advantage.
	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	Solve simple problems on lifting tackles like crane-Solution of problems with the aid of vectors.
<b>ENGINEERING DRAWING</b>	
1. Read and apply engineering drawing for different application in the field of work.	Read & interpret the information on drawings and apply in executing practical work.
	Read & analyse the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.

**SECTION 2**

**25. EVIDENCE OF LEVEL**

**OPTION A**

Title/Name of qualification/component: ELECTRICIAN		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
Process	<p><b>Requires Well Developed Skill</b></p> <ul style="list-style-type: none"> <li>• Estimate, Assemble, install and test wiring system</li> <li>• Perform testing, verify errors and calibrate instruments.</li> <li>• Distinguish, organize and perform motor winding</li> <li>• Plan, execute testing, evaluate performance and carry out maintenance of Alternator / MG set</li> <li>• Plan, assemble and install solar panel.</li> </ul> <p><b>Clear choice of procedures in familiar context</b></p> <ul style="list-style-type: none"> <li>• Plan and prepare Earthing installation.</li> <li>• Plan and carry out installation, fault detection and repairing of domestic</li> </ul>	<p>The learner requires to demonstrate well developed skill for example 'Estimate, Assemble, install and test wiring system', 'Perform testing, verify errors and calibrate instruments', and 'Distinguish, organize and perform motor winding'. One needs to perform complex set of activities for these outcomes and there is no scope for error as these could cause fatal accidents if not done correctly.</p> <p>The learner requires to apply clear choice of procedures in familiar context for example 'Plan and prepare Earthing installation', 'Plan and carry out installation, fault detection and repairing of domestic appliances' and 'Detect the faults and troubleshoot inverter, stabilizer, battery charger, emergency light and UPS etc.' In all these learning outcomes the learner has to</p>	5

Title/Name of qualification/component: ELECTRICIAN		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
	<p>appliances.</p> <ul style="list-style-type: none"> <li>• Detect the faults and troubleshoot inverter, stabilizer, battery charger, emergency light and UPS etc.</li> </ul>	<p>apply one's knowledge and decide what needs to be done to either meet the client's requirement or identify fault and decide how to rectify it or plan as per the layout and conditions available.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	
Professional knowledge	<p><b>Knowledge of facts in the field of work or study</b></p> <ul style="list-style-type: none"> <li>• Comparison and Advantages of DC and AC systems.</li> <li>• Line and phase voltage, current and power in a 3 phase circuits with balanced and unbalanced load.</li> </ul> <p><b>Knowledge of Principles and general concepts in the field of work or study</b></p> <ul style="list-style-type: none"> <li>• Ohm's Law; Simple electrical circuits and</li> </ul>	<p>The learner requires to demonstrate knowledge of facts, principles, processes and general concepts, in the field of work or study which is Electrical wiring, electro-magnetism, repair of electrical appliances and machines etc.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	5



Title/Name of qualification/component: ELECTRICIAN		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
	<p>problems.</p> <ul style="list-style-type: none"> <li>Working principles and circuits of common domestic equipment and appliances.</li> </ul> <p><b>Knowledge of processes in the field of work or study</b></p> <ul style="list-style-type: none"> <li>Different methods of measuring the values of resistance</li> <li>Wiring circuits planning, permissible load in sub-circuit and main circuit.</li> </ul>		
Professional skill	<ul style="list-style-type: none"> <li>Plan and execute electrical illumination system and test.</li> <li>Perform testing, verify errors and calibrate instruments.</li> <li>Plan and carry out installation, fault detection and repairing of domestic appliances.</li> <li>Plan, execute commissioning and evaluate performance of DC/AC machines, transformer/Alternator/MG Set.</li> <li>Distinguish, organise and perform motor winding.</li> </ul>	<p>The learning outcomes indicated in the adjacent cell require cognitive and practical skills to accomplish tasks that involve estimating bill of materials and cost required for the job or planning as per requirement and conditions available or detecting fault and deciding course of action for repair; all of which involve solving problems by selecting and applying basic methods, tools, materials and information.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	5
Core skill	<b>Desired Mathematical Skills</b>	The learning outcomes for example 'Explain	5

Title/Name of qualification/component: ELECTRICIAN		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relate to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> <li>Explain science in the field of study including simple machine.</li> </ul> <p><b>Understanding of social/political skill</b></p> <ul style="list-style-type: none"> <li>Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal &amp; societal growth.</li> </ul> <p><b>Organizing information and communication</b></p> <ul style="list-style-type: none"> <li>Interpret &amp; use formal and technical communication.</li> </ul>	<p>science in the field of study including simple machine' and 'Interpret &amp; use formal and technical communication' etc. display the learning outcomes where the learner needs to display desired mathematical skill; understanding of social, political skill and some skill of collecting and organizing information, communication.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	
Responsibility	<ul style="list-style-type: none"> <li>Plan and prepare Earthing installation.</li> <li>Estimate, assemble, install and test wiring system.</li> <li>Plan, execute commissioning and evaluate performance of DC machines.</li> <li>Plan, execute testing, evaluate performance and carry out maintenance of Alternator / MG set.</li> <li>Detect the faults and troubleshoot inverter, stabilizer, battery charger, emergency light and UPS etc.</li> </ul>	<p>The role of Electrician is independently responsible to perform the works as per specifications and their own analysis of what needs to be done based on their understanding of electrical processes, principles and standards and they have got some responsibility for other's works and learning as well; Learning outcomes like "Plan and prepare Earthing installation", "Plan, execute testing, evaluate performance and carry out maintenance of Alternator / MG set" etc. reveal the same.</p> <p>Hence NSQF Level is 5 for this descriptor.</p>	5

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

26	<p><b>What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?</b></p> <table border="1" data-bbox="339 546 1390 1693"> <thead> <tr> <th data-bbox="339 546 627 689"><b>Basis</b></th> <th data-bbox="627 546 1390 689"><b>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="339 689 627 1070">Need of the qualification</td> <td data-bbox="627 689 1390 1070">Power Sector has a significant presence of organized as well as unorganized skilled manpower requirement. This sector is poised to grow exponentially in the years to come and is highly labour intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.</td> </tr> <tr> <td data-bbox="339 1070 627 1496">Industry Relevance</td> <td data-bbox="627 1070 1390 1496">The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/ NSTIs/ MSTIs/ BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.</td> </tr> <tr> <td data-bbox="339 1496 627 1621">Usage of the qualification</td> <td data-bbox="627 1496 1390 1621">The Proposed qualification will create skilled Technician for various establishments in different Sectors.</td> </tr> <tr> <td data-bbox="339 1621 627 1693">Estimated uptake</td> <td data-bbox="627 1621 1390 1693">The present seating capacity is 1159788</td> </tr> </tbody> </table>	<b>Basis</b>	<b>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</b>	Need of the qualification	Power Sector has a significant presence of organized as well as unorganized skilled manpower requirement. This sector is poised to grow exponentially in the years to come and is highly labour intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.	Industry Relevance	The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/ NSTIs/ MSTIs/ BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.	Usage of the qualification	The Proposed qualification will create skilled Technician for various establishments in different Sectors.	Estimated uptake	The present seating capacity is 1159788
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Estimated uptake	The present seating capacity is 1159788										
27	<p><b>Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences.</b></p> <p>The qualification, originally designed for Craftsman Training Scheme is in existence for many years and approved by DGT (Regulatory Body) under Ministry of Skill Development and Entrepreneurship, Govt. of India.</p>										

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

**SECTION 4**  
**EVIDENCE OF PROGRESSION**

**30** **What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector? Show the career map here to reflect the clear progression**

On completion of the training the trainee will have an opportunity to move in vertical/horizontal pathways to promote to higher designations. The learner can further undergo other specialised courses to excel in the relevant field.

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