



**GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING**

COMPETENCY BASED CURRICULUM

REMOTELY PILOTED AIRCRAFT (RPA)/DRONE PILOT

(Duration: Six Months)

**CRAFTSMEN TRAINING SCHEME (CTS)
NSQF LEVEL- 4**



SECTOR – AEROSPACE & AVIATION



Directorate General of Training

REMOTELY PILOTED AIRCRAFT (RPA)/DRONE PILOT

(Non-Engineering Trade)

(Revised in 2021)

Version: 1.3

CRAFTSMEN TRAINING SCHEME

(CTS) NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091
www.cstaricalcutta.gov.in

CONTENTS

S No.	Topics	Page No.
1.	Course Information	1
2.	Training System	2-5
3.	Job Role	6
4.	General Information	7-8
5.	Learning Outcome	9
6.	Assessment Criteria	10-12
7.	Trade Syllabus	13-21
	Annexure I(List of Trade Tools & Equipment)	22-25
	Annexure I (A)	26-29
	Annexure II (List of Trade experts)	30-31

1. COURSE INFORMATION

During the six months duration of Remotely Piloted Aircraft (RPA)/ Drone Pilot Trade a candidate is trained on professional skills and professional knowledge related to job role. In addition to this a candidate is entrusted to undertake project work and Extra-Curricular Activities to build up confidence. The broad components covered related to the trade are categorized in six months duration as below: -

The trainee begins with learning first aid, firefighting and various safety practices for working in industrial environment. Recognizes DGCA Safety Regulations & develop safety attitude while flying RPA. Identifies & selects different types of RPA & Fundamentals of Flight (Aerodynamics), ATC procedures & Radio Telephony, different regulations of DGCA, Civil Aviation Requirements, Weather and meteorology. Develops & applies knowledge on RPA system and sub systems. Identifies & selects Electronic Speed Controllers (ESC) & flight Controllers for RPAS. Recognizes application of Batteries, Chargers & Connectors, Transmitters & Receivers, Cameras, Gimbals & other payloads. Applies knowledge of Ground Control Stations & FPV. Performs Assembling, MRO & battery care of RPAS. Identifies & selects Basic operating features of a RPA Flight Simulator. Fly a RPA with instructor and then perform solo flight (Virtual reality training & live RPA flying). Carry out entire flying operations from pre-flight checks to after flight checks while flying a RPA in simulator training & live training.

Also the trainee will learn to Communicate with required clarity, understand technical English, environment regulation, productivity and enhance self-learning.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of the economy/ labour market. The vocational training programs are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programs of DGT for propagating vocational training.

‘Remotely Piloted Aircraft (RPA)/ Drone Pilot’ Trade under CTS is one of the newly designed courses. The CTS courses are delivered nationwide through network of ITIs. The course is of six months duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory and Trade Practical) imparts professional skills and knowledge, while Core area (Employability Skills) imparts requisite life skills. After passing out of the training programme, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read and interpret technical parameters/ documentation, executes work, identify necessary materials and tools.
- Perform tasks with due consideration to safety rules, accident prevention regulations.
- Apply professional knowledge & employability skills while performing the job and maintenance work.
- Check the circuit/ equipment/ panel as per drawing for functioning, identify and rectify faults/defects.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Drone Pilot and will progress further as Senior Drone Pilot, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can join Aviation industry/other sectors as drone Pilot for implementing different applications of Drone.
- Can work in a Drone service center or start own Drone Training Academy.
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSESTRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of six months: -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Flying)	50
2.	Professional Skill (Trade Practical)	530
3.	Professional Knowledge (Trade Theory)	140
4.	Employability Skills	80
	Total	800

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the DGT from time to time.

a) The Continuous Assessment (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in.

b) The final assessment will be in the form of summative assessment. The All-India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines. The pattern and marking structure is being notified by DGT from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/ reduction of scrap/ wastage and disposal of scrap/ waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self- learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	<ul style="list-style-type: none"> • Demonstration of good skills and accuracy in the field of work/assignments. • A fairly good level of neatness and consistency to accomplish job activities. • Occasional support in completing the task/ job.
(b)Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices	<ul style="list-style-type: none"> • Good skill levels and accuracy in the field of work/ assignments. • A good level of neatness and consistency to accomplish job activities. • Little support in completing the task/job.

(c) Weightage in the range of more than 90% to be allotted during assessment

For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.

- High skill levels and accuracy in the field of work/ assignments.
- A high level of neatness and consistency to accomplish job activities.
- Minimal or no support in completing the task/ job.

3. JOB ROLE

Remotely Piloted Aircraft (RPA)/ Drone Pilot; remotely controls Drone/Unmanned Aerial Vehicle (UAV) which is a flying robot and can fly autonomously through software-controlled flight plans in their embedded systems working in conjunction with onboard sensors and GPS.

Can take photography for Real estate, Film Making, special events, Journalism, Agriculture etc., can apply it for liquid pesticides, fertilizers, herbicides, seeding, farm land mapping & surveying, crop theft or theft by animal etc. Provides key surveying capabilities and point the way to new excavation sites for mapping archaeological remains. Inspects infrastructure from power lines to pipelines, which are often in hard-to-reach, dangerous places to mitigate hazardous, time consuming and expensive work. Obtain high-quality, detailed images of overhead utility lines to look for damage, corrosion and more. They are able to provide engineers with real-time data, images and post-inspection analysis—the benefits of which are causing a shift away from traditional utility inspection methods. Carries on commercial Inspection of Bridges, Cell & TV Towers, Wind Turbines, Power lines, Pipe Lines & even solar panels. Checks roofs, chimneys, sliding, bricks and other structures for exterior damage as Residential Home Inspection. Uses RPA for wild life Management & conservation where wildlife drones can be used in many different ways, from small multi-rotor units that can scare invasive birds away from crops, to fixed-wing aircraft that fly above rainforests to spot orangutan nests. Individual may use it for law and order and aerial surveillance in police departments for Public Service Surveillance. Applies it in E-Commerce: for a variety of purposes: to take inventory, streamline its distribution system and use for deliveries to customers. Can take part in Drone Aerobatics show & Aerial Advertising.

Aircraft Pilots and Related Associate Professionals, other; include associate professionals who control the operation of mechanical, electrical and electronic equipment, in order to navigate aircraft for transporting passengers, mail and freight and perform related pre-flight and in-flight tasks not classified elsewhere.

Reference NCO-2015:

3153.9900 - Aircraft Pilots and Related Associate Professionals, Other

4. GENERAL INFORMATION

Name of the Trade	REMOTELY PILOTED AIRCRAFT (RPA)/ DRONE PILOT
Trade Code	DGT/2010
NCO - 2015	3153.9900
NSQF Level	Level – 4
Duration of Craftsmen Training	Six Months (800 Hours)
Entry Qualification	Passed 10 th Class Examination with Science and Mathematics of its Equivalent and pursuing continuous regular schooling through NIOS for class 12 th .
Minimum Age	18 years as on first day of academic session.
Eligibility for PwD	LD, DEAF, LC, DW, AA, LV, HH
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	35 Sq. m
Power Norms	3 KW
Instructors Qualification for:	
(i) Remotely Piloted Aircraft (RPA)/ Drone Pilot Trade	<p>B.Voc/Degree in Aeronautical engineering/ ECE/ EEE/ Mechatronics from AICTE/UGC recognized university/ college with one year experience in building & piloting drones and good at teaching. Candidates with experience of a drone project or a project experience in Robotics are preferred.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Aeronautical engineering/ ECE/ EEE/ Mechatronics from AICTE / recognized technical board of education or relevant Advanced Diploma (Vocational) from DGT with two year experience in building & piloting drones and good at teaching. Candidates with experience of a drone project or a project experience in Robotics are preferred.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC passed in “Remotely Piloted Aircraft (RPA)/Drone Pilot” with three years experience in building & piloting drones and good at teaching. Candidates with experience of a drone project or a project experience in Robotics are preferred.</p>

Remotely Piloted Aircraft (RPA)/ Drone Pilot

	<p>Essential Qualification: Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Out of two Instructors required for the unit of 2 (1+1), one must have at least 200 hours of flying experience in the field. 2. Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them must possess NCIC in any of its variants. 		
(ii) Employability Skill	<p>MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes.</p> <p>(Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above)</p> <p style="text-align: center;">OR</p> <p>Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT Institutes.</p>		
(iii) Minimum Age for Instructor	21 Years		
List of Tools and Equipment	As per Annexure – I		
Distribution of training on hourly basis: (Indicative only)			
Total hours / week	Trade practical	Trade theory	Employability Skill
40 Hours	29 Hours	7 Hours	4 Hours

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 SPECIFIC LEARNING OUTCOME

1. Interpret DGCA Safety Regulations & observe safety guidelines, ATC procedures & Radio Telephony, Weather and meteorology as a RPA Pilot in flying a RPA.
2. Identify & select different types of RPA and illustrate Fundamentals of Flight (Aerodynamics) and Different Airframes in RPA flying.
3. Identify & select various parts of RPA like assembling Electric motors, Batteries, Chargers, Connectors, Electronic Speed Controllers (ESC), Transmitters, Receivers, sensors and flight Controllers.
4. Identify and compare the weather effects and analyze the performance of RPA.
5. Perform installation, maintain and configuration of ground control station software.
6. Perform preflight inspection and assembling of basic RPA parts like landing gears, propellers, antennas and any wire / electronics hanging outside.
7. Carryout basic training to fly RPA in flight simulator.
8. Plan and organize training to fly RPA in controlled environments.
9. Perform and obtain training to fly RPA in uncontrolled airspace including VLOS and BVLOS flight.
10. Apply emergency protocols to control and manage RPA flight.

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
<p>1. Interpret DGCA Safety Regulations & observe safety guidelines, ATC procedures & Radio Telephony, Weather and meteorology as a RPA Pilot in flying a RPA.</p>	Apply workshop safety norms.
	Identify & select safety rules while flying a RPA.
	Apply DGCA safety regulations.
	Recognize Do's and Don'ts of drone flying.
	Apply remote pilot, 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.
	Take METAR from MET office/ ATC before flying.
<p>2. Identify & select different types of RPA and illustrate Fundamentals of Flight (Aerodynamics) and Different Airframes in RPA flying.</p>	Identify & select different types of RPA.
	Identify basic components of RPA.
	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.
<p>3. Identify & select various parts of RPA like assembling Electric motors, Batteries, Chargers, Connectors, Electronic Speed Controllers (ESC), Transmitters, Receivers, sensors and flight Controllers.</p>	Learn motor Specifications and their performance RPA.
	Identify different electricity fundamentals (Wattage, voltage, Amperage and their relationship) and soldering techniques.
	Identify parallel vs. serial arrangements of batteries.
	Perform charging, cell balancing and explore various connectors.
	Learn ESC performance, ESC calibration and assembly procedure (both mechanical and electrical).
	Recognize different sensors & their applications in RPAS.
	Identify GPS applications in RPA flying.
	Perform power up connections
	Identify different radio control systems, controllers, transmitters and receivers, Frequency bands and programming transmitters.

4. Identify and compare the weather effects and analyze the performance of RPA.	Identify the factors that influence the performance of the RPAS.
	Identify and learn measurement of atmosphere pressure, effect of obstructions on wind speed and direction.
	Identify and learn measurement of temperature and humidity, Rain and solar radiation.
5. Perform installation, maintain and configuration of ground control station software.	Knowledge of GCS telemetry and Track RPA using telemetry.
	Learn GCS features and possible flight plans using GCS.
	Identify Flight mode operation, GUI parameters, Maps and user control operation.
	Perform 3D mapping and modeling.
	Perform Geographic Map along with UAV location, UAV trajectory, camera view polygon, waypoints and flight plan.
6. Perform preflight inspection and assembling of basic RPA parts like landing gears, propellers, antennas and any wire / electronics hanging outside.	List out the pre-flight inspection.
	Perform any three inspection procedures.
	Perform assembling & disassembling of RPA.
	Perform assembly of landing gears, propellers, antennas and electronics.
	Remotely-piloted aircraft system (RPAS) controls, know your remote control, safety precautions, pre-flight checks, arming and disarming.
	Method of RPA inspection Charging the battery Cleaning the RPA Storage Maintenance resources and standards.
7. Carryout basic training to fly RPA in flight simulator.	Identify Basic operating features of a RPA flight simulator.
	Select different aircrafts/RPAS and aerodromes.
	Carry out Demo flight in RPA Flight Simulator.
	Perform Pre-flight checks and start-up.
	Prepare & coordinate RPA flight.
	Take-off RPA and carry out flight stage.
	Perform in-flight checks.
	Do Approach and safe landing.
	Perform post flight checks.
	Identify emergency and handle it accordingly.
	Tackle In flight emergencies, Loss of link, Fly-aways (Straying).
	Loss of power, Control surface failures etc.
	Perform Practical flying with instructor in RPA simulator.
Fly a live RPA with instructor.	

	Fly a live RPA without instructor/Solo.
8. Plan and organize training to fly RPA in controlled environments.	<p>Understand the requirement of flying RPA in a controlled environment.</p> <p>Operate a small RPA in a controlled environment.</p> <p>Practice flying the RPAS in left/right and forward/backward motion, square pattern, circle.</p> <p>Practice flight mode such as takeoff, loiter, alt hold.</p> <p>Learn to land in GPS failsafe, radio failsafe and battery failsafe.</p> <p>RPAS controls, safety precautions, pre-flight checks, takeoff, learn basic flight modes such as manual, stabilize, alt hold and land.</p> <p>Learn to upgrade the autopilot / system firmware and test the machine in a controlled environment.</p> <p>Explore camera options, resolution and perform operation to full camera controls Pan/Tilt & Zoom In/Out.</p>
9. Perform and obtain training to fly RPA in uncontrolled airspace including VLOS and BVLOS flight.	<p>Apply knowledge of VLOS (visual line of sight) and BVLOS (Beyond Visual Line Of Sight) and identify safety practices for BVLOS and VLOS.</p> <p>Perform Secure Communication link between UAV and GCS.</p> <p>Identify & select other payload possibilities.</p> <p>Identify different payloads including cameras like Lidar, Thermal, RGB, Hyper spectral etc.</p> <p>Perform autonomous waypoint navigation (pre-defined as well as dynamically adjustable waypoints during flight).</p> <p>Remotely Piloted mode for video-based navigation (RPV Mode).</p> <p>Learn Geographic Map along with UAV location, UAV trajectory, camera view polygon, waypoints and flight plan.</p> <p>Fly RPA for application specific including Surveillance, Agriculture and Inspection.</p>
10. Apply emergency protocols to control and manage RPA flight.	<p>Identify loss of aircraft control. Perform activate the aircraft's Return to Home (RTH).</p> <p>Identify emergency and handle it accordingly.</p> <p>Identify emergencies like Aircraft structural failure, loss of power – battery, motor, Loss of GPS and loss of lights at night.</p> <p>Maintain Visual Line of Sight (VLOS) with the aircraft for as long as possible.</p> <p>Learn where to fly and how to fly legally and How you fly it in uncontrolled airspace.</p>

SYLLABUS FOR REMOTELY PILOTED AIRCRAFT(RPA)/DRONE PILOT TRADE			
DURATION: SIX MONTHS			
Duration	Reference Learning outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 87 Hrs; Professional Knowledge 21 Hrs (Week 1-3)	Interpret DGCA Safety Regulations & observe safety guidelines, ATC procedures & Radio Telephony, Weather and meteorology as a RPA Pilot in flying a RPA.	<ol style="list-style-type: none"> 1. Visit to various sections of the institute and identify location of various installations. (02 hrs.) 2. Identify safety signs for danger, warning, caution & personal safety message. (03 hrs.) 3. Practice Use of Personal Protective Equipment (PPE). (02 hrs.) 4. Practice elementary first aid. (05 hrs.) 5. Practice Preventive measures for electrical accidents & steps to be taken in such accidents. (05hrs.) 6. Practice Use of Fire extinguishers. (02 hrs.) 7. Practice workshop safety norms.(02hrs.) 8. Identify safety rules while flying a RPA.(05hrs.) 9. Practice DGCA safety regulations, Do's and Don'ts. (05hrs.) 10. Recognize issues RPA pilots encounter including airspace, traffic patterns etc.(05hrs.) 11. Practice Radio telephony 	Familiarization with the working of Industrial Training Institute system. Importance of safety and precautions to be taken in the industry/ shop floor. Introduction to PPEs. Introduction to First Aid. Importance of housekeeping & good shop floor practices. Occupational Safety & Health: Health, Safety and Environment guidelines, legislations & regulations as applicable. Importance of adopting a "safety attitude" when is flying a RPA. Workshop safety norms and outdoor flying safety regulations. Regulations of DGCA, Civil Aviation Requirements: Classification, Basic Air Regulations, Salient points, Do's andDon'ts. Issues aircraft pilots encounter including airspace, traffic patterns, and safe

		<p>using Standard radio terminology and RT Phraseology.(10hrs.)</p> <p>12. Communicate with virtual ATC including Position, Altitude Reporting etc. (12hrs.)</p> <p>13. Identify specific Flight Planning Procedures for specific RPA flights. (09hrs.)</p> <p>14. Recognize importance of Weather and meteorology in RPA flight. (09hrs.)</p> <p>15. Take METAR from mini weather station and MET office/ ATC before flying. (11hrs.)</p>	<p>attitudes.</p> <p>Understanding ATC operations Airspace Structure and Airspace Restrictions with knowledge of No RPA Zones Communicating with ATC including Position and Altitude Reporting Flight Planning Procedures Collision Avoidance Radio Telephony (RT) techniques Standard radio terminology and RT Phraseology Practice Session inRadio Communication.</p> <p>Weather and meteorology: The standard atmosphere, Measuring air pressure, Heat and temperature, Wind, Moisture, cloud formation Met Terminal Aviation Routine Weather Report (METAR).</p>
<p>Professional Skill 58 Hrs;</p> <p>Professional Knowledge 14 Hrs</p> <p>(Week 4-5)</p>	<p>Identify & select different types of RPA and illustrate Fundamentals of Flight (Aerodynamics) and Different Airframes in RPA flying.</p>	<p>16. Identify Different types of RPAS. (10hrs.)</p> <p>17. Select basic components and RPAS. (10hrs.)</p> <p>18. Fundamentals of flight aerodynamics (10hrs.)</p> <p>19. Recognize basic principles of flying like Bernoulli's Principle etc. (13hrs.)</p> <p>20. Apply principles of flight to RPAS. (15hrs.)</p>	<p>Different types of RPAS, Nomenclatures, and History of aerial RPAS, reputation, airframe, configurations, basic components, and current/future uses of RPAS.</p> <p>Introduction to aerodynamics, history of Flight, Newton's Laws of Motion, Bernoulli's Principle, four forces of Fight, three axes of Fight how they apply to RPA Flight.</p>
<p>Professional Skill 116 Hrs;</p> <p>Professional</p>	<p>Identify & select various parts of RPA like assembling Electric motors,</p>	<p>21. Identify each component in RPAS. (06hrs.)</p> <p>22. Perform assembling & disassembling of RPAS. (10hrs.)</p>	<p>History of helicopter design, early multi rotor design, various Configurations, airframe sizes and construction materials.</p>

Remotely Piloted Aircraft (RPA)/ Drone Pilot

<p>Knowledge 28 Hrs (Week 6-9)</p>	<p>Batteries, Chargers, Connectors, Electronic Speed Controllers (ESC), Transmitters, Receivers, sensors and flight Controllers.</p>	<ol style="list-style-type: none"> 23. Recognize multi rotor design, various configurations, airframe sizes and construction materials. (10hrs.) 24. Identify different propeller designs and choose appropriate propeller. (10hrs.) 25. Electricity fundamentals (Wattage, voltage, Amperage and their relationship) and soldering techniques. (15hrs.) 26. Calculate motor ratings for load capabilities for a RPA build. (10hrs.) 27. Identify parallel vs. serial arrangements of batteries. (10hrs.) 28. Practice charging, cell balancing and explore various connectors. (15hrs.) 29. Identify different role of FCs and ESCs. And its calibration (15hrs.) 30. Recognize different sensors & their applications in RPAS. (05hrs.) 31. Identify GPS applications in RPA flying. (05hrs.) 32. Identify different radio control systems, controllers, transmitters and receivers, Frequency bands and. (05hrs.) 	<p>History of propeller design, fixed-pitch and constant speed blades, airfoil design, size, pitch, and blade-count including balancing tips and construction materials.</p> <p>History of batteries, various makeup's, reactions and chemistry, parallel vs. serial arrangements, rechargeable batteries, Li-Po battery characteristics, charging, cell balancing and various connectors.</p> <p>AC/DC motor differences, amperage and voltage ratings, history of electric motors, brushed vs. brushless motors, Kv ratings, and calculations of motor capabilities for a RPA build.</p> <p>Introduction to the history radio control systems, controllers, transmitters and receivers, Frequency bands and programming transmitters.</p> <p>Introduction to role of ESCs, how they work, PWM, PPM, ESC calibration, Simon KVs. BLHeli firmware options and BEC, OPTO, and UBEC.</p> <p>Introduction to role off light controllers, how they work, Introduction to sensors, Sense-and-avoid technology, GPS, open source vs. closed source programming, and comparison of current FCs on the market.</p>
---	--	--	--

Remotely Piloted Aircraft (RPA)/ Drone Pilot

<p>Professional Skill 29Hrs; Professional Knowledge 07Hrs (Week 10)</p>	<p>Identify and compare the weather effects and analyze the performance of RPA.</p>	<p>33. Identify the factors that influence the performance of the RPAS. (09 hrs.) 34. Identify and learn measurement of atmosphere pressure, effect of obstructions on wind speed and direction. (10 hrs.) 35. Identify and learn measurement of temperature and humidity, Rain and solar radiation. (10 hrs.)</p>	<p>Introduction to measurement systems and sensors. To develop a basic understanding of the principles involved in measurements. To introduce the state-of-the-art sensors for various engineering applications. Different types of sensors operate in very different ways. Data on the weather qualities of each specific sensor must be obtained prior to implementation. Sensors and platforms; To enable the students to interface the sensors with RPA platforms.</p>
<p>Professional Skill 58 Hrs; Professional Knowledge 14 Hrs (Week 11-12)</p>	<p>Perform installation, maintain and configuration of ground control station software.</p>	<p>36. Knowledge of GCS telemetry and Track RPA using telemetry. (05hrs.) 37. Learn GCS features and possible flight plans using GCS. (05hrs.) 38. Identify Flight mode operation, GUI parameters, Maps and user control operation. (05hrs.) 39. Autonomous Waypoint Navigation and Dynamic flight plan adjustment. (03 hrs.) 40. Perform 3D mapping and modeling. (05 hrs.) 41. Perform Geographic Map along with UAV location, UAV trajectory, camera view polygon, waypoints and flight plan. (05 hrs.) 42. Collect and explore Flight data, Sensor data, Flight planning data, Airspace and</p>	<p>Introduction to telemetry, data tracking, mission planning, and 3D mapping and modeling. First-person-view (FPV) flying, safety and drone racing options. Introduction to ground control station software and its features. What is RPA Data? What Types of data are there? How to analyze and report on RPA Data, RPA Imaging Data? Data & Analytics: How to Report on Missions. The data collected from these RPA images can then be measured, analyzed, tracked, and compared over time.</p>

Remotely Piloted Aircraft (RPA)/ Drone Pilot

		<p>weather data. (10hrs.)</p> <p>43. Platform Analytics: including performance figures on orders, missions, inspections, flights, pilots, and data. (10hrs.)</p> <p>44. Data Mapping and Navigation: with a graphical user interface to navigate across 2D/3D models, visualize on maps, and click through images. (10hrs.)</p>	
<p>Professional Skill 58 Hrs;</p> <p>Professional Knowledge 14 Hrs</p> <p>(Week 13-14)</p>	<p>Perform pre flight inspection and assembling of basic RPA parts like landing gears, propellers, antennas and any wire / electronics hanging outside.</p>	<p>45. Learn all three inspection procedures. (03hrs.)</p> <p>46. Prepare the checklist immediately before piloting a RPA to ensure best practice for mission success. (05hrs.)</p> <p>47. Perform assembly of landing gears, propellers, antennas and electronics. (10hrs.)</p> <p>48. Remotely-piloted aircraft system (RPAS) controls, know your remote control, safety precautions, pre-flight checks, arming and disarming. (15hrs.)</p> <p>49. Method of RPA inspection charging the battery Cleaning the RPA Storage Maintenance resources and standards. (10hrs.)</p> <p>50. Perform assembly of Gimble, camera and base station hardware and software setup. (15hrs.)</p>	<p>Introduction to inspection procedures.</p> <p>History of propeller design, fixed-pitch and constant speed blades, airfoil design, size, pitch, and blade-count including balancing tips and construction materials.</p> <p>Knowledge about remote control, safety precautions, pre-flight checks, arming and disarming.</p> <p>Procedures of Charging the battery, importance of Cleaning the RPA Storage Maintenance resources and standards.</p>
<p>Professional Skill 58 Hrs;</p> <p>Professional</p>	<p>Carryout basic training to fly RPA in flight simulator.</p>	<p>51. Identify Basic operating features of a RPA flight simulator. (03hrs.)</p> <p>52. Select different</p>	<p>Basic operating features of a RPA flight simulator, How to select different aircrafts/RPAS and aerodromes, knowledge of</p>

Remotely Piloted Aircraft (RPA)/ Drone Pilot

<p>Knowledge 14 Hrs (Week 15-16)</p>		<p>aircrafts/RPAS and aerodromes. (05hrs.)</p> <p>53. Carry out Demo flight in RPA Flight Simulator with Pre-flight checks, start-up, Take-off RPA and carry out flight stage. (10 hrs.)</p> <p>54. Do Approach and safe landing, perform post flight checks and identify emergency, Loss of link, Loss of power, Control surface failures etc. (05 hrs.)</p> <p>55. Perform Practical flying with and without instructor in RPA simulator. (10 hrs)</p> <p>56. Fly RPARPA in Simulator. RPA. (10 hrs)</p> <p>57. Carry out entire flying operations from pre-flight checks to after flight checks while flying RPA with instructor and solo flying RPA. (10 Hrs)</p> <p>58. Demonstrate Handling in flight emergencies, fail safe mechanisms. (05 Hrs)</p>	<p>Demo flight.</p> <p>Introduction to demonstrate solo flight training and Live RPA flying, Flight Operation, Flying a RPA in simulator training.</p> <p>Introduction to photogrammetry for stitching and analysis of RPA pictures.</p>
<p>Professional Skill 58 Hrs; Professional Knowledge 14 Hrs (Week 17-18)</p>	<p>Plan and organize training to fly RPA in controlled environments.</p>	<p>59. Carry out First-person-view (FPV) flying. (03hrs.)</p> <p>60. RPA Understand the requirement of flying RPA in a controlled environment. (05hrs.)</p> <p>61. RPAS controls, safety precautions, pre-flight checks, takeoff, learn basic flight modes such as manual, stabilize, alt hold and land. (05hrs.)</p> <p>62. Practice flying the RPAS in left/right and forward/backward motion,</p>	<p>Introduction to demonstrate RPA flying operation, Flying a RPA in controlled environment with different modes of operation.</p> <p>Overview of the main quad copter parts, choosing a place to learn how to fly an RPA, how to get your RPA off the ground, flying your quad copter left/right and forwards/backwards, Beginner and Advanced RPA flying techniques.</p>

		<p>square pattern, circle. (05hrs.)</p> <p>63. Practice flight mode such as takeoff, loiter, alt hold. (05hrs.)</p> <p>64. Learn to land in GPS failsafe, radio failsafe and battery failsafe. (05hrs.)</p> <p>65. Learn to upgrade the autopilot / system firmware and test the machine in a controlled environment. (15hrs.)</p> <p>66. Explore camera options, resolution and perform operation to full camera controls Pan/Tilt & Zoom In/Out. (05hrs.)</p> <p>67. Plan & estimate payload considerations, camera options, resolution etc. & other payload possibilities. (05hrs.)</p> <p>68. Identify different payloads including cameras like Lidar, Thermal, RGB, Hyper spectral etc. (05hrs.)</p>	<p>Introduction to Payload considerations, camera options, resolution, still photography, video photography, GPS modes, vibration and Jello effect, exposure settings, camera lenses, video Frame rate, image files, camera payloads, and other payload possibilities.</p>
<p>Professional Skill 29 Hrs;</p> <p>Professional Knowledge 07 Hrs</p> <p>(Week 19)</p>	<p>Perform and obtain training to fly RPA in uncontrolled airspace including VLOS and BVLOS flight.</p>	<p>69. Apply knowledge of VLOS (visual line of sight) and BVLOS (Beyond Visual Line Of Sight) and identify safety practices for BVLOS and VLOS. (03hrs.)</p> <p>70. Perform Secure Communication link between UAV and GCS. (02hrs.)</p> <p>71. Identify & select other payload possibilities. (02hrs.)</p> <p>72. Identify different payloads including cameras like Lidar,</p>	<p>What are VLOS, BVLOS, IFR, and VFR? Why do they affect RPA operations? What rules and restrictions apply to flights performed in 'visual line of sight' (VLOS) and 'beyond visual line of sight' (BVLOS)?</p> <p>Introduction of different payload like cameras, thermal cameras, Lidar sensor, RGB and Hyper spectral cameras. Payload connection and its operation procedure to for RPA Flight in a uncontrolled</p>

		<p>Thermal, RGB, Hyper spectral etc. (05hrs.)</p> <p>73. Perform autonomous waypoint navigation (pre-defined as well as dynamically adjustable waypoints during flight). (05hrs.)</p> <p>74. Remotely Piloted mode for video-based navigation (RPV Mode). (02hrs.)</p> <p>75. Learn Geographic Map along with UAV location, UAV trajectory, camera view polygon, waypoints and flight plan. (05hrs.)</p> <p>76. Fly RPA for application specific including Surveillance, Agriculture and Inspection. (05hrs.)</p>	<p>environment.</p> <p>How to choose a RPA based on the application different sectors like agriculture, inspection and etc.</p>
<p>Professional Skill 29 Hrs;</p> <p>Professional Knowledge 07 Hrs</p> <p>(Week 20)</p>	<p>Apply emergency protocols to control and manage RPA flight.</p>	<p>77. Identify emergency and handle it accordingly. (05Hrs.)</p> <p>78. Learn instrument flying rules using manual/ semi-autonomous flight modes. (05hrs.)</p> <p>79. Identify emergencies like Aircraft structural failure, loss of power – battery, motor, Loss of GPS and loss of lights at night. (05Hrs.)</p> <p>80. Maintain Visual Line of Sight (VLOS) with the aircraft for as long as possible. (05Hrs.)</p> <p>81. Learn where to fly and how to fly legally and how you fly it in uncontrolled airspace. (09Hrs.)</p>	<p>Introduction to the safety risks Guidelines to fly RPA, UAV Regulations in India, Personal Safety, UAV Operations & Safety, Regulatory and regulations, Emergency identification and handling, In flight emergencies Loss of link, Fly-away (Straying), Loss of power, Control surface failures.</p>
		<p><i>*Refer to Annexure-I (A) for Specific Course content in detail as per DGCA Guidelines. (36 hrs)</i></p>	

SYLLABUS FOR CORE SKILLS

1. Employability Skills (Common for all CTS trades) (80 Hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in



List of Tools & Equipment			
REMOTELY PILOTED AIRCRAFT(RPA)/DRONE PILOT (For batch of 24 Candidates)			
S No.	Name of the Tools and Equipment	Specification	Quantity
A. GENERAL TOOLS			
1.	Pliers		7 Nos.
2.	Soldering Station		7 Nos.
3.	Multi meter		7 Nos.
4.	Tweezer		7 Nos.
5.	Binoculars		7 Nos.
6.	Anemometer		7 Nos.
7.	Magnifier		7 Nos.
B. CONSUMABLES			
8.	Assorted set of Tapes (masking, duct, scotch, double sided, cloth tapes etc)		7 Nos.
9.	Assorted sets of wires	(12 to 24 AWG wires)	7 Nos.
10.	Assorted set of sleeves	(2 mm to 20mm sleeves)	7 Nos.
11.	Assorted sets of ties (zip ties, bunching sleeves)		7 Nos.
12.	Assorted sets of epoxy	(quick fix, gorilla glue, 5mins epoxy, 24 hrs epoxy, hot glue etc)	7 Nos.
13.	Assorted set of screws	(M2 to M6)	7 Nos.
14.	First aid kit		7 Nos.
C. Drone kit			
15.	Drone Quad copter kit includes: <ul style="list-style-type: none"> • GPS Module • Propellers • BLDC Motors - • ESC(Electronic Speed controllers) • FCB (Flight Controller Board)/Auto pilot • Lipo Battery • Lipo Battery Charger • RF Transmitter and receiver • Drone base • Receiver cables • Lidar 	Processor : Cortex-M4F 168MHz / 252MIPS 14 PWM / Servo outputs (8 with failsafe and manual override, 6 auxiliary, high-power compatible) Wheel-base 450mm, Landing Support, BASE PCB(For Fixing Frames) Motor Brushless, 920RPM/V, 168dBm navigation Sensitivity, Navigation update rate up to 10Hz, includes Digital Compass Sensor. Controller 10channel, Receiver:	6 Nos.



Remotely Piloted Aircraft (RPA)/ Drone Pilot

		<p>14channels RF Range 2.40 ~ 2.48GHz Band width : 500kHz Band : 142 RF Power : Less than 20dBm 2.4GHz System : LiDAR:Operating Range : 0.3m ~ 12m - Applicable voltage range : 4.5V ~ 6V (Serial TTL Level is 3.3V) - Acceptance angle : 2.3° - Frequency : 100Hz - Accuracy : 1%(~6m), 2%(6m~12m)</p>	
16.	<p>NPNT compliant Micro UAV built for Mapping and Surveillance. Mapping/RGB/Photogrammetry Payload, 15 MP and Ground Control Station Software with data-link equipment</p>	<p>UAV Weight with battery and standard payloads - <2 Kg UAV Size with Propeller - < 80 cm x 80 cm Endurance/ Flight time (upto 1000m AMSL) - 20-25 minutes Range for live transmission (Radius) - 2 km Typical Cruise Speed - 7 m/s Operating altitude (AGL) - 200m AGL (Above Ground Level) Maximum launch altitude (AMSL) - 3000m AMSL (Above Mean Sea Level) Wind Resistance - Minimum 10 m/s Failsafe features - Return to Home on communication failure - Return to Home/Land on low battery or battery issues - Return to home on high winds - Multiple GPS on-board for GPS failure redundancy Autonomy Fully autonomous from Take-off to Landing without using any R/C controller Payload Characteristics - Mapping/RGB/Photogrammetry Payload, 15 MP</p>	2 Nos.
17.	HD Payload,	1280X720,5X Optical Zoom Video Resolution	2 Nos.
18.	Thermal Camera Payload	320X240 pixel	2 Nos.
19.	Field Repair kits		2 Nos.
20.	Mini Weather station with sensors	<p>Air Temperature :0°C to100°C Relative Humidity : 0% to 100 %RH Solar Radiation Range : 0 to 2000W/m2 Atmospheric Pressure Range : 15- 115kPa Air Quality Sensor (PM2.5) : 10 - 500 Wind Speed Sensor Speed : 0 to 20m/S Wind Direction Sensor : North, East,</p>	2 Nos.



Remotely Piloted Aircraft (RPA)/ Drone Pilot

		<p>West, South, North-East, East-South, North-West, South-West Rainfall : Tipping bucket in mm</p> <p>System should have portable mechanical structure with all sensors mounted on it. LCD Display for real time data monitoring and USB interface for local storage and GSM connectivity for cloud storage, Application Software for Dashboard for real time and remote monitoring and analysis. Power Supply : Main 230V AC and Battery operated when used in field: 12V/7Ah</p>	
21.	GSP Trainer	<p>Channel : 12 Receiver Frequency : 1575.42 MHz Position Accuracy : 25 meters CEP without SA Velocity Accuracy : 0.1 meters/second, without SA Time Accuracy : Synchronized to GPS time Update rate : 1 sec. Receiver Sensitivity : -175 dB Serial Communication : 4800 Baud Rate (default) Protocol Messenger : NMEA0183 V 2.2, SiRf binary & RTCMSC-104 V2.0 type 1,2,9 Maximum Speed : 515 meters/sec. Maximum Altitude : 18000 meters Time to First Fix : 45 / 38 / 8 sec</p> <p>USB for PC communication GPS Software for analysis Study of PRN code Study of common NMEA standard Protocol like, GPGGA, GPGLL, GPGSA, GPGSV, GPRMC, GPVTG Study of other GPS NMEA standard like, GPALM, GPGRS, GPGST, GPMSS, GPZDA</p>	2 Nos.
22.	Handheld weather meter	<p>Air Temperature : 0°C to 100°C Relative Humidity : 0% to 100 %RH UV Index, Atmospheric Pressure Range : 15- 115kPa Carbon dioxide (CO₂) : 0 – 2000 ppm Carbon monoxide (CO) : 1 – 1000 ppm Temperature sensor : 0 to 100 degree Humidity sensor : 5 to 95% RH Power : 5V DC/1A PC interface : USB</p>	2 Nos.



Remotely Piloted Aircraft (RPA)/ Drone Pilot

		Charging : USB Battery : 3.7V/2200mAh Connectivity Wi-Fi : 802.11 b/g/n wireless LAN USB : USB 2.0 • Desktop application for data collection • Battery backup inbuilt battery protection and charging circuit • Inbuilt wireless data transmitter over wi-fi • USB charging port	
23.	Indoor netted facility		Size as required in Lab
24.	outdoor controlled netted testing facility		Size as required for outdoor
25.	RPA and spare parts kit		2 Nos.
26.	Balance Charger		2 Nos.
27.	Power distribution board		6 Nos.
28.	Simulator to teach drone assembly		6 Nos.
29.	Real Flight Simulator		4 Nos.
30.	Thrust measurement meter		2 Nos.
31.	Universal Battery Eleminator Circuit (UBEC)		4 Nos.
32.	Servo tester		4 Nos.
33.	Current meter		4 Nos.
34.	GPS Jammer		1 Nos.
35.	Drone upto 18KM	<ul style="list-style-type: none"> • Automatic flight • Payload or camera control • Up to 3 kg payload • IP55 rating • Up to 18 km • Flight time up to 40 minutes • Aircraft dimensions 600 x 600 x 500 mm (LxWxH) • Joystick Controller • Auto fly home and landing Camera angle control Camera shutter and zoom Multiple camera switching 	1no. (Optional)

Note: -

1. Internet facility is desired to be provided in the classroom.

SPECIFIC COURSE CONTENT AS PER DGCA GUIDELINES - 5 DAY COURSE

No. Subjects	Theory Classes	No. of Classes
1.	Regulations of DGCA	01
2.	Basic Principles of Flight	01
3.	ATC Procedures & Radio Telephony	01
4.	Fixed wing Operations/Aerodynamics	01
5.	Multi rotor Operations/Aerodynamics	01
6.	Weather & Meteorology	01
7.	Drone equipment and maintenance	01
8.	Emergency Identification & handling	01
9.	Payload installation & utilization	01
10.	Image/video interpretation	01
11.	Final Test Theory	01
Total No. of Theory Classes		11
No. Subjects	Practical Training	No. of Classes
1.	Flight Simulator training	08
2.	Practical lessons in Lab	01
3.	Practical flying lessons	15
Total No. of Practical Classes		24
Total Training		35

DETAILED CURRICULUM FOR SPECIFIC COURSE
CONTENT

AS PER DGCA GUIDELINES

No. of Day	Topics of Training	Description of Training
Day 01:	Regulations of DGCA, Civil Aviation Requirements (01 Class)	<ul style="list-style-type: none"> - Classification - Basic Air Regulations - Salient points - Do's and Don'ts
	Basic principles of flight (01 Class)	<ul style="list-style-type: none"> - Fundamentals off light - Aerodynamics - Take-off, flight, and landing - Man oeuvres, turns and circuit pattern
	ATC procedures & Radio Telephony (01 Class)	<ul style="list-style-type: none"> - Understanding ATC operations - Airspace Structure and Airspace Restrictions with knowledge of No Drone Zones - Communicating with ATC including Position and Altitude Reporting - Flight Planning Procedures - Collision avoidance - Radio Telephony (RT)techniques - Standard radio terminology and RT Phraseology - Practice Session in Radio Communication
	Fixed wing operations and aerodynamics (01 Class)	<ul style="list-style-type: none"> - Types of fixed wing drones, make, parts and terminology - Operation and man oeuvres of fixed wing drones - Applications and operations - Advantages/disadvantages over multi rotor drones
	Multi rotor introduction (01 Class)	<ul style="list-style-type: none"> - Basic drone terminology - Types of drones, material used and size of drones

		<ul style="list-style-type: none"> - Motors and propellers - Electronic Speed Controller (ESC), flight controllers - Operation and Applications of drones - Advantages/disadvantages over multi rotor drones
	Weather and meteorology (01 Class)	<ul style="list-style-type: none"> - The standard atmosphere - Measuring air pressure - Heat and temperature - Wind - Moisture, cloud formation - Met Terminal Aviation Routine Weather Report (METAR)
	Drone equipment maintenance (01 Class)	<ul style="list-style-type: none"> - Maintenance of drone, flight control box, ground station - Maintenance of ground equipment, batteries and payloads - Scheduled servicing - Repair of equipment - Fault finding and rectification
Day 02:	Emergency identification and handling (01 Class)	<ul style="list-style-type: none"> - In flight emergencies - Loss of link - Fly-aways (Straying) - Loss of power - Control surface failures
	Payload, installation and utilization (01 class)	<ul style="list-style-type: none"> - Types of payloads - Parts of payloads - Installation - Features of payloads - Utilization
	Image and video interpretation (01 Class)	<ul style="list-style-type: none"> - Principles of observation - Interpretation of image/video - Analysis
	Final test - Theory (40 min)	-
	Introduction to flight simulator (01 Class)	<ul style="list-style-type: none"> - Basic operating features of simulator - How to select different aircrafts and aerodromes

		- Demo flight
	Flight simulator training (02 Classes)	- Pre-flight checks and start-up - Preparation cum coordination for flight - Take-off and flight stage - Approach and landing - After flight checks
Day 03:	Flight simulator training (05 Classes)	- Pre-flight checks and start-up - Preparation cum coordination for flight - Take-off and flight stage - Approach and landing - After flight checks
	Practical lessons in Lab (01 Class)	- Assembling of drone - De-assembling - Integration of sub-sections/modules - Integration of engine/propulsion system - Fault finding and rectification - Repair maintenance and documentation
	Practical flying (01 Class)	- with instructor
Day 04:	Practical flying	- Full day flying with instructor
Day 05:	Solo flying	- Full day flying without instructor

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all others who contributed in revising the curriculum.

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of members/ Expert committee meeting to revise the syllabus of Remotely Piloted Aircraft (RPA)/ Drone Pilot			
S No.	Name & Designation Sh./Mr./Ms	Organization	Remarks
1.	LK Mukherjee, Joint Director	RDSDE Kanpur	Convener
2.	C. S. Murthy, Joint Director	CSTARI Kolkata	Member
3.	N. Nath, Deputy Director	NIMI Chennai	Member
4.	Asheesh Kumar Shukla, Assistant Director	RDSDE Kanpur	Member
5.	Rachit Bhatnagar, CEO AASSC, Bengaluru	AASSC, Bengaluru	Member
6.	Sanjay Nath, Managing Director	Tech 24 Aviation, Kolkata.	Member
7.	Shuddho Ghosh, Unit Head	Tech 24 Aviation, Kolkata.	Member
8.	Satyabrata, Director	Voyzon Aerospace Pvt. Ltd. Bengaluru	Member
9.	Sandip Chatterjee, Ex Joint General Manager	Airport Authority of India Kolkata	Member
10.	Bhudeb Sarkar, Deputy General Manager, E-C	Airport Authority of India Kolkata	Member
11.	Ravindranath, Deputy General Manager	Technical Training Institute, HAL. Bengaluru	Member
12.	Soundrarajan, Sr. General Manager	Taneja Aerospace and Aviation Limited, Belagondapalli, Hosur, Tamilnadu.	Member
13.	Aravind Kumar, CEO	Dassault Reliance Aerospace Ltd. Nagpur	Member
14.	Mayur Yaul	Dassault Skill Academy, Nagpur	Member
15.	Ambrish Kela, Managing Director	Scientech Technologies Pvt. Ltd. Indore, Madhya Pradesh	Member

Remotely Piloted Aircraft (RPA)/ Drone Pilot

	& CEO		
16.	Rajeshwari. M, Deputy Director	NSTI Bengaluru	Member
17.	Debashis Acharya, General Secretary	State Private ITI Association, SPITIA, Odisha.	Member
18.	M. K. Singh, Principal	Govt. ITI Pandunagar, Kanpur,U.P.	Member
19.	Rajeev Karothia, Asst. Manager R&D (Embedded & IoT)	Scientech Technologies Pvt. Ltd. Indore, Madhya Pradesh	Expert
20.	Prashant Tomar, Sr. R&D Engineer	Scientech Technologies Pvt. Ltd., Indore	Expert
21.	Peeyush Tandon, AGM	ideaForge Technology, Mumbai	Expert
22.	Dr. Manju k Chattopadhyay, Assistant Professor	School of Electronics Devi Ahilya University, Indore	Expert
23.	D K Sharma, MD & Chairman	Technology Exchange Services Pvt. Ltd., Ahmadabad	Expert
24.	Arvind Mishra, Director	Techlene Software Solutions Pvt. Ltd., Indore	Expert
25.	Tushar Bidawe, Manager- Enterprise Applications	Idea Forge Technology, Mumbai	Expert
26.	Maurice Raaijmakers, Global Business Development Manager	Aerialtronics, Netherlands	Expert
27.	Abinash Sahoo, Systems Engineer	Asteria Aerospace Pvt. Ltd, Bangalore	Expert
28.	Capt Gaurav Nath, Founder and CEO	CLEARSKIES Aviation OPC Pvt Ltd	Expert

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities

