

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

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

NCVET Code

2021/AA/DGT/04584

Name and address of submitting body:

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

Name and contact details of individual dealing with the submission

Name: Mrs. Sandhya Salwan

Position in the organisation: Deputy Director General

Address if different from above:

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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:

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

5. SUMMARY

1	Qualification Title	‘Drone Technician’
2	Qualification Code, if any	DGT/2019
3	NCO code and occupation	7419.9900 - Electrical and Electronic Equipment Mechanics and Fitters and Related Workers, Other
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	Prepare skilled craftsman to undertake the job roles of Drone Technician and will enable the trainee to perform troubleshooting and maintenance of Unmanned Ariel Vehicle (UAV) which is a flying robot and test different electric components, circuits, boards used in Drone. It is a long term qualification.
5	Body/bodies which will award the qualification	Directorate General of Training (DGT).
6	Body which will accredit providers to offer courses leading to the qualification	Directorate General of Training (DGT) accredits the Training providers (ITIs/ NSTIs/MSTIs/BTCs/BTPs / Industries / Establishments).
7	Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)	Yes. The accreditation/ affiliation norms and any amendments made from time to time are available on DGT web portal.
8	Occupation(s) to which the qualification gives access	<ul style="list-style-type: none"> • Drone Technician
9	Job description of the occupation	The individual performs troubleshooting and maintenance tasks on unmanned aerial vehicles (Drones). Test different electronic components, circuits used in Drone and find the faulty parts. Testing of different motors BLDC etc, Electronic Speed Controller and it's circuits. Testing of flight controller, landing gear, GPS Module, collision avoidance sensor and their connectivity with console. Testing of transmitter, communication link, Gimbal Motor, Controller rand its programming, etc.

NSQF QUALIFICATION FILE

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Drone Technician

10	Licensing requirements	NOT REQUIRED		
11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)	NOT APPLICABLE		
12	Level of the qualification in the NSQF	Level 4		
13	Anticipated volume of training/learning required to complete the qualification	S No.	Course Element	Notional Training Hours
		1.	Professional Skill (Trade Practical)	580
		2.	Professional Knowledge (Trade Theory)	140
		3.	Employability Skills	80
			Total	800
14	Indicative list of training tools required to deliver this qualification	As per Annexure I of curriculum.		
15	Entry requirements and/or recommendations and minimum age	Passed 10 th Class Examination with Science and Mathematics or its equivalent.		
16	Progression from the qualification (Please show Professional and academic progression)	An Individual can proceed for:		
		Professional <ul style="list-style-type: none"> • Drone Technician • Senior Technician • Supervisor • Manager • Entrepreneur 	Technical / Academic <pre> graph TD A[Technical / Academic] --> B[ATS] A --> C[CITS] A --> D[Diploma/ Advance Diploma (Vocational)] </pre>	
17	Arrangements for the Recognition of Prior	<ul style="list-style-type: none"> • Yes (For more details refer “Guidelines for Private candidate” in DGT website MIS portal). 		

	learning (RPL)			
18	International comparability where known (research evidence to be provided)	-		
19	Date of planned review of the qualification.	5 Yrs. from the Date of Approval		
20	Formal structure of the qualification			
	Mandatory components			
	Title of component and identification code/NOSs/ Learning Outcomes	Estimated size (learning hours)		Level
		Skills	Knowledge	
TRADE SPECIFIC				
(i)	Identify & select different types of drones, drone rules and regulations, drone applications, and important safety precautions.	58	14	3
(ii)	Identify & select different drone's mechanical parts, aerodynamics of wings, propellers and disassembly and reassembly of common drone platform with flying practices.	87	21	3
(iii)	Identify and test various electronic SMD components using proper measuring instruments and Identify, place, solder and de-solder and different SMD discrete components and ICs package with due care and following safety norms using proper tools/setup.	29	7	4
(iv)	Measure different type electrical parameters and record the data related with drone hardware.	58	14	4
(v)	Identification of different type of batteries, battery specifications and their charging	29	7	4

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	techniques used in drone.			
(vi)	Test different sensors, their characteristics and repair which are commonly used in different drones.	58	14	4
(vii)	Identify, select and test hardware assembly, driver for BLDC motors.	58	14	4
(viii)	Inspect, test and execute GPS navigation and telemetry module, different RF blocks and antennas used in RF transmitter and receiver.	29	7	4
(ix)	Test and troubleshoot Flight Controller Board (FCB), Electronic Speed Controller (ESC) and its associated peripherals.	29	7	4
(x)	Calibrate and troubleshoot drone gimbal and drone payload.	58	14	4
(xi)	Identify and resolve common error messages and corrections by Software debugging.	58	14	4
(xii)	Inspect, test and execute primary and secondary servicing with troubleshoot malfunctioning, and repair issues discovered.	29	7	4
CORE SKILL				
EMPLOYABILITY SKILLS				
(i)	Apply safe working practices.	-	10	4
(ii)	Comply with environment regulation and housekeeping.	-	10	4
(iii)	Interpret & use formal and technical communication.	-	10	4
(iv)	Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	-	10	4
(v)	List and interpret various acts of labour welfare legislation.	-	10	4
(vi)	Explain energy conservation, global warming and pollution and contribute in day to day work	-	10	4

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	by optimally using available resources.			
(vii)	Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	-	10	4
(viii)	Utilize basic computer applications and internet to take benefit of IT developments in the industry.	-	10	4
	Total		800	

SECTION 1
ASSESSMENT

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

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

The question papers for the theory Examinations contain objective type questions.

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

Sl. No.	Type of assessment	Subject for the trade test	Marks
1	Summative Assessment	Practical	250
2		Trade Theory	100
3		Employability Skills	50
4	Formative assessment based on Learning Outcomes		200
TOTAL:			600

(2) Minimum pass marks:

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

Testing and certifications for the course:

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

Overall assessment strategy:

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

	<p>reports. The ultimate objective of the assessment is to assess the candidates as per the defined assessment criteria for the learning outcomes.</p> <p>Specific Arrangements for assessment:</p> <ul style="list-style-type: none"> • Assessment is outcome-based. • There are formative and summative assessments in Theory and Practical. • Assessment is carried out in Trade theory, Trade Practical and Employability Skills. • While Trade Theory and Trade Practical are used for assessing Trade-related jobs and Employability skills is used to test the communication, professional language, leadership and 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. <p>Quality assurance activities:</p> <p>Question papers are set by external paper setters/ software generated. Evaluation of Theory Examinations in Trade and Employability Skill is done by third-party agency. Trade Practical is examined by External Examiner.</p>
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24. Assessment evidences

Title of Component: Formative Assessment Breakup

(On half yearly average of the learning assessment covered)

Means of assessment

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

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

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10	VIVA	15
	Total Maximum Weightage (%)	100

Pass/Fail

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

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ASSESSMENT CRITERIA:

LEARNING OUTCOME (TRADE SPECIFIC)	
LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Identify & select different types of drones, drone rules and regulations, drone applications, and important safety precautions.	Apply workshop safety norms.
	Identify & select safety rules to operate drone.
	Apply DGCA safety regulations.
	Recognize Do's and Don'ts of drone.
	Perform drone registration and NPNT permission before flight.
	Recognize issues Drone pilots encounter including airspace, traffic patterns etc.
	Perform Radio telephony using Standard radio terminology and RT Phraseology.
	Communicate with ATC including Position, Altitude Reporting etc.
	Identify & prepare specific Flight Planning Procedures for Specific drone flights.
2. Identify & select different drone's mechanical parts, aerodynamics of wings, propellers and disassembly and reassembly of common drone platform with flying practices.	Identify & select different components, parts, block of the drone and its function & their interconnectivity.
	Identify various types of body material used in drone.
	Recognize basic principles of flying like Bernoulli's Principle etc.
	Recognize multi rotor design, various configurations, airframe sizes and construction materials.
	Identify different propeller designs and design using 3D printer.
	Identify different types of motor used in drone.
	Identify & prepare specific flight planning procedures to drone flights.
	Practice drone flying to check to identify faults in drone.
3. Identify and test various electronic SMD components using proper measuring instruments and Identify, place, solder and de-solder and different SMD discrete components and ICs package with due care	Identification of different types of SMD Components and measure their value using SMD Technology Kit, Tweezers and DMM.
	Identify and use SMD soldering and de-soldering rework station.
	Practice soldering and de-soldering the SMD components on the PCB.
	Make necessary practice on SMD soldering station to solder and de-solder various IC's of

<p>and following safety norms using proper tools/setup.</p>	<p>different packages.</p>
<p>4. Measure different type electrical parameters and record the data related with drone hardware.</p>	<p>Identify and use different functions of measuring instruments for different measurements of electrical parameters.</p> <p>Measurement of voltage dc & ac using Digital Multimeter</p> <p>Measurement of current dc & ac using Digital Multimeter</p> <p>Measurement of frequency using Digital Multimeter</p> <p>Measurement of peak to peak voltage, frequency, time period, and duty cycle using DSO and waveform generator.</p> <p>Measurement of analog & digital signal using DSO.</p> <p>Measurement of unknown frequency and it's level using spectrum analyzer</p>
<p>5. Identification of different type of batteries, battery specifications and their charging techniques used in drone.</p>	<p>Identification of different type of batteries Li-ion and Li-Po.</p> <p>Recognize different battery specifications.</p> <p>Explore different charging techniques to charge batteries.</p> <p>Battery management to measure and monitor different parameters of different batteries.</p> <p>Inspect battery packs for bulges or leakage.</p> <p>Inspect charger for visible damage and perform voltage and current reading of battery.</p> <p>Explore Battery power management includes functions for charging, monitoring, and charge protection.</p>
<p>6. Test different sensors, their characteristics and repair which are commonly used in different drones.</p>	<p>Identify and measure condition of drone sensors.</p> <p>Identify and Install types of sensors used in drone.</p> <p>Test & measure the resistance, voltage, current and frequency of drone sensors and actuators.</p> <p>Test & measure accelerometers, inertial measurement units, tilt and lidar sensor, gyro sensor.</p> <p>Write and upload computer code to FCB to test</p>

	sensors results.
7. Identify, select and test hardware assembly, driver for BLDC motors	Identify different BLDC motors and its specifications
	Test BLDC motor and measure speed-torque characteristics of BLDC Motor.
	Test BLDC Motor driver circuit.
	Identify DC, BLDC and servo motors and test driving circuits.
	Perform running and reversing phenomenon of BLDC Motor
	Demonstration speed control of BLDC Motor using PWM technique.
	Inverted pendulum and its balancing using programming technique of motor.
	Measure thrust to weight ratio and payload.
8. Inspect, test and execute GPS navigation and telemetry module, different RF blocks and antennas used in RF transmitter and receiver.	Identify different antennas such as patch, helical, and omni-directional and check their radiation patterns.
	Measure frequencies and directivity of the drone antenna.
	Detecting a drone with a Real-Time Spectrum Analyzer.
	Identify the characteristics of RF circuit blocks like amplifier, and filters.
	Identify, configure and operate 433MHz and 2.4 GHz RC transmitter and receiver.
	Operate drone using RC transmitter and receiver.
	Dismantle, identify parts, service and test different parts of the drone system.
	Knowledge of GPS and its hardware interfacing.
	Measure and use signals from GPS module to determine latitude & longitude.
	Explore the interfacing of GPS module to navigation drone.
Perform experiment to measure, GPGGA, GPGLL, GPGSA, GPGSV, GPRMC and GPVTG values.	
9. Test and troubleshoot Flight Controller Board (FCB), Electronic Speed Controller (ESC) and its associated peripherals.	Work upon electronic boards to perform specific tasks such as flight control board.
	Programming and configure of parameters in flight control board (FCB).
	Test the different peripheral interconnections with FCB
	Configure, test and perform communication FCB

	<p>with motor, GPS, ESC and sensors.</p> <p>Configure and test FCB with battery to monitor battery level and perform defined operation.</p> <p>Carry out drone leveling as per procedure using IMU sensor Calibrate the compass, Lidar, and gyro sensor</p> <p>Configure, test and perform communication FCB with RF transceiver.</p> <p>Write and upload computer code to FCB to test sensors results.</p> <p>Configure and check electronic speed control (ESC).</p> <p>Test the different peripheral interconnections with ESC</p> <p>Configure, test and perform communication of ESC with FCB.</p> <p>Configure, test and perform communication of ESC with motor.</p> <p>Configure and test ESC parameters on FCB to check its operation.</p> <p>Write and upload computer code to FCB to ESC working.</p>
10. Calibrate and troubleshoot drone gimbal and drone payload.	<p>Identify the different types of drones and its application in different areas.</p> <p>Configure HD and thermal image camera with drone.</p> <p>Perform Gimbal camera assembly and gimbal calibration.</p> <p>Practice Gimbal stabilization and control of cameras using x, y, and z axes rotation.</p> <p>Practice remote sensing, surveying & mapping, photogrammetry and precision agriculture using HD and thermal image camera.</p> <p>Identify, select different application drones like agriculture, Surveillance, Inspections and gathering Information for disaster management. Also, maintenance, inspection, examinations and investigation of drone.</p>
11. Identify and resolve common error messages and corrections by software debugging.	<p>Identify bugs in the software program as per the algorithms used and the libraries.</p> <p>Resolve common error messages and apply the correct logic.</p> <p>Perform firmware configuration and updates.</p> <p>Identify and fix issues reported in drone hardware after firmware update. Perform Testing flight procedure and execution with</p>

	virtualization.
	Download and Install App, Menu, Planning, Set-up / Flight / Application.
	Demonstration and perform base station software to debugging to get GPS and flight data.
	Perform experiments on software debug tool use to identify coding errors at different stages.
	Knowledge and advantage of preventative maintenance of drone.
	Diagnose problems using Log Data / Analyze Data flash Log Data / Remote Communication Log Data / Save and Execute Log Data.
	Upgrade/downgrade drone firmware.
12. Inspect, test and execute primary and secondary servicing with troubleshoot malfunctioning, and repair issues discovered.	Perform primary and secondary servicing based upon the checklist.
	Test and diagnose drone after 100 hours of flying for preventive maintenance.
	Test and diagnose drone after 500 hours of flying.
	Knowledge about drone troubleshooting check list like Equipment check, System reset, calibration, Motor Troubleshooting, Gimbal rotation, Battery Maintenance, and RF Signal and hardware.
	Diagnose the common drone problem like GPS signals are blocked , Decreased battery life, Wrong direction during flight, Flight Planning, Mechanical issue, and Firmware issue.
	Inspect drone before and after each flight.
	First time drone hardware assembly and test.
	Test, locate the fault and repair a wiring of drone.
	Check bent or cracked on legs and feet of the drone
	Demonstration drone wiring connections with different parts
	Perform takeoff/Landing operation and identify faults in system.

LEARNING OUTCOME (CORE SKILL)	
LEARNING OUTCOME	ASSESSMENT CRITERIA
EMPLOYABILITY SKILLS	
1. Apply safe working practices	Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	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.
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
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.

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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.
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 etc. in day to day work.
	Awareness about useful internet websites, search relevant information pertaining to the assigned tasks.

SECTION 2

25. EVIDENCE OF LEVEL

OPTION A

Title/Name of qualification/component: Drone Technician			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relates to the NSQF level descriptors	NSQF Level
Process	<p>Familiar, Predictable, Routine Situations of Clear Choice</p> <ul style="list-style-type: none"> Identify & select different types of drones, drone rules and regulations, drone applications, and important safety precautions. Identify & select different drone's mechanical parts, aerodynamics of wings, propellers and disassembly and reassembly of common drone platform with flying practices. Identify and test various electronic SMD components using proper measuring instruments and Identify, place, solder and de-solder and different SMD discrete components and ICs package with due care and following safety norms using 	<p>In the learning outcomes for example in 'Identify & select different drone's mechanical parts, aerodynamics of wings, propellers and disassembly and reassembly of common drone platform with flying practices' and 'Identify and test various electronic SMD components using proper measuring instruments and Identify, place, solder and de-solder and different SMD discrete components and ICs package with due care and following safety norms using proper tools/setup', the learner will be required to choose appropriate tools, equipments, procedures as per the requirement of the job. The work will however be done within a familiar, predictable and routine range of situations to achieve the required performance/tolerance levels and accuracy demanded as per the job.</p>	4

Title/Name of qualification/component: Drone Technician			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relates to the NSQF level descriptors	NSQF Level
	proper tools/setup.	<p>Thus the learner requires demonstrating ability to work in familiar, predictable, routine, situation of clear choice.</p> <p>Hence the NSQF level as per this descriptor will be 4.</p>	
Professional knowledge	<p>Factual Knowledge of field of Knowledge or study</p> <ul style="list-style-type: none"> • Different types of Drones, Nomenclatures. • Knowledge about soldering station, soldering tools, soldering iron, soldering wicks, soldering temperature etc. • Different charging circuits or batteries, What is battery management system (BMS) and different Building Blocks of BMS. • Introduction to different motors like DC, BLDC, servo motors, working, understanding its functioning. 	<p>The learner is expected to possess knowledge about soldering station, soldering tools, different charging circuits or batteries, different motors like DC, BLDC, servo motors, working, understanding its functioning etc.</p> <p>The above knowledge expected to be possessed by the learner are the factual knowledge of this field of work or study.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	4

Title/Name of qualification/component: Drone Technician			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relates to the NSQF level descriptors	NSQF Level
Professional skill	<ul style="list-style-type: none"> • Measure different type electrical parameters and record the data related with drone hardware. • Test different sensors, their characteristics and repair which are commonly used in different drones. • Identify, select and test hardware assembly, driver for BLDC motors. 	<p>In learning outcomes such as ‘Measure different type electrical parameters and record the data related with drone hardware’ and ‘Test different sensors, their characteristics and repair which are commonly used in different drones’, the learner is expected to recall and demonstrate practical skills and make use of appropriate rules and tools in order to perform the assigned tasks. The nature of work performed by the learner is repetitive in narrow range of application and routine type.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	4
Core skill	<p>Language to communicate written or oral, with required clarity</p> <ul style="list-style-type: none"> • Interpret & use formal and technical communication. <p>Basic Arithmetic and algebraic principles</p> <ul style="list-style-type: none"> • Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth. 	<p>The learning outcomes for example ‘Interpret & use formal and technical communication’ and ‘Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.’ are the learning outcomes where the learner requires to display competence in written language with required clarity, skill of basic arithmetic & algebraic principles in order to understand the work enlisted in the job card/service card and use the measuring & marking tools. The learner will also need to communicate with team</p>	4

Title/Name of qualification/component: Drone Technician			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relates to the NSQF level descriptors	NSQF Level
	<p>Basic Understanding of social/political</p> <ul style="list-style-type: none"> • Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources 	<p>supervisor to understand the job and explain ones work.</p> <p>The learner is also expected to possess basic understanding of social political and natural environment as mentioned in the learning outcome for example ‘Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources’.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	
Responsibility	<ul style="list-style-type: none"> • Inspect, test and execute GPS navigation and telemetry module, different RF blocks and antennas used in RF transmitter and receiver. • Test and troubleshoot Flight Controller Board (FCB), Electronic Speed Controller (ESC) and its associated peripherals. • Calibrate and troubleshoot drone gimbal 	<p>The role of the learner is to perform the work as per specifications and apply their own analysis of what needs to be done based on their understanding of Drone architecture & test and troubleshoot Flight Controller Board and standards as indicated in the learning outcomes like ‘Test and troubleshoot Flight Controller Board (FCB), Electronic Speed Controller (ESC) and its associated peripherals’ and ‘Identify and resolve common error messages and corrections by Software debugging’ etc.</p>	4

NSQF QUALIFICATION FILEApproved in 13th NSQC Meeting – NCVET – 25th November, 2021*Drone Technician*

Title/Name of qualification/component: Drone Technician			Level: 4
NSQF Domain	Outcomes of the Qualification/Component	How the outcomes relates to the NSQF level descriptors	NSQF Level
	<p>and drone payload.</p> <ul style="list-style-type: none">• Identify and resolve common error messages and corrections by Software debugging.• Inspect, test and execute primary and secondary servicing with troubleshoot malfunctioning, and repair issues discovered.	<p>Here the learner is responsible for his own quality work and learning to ensure the conformance of given job requirements.</p> <p>Hence NSQF Level is 4 for this descriptor.</p>	

SECTION 3

EVIDENCE OF NEED

<p>26</p>	<p>What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?</p> <table border="1"> <thead> <tr> <th data-bbox="336 521 625 667"> <p>Basis</p> </th> <th data-bbox="625 521 1390 667"> <p>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</p> </th> </tr> </thead> <tbody> <tr> <td data-bbox="336 667 625 1025"> <p>Need of the qualification</p> </td> <td data-bbox="625 667 1390 1025"> <p>Aerospace & Aviation 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 labor intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.</p> </td> </tr> <tr> <td data-bbox="336 1025 625 1429"> <p>Industry Relevance</p> </td> <td data-bbox="625 1025 1390 1429"> <p>The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/NSTIs/MSTIs/BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.</p> </td> </tr> <tr> <td data-bbox="336 1429 625 1547"> <p>Usage of the qualification</p> </td> <td data-bbox="625 1429 1390 1547"> <p>The Proposed qualification will create skilled craftsman for various establishments in different Sectors.</p> </td> </tr> <tr> <td data-bbox="336 1547 625 1619"> <p>Estimated uptake</p> </td> <td data-bbox="625 1547 1390 1619"> <p>This is a New Trade.</p> </td> </tr> </tbody> </table>	<p>Basis</p>	<p>In case of other Awarding Bodies (Institutes under Central Ministries and states departments)</p>	<p>Need of the qualification</p>	<p>Aerospace & Aviation 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 labor intensive and there are many emerging trends in this sector. Hence the qualification has been designed keeping in view to cater to the ever-increasing demand of skilled manpower in consultation with stakeholders.</p>	<p>Industry Relevance</p>	<p>The job role defined for the qualification is as per the National Classification of Occupations 2015 which is developed by Employment Directorate under the ministry of Labour and Employment in collaboration with different industry partners and as per ILO guidelines. Moreover, the training is imparted in ITIs/NSTIs/MSTIs/BTC/ BTPs/ Industries / Establishments etc. where such requirement is available. This justifies the qualification is very much relevant for industry.</p>	<p>Usage of the qualification</p>	<p>The Proposed qualification will create skilled craftsman for various establishments in different Sectors.</p>	<p>Estimated uptake</p>	<p>This is a New Trade.</p>
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<p>27</p>	<p>Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences.</p> <p>The qualification originally designed for Craftsman Training Scheme is in existence for many years and approved by DGT (Regulatory Body) under Ministry of Skill Development and Entrepreneurship, Govt. of India.</p>										
<p>28</p>	<p>What steps were taken to ensure that the qualification(s) does (do)</p>										

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

SECTION 4

EVIDENCE OF PROGRESSION

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