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

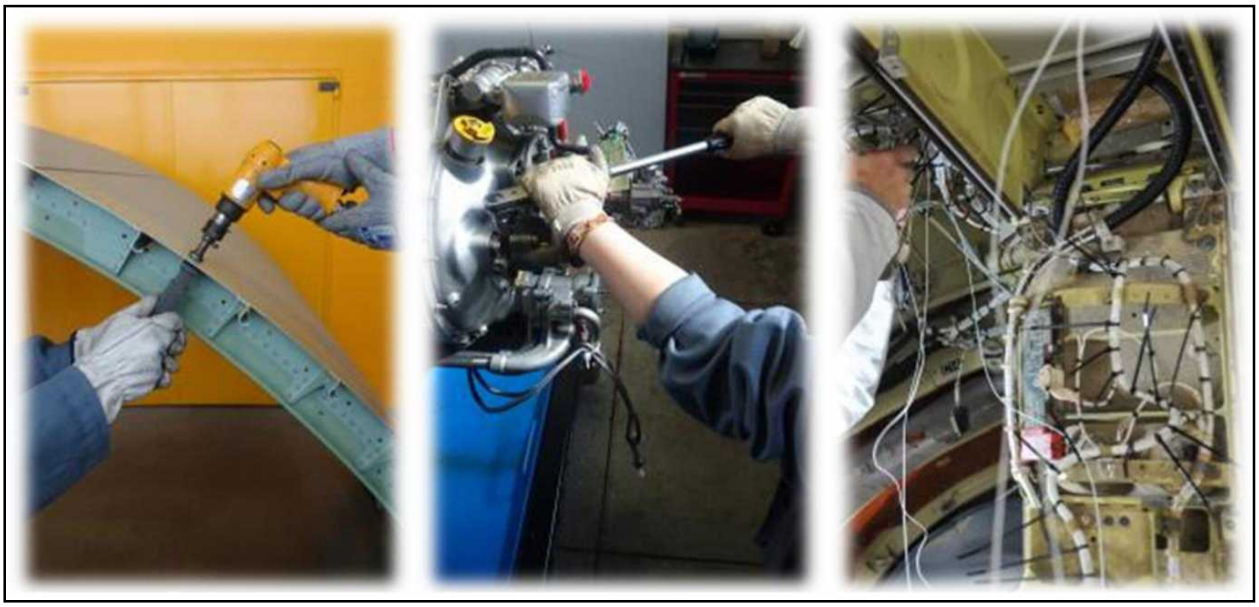
COMPETENCY BASED CURRICULUM

AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 5



SECTOR– CAPITAL GOODS & MANUFACTURING

Directorate General of Training

AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER

(Engineering Trade)

(Designed in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 5

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

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1. COURSE INFORMATION

During the two-year duration, a candidate is trained on subjects- Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Science & Calculation and Employability Skills related to job role. In addition to this, a candidate is assigned to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task.

The broad components covered under this trade are as below:-

FIRST YEAR: In the first year, the trainee learns about safety aspect related to the trade, basic fitting operations viz., marking, filing, sawing, chiseling, drilling, tapping, grinding to an accuracy of ±0.25mm. The trainee is able to make different fits viz., sliding, T-fit and square fit with an accuracy of ±0.2mm & angular tolerance of 1°. He/she is able to operate on Lathe for different shaped job and produce components by different turning operation including thread cutting; Makes different types of simple sheet metal components for assembling and checking accuracy using appropriate measuring instruments. The trainee learns to prepare simple sheet metal with bending and rivet metal components using squeeze riveting, "C" squeeze, rivet metal components using rivet gun, rivet big size metal components using appropriate tools; check the mechanical properties of the riveted parts and interpret the tensile test results.

SECOND YEAR: During the second year, the trainee learns to perform monolithic panel in plain weave composite material, glass fibre, unidirectional carbon fibre by wet lay-up; produce composite riveted components using different thicknesses of carbon fibre and different types of rivets. Also, he/she performs practical on manufacturing of composite open and closed riveted box using different types of metal and composite materials. The trainee learns how to perform surface treatment and touch-ups on manufactured metal parts; he/she is able to perform different Non Destructive Tests (NDT) by observing standard procedures; Plan, dismantle, and assemble different mechanical components used for full mechanical flight control chain, hydraulic components and pneumatic components and fuel components. Also he/she learns to perform basic electrical tests relative to connections and check compliance of harness building.

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 economy/ Labour market. The vocational training programmes are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variants and Apprenticeship Training Scheme (ATS) are the two pioneer programmes of DGT for propagating vocational training.

Aeronautical Structure and Equipment Fitter trade under CTS is one of the newly designed courses. The CTS courses are delivered nationwide through network of ITIs. The course is of two years duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory & Practical) impart professional skills and knowledge, while Core area (Workshop Calculation Science, Engineering Drawing and Employability Skills) impart requisite core skill, knowledge and life skills.After passing out of the training programme, the trainee is awarded National Trade Certificate (NTC) by DGTwhich is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job and machining work.
- Check the job/components as per drawing for functioning, identify, report any error to hierarchy and rectify errors in job/components.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Technician and will progress further as Senior Technician, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can take admission in diploma course in notified branches of Engineering by lateral entry.
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).

- Can joint Crafts Instructor Training Scheme (CITS) in the Trade for becoming instructor in ITIs.
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years:

S No.	Course Element	Notional Training Hours	
		1st Year	2nd Year
1	Professional Skill (Trade Practical)	1000	1000
2	Professional Knowledge (Trade Theory)	280	360
3	Workshop Calculation & Science	80	80
4	Engineering Drawing	80	80
5	Employability Skills	160	80
	Total	**1600**	**1600**

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment 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 have to maintain 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 method. 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 assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/wastage as per procedure, behavioral attitude, sensitivity to 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.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the

	project/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.	• Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% accuracy achieved while undertaking different work with those demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
(c) Weightage in the range of above 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 in the use of hand tools, machine tools and workshop equipment. • Above 80% accuracy achieved while undertaking different work with those demanded by the component/job. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Aeronautical Structure Fitter:

- Assembles aircraft structure parts using fasteners or rivets with respect of standard procedures.
- Controls the quality of an assembly.
- Manufactures metallic parts with compliance of manufacturer reference publication.
- Manufactures composite parts with compliance of manufacturer reference publication.
- Identifies and checks assembly operations and makes touch-ups, adjustments.
- Checks, positions and fixes fasteners and elements of assemblies.
- Knows and applies safety rules and quality standards.
- Uses manual and power tools.
- Studies drawings to understand specification of different parts, fittings or assembles to be made and their functions.
- Removes corrosion using standard procedures.
- Selects materials, appropriate tool and equipment's to carry out the work. Holds the work in vice, cuts and shapes required parts to dimensions and specifications by processes of sawing, filing, grinding, drilling holes, scrapping etc., using hand tools for making specimens or finished components.
- Measures object while working using calipers, micrometer, gauges, etc. and checks for correct filing with square.
- Gets half-finished object marked or marks it himself using marking block scriber, vernier, height gauges, etc. depending on accuracies required, to indicate guidelines for finished sizes, holes to be drilled and pitch centres, threads to be cut and other working details as specified in drawing or sample.
- May make parts separately and assembles those with screws, rivets, pins, etc. as specified, so as to make complete unit according to drawing.
- Dismantles or removes worn out, broken or defective parts using hand tools or power tools and replaces them by repaired one or new ones.

Aeronautical Equipment Fitter for Fluid Aircraft Systems:

- Marks non-compliant components and removes non-compliant components from production;
- Controls the quality of a component;
- Identifies and checks assembly operations and makes touch-ups, adjustments;
- Checks, positions and fixes parts and elements of the assemblies;
- Knows and applies safety rules and quality standards;
- Uses manual and power tools;

- Reads and understands the technical documentation;
- Knows the operations and functions of different fluid aircraft systems;
- Masters the different mechanical locking and sealing techniques;
- Manages and uses Ground Support Equipment to perform a leak test;
- Performs visual inspection of a system and corrects the defects according to the technical documentation;
- Knows the appropriate assembly technique to pipes, mechanical assemblies, graviner, fluid equipment concerning hydraulic, pneumatic, oxygen, conditioning and fuel systems.
-

Aeronautical Equipment Fitter for Electrical Aircraft Systems:

- Selects cables and associated parts from the wiring diagram and technical documentation;
- Assembles supports and wiring attaching parts;
- Prepares and positions electrical equipment, wires, harness on a support;
- Checks the electrical continuity of the wiring and makes the settings prior to powering on;
- Uses of electrical measuring devices;
- Masters Stripping, crimping and connecting techniques;
- Applies electrical safety standards and respects wiring arrangement rules;
- Performs visual appreciation of wiring installations.

In addition, "Aeronautical Structure and Equipment Fitter" have the following abilities:

- Good visualization and coordination of the job;
- Manual dexterity;
- Performing work applying mathematical calculations;
- Planning and organizing the assigned work;
- Detecting and resolving issues during work execution with confident feedback to the managing team;
- Being aware about responsibilities of its working activities according to flight safety rules;
- Demonstrating possible solutions and agree tasks within the team;
- Communicate with required clarity and understand technical English;
- Sensitive to environment, self-learning, productivity and team spirit.

Plan and organize assigned work, detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

May be designated as **Aeronautical Structure and Equipment Fitter** according to nature of work done

Reference NCO-2015:3115.1000- Aeronautical Engineering Technician.

4. GENERAL INFORMATION

Name of the Trade	**AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER**
Trade Code	DGT/2013
NCO - 2015	3115.1000
NSQF Level	Level – 5
Duration of Craftsmen Training	Two Years (3200 Hours)
Entry Qualification	Passed 10th Class examination with Science and Mathematics
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, LC, DW, AA, LV, HH
Unit Strength (No. Of Students)	20 (There is no separate provision of supernumerary seats)
Space Norms	400 Sq. m
Power Norms	110 KW
Instructors Qualification for	
1. Aeronautical Structure and Equipment Fitter Trade	B.Voc/Degree in Aeronautical/ Mechanical Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Aeronautical/Mechanical Engineering from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** Candidate with 20 years of service, Sergeant/Warrant Officer Rank. Candidate should have undergone methods of instruction course and with minimum two years of experience in technical training institute of Indian Air Force/Indian Navy of equivalent Rank. **OR** NTC/NAC passed in the trade of "Aeronautical Structure and Equipment Fitter" with three years' experience in the relevant field.

	Essential Qualification: Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT. ***NOTE:- 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.***
2. Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the engineering trades with three years' experience. **<u>Essential Qualification:</u>** National Craft Instructor Certificate (NCIC) in relevant trade OR NCIC in RoDA or any of its variants under DGT
3. Engineering Drawing	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the Mechanical group (Gr-I) trades categorized under Engg. Drawing'/ D'man Mechanical / D'man Civil' with three years' experience. **<u>Essential Qualification:</u>** National Craft Instructor Certificate (NCIC) in relevant trade OR NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT.
4. Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability

	Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT institutes.
5. Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

Distribution of training on Hourly basis: (Indicative only)

Year	Total Hrs /week	Trade Practical	Trade Theory	Workshop Cal. & Sc.	Engg. Drawing	Employability Skills
1st	40 Hours	25 Hours	7 Hours	2 Hours	2 Hours	4 Hours
2nd	40 Hours	25 Hours	9 Hours	2 Hours	2 Hours	2 Hours

5. LEARNING OUTCOME

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

5.1 LEARNING OUTCOME (TRADE SPECIFIC)

FIRST YEAR:

1. Plan and organize the work to make job as per specification applying different types of basic fitting operation and check for dimensional accuracy following safety precautions.
2. Perform making of basic adjustment of sheet metal and Joining techniques for sheet metal and metal components.
3. Produce components by different operations and check accuracy using appropriate measuring instruments.
4. Make different fit of components for assembling as per required tolerance observing principle of interchangeability and check for functionality.
5. Check the mechanical properties of the different materials and interpret the tensile test results.
6. Make different types of simple sheet metal components for assembling using hand drill machine and check accuracy using appropriate measuring instruments according to required tolerances ±0.1 mm.
7. Manufacture simple sheet metal with bending and check accuracy using appropriate measuring instruments and according to required tolerances ±0.1 mm.
8. Manufacture sheet metal as per drawing and Join them by basic riveting observing standard procedure.
9. Make and assemble components by different handling fitting operations and checking accuracy using appropriate measuring instruments.
10. Produce straight and curved interchangeable metal components by sheet metal working operations and check accuracy using appropriate measuring instruments and according to required tolerances ±0.1 mm.
11. Perform PR sealant application on structure panels without riveting and perform a tensile test for checking the correct bonding PR sealant application.
12. Manufacture open and closed riveted box with two different thicknesses, bended sheets, anchor nuts and electrical bonding.

SECOND YEAR:

13. Perform coating and validation of coating PR sealant application on a manufactured closed box.

14. Perform monolithic panel in plain weave composite material, Glass Fibre, unidirectional carbon fibre by wet lay-up.
15. Perform operations of drilling on composite material, Carbon (Unidirectional) and Glass Fibre (plain weave).
16. Produce composite riveted components using different thicknesses of Carbon Fibre and different types of rivets.
17. Manufacture composite open and closed riveted box using different types of metal and composite materials.
18. Prepare the task, the corresponding material and tools for Equipment fitting (Aircraft Systems) by using and processing technical documentation related and standard practices.
19. Identify the aircraft systems assembly phases and mechanical assembly knowing the operation of the different aircraft systems: Hydraulic, Pneumatic, Fuel, Oxygen and Flight control.
20. Perform pipe fitting assembly by different operations using standard tools and check for specified accuracy [Metallic pipes, composite ducts and flexible hoses].
21. Prepare the task, the corresponding material and tools for Equipment fitting by using and processing technical documentation and standard practices.
22. Perform surface treatment, Heat treatment and touch-ups on manufactured metal parts.
23. Perform corrosion treatment and NDT by observing standard procedure.
24. Plan, dismantle, and assemble different mechanical components used for full mechanical flight control chain
25. Plan, dismantle, and assemble different Hydraulic components used for full Hydraulic system and Perform pipe routing inspections and leak tests.
26. Plan, dismantle, and assemble different Pneumatic components used for full Pneumatic system and Perform pipe routing inspections and leak tests.
27. Plan, dismantle, and assemble different Oxygen components used for full Oxygen system and Perform pipe routing inspections and leak tests.
28. Plan, dismantle, and assemble different Fuel components used for full Fuel system and Perform pipe routing inspections and leak tests.
29. Join cables to build a harness and Insertion and extraction on different types of connector terminations by using the appropriate tools.
30. Fit and install harness on different types of panels and structure elements and Perform basic electrical tests relative to connections and check compliance of harness building.

6. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENT CRITERIA
FIRST YEAR	
1. Plan and organize the work to make job as per specification applying different types of basic fitting operation and check for dimensional accuracy following safety precautions.	Plan and identify tools, instruments and equipment's for marking and make this available for use in a timely manner.
	Plan and identify tools, instruments and equipment's for marking and make this available for use in a timely manner. Select raw material and visual inspect for defects
	Mark as per specification applying desired mathematical calculation and observing standard procedure.
	Measure all dimensions in accordance with standard specifications and tolerances.
	Identify hand tools for different fitting operations and make these available for use in a timely manner.
	Prepare the job for hacksawing.
	Perform basic fitting operations viz., Hacksawing to close tolerance as per specification to make the job.
	Observe safety procedure during operation as per standard norms and company guidelines.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
2. Perform making of basic adjustment of sheet metal and Joining techniques for sheet metal and metal components.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms.
	Prepare the job for basic adjustment of sheet metal
	Perform basic joining techniques as per specification to make the job.
	Observe safety procedure during operation as per standard norms and company guidelines.
	Ensure the workshop cleanliness.
3. Produce components by	Plan and organize to produce different components.

different operations and check accuracy using appropriate measuring instruments.	Select raw material, tools &equipments as per drawing.
	Execute/ perform different operations such as counter sinking counter boring and reaming, tapping, dieing etc.
	Check the work/ job using vernier, screw gauge micrometer and rectify if necessary.
4. Make different fit of components for assembling as per required tolerance observing principle of interchangeability and check for functionality.	Plan and organize for fitting job.
	Select raw material, tools &equipment's.
	Perform the work pieces for fitting according to tolerances and interchangeability.
	Check all dimensions and interchangeability in accordance with drawing and rectify if required.
5. Check the mechanical properties of the different materials and interpret the tensile test results.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms.
	Check for dimensional accuracy as per standard procedure.
	Observe safety procedure during operation as per standard norms and company guidelines.
	Interpretation of tensile test results.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
6. Make different types of simple sheet metal components for assembling using hand drill machine and check accuracy using appropriate measuring instruments and according to required tolerances ±0.1 mm.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for hacksawing, chiselling, filing, drilling, tapping, grinding.
	Perform basic fitting operations viz., hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.

7. Manufacture simple sheet metal with bending and check accuracy using appropriate measuring instruments and according to required tolerances ±0.1 mm.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for sawing, filling, bending
	Perform basic fitting operations hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
8. Manufacture sheet metal as per drawing and Join them by basic riveting observing standard procedure.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for riveting.
	Perform basic fitting operations hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Perform basic riveting operations as per specification to make the job.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Self-check with specific tools to verify work accuracy.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
9. Make and assemble components by different handling fitting operations and checking accuracy using appropriate measuring instruments.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for sawing, filling, bending.
	Perform basic fitting operations hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Plan work in compliance with standard safety norms.

	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
10. Produce curved and interchangeable metal components by sheet metal working operations and check accuracy using appropriate measuring instruments and according to required tolerances ±0.1 mm.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for sawing, filling, bending.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
11. Perform PR sealant application on structure panels without riveting& perform a tensile test for checking the correct bonding PR sealant application.	Prepare the job for scouring and PR sealant application Observe safety procedure during above operation as per standard norms and company guidelines.
	Check for dimensional accuracy as per standard procedure.
	Check for dimensional accuracy as per standard procedure waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
12. Manufacture open and closed riveted box with two different thicknesses, bended sheets, anchor nuts and electrical bonding.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for riveting.
	Perform basic fitting operations hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Perform riveting operations as per specification to make the job.
	Perform bonding with bonding brushes.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.

	Check for dimensional accuracy as per standard procedure.
	Self-check with specific tools to verify work accuracy.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
SECOND YEAR	
13. Perform coating and validation of coating PR sealant application on a manufactured closed box.	Prepare the job for scouring and PR sealant application.
	Observe safety procedure during operation as per standard norms and company guidelines.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
14. Perform monolithic panel in plain weave composite material, Glass Fibre, unidirectional carbon fibre by wet lay-up.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for composite manufacturing.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Produce job by team working.
	Self-check with specific tools to verify work accuracy.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
15. Perform operations of drilling on composite material, Carbon (Unidirectional) and Glass Fibre (plain weave).	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for hacksawing, chiseling, filing, drilling, tapping, and grinding on composite materials.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.

16. Produce composite riveted components using different thicknesses of Carbon Fibre and different types of rivets.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for riveting.
	Perform basic fitting operations hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Perform riveting operations on composite materials as per specification to make the job.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Self-check with specific tools to verify work accuracy.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
17. Manufacture composite open and closed riveted box using different types of metal and composite materials.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Prepare the job for riveting.
	Perform basic fitting operations hacksawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Perform riveting operations on composite and metallic assembly materials as per specification to make the job.
	Plan work in compliance with standard safety norms.
	Produce component by observing standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Self-check with specific tools to verify work accuracy.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Interpret Quality Inspection result.
	Ensure the workshop cleanliness.
18. Prepare the task, the corresponding material and tools for Equipment fitting (Aircraft Systems) by using	Identify the pipe protections to be used.
	Check the storage conditions observing safety rules and technical information.
	Unpack, destock and handle all types of pipe by applying

and processing technical documentation related and standard practices.	standard practices.
	Set up pipes in the place provided for this purpose.
	Prepare the job by analyzing the tasks and technical documents.
	Check the absence of scratches and deformations and fitting system integrity.
	Identify Part Number or Serial Number according to the technical documents.
	Apply FOD procedure.
	Clean the pipe by observing safety rules and technical information.
	Apply 5S methodology.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
19. Identify the aircraft systems assembly phases and mechanical assembly knowing the operation of the different aircraft systems: Hydraulic, Pneumatic, Fuel, Oxygen and Flight control.	Explain the role of the main elements of each system (Hydraulic, Pneumatic, Fuel, Oxygen and Flight controls).
	Perform assembly by observing the functional order of each element according to a typical system.
	Identify the hazards of each system (Hydraulic, Pneumatic, Fuel, Oxygen and Flight controls).
20. Perform pipe fitting assembly by different operations using standard tools and check for specified accuracy (Metallic pipes, composite ducts and flexible hoses).	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with technical documentation and with standard installation of fittings and pipe.
	Perform appropriate assembly and joining techniques according to the type of pipe and technical documentation standard practices.
	Perform correct bounding / grounding.
	Plan work in compliance with technical documentation and with standard installation of sleeves and ducts.
	Perform appropriate assembly and joining techniques according to the type of ducts and technical documentation standard practices.

	Plan work in compliance with technical documentation and with standard installation of fittings.
	Perform appropriate assembly and joining techniques according to the type of flexible hose and technical documentation standard practices.
	Set and apply the right torque Aluminum on the appropriate torque wrench.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
21. Prepare the task, the corresponding material and tools for Equipment fitting (Wiring system) by using and processing technical documentation and standard practices.	Read and understand the technical documents.
	Choose the necessary documents and information to perform the job.
	Prepare the job by analyzing the task.
	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Perform the cutting operations observing safety rules and technical information.
	Check for length accuracy.
	Classify and store wires by types and lengths in order to be used during following TP.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
22. Perform surface treatment, Heat treatment and touch-ups on manufactured metal parts.	Prepare the job for specific surface treatment operations.
	Observe safety procedure during operation as per standard norms and company guidelines.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
23. Perform corrosion treatment and NDT by	Ascertain and select tools and materials for the job and make this available for use in a timely manner.

observing standard procedure.	Prepare the job for eliminating the corrosion.
	Plan work in compliance with standard safety norms.
	Check for dimensional accuracy as per standard procedure.
	Self-check with specific tools to verify work accuracy.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
24. Plan, dismantle, and assemble different mechanical components used for full mechanical flight control chain.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard installation of the flight controls.
	Apply the appropriate assembly technique according to the flight controls.
	Adjust the tension of a cable, adjust the length of a connecting rod.
	Broach and set the flight controls.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness
	Make a tools inventory.
25. Plan, dismantle, and assemble different Hydraulic components used for full Hydraulic system and Perform pipe routing inspections and leak tests.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard installation of the Hydraulic system
	Apply the appropriate assembly technique according to the Hydraulic system components.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness
	Make a tools inventory.
26. Plan, dismantle, and assemble different Pneumatic components	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard installation of the

used for full Pneumatic system and Perform pipe routing inspections and leak tests.	Pneumatic system.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
	Make a tools inventory
27. Plan, dismantle, and assemble different Oxygen components used for full Oxygen system Perform pipe routing inspections and leak tests.	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard installation of the Oxygen system.
	Apply the appropriate assembly technique according to the Oxygen system components.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
	Make a tools inventory
	Safety behavior.
28. Plan, dismantle, and assemble different Fuel components used for full Fuel system Perform pipe routing inspections and leak tests.	Ascertain and select tools (ATEX Standard) and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard installation of the Fuel system.
	Apply the appropriate assembly technique according to the Fuel system components.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
	Make a tools inventory
29. Join cables to build a harness and Insertion and extraction on different types of connector terminations by using the appropriate tools.	Prepare the job by analyzing the tasks.
	Ascertain and select tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms. Perform the operations observing safety rules and technical information.
	Produce component by observing standard

	Check for tying conformity and cable tie gun settings.
	Check for length accuracy and breakout positions.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.
30. Fit and install harness on different types of panels and structure elements and Perform basic electrical tests relative to connections and check compliance of harness building.	Plan work in compliance with standard safety norms and identify the work area and the different parts to install.
	Ascertain and select the necessary tools and consumable supplies and make this available for use in a timely manner.
	Check the harness integrity before fitting.
	Check conformity for attaching parts assembly and tightening.
	Check harness: references, routing, tightening, markers positions, connections and protection.
	Fill the traceability sheet (torque Aluminium).
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness.

SYLLABUS FOR AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER TRADE			
FIRST YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 100 Hrs; Professional Knowledge 28 Hrs	Plan and organize the work to make job as per specification applying different types of basic fitting operation and check for dimensional accuracy following safety precautions.	1. Importance of trade training, List of tools & Machinery used in the trade. 2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE). 3. First Aid Method and basic training. 4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. 5. Hazard identification and avoidance. 6. Safety signs for Danger, Warning, caution & personal safety message. 7. Preventive measures for electrical accidents & steps to be taken in such accidents. 8. Use of Fire extinguishers. (100 hrs)	English technical vocabulary related to the task. All necessary guidance to be provided to the newcomers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Importance of safety and general precautions observed in the in the industry/shop floor. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Response to emergencies e.g.; power failure, fire, and system failure. **Importance of housekeeping & good shop floor practices.** Introduction to 5S concept & its application. **Occupational Safety & Health:** Health, Safety and Environment guidelines, legislations & regulations as applicable. (14 hrs)
		9. Identification of tools & equipment as perdesired specifications for marking & sawing.	English technical vocabulary related to the task. Aircraft Safety Practices: Foreign Object Damage, Inventory of tools

		10. Selection of material as per application. 11. Visual inspection of raw material for rusting, scaling, corrosion etc. 12. Marking out lines, gripping suitably in vice jaws, hacksawing to given dimensions 13. Sawing different types of metals of different sections. (100 hrs)	before and after intervention, Traceability of specific tools used. Linear measurements- its units, dividers, callipers, hermaphrodite, center punch, dot punch, their description and uses of different types of hammers. Description, use and care of 'V' Blocks, marking off table. (14 hrs)
Professional Skill 125 Hrs; Professional Knowledge 35 Hrs	Perform making of basic adjustment of sheet metal and Joining techniques for sheet metal and metal components.	14. Make basic adjustment of sheet metal using Aluminum2024, size 150 mm x 150 mm, thickness1.5 mm, by performing operations of: - Tracing by using ruler, Vernier calipers, Vernier height gauge - Cutting process with Hack saw - Deburring (files handling) - Checking criteria and acceptance in accordance with geometric tolerances: perpendicularity, parallelism, flatness, angle - Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Micrometer](50 hrs)	English technical vocabulary related to the task. Aircraft Safety Practices: Maintenance of tools, Clean the workstation. Metallic Material Science: properties - Physical & Mechanical Non-Ferrous metals: Aluminum Non-Ferrous Alloys: Aluminum series Introduction of Engineering Drawing reading plan. Introduction of Metrology Vernier and height gauge handling and maintenance. File handling, Machining file, Tracing, Sawing, Vice. (14hrs)
		15. **Make basic adjustment of sheet metal with flanged holes using Aluminum 2024,**	English technical vocabulary related to the task. Aircraft Safety Practices: Means

		size 150 mm x 200 mm, thickness 2 mm, by performing operations of: - Tracing - Debiting - Deburring - Adjustment of the parts with geometric tolerances: perpendicularity, parallelism, flatness, rounded - Making flanged holes - Appropriate Measuring Instrument. [Vernier calipers, Vernier Height Gauge, Cast Iron surface plates, Veeblocks, Square, Micrometer](75 hrs)	of protection of the aircraft working area. Metallic Material Science: properties - Physical &Mechanical Non-Ferrous metals: Aluminum Non-Ferrous Alloys: Aluminum series File holding, Machining file, Tracing, Sawing, Vice. Bench vice construction, types, uses, care & maintenance, vice clamps, hacksaw frames and blades, specification, description, types and their uses, method of using hacksaws. Hydraulic press for Flanges holes.(21hrs)
Professional Skill 225 Hrs; Professional Knowledge 63 Hrs	Produce components by different operations and check accuracy using appropriate measuring instruments.	16. **Adjustment N°1** Perform deburring operations on a 10 mm Aluminum block (Al 2024), size 100mm x 50 mm, with geometric constraints (flatness, angle, rounded) by: - Tracing by using ruler, Vernier calipers, Vernier height gauge, marking blue, Dial comparator - Cutting process with Hack saw - Deburring - Perform adjustment operations with geometric and machining tolerances: - Drilling by using depth gauge and vertical drill machine - Fitting process by using files - Counter boring Appropriate	English technical vocabulary related to the task. Human Factors: Human Performance and Limitations, Social Psychology, Factors Affecting Performance, Physical Environment, Physical work; Repetitive tasks; Visual inspection; Complex systems, Communication within and between teams; Human Error, Hazards in the Workplace. Vertical drill handling and maintenance (counterboring, countersinking) Marking- Prussian blue, their special application, description. Use, care and maintenance of scribing block. Surface plate and auxiliary marking equipment, angle plates,

		Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square ,Dial comparator, Micrometer](75 hrs)	parallel block, description, types, uses, accuracy, care and maintenance.(21hrs)
		17. **Adjustment N°2** Perform adjustment operations on a 20 mm Aluminum block (Al 2024), size 50 mm x 50 mm, with geometric constraints by: - Tracing by using ruler, Vernier, height gage, marking blue, dial comparator - Cutting process with Hack saw - Deburring - Drilling by using Vernier depth gauge and vertical drill machine - Fitting process (using files) - Countersinking - Checking criteria and acceptance - Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, dial comparator, Micrometer](75 hrs)	English technical vocabulary related to the task. Human Factors: Brief History of Aviation, General aircraft description, Aerodynamic notions, how does an aircraft fly? Counter sink, counter bore and spot facing-tools and nomenclature, Reamer- material, types (Hand and machine reamer).(21hrs)
		18. **Adjustment N°3** Perform adjustment operations on a 10 mm Aluminum block (Al 2024), size 50 mm x 50 mm, with geometric constraints by: - Tracing by using ruler, Vernier, Vernier height gage, marking	English technical vocabulary related to the task. Human Factors: Aircraft main parts (fuselage, wing and empennage, engine and pylons, Landing gear, equipment's) Taps and Thread Standards.(21hrs)

		blue, dial comparator - Cutting process with Hack saw - Deburring - Drilling by using depth gauge and vertical drill machine- - Fitting process (using files) - Reaming - Countersinking - Performing thread cutting - Checking criteria and acceptance - Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Dial comparator, " GO no GO" gauge, Micrometer] (75 hrs)	
Professional Skill 75 Hrs; Professional Knowledge 21 Hrs	Make different fit of components for assembling as per required tolerance observing principle of interchangeability and check for functionality.	19. **Adjustment N°4** Make an assembly (size 100 mm x 50 mm) with Aluminum (Al 7075) and Stainless steel parts of different thicknesses, with geometric constraints by performing operations of: - Drilling - Fitting process (using files) - Countersinking - Reaming - Performing thread cutting - Filling with liquid shim (Aluminum filler) - Clearances measurement. / - Appropriate Measuring Instrument. [Vernier Caliper, Square, Dial	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Non-Ferrous metals: Aluminum Non-Ferrous Alloys: Aluminum series Screw threads: terminology, parts, types and their uses. Screw pitch gauge. Clearance and tolerances, liquid shim handling and maintenance. (21 hrs)

		comparator, "GOno GO" gauge, Micrometer, Clearance Gauge](75 hrs)	
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Check the mechanical properties of the different materials and interpret the tensile test results.	20. **Tensile test N°1** Using Aluminum (2024, 5086,7075), AISI 316L Stainless steel, Titanium TA6V, Carbon Steel, tank 250 mm x 20 mm, make 3 tensile specimens by: - Tracing with geometric constraints - Cutting process with Hack saw - Fitting process (using files) - Interpretation of tensile test results(25 hrs)	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Screw threads: terminology, parts, types and their uses. Screw pitch gauge. Clearance and tolerances, liquid shim uses.(07hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Make different types of simple sheet metal components for assembling using hand drill machine and check accuracy using appropriate measuring instruments according to required tolerances ±0.1 mm.	21. Perform manual drilling operations on Aluminum 2024, stainless steel 316L and titanium TA6V (size 400 mm x 200 mm for each) by: - Tracing, Cutting process with Hack saw, fitting process (using files) on each sheet - Tracing for rivet pitch and edge distance calculation and drilling - Drilling - Counter drilling - Deburring - Temporary fitting (clamping pin)Appropriate Measuring Instrument.[Vernier Height	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Drill- material, types, parts and sizes for metallic materials. Drill angle-cutting angle for different materials, cutting speed

		Gauge, Cast Iron surface - plates, Vee blocks, Square, Micrometer] (25 hrs)	feed. R.P.M. for different materials. Drill holding devices- material, construction and their uses. Calculation of pitch and edge distance, importance of the pitch and the edge distance. (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Manufacture simple sheet metal with bending and check accuracy using appropriate measuring instruments and according to required tolerances ±0.1 mm.	22. **Perform manual bending operations on Aluminum 5086 (size 100 mm x 80 mm) by:** - Tracing, Cutting process with Hack saw, fitting process (using files) - Bending following drawings instructions - Appropriate Measuring Instrument - [Vernier Caliper, Vernier Height Gauge, Cast iron surface plates, Vee blocks, Square, Micrometer](25 hrs)	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing, and torquing. Bending handling and maintenance. (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Manufacture sheet metal as per drawing and Join them by basic riveting observing standard procedure.	23. **Perform drilling operations on Aluminum sheet (2024, 7075), size 400 mmx 200 mm by:** - Tracing, Cutting process with belt saw - Fitting process (using files) - Using hand drill machine - Deburring - Pitch and edge distance calculation - Temporary fitting (clamping pin)	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel.

		24. **Perform squeeze riveting or "C" squeeze on thickness 3 mm and angle profile (countersunk head and round head rivet with different dash diameters) by:** - Manual countersinking - Dial Comparator using - Self-check by using rivet gauge - Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Dial comparator, Rivet gauge, Micrometer](25 hrs)	Sheet holders pins: material, construction, types, accuracy and uses. Basic riveting operations with squeeze et C riveting tools, care, maintenance, Solid Rivet definition, types, sizes, materials, length calculation. (07 hrs)
Professional Skill 150 Hrs; Professional Knowledge 42 Hrs	Make and assemble components by different handling fitting operations and checking accuracy using appropriate measuring instruments.	25. **Part manufacturing** (example: little bended aircraft):Perform adjustment operations on Aluminum sheet (Al 5086), size 200 mm x 100 mm, thickness of 1.5 mm by: - Tracing with template, Cutting process with belt saw, Fitting process (using files) - Using hand drill machine / - Deburring - Temporary fitting (clamp) - Rivet pitch and edge distance calculation 26. Perform deburring on the manufactured part. 27. Appropriate Measuring Instrument. [Vernier	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing and torquing. (07hrs)

		Caliper, Vernier Height Gauge, Micrometer] (25 hrs)	
		28. **Part manufacturing** (example: little bended aircraft):Perform duplicate operations of the previous work (Aluminum sheet (Al 5086), size 200 mm x 100 mm, thickness of 1.5 mm) by: - Adjustment - Tracing - Cutting process with belt saw - Fitting process (using files) - Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Micrometer](25 hrs)	Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing and torquing. Fixing, mechanical jointing, threaded jointing, sealing and torquing. Sheet holders pins: material, construction, types, accuracy and uses. Perform basic riveting operations viz., squeeze etc., riveting tools, care, maintenance, specification, description, types and their uses, method of using.(07hrs)
		29. **Part manufacturing** (Example: little bended aircraft):Using Aluminum 5086, size 200 mm x 100 mm, perform operations of: - Drilling, Counter drilling - Temporary fitting (clamping pin) - Rivet pitch and edge distance calculation	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon

		- Bending - Appropriate Measuring Instrument. [Vernier, Height Gauge, Micrometer](25 hrs)	steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing, and torquing.(07hrs)
		30. **Part manufacturing** (example: little bended aircraft):Using Aluminum 5086, size 200 mm x 100 mm, perform operations of: - Bending - Deburring, Temporary fitting - Riveting (squeeze riveting, "C" squeeze) - Self-check by using rivet gauge - Appropriate Measuring Instrument. [Rivet gauge, etc.] (25 hrs)	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: magnesium, titanium, copper, nickel. Sheet holders pins: material, construction, types, accuracy and uses. Perform basic riveting operations viz., squeeze etc., riveting tools, care, maintenance, specification, description, types and their uses, method of using.(07hrs)
		31. **Using Aluminum 2024, size 250 mm x 20 mm, perform operations of:** - Tracing - Cutting process with belt saw - Fitting process (using belt sanding machine) - Using hand drill machine - Deburring	English technical vocabulary related to the task. Metallic Material Science: properties - Physical & Mechanical Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Steel, difference between Iron, steel

		- Temporary fitting (clamping pin) - Manual and micrometric countersinking - Self-check by using rivet gauge - Riveting using rivet gun (different diameters, different thicknesses, angle profile, countersunk head and round head rivets) Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Dial indicator, Rivet gauge, Micrometer] (25 hrs)	and Cast iron, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals: Magnesium, titanium, copper, nickel. Sheet holders pins: material, construction, types, accuracy and uses. Riveting operations with Rivet gun tools, care, maintenance, specification, description, types and their uses, handling and maintenance.(07hrs)
		32. **Tensile test N°2:**Using Aluminum 2024, tank 250 mm x 20 mm, make 3 riveted tensile specimens by: - Tracing with geometric constraints - Cutting process with belt saw - Fitting process (using files) - Riveting - Perform tensile tests(25 hrs)	English technical vocabulary related to the task. Basic study of stress-strain curve for MS.(RDM) Stress, strain, ultimate strength, factor of safety. Physical properties of engineering metal: colour, weight, structure, and conductivity, magnetic, fusibility, specific gravity.(07hrs)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Produce straight and curved interchangeable metal components by sheet metal working operations and check accuracy using appropriate measuring	33. **Structure parts manufacturing N°1:** Using Aluminum 2024, sheet size 400 mm x 150 mm, thickness of 1.5 mm, bending radius 4,5, manufacture primary parts by performing operations of :	English technical vocabulary related to the task. Temperature measuring instruments. Specific heats of solids & liquids. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing, and torquing. (07 hrs)

	instruments and according to required tolerances ±0.1 mm.	- Tracing - Cutting process with belt saw - Bending - Drilling with hand drill machine - Flanged holes Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Micrometer](25 hrs)	
		34. **Structure parts manufacturing N°2:**(Example: frames, stringers, splices)Using Aluminum 2024, sheet size 2000 mm x1000 mm thickness of 1.5 mm or 2 mm, bending radius 4,5 , manufacture primary parts with geometric constraints (angle, rounded, flatness) - Tracing - Cutting process with belt saw - Bending - Drilling with hand drill machine - Flanged holes Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Micrometer](25 hrs)	English technical vocabulary related to the task. Thermal Conductivity, Heat loss and heat gain. Average Velocity, Acceleration & Retardation. Related problems. Sheet metal working techniques such as growing, shrinking. (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge	Manufacture sheet metal as per drawing and Join them by basic	35. **Assembly of structure parts (by team of 2 trainees):**Using the previous manufactured parts, with	English technical vocabulary related to the task. Circular Motion: Relation between circular motion and

07 Hrs	riveting observing standard procedure.	Aluminum 2024, sheet size 2000 mm x 1000 mm, perform operations of: - Drilling with hand drill machine - Riveting using rivet gun, drilling grid, countersunk head and round head rivets, different diameters of rivets - Self-check by using rivet gauge - Joogling sheet metal Appropriate Measuring Instrument. [Vernier Caliper, Rivet Gauge](25 hrs)	Linear motion, Centrifugal force, centripetal force. Drill- material, types, parts and sizes for metallic materials. Drill angle-cutting angle for different materials, cutting speed feed. R.P.M. for different materials. Drill angle holding devices-material, construction and their uses. (07 hrs)
Professional Skill 100 Hrs; Professional Knowledge 28 Hrs	Perform PR sealant application on structure panels without riveting and perform a tensile test for checking the correct bonding PR sealant application.	36. **PR sealant application:** Using Aluminum 2024, sheet size 400 mm x 200 mm, perform operations of: - Tracing, Cutting process with belt saw with geometric constraints - Drilling with hand drill machine - Counter drilling, - Pickling - Temporary fitting - PR sealant application Appropriate Measuring Instrument. [Vernier Caliper](25 hrs)	English technical vocabulary related to the task. Aircraft Safety Practices: Identification of ingredients with limited shelf life, how to store them and discard them. PR sealant types, uses, curing, pot life, storage, care and maintenance (07 hrs)
		37. **Tensile Test N°3:**Using Aluminum 2024, sheet size 250 mm x 20 mm, perform operations of: - Bonding PR sealant application with surface preparation on tensile specimens	English technical vocabulary related to the task. PR physical properties, surfaces treatment associated. (07 hrs)

		- Tensile tests on the realized specimens Appropriate Measuring Instrument. [Tensile test machine](25 hrs)	
		38. **Rivets removal Using:** Aluminum 2024, sheet size 2000 mm x 1000 mm, perform rivets removals by manual drilling and using center punch and pin drift.(25 hrs)	English technical vocabulary related to the task. Solid Rivet definition, types, sizes, removal operations. (07 hrs)
		39. **Structure parts manufacturing N°3:**Using Aluminum 2024, sheet size 300 mm x 100 mm, thickness of 1.5 mm, adjust curved parts by performing: - Tracing, Cutting process with Hack saw with geometric constraints - Debiting - Deburing - Bending - Adjustment and shrinking sheet metal - Clearances measurement Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Clearance gauge, Micrometer](25 hrs)	English technical vocabulary related to the task. Sheet metal working techniques such as growing, shrinking. Shrinking machine handling and maintenance. (07 hrs)
Professional Skill 50 Hrs; Professional Knowledge	Manufacture open and closed riveted box with two different thicknesses, bended sheets, anchor nuts	40. **Open riveted box manufacturing:** Using Aluminum 2024, different thicknesses sheet, size 400 mm x 400 mm, perform operations of :	English technical vocabulary related to the task. Sheet holders pins: material, construction, types, accuracy and uses. Perform riveting operations viz.,

14 Hrs	and electrical bonding	- Bending - Drilling, counter drilling - Countersinking - Riveting - Flanged hole (2 spars with thickness 1.5mm, 2 spars with thickness 2.5mm) Appropriate Measuring Instrument. [Vernier Caliper, Rivet gauge](10hrs)	Rivet gun tools, care, maintenance, specification, description, types and their uses, method of using.(03 hrs)
		41. **Open riveted box manufacturing** on dedicated support, perform operations of: - Assemblies of anchor nuts - Assemblies of equipment and electrical harness supports - Electrical Bonding using electrical bonding brush Appropriate Measuring Instrument. [Ohmmeter](15 hrs)	English technical vocabulary related to the task. Bonding definition, uses, protection. Bonding brush handling and maintenance(04hrs)
		42. **Riveted closed profile manufacturing :** Using Aluminum 2024, Titanimn TA6V, sheet size 400 mm x 300 mm, Perform operations of: - Rolling, - Shaping, - Bending, - Joggling - Drilling (with angle drill machine), counter drilling - Countersinking - Riveting on sheets of different thicknesses, - Pickling - PR sealant application, /	English technical vocabulary related to the task. Drill-material, types, parts and sizes for metallic materials. Drill angle-cutting angle for different materials, cutting speed feed. R.P.M. for different materials. Drill angle holding devices-material, construction and their uses.(07hrs)

		- Making flanged holes / - Making movable access door Appropriate Measuring Instrument. [Vernier Caliper, Vernier Height Gauge, Cast Iron surface plates, Vee blocks, Square, Rivet gauge, Micrometer](25 hrs)	
In-plant training / Project work **Broad Area:-** 1. Basic Adjustments of Sheet Metal. 2. Structure Parts Manufacturing. 3. Drilling Operations/Bending Operations.			

SYLLABUS FOR AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER TRADE			
SECOND YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Perform coating and validation of coating PR sealant application on a manufactured closed box.	43. **Coating PR sealant application:** Perform PR sealant application by coating on a closed box with bended sheets: pickling, cleaning, PR mixing, rivets and rivets and fasteners covering. (25hrs)	English technical vocabulary related to the task. Heat treatment and advantages. PR sealant types, uses, curing, pot life, storage, care & maintenance. (09 hrs)
		44. **Coating PR sealant application validation by performing a leak test of the closed wing profile by using a Schrader plug and compressed air:** *Appropriate Measuring Instrument. [Schrader plug and compressed air]* 45. **Removal PR sealant by performing:** - Rivets and fasteners removal - Mastic removal by scraping - Surface cleaning. (25hrs)	English technical vocabulary related to the task. Manufacturing processes for metallic materials: molding, welding, forging, forging die, sheet metal work (bending, cutting, stamping, rolling), additive manufacturing. PR sealant types, uses, curing, pot life, storage, care &maintenance. Manufacturing processes for metallic materials: molding, welding, forging, forging die, sheet metal work (bending, cutting, stamping, rolling), additive manufacturing. PR sealant removal operations and cleaning. (09 hrs)
Professional Skill 75 Hrs; Professional Knowledge	Perform monolithic panel in plain weave composite material, Glass Fibre, unidirectional	46. **Composite panel manufacturing N°1:** Using GFRP (Glass Fibre Reinforced Polymer), sheet size 500 mm x 500 mm	English technical vocabulary related to the task. Manufacturing processes for metallic materials: molding, welding, forging, forging die,

27 Hrs	carbon fibre by wet lay-up.	perform operations of: - Marking plies - Making Fibre orientation choice - Calculating resin ratio - Composite wet lay-up - Vacuum bag installation - Resin curing. (25hrs)	sheet metal work (bending, cutting, stamping, rolling), additive manufacturing. Composite Fibre: types, conductivity, specific gravity, mechanical properties and uses. Resins types, conductivity, specific gravity, mechanical properties and uses. Composite Fibre orientation, different waves types, resin ratio calculation. Composite manufacturing processes. (09 hrs)
		47. **Composite panel manufacturing N°2:** Using unidirectional CFRP (Carbon Fibre Reinforced Polymer), sheet size 500 mm x 500 mm perform operations of: - Making a thin panel by wet lay-up - Making Fibre orientation choice - Calculating resin ratio - Composite lay-up - Vacuum film installation - Resin curing, (25hrs)	English technical vocabulary related to the task. Composite Material Science : properties -Physical & Mechanical, Fiber Types -Resin types, difference between CFRP, GFRP, AFRP, QFRP, different weaving types, manufacturing methods, resin ratio, curing, sandwich materials, different core materials, composite technical textile. Composite Fibre: types, conductivity, specific gravity, mechanical properties and uses. Resins types, conductivity, specific gravity, mechanical properties and uses. Composite Fibre orientation, different waves types, resin ratio calculation. Composite manufacturing processes.(09hrs)

		48. **Composite panel manufacturing N°3 :** Using CFRP Carbon Fibre Reinforced Polymer), sheet size 500 mm x 500 mm, perform operations of: - Making a curved panel by wet lay-up - Making Fibre orientation choice - Calculating resin ratio - Composite lay-up - Vacuum film installation - Resin curing. (25hrs)	English technical vocabulary related to the task. Composite Material Science: properties - Physical & Mechanical, Fiber Types -Resin types, difference between CFRP, GFRP, AFRP, QFRP, different weaving types, manufacturing methods, resin ratio, curing, sandwich materials, different core materials, composite technical textile. Composite Fibre: types, conductivity, specific gravity, mechanical properties and uses. Resins types, conductivity, specific gravity, mechanical properties and uses. Composite Fibre orientation, different waves types, resin ratio calculation. Composite manufacturing processes.(09hrs)
Professional Skill 25 Hrs; Professional Knowledge 09 Hrs	Perform operations of drilling on composite material, Carbon (Unidirectional) and Glass Fibre (plain weave).	49. **Composite drilling:** Using previous GFRP & CFRP, sheets size 500 mm x 500 mm, perform operations of: - Drilling, counter drilling Using hand drill machine - Countersinking - Temporary fitting 50. **Composite sandwich manufacturing:** Using previous CFRP, sheets size 500 mm x 500 mm, make a sandwich panel by performing operations of: - Tracing - Fibre orientation, resin	English technical vocabulary related to the task. Composite Material Science: properties - Physical & Mechanical, Fiber Types -Resin types, difference between CFRP, GFRP, AFRP, QFRP, different weaving types, manufacturing methods, resin ratio, curing, sandwich materials, different core materials, composite technical textile. Drill- material, types, parts and sizes for composite materials. Drill angle-cutting angle for different materials, cutting speed

		ration calculation, composite lay-up, honeycomb cutting, vacuum bag, polymerization. *Appropriate Measuring Instrument.* *[Tap test]*(25hrs)	feed. R.P.M. for composite materials. Drilling composite materials handling and maintenance. Composite Material Science: properties - Physical & Mechanical, Fiber Types -Resin types, difference between CFRP, GFRP, AFRP, QFRP, different weaving types, manufacturing methods, resin ratio, curing, sandwich materials, different core materials, composite technical textile. Composite core, types, mechanical properties and uses. Sandwiches composites manufacturing processes, curing.(09hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Produce composite riveted components using different thicknesses of Carbon Fibre and different types of rivets.	51. **Composite riveted installation:** Using different thicknesses of CFRP and different types of rivets (LGP, Hi-lite, Cherry-max, Compos lock, etc.) perform operations of: - Drilling, Counter drilling, Countersinking Using hand drill machine - Deburring - Reaming - Temporary fitting - Rivets and fasteners fitting (LGP, Hi-lite, Cherry-max, etc.). *Appropriate Measuring Instrument. [Rivet gauge, " GO no GO" gauge]*(25hrs)	English technical vocabulary related to the task. Sheet holders pins: material, construction, types, accuracy and uses. Perform riveting operations on composite structure, Rivet pull machine, care, maintenance, specification, description, types and their uses, method of using. Blind rivet specifications for composite installation, definition, types, sizes, materials, length calculation (09 hrs)

		52. **Composite riveted installation:** Using different thicknesses of multi-materials (Aluminum, Titanium, CFRP, GRFP...) and different types of rivets and fasteners (LGP, Hi-lite, Cherry-max, Composi-lock, etc.) perform operations of: - Drilling, counter drilling, countersinking Using hand drill machine - Deburring - Reaming - Temporary fitting - Rivets and rivets and fasteners fitting (LGP, Hi-lite, Cherry-max, etc.) *Appropriate Measuring Instrument. [Rivet gauge, " GO no GO" gauge]* 53. **Rivets and fasteners removal:** Using Metallic and composite assembly perform rivets and fasteners removals on the composite component by manual drilling and use of punch tool and pin drift.(25hrs)	English technical vocabulary related to the task. Sheet holders pins: material, construction, types, accuracy and uses. Composite metallic assembly specification. Blind rivet and specific fasteners specifications for composite and metallic installation, definition, types, sizes, materials, length calculation. Blind Rivet and other fasteners definition, types, sizes, removal operations. Aviation Legislation: International Aviation legislation: Chicago Convention and the role of the International Civil Aviation Organization. Directorate General of Civil Aviation: India safety policy, Structure of the aviation regulatory framework, relationship between CAR-21, CAR-M, CAR-145, CAR-147. General description of CAR 21 and the importance of applying Airworthiness requirements. (09 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Manufacture composite open and closed riveted box using different types of metal and composite materials	54. **Composite riveted box manufacturing :**Using CFRP, Aluminum 2024, Titanium TA6V and AISI 316L Stainless steel, sheets size 400 mm x 200 mm, perform operations of: - Riveting - Drilling - Countersinking	English technical vocabulary related to the task. Aircraft description: ATA standard and ATA list, General description of the main Aircraft systems and related parts. Perform riveting operations on composite structure, Rivet pull machine, care, maintenance, specification, description,

		- Temporary fitting - Rivets and fasteners installation Perform Quality Inspection on an existing installation: defects and non-conformities detection by visual inspection. *Appropriate Measuring Instrument. [Rivet gauge]*(25hrs)	typesand their uses, method of using. Composite metallic assembly specification, Blind rivet specifications for composite and metallic installation, definition, types, sizes, materials, length calculation. (09 hrs)
		55. **Composite riveted closed box manufacturing:** Using CFRP, size 500 mm x 500 mm, make a metal-composite assembly performing operations of: - Bending - Riveting - Drilling - Countersinking - Pinning - Rivets and fasteners installation - PR sealant application. *Appropriate Measuring Instrument. [Rivet gauge]*(25hrs)	English technical vocabulary related to the task. Aircraft description: General description of the main Aircraft systems and related parts. Perform riveting operations on composite structure, Rivet pull machine, care, maintenance, specification, description, types and their uses, method of using. Blind rivet specifications for composite and metallic installation, definition, types, sizes, materials, length calculation. PR sealant types, uses, curing, pot life, storage, care & maintenance on composite materials. (09 hrs)
		56. **Composite riveted closed box manufacturing – Examination** Using CFRP, size 500 mm x 500 mm, make a metal-composite assembly by performing operations of: - Bending - Riveting - Drilling - Countersinking	English technical vocabulary related to the task. Aircraft description: General description of the main Aircraft systems and related parts. Perform riveting operations on composite structure, Rivet pull machine, care, maintenance, specification, description, types and their uses, method of using. Blind rivet specifications for

		- Pinning - Rivets and fasteners installation - PR sealant application. *Appropriate Measuring Instrument.* *[Rivet gauge]*(25hrs)	composite and metallic installation, definition, types, sizes, materials, length calculation. PR sealant types, uses, curing, pot life.(09hrs)
Professional Skill 25 Hrs; Professional Knowledge 09 Hrs	Prepare the task, the corresponding material and tools for Equipment fitting (Aircraft Systems) by using and processing technical documentation related and standard practices.	57. **Reception of a pipe.** Perform operations of: - Checking the lack of impact on the pipes, - Checking the protections - Handling of all types of pipes and different lengths (trolleys, protective foam, bubble wrap, transport case) 58. **Operations before mounting piping (ATA 26,28,29,30,35,36,38...) : Perform operations of :** - Identification of the pipe's plugs shutter - Installation of the corresponding plugs - Checking that the elements to be mounted have not been damaged - Checking that their part or equipment number corresponds to the requisition sheet - Checking the expiry date. (25hrs)	English technical vocabulary related to the task. Aircraft description: General description of the main Aircraft systems and related parts. Unpacking and storage conditions. Different common damage. English technical vocabulary related to the task. Standard practices procedures on the technical documentation. Different types of plugs. (09 hrs)
Professional Skill 50 Hrs; Professional Knowledge	Identify the aircraft systems assembly phases and mechanical assembly knowing	59. **Identify the aircraft systems assembly phases by team of 2 students:** On structure panels and mock-up, Perform for each system	English technical vocabulary related to the task. Brief description of Hydraulic, Pneumatic, Fuel, Oxygen and Flight controls systems. (09 hrs)

18 Hrs	the operation of the different aircraft systems: Hydraulic, Pneumatic, Fuel, Oxygen and Flight control.	(Hydraulic, Pneumatic, Fuel, Oxygen and Flight controls): - Identification of the different elements and explanations of their role - Brief presentation of the system operating - Identification of the hazards - Association of each element of the panel its symbol on the corresponding diagram - Identifying in the work card the order of assembly of each element - Assembly on the mock-up all the different elements - Crosschecking by another team according to the technical documentation.(25hrs)	
		60. **Pipe routing on a diagram:** On mock-up with technical documentation, perform operations of: - Identification of each pipe mentioned in the work card and its belonging system - Identification of the fluid flow direction - Identification of tools and equipments to achieve the pipe routing - Checking the condition of the connection ends	English technical vocabulary related to the task. Routing diagram. Definition of the appropriate marking according to the type of pipe. Technical vocabulary related to the systems. Select a torque wrench and read the Aluminum of torquing on an abacus. Locking techniques.(09hrs)

		- Preparation of the structure panel and mark - Marking the path of the different elements 61. **Screwing and torquing operations** On structure panels Perform operations of: - Screwing different types of screws using the appropriate tools - Tightening different types of screws using ratchet socket with the appropriate torque wrench regarding the torque Aluminum required and mentioned in the work card 62. **Locking techniques** on different subassemblies and structure panel, Perform operations of: - Locking with nut lockwasher, pin and castle nut, self-locking nut - Wire locking of nut retainer, screw, nut and piping and safety wire - Locking fault identification.(25 hrs)	
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Perform pipe fitting assembly by different operations using standard tools and check for specified accuracy [Metallic pipes,	63. **Metallic pipe installation by performing operations of:** - Combs, pipe support collars and clamps installation and torque tightening. - Connection of the pipe in	English technical vocabulary related to the task. Different pipe joining techniques / grounding / bounding. Identify pipes constraints and gaps between pipes and the surrounding environment. (09 hrs)

	composite ducts and flexible hoses].	accordance with work card. - Dismantling, assembly valves and fitting with pipes. - Fittings torque tightening with torque wrench. - Ensuring the electrical continuity and grounding with bonding leads. ^^^*F* - Assembly of metal pipes on different structural panels with respect of the gaps between pipes and the surrounding environment. - Checking the mounting constraints.(25 hrs)	
		64. **Composite duct installation by performing operations of:** - Composite duct support collars, brackets installation and torque tightening. - Connection of the duct in accordance with work card. - Dismantling, assembly of sleeves and bellows. - Fittings torque tightening with torque wrench. - Assembly of composite ducts on different structural panels with respect of the gaps between ducts and the surrounding environment.	English technical vocabulary related to the task. Different duct joining techniques/ grounding/ bounding. Identify ducts constraints and gaps between ducts and the surrounding environment. English technical vocabulary related to the task. Different flexible hose joining techniques. Identify flexible hose constraints, bending radius, kinking and gaps between flexible hoses and the surrounding environment. Common damage. Different thermal insulation sleeving assembly techniques. Common damage.(09hrs)

		- Checking the mounting constraints. 65. **Flexible hose installation by performing operations of:** - Connection of the flexible hose in accordance with work card. - Dismantling, assembly of fittings. - Fittings torque tightening with torque wrench. - Assembly of flexible hoses on different structural panels with respect of the gaps between ducts and the surrounding environment. - Checking the mounting constraints, bending radius and lack of kinking. 66. **On different subassemblies perform operations of:** - Checking that the insulation sleeves comply with installation plans, standards and technical specifications. - Put the sleeve in place and fix it to the pipe work.(25hrs).	
Professional Skill 75 Hrs; Professional Knowledge	Prepare the task, the corresponding material and tools for Equipment fitting by using and	67. **Perform assembly/ disassembly of Over Heat Detection System by performing operations of:** - Muff installation on duct	English technical vocabulary related to the task. Different types of GRAVINER systems. Common damage / mistakes. (09 hrs)

27 Hrs	processing technical documentation and standard practices	coupling - Connection of the Graviner and wire locking in accordance with work card - Assembly of OHDS on different ducts with respect of the functional installation rules - Checking the tolerances for waviness, bends in wire and two detection loops - Checking the duct coupling - Checking the correct adjustment between the muff position and the Graviner. (25hrs)	
		68. **Perform assembly / disassembly of different mechanical sub-assemblies by operations of:** - Applying the task according to technical documentation - Disassembly the mechanical sub-assembly: classification, verification, identification and storage of the parts - Assembly of mechanical sub-assembly: clearance gaps, torque tightening, lockage - Checking the correct assembly (Cross-check by another trainee)	English technical vocabulary related to the task. Different types of locking techniques. Common damage / mistakes. (09 hrs)

		- Checking the proper functioning of all the assembled parts: bonding, leaks.(25hrs)	
		69. **Wiring technical documentation identification and use** - Define necessary documents for the job to perform. - Verify effectively and applicability of the extracted documents. - Find and understand the main information in the different types of technical documents (texts, electrical schemes, wiring diagrams, manufacturers norms) 70. Harness kit preparation Analyze the work card, identifying tasks, necessary tools and materials for: - Cutting different wires/cables types according to length definitions - Classify and store the cables for next practical exercises. (25hrs)	English technical vocabulary related to the task. Safety rules and use technical documentation related to wiring practices Aeronautic electrical wires and cables: characteristics, references, types and gauges, shielded and coaxial cables, special cables, manufacturer marking, identification marking. Wiring tools: cutting pliers, scissors, cable cutter, ruler and tape measure. (09 hrs)
Professional Skill 75 Hrs; Professional Knowledge	Perform surface treatment, Heat treatment and touch-ups on manufactured metal parts.	71. **Surface treatment** Perform surface treatments on the manufactured parts by: - Sanding - Pickling - Reworking	English technical vocabulary related to the task. Corrosion definition: different types of corrosion (galvanic, pitting, filiform, crevice, stress, fatigue, intergranular)

27 Hrs		- Alodine process application - Zinc chromate touch-ups - Painting touch-ups *Appropriate Measuring Instrument.*(25hrs)	Methods of corrosion protection. Corrosion treatment. Physical properties of materials. Surfaces treatment knowledge, grinding, scouring. Surface protection, definition: types, uses, properties, paint. (09hrs)
		72. **Tensile Test n°4 Heat treatment by:** - Performing Heat treatment on the manufactured parts with Aluminum 2024, Aluminum 5086 and Aluminum 7075 - Tensile tests on the treated parts in order to verify the physical and mechanical properties. (25hrs)	English technical vocabulary related to the task. Corrosion definition: different types of corrosion (galvanic, pitting, filiform, crevice, stress, fatigue, intergranular) Methods of corrosion protection. Corrosion treatment. Safety practices. Physical properties of Aluminum metal: phase diagram of Al-Cu, AL-Zn and Al-Mg, Heat treatment associated. (09hrs)
		73. **Sheet metal boxes assembly** Using CFRP, GFRP, AFRP (AramideFibre Reinforced Polymer), Aluminum 2024, Titanium TA6V and AISI 316L Stainless steel, sheets size 500 mm x 300 mm, perform operations of: - Tracing - Manual drilling, Counter drilling using hand drill machine - Deburring - Temporary fitting - Reaming - Countersinking - Rivets and fasteners	English technical vocabulary related to the task. PR sealant types, uses, curing, pot life, storage, care &maintenance on composite materials. Torquing specifications. Wire lock installation.(09hrs)

		installation /PR sealant application - Bending - Fitting process (using files) - Performing an access panel with hinge - Self-check by using rivet gauge 74. Perform Quality Inspection on an existing installation: defects and non-conformities detection by visual inspection.(25hrs)	
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Perform corrosion treatment and NDT by observing standard procedure.	75. **Corrosion treatment elimination by :** - Manual rework - Tool rework - Sanding blending - Pickling - Alodine treatment - Zinc chromate touch-ups - Painting touch-ups. (25hrs)	English technical vocabulary related to the task. 90°angle sander handling, care and maintenance Corrosion reworking and corrosion removal processes.(09hrs)
		76. Non Destructive Test performing inspections: - Tapping - Ultrasonic - Dye penetrant - Visual camera. (25hrs)	English technical vocabulary related to the task. NDT definition, types, uses, care, maintenance for metallic and composite materials.(09hrs)
Professional Skill 25 Hrs; Professional Knowledge 09 Hrs	Plan, dismantle, and assemble different mechanical components used for full mechanical flight control chain	77. **Perform assembly of flight controls and settings by operations of:** - Assembly the components a flight control chain: control rod, cable, pulley, shaft... - Tightening according to the standard torque	English technical vocabulary related to the task. Technical documentation, tolerance criteria. Flight controls chain and setting process. Common damage / mistakes. Specific hazards regarding the test procedure. (09 hrs)

		Aluminum mentioned in work card - Bonding/grounding: screw the ground termination, apply varnish on different pipes - Checking flight controls functionality. - Constraint checking / tension of a cable. (25hrs)	
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan, dismantle, and assemble different Hydraulic components used for full Hydraulic system and Perform pipe routing inspections and leak tests.	78. **Perform assembly on the Hydraulic system by operations of:** - Assembly of the Hydraulic system components: valve, pump, actuators. - Position parts relative to each other - Tightening according to the standard torque Aluminum mentioned in work card - Bonding/grounding: screw the ground termination, apply varnish on different pipes - Functionality check according to the technical documentation. (25hrs)	English technical vocabulary related to the task. Technical documentation and operation of hydraulic system. Common damage / mistakes.(09hrs)
		79. **Perform crosscheck visual inspection (by team of 2 students) on a mock up with defaults on the hydraulic system:**	English technical vocabulary related to the task. Technical documentation, standards inspection procedure according to the system. Common faults /

		- Routing according to the diagram - Cleanliness - Grounding, bounding standards - Marking and lockage - Marking of systems - Check tightening torques - Check the assembly compliance of the system according to the requirements defined in the documentation. 80. **Using compressed air, perform Hydraulic system leak tests.**(25hrs)	mistakes English technical vocabulary related to the task. Technical documentation, tolerance criteria. Specific hazards regarding test procedure.(09hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan, dismantle, and assemble different Pneumatic components used for full Pneumatic system and Perform pipe routing inspections and leak tests	81. **Perform assembly on the Pneumatic system by operations of:** - Assembly the hydraulic system components: compressor, pressure gauge, filter, regulator... - Position parts relative to each other - Tightening according to the standard torque Aluminum mentioned in work card - Bonding/grounding: screw the ground termination, apply varnish on different pipes - Checking functionality according to the technical documentation - Checking leakages. (25hrs)	English technical vocabulary related to the task. Technical documentation and operation of pneumatic system. Common faults / mistakes. (09 hrs)

		82. **Perform crosscheck visual inspection (by team of 2 students) on a mock up with defaults on the Pneumatic system:** - Routing according to the diagram - Cleanliness - Grounding, bounding standards - Marking and lockage - Marking of systems - Check tightening torques - Check the assembly compliance of the system according to the requirements defined in the documentation.(25hrs)	English technical vocabulary related to the task. Technical documentation, standards inspection procedure according to the system. Common faults / mistakes. (09 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan, dismantle, and assemble different Oxygen components used for full Oxygen system and Perform pipe routing inspections and leak tests.	83. **Using compressed air, perform Pneumatic system leak tests.** 84. **Perform assembly and fitting of Oxygen components by operations of:** - Position parts relative to each other - Tightening according to the standard torque Aluminum mentioned in work card - Bonding/grounding: screw the ground termination, apply varnish on different pipes - Checking functionality according to the	English technical vocabulary related to the task. Technical documentation, tolerance criteria. Specific hazards regarding test procedure.(09hrs)

		technical documentation.(25hrs)	
		85. **Perform crosscheck visual inspection (by team of 2 students) on a mock up with defaults on the Oxygen system:** - Routing according to the diagram - Cleanliness - Grounding, bounding according to CDCCL standards - Marking of systems - Check tightening torques - Check the assembly compliance of the system according to the requirements defined in the documentation. 86. Using compressed air, perform Oxygen system leak tests.(25hrs)	English technical vocabulary related to the task. Technical documentation, standards inspection procedure according to the system. Common faults /mistakes. Technical documentation, tolerance criteria. Specific hazards regarding test procedure.(09hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan, dismantle, and assemble different Fuel components used for full Fuel system and Perform pipe routing inspections and leak tests.	87. **Perform assembly and fitting of fuel components by operations of:** - Assembly of Fuel system components: pump, pipes, vent valve, fixed and semi-floating elements, floating fittings, pipe fastening elements, different fitting joints, pipe marking... - Positioning parts relative to each other - Tightening according to the standard torque	English technical vocabulary related to the task. Technical documentation and operation of Fuel system. Common faults / mistakes. (09 hrs)

		Aluminum mentioned in work card - Bonding/grounding: screw the ground termination, apply varnish on different pipes (Fuel Tank Safety standard) - Checking leakages. (25hrs)	
		88. **Perform crosscheck visual inspection (by team of 2 students) on a mock up with defaults on the Fuel system:** - Routing according to the diagram - Cleanliness - Grounding, bounding according to CDCCL standards - Marking of systems - Check tightening torques - Check the assembly compliance of the system according to the requirements defined in the documentation 89. **Using compressed air, perform Fuel system leak tests.**(25hrs)	English technical vocabulary related to the task. Technical documentation, standards inspection procedure according to the system. Common faults / mistakes. English technical vocabulary related to the task. Technical documentation, tolerance criteria. Specific hazards regarding test procedure. (09 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Join cables to build a harness and Insertion and extraction on different types of connector terminations by using the appropriate tools	90. **Shape and tie wires/cables to build a harness:** - Check wires/cables : references lengths (notion of tolerances) - Carry out the wires/cables identification in correlation with the	English technical vocabulary related to the task. Cutting wires/cables to length within tolerances defined by the work card, wiring diagram and layout drawing understanding, tying techniques using plastic ties or textile lacing tape, mechanical protection for harness (plastic

		technical instructions - Set wires/cables according to their destination (layout - wiring diagram) - Tie wires/cables with plastic ties or lacing tape - Perform installation of textile/plastic protective sheaths or sleeves - Install position markers (coloured scotch tape or lacing tape) - Identify harness and its different branches using labels. (25hrs)	and textile sleeves, shrinkable sleeves), tightening gun settings according to the technical documentation, identification by labels and sleeves. (09 hrs)
		91. **Shape and tie wires/cables to build a harness - Examination** - Check wires/cables: references - lengths (notion of tolerances) - Carry out the wires/cables identification in correlation with the technical instructions - Set wires/cables according to their destination (layout - wiring diagram) - Tie wires/cables with plastic ties or lacing tape - Perform installation of textile/plastic protective sheaths or sleeves - Install position markers	English technical vocabulary related to the task. Cutting wires/cables to length within tolerances defined by the work card, wiring diagram and layout drawing understanding, tying techniques using plastic ties or textile lacing tape, mechanical protection for harness (plastic and textile sleeves, shrinkable sleeves), tightening gun settings according to the technical documentation, identification by labels and sleeves. English technical vocabulary related to the task. Stripping techniques using appropriate tools according towires/cables types and gauges, and in compliance with technical documentation. Stripping defects/ nonconformities. Safety

		(coloured scotch tape or lacing tape) - Identify harness and its different branches using labels 92. **Strip different types of wires/cables (insulation removal) by:** - Stripping small gauge wires using the stripping pliers - Removal insulation on shielded cables using the scalpel - Stripping and disassembly large section cables using the specific tooling - Checking for non conformities, (25hrs)	rules with cutting tools. Wiring tools: Scalpel or cutter, stripping pliers, ruler. (09 hrs)
		93. **Using infra-red gun or hot air gun perform operations of:** - Shielding by end implementation (special measurements, insulation stripping, shield cutting, wire lead and solder sleeve installation, infra-red gun heating, checking) - Shielding by window implementation (special measurements, insulation stripping, shield cutting, wire lead and solder sleeve installation, infra-red gun heating, checking)	English technical vocabulary related to the task. Aeronautic shielded cables. Stripping techniques and associated inspections. Solder sleeves and shrinkable sleeves. Wiring tools: Scalpel or cutter, cutting pliers, scissors, ruler, infra-red gun, hot air gun. Quality requirements.(09hrs)

		- Shield stop implementation (special measurements, insulation stripping, shield cutting, shrinkable sleeve heating with hot airgun). (25hrs)	
Professional Skill 100 Hrs; Professional Knowledge 36 Hrs	Fit and install harness on different types of panels and structure elements and Perform basic electrical tests relative to connections and check compliance of harness building	94. **Perform crimping operations of different terminal components by:** - Crimping contacts on small gauge wires - Crimping lugs on small gauge wires - Crimping splices small gauge wires - Crimping plugs on big gauge cables - Checking for non-conformities - Ensuring the traceability of crimping operations on the associated technical sheet 95. **Insertion and extraction of various contacts on different types of connector / Connect lugs on terminal blocks by performing operations of:** - Insertion/extraction on different connectors type (rectangular, circular, modules) using the appropriate tools - Associated checks - Coding change (fool proofing devices) on	English technical vocabulary related to the task. Terminal types: contents, splices, lugs, spare wire end caps. Stripping techniques. Crimping procedures for small gauge wires with hand crimping pliers (for contacts, lugs and splices) and associated controls (Quality requirements). Crimping procedures for big gauge cables with pneumatic crimping tool and associated controls (Quality requirements). Wiring tools: Crimping pliers, locators, positioner, stripping pliers, cutting pliers. Tools validity. English technical vocabulary related to the task. Insertion and extraction tools and the associated standard practices. Terminal types for connectors: pins, sockets, short-male contacts, sealing pins. Connector types: plugs/sockets, mobile/fixed, circular, rectangular, junction modules, grounding modules, ARINC connectors, terminal blocks,

		rectangular connectors - Connecting lugs on terminal blocks and secure terminal block covers. (25hrs)	relay bases. Connector accessories: back shells, cable clamps, fool proofing devices, protective covers, sealing plugs Terminal types: contacts, splices, lugs, spare wire end caps. Wiring tools: contacts insertion/extraction tools, fool proofing ejector. (09 hrs)
		96. **Using a torque wrench, strap wrench, thread lock, lock wire and connector assembly tools, finalize assembly of harness components by performing operations of:** - Installation all connector accessories according to the work card - Tightening and torque the back shells on circular connectors and apply the appropriate locking procedures, marking procedures - Coding on rectangular connectors and install cable clamps 97. **Perform electrical tests using a multimeter:** - Carry out a wire continuity check on the harness - Perform troubleshooting in case of mistakes during insertion task. - Correct the wrong position contacts by	English technical vocabulary related to the task. Connector types plugs/sockets, mobile/fixed, circular, rectangular, junction modules, grounding modules, ARINC connectors, terminal blocks, relay bases. Connector accessories: back shells, cable clamps, fool proofing devices, protective covers, sealing plugs. Wiring tools: Strap wrench, torque wrench, locking wirepliers, connector assembly plate. Consumable supplies: thread lock, lock wire. English technical vocabulary related to the task. Wiring diagram understanding and troubleshooting method. Quality Inspection. Electrical tests: continuity check using a multimeter. (09hrs)

		extracting/re-inserting - Ensure the harness compliance according to quality and functional requirements after repair - Cross-check on the harness of another student - Perform Quality Inspection on an existing installation: defects and non-conformities detection by visual inspection.(25hrs)	
		98. **Fit and install harness on different types of attaching part (+20 scenarios) by performing operations of:** - Inspecting the integrity of harness before beginning the installation tasks - Choosing the attaching parts / routing supports (plastic vee supports, metallic or plastic clamps, spacers, screws and washers) to be fastened to the structure panels according to the work card - Installation of the attaching parts on the panels using ratchet, sockets, screwdrivers and torque wrench	English technical vocabulary related to the task. Attaching parts (plastic vee supports, metallic or plastic clamps, spacers, screws and washers). Structure and fuselage parts (frames, stringers, brackets, panels). Harness fitting rules: special care for harness integrity, bending radii, position markers, routing, segregation, tightening. (18hrs)

		- Installation harness on the different attaching points in accordance with 2D routing drawing - Bonding/grounding connections: torque the bonding/grounding terminals, apply protection varnish on the bonding/grounding terminals - Ensuring the protection of the connection elements with plastic caps or bags - Ensuring the traceability of the tasks on the associated traceability sheet - Self-check. (50hrs)	

In-plant training / Project work

Broad Area:-

1. Hydraulic System/Pneumatic System
2. Oxygen system /Fuel System
3. Crimping Operations.

SYLLABUS FOR CORE SKILLS
1. Workshop Calculation & Science (Common for two year course) (80Hrs + 80 Hrs)
2. Engineering Drawing (80Hrs + 80 Hrs)
3. Employability Skills(Common for all CTS trades) (160Hrs + 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 AND EQUIPMENT			
AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER(CTS)(For batch of 20 Candidates)			
S No.	**Name of the Tool & Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Steel Rule with metric & British graduation	200 mm	21(20+1) Nos.
2.	Try Square.	150 mm	21 (20+1) Nos.
3.	Precision Square - Wide Base		21 (20+1) Nos.
4.	Caliper vernier		21 (20+1) Nos.
5.	Scriber		21 (20+1) Nos.
6.	Centre Punch		21 (20+1) Nos.
7.	Hacksaw frame fixed type		21 (20+1) Nos.
8.	File flat - second cut		21 (20+1) Nos.
9.	File flat smooth		21 (20+1) Nos.
10.	File half round second cut		21 (20+1) Nos.
11.	Hammer ball peen With handle.		21 (20+1) Nos.
12.	6 needle files		21 (20+1) Nos.
13.	File round		21 (20+1) Nos.
14.	File half round bastard		21 (20+1) Nos.
15.	File triangular		21 (20+1) Nos.
16.	Flat brush		21 (20+1) Nos.
17.	File carde brush		21 (20+1) Nos.
18.	Deburring tool hole		21 (20+1) Nos.
19.	Handi clamps		21 (20+1) Nos.
20.	Bonding brush		21 (20+1) Nos.
21.	Sealant spatula kit		21 (20+1) Nos.
22.	Grip clampscleco pliers		126Nos.
23.	Cleco pin sheet metal 2,5mm		210Nos.
24.	Cleco pin sheet metal 3,2mm		210Nos.
25.	Cleco pin sheet metal 4mm		210Nos.
26.	Metric feeler gauge		21 (20+1) Nos.
27.	Flute deburring tool		21 (20+1) Nos.
28.	Drawing compass		21 (20+1) Nos.
29.	Cut resistance Gloves		200Nos.
30.	Dust Mask FFP3		100Nos.
31.	Ear plugs		100Nos.
32.	Safety goggles.		21 (20+1) Nos.
33.	Screwdriver	FACOM AN 3,5 x 100	21 (20+1) Nos.

34.	Cutting pliers	FACOM 405.10	21 (20+1) Nos.
35.	Electrician scissors	FACOM 841	21 (20+1) Nos.
36.	Stripping pliers	IDEAL Strip master 45-2834	21 (20+1) Nos.
37.	Crimping pliers	DMC 22520 / 2-01	21 (20+1) Nos.
38.	Positioner	DMC 22520 / 2-02	21 (20+1) Nos.
39.	Positioner	DMC 22520 / 2-06	21 (20+1) Nos.
40.	Positioner	DMC 22520 / 2-08	21 (20+1) Nos.
41.	Positioner	DMC 22520 / 2-09	21 (20+1) Nos.
42.	Positioner	DMC 22520 / 2-23	21 (20+1) Nos.
43.	Positioner	K127-2	21 (20+1) Nos.
44.	Set of 12 points 1/4" sockets -inch- + bits	FACOM R.161B	21 (20+1) Nos.
45.	8 piece 1/4" long reach metric 12 points sockets on rack	FACOM REL.40	21 (20+1) Nos.
46.	Cable tie gun	PANDUIT GTS	21 (20+1) Nos.
B. WORKSHOP BENCHES TOOL KIT			
47.	Workshop Bench tool with storage		21Nos.
48.	Padlock		21Nos.
49.	Hammer ball peen With handle		21Nos.
50.	Rubber mallet		21Nos.
51.	Mitre square 135°		21Nos.
52.	Round angle ruler		21Nos.
53.	Straight pneumatic drill	5200trs/min	21Nos.
54.	Pneumatic drill	5200trs/min	21Nos.
55.	Pneumatic oil tool		21Nos.
56.	WNX pin sheet metal 2,5mm		210Nos.
57.	WNX pin sheet metal 3,2mm		210Nos.
58.	WNX pin sheet metal 4mm		210Nos.
59.	Steel Rule with metric & British graduation	500mm	21Nos.
60.	Pneumatic pipe + staubli coupling	3m	21Nos.
61.	Deburring tool with blade		21Nos.
62.	Micrometric stop-countersink		21Nos.
63.	Micrometric cutter with pilot 2,5mm		21Nos.
64.	Micrometric cutter with pilot 3,2mm		21Nos.
65.	Micrometric cutter with pilot 4mm		21Nos.
66.	Manual cutter countersink 6mm		21Nos.
67.	Vice jaw pad		21Nos.
68.	Vice		21Nos.
C. GENERAL MACHINERY INSTALLATION			
69.	Air Compressor with dehumidifier	55KW	2Nos.

70.	Air reserve compressor tank	2000 L	1 No.
71.	Vertical Drill machine	1KW	12Nos.
72.	Hydraulic guillotine shear machine	2100 mm	1 No.
73.	Belt saw	0.75 KW	2Nos.
74.	Belt sand	0.75 KW	2Nos.
75.	Linisher	0.75 KW	2Nos.
76.	Bench grinder	0.75 KW	2Nos.
77.	Air Catcher ATEX with inlets for Aluminum/composite dust	15 KW	1No.
78.	Ultrasonic machine		1No.
79.	Endoscope		1No.
80.	Tool chest equipped with metric and inch tools		1No.
81.	Oven 550°C		1No.
82.	Sheet metal shrinking and streching machine		1No.
83.	Rolling sheet meal machine		1No.
84.	Refrigerator for PR sealant and Resin stockage	170L	1No.
D. HANDLING MACHINE			
85.	Dust Vacuum cleaner		2Nos.
86.	Manual pneumatic best sander ^		12Nos.
87.	Manual pneumatic inline router		2Nos.
88.	Pneumatic "C" riveting machine		5Nos.
89.	Pneumatic Squeeze riveting machine		5Nos.
90.	Riveting die set for squeeze machine		10Nos.
91.	Pneumatic rivet gun	Power 3 X	21Nos.
92.	Riveting die for rivet gun set		21Nos.
93.	Bucking bar set		5Nos.
94.	Blind rivet gun machine	untl 6,35mm	4Nos.
95.	Nose pieces set blind rivet		4Nos.
96.	Drill bushes support		21Nos.
97.	Drill bush 2,5mm		21Nos.
98.	Drill bush 3,2mm		21Nos.
99.	Drill bush 4,8mm		21Nos.
100.	Drift Pin set		21Nos.
101.	Dynamometric key	2 to 20 N.m	10Nos.
102.	Dynamometric key	20 to 200N.m	10Nos.
103.	Deburring countersink	6 mm	6Nos.
104.	Manual sheetmetal bending machine	1200 mm	2Nos.
105.	Hydraulic press	5T	1 No.

106.	Dimple die set for flanged holes		2Nos.
107.	Sheetmetal bench shear ^	300 mm	2Nos.
108.	Sheet metal scissor		12Nos.
TOOL FOR STRUCTURE WORKSHOP			
109.	Cast iron surface plates	1000 x 700 mm	4Nos.
110.	Height vernier gauge	500 mm	4Nos.
111.	V block		8Nos.
112.	LGP Fasteners gauge 3,2 mm		22Nos.
113.	LGP Fasteners gauge 4,8 mm		22Nos.
114.	Hi-Lite Fasteners gauge		22Nos.
115.	Comparator		4Nos.
116.	Magnetic Comparator support		4Nos.
117.	Try square	300 mm	4Nos.
118.	Manual Light		8Nos.
119.	Radius gauge	1 to 7 mm	12Nos.
120.	Radius gauge	7.5 to 15 mm	12Nos.
121.	Radius gauge	15 to 30 mm	12Nos.
122.	Depth vernier gauge	300 mm	4Nos.
123.	Magnifier x5		12Nos.
124.	Micrometer 0/25		5Nos.
125.	Micrometer 25/50		5Nos.
126.	Micrometer 50/75		5Nos.
127.	Micrometer 75/100		5Nos.
128.	Mirror with handle	45 mm	6Nos.
129.	Vernier caliper	200 mm	6Nos.
130.	Manual Tap test stainless steel		6Nos.
LIST OF COMPOSITE TOOLS			
131.	Scissor Kevlar		21Nos.
132.	Venturi vacuum system		21Nos.
133.	Vacuum bag valve		21Nos.
134.	Cutting rule	1000 mm	1 No.
135.	Cutting table		1 No.
TOOLS & ACCESSORIES FOR PNEUMATICS, HYDRAULICS, FUEL, OXYGEN, FLIGHT CONTROL			
136.	Trolley		4Nos.
137.	Technical documentation	Digital and books	2Nos.
138.	Set of fod boxes		10Nos.
139.	Workbench protective mat	2,00 m * 1.20 m	10Nos.
140.	Full aircraft hydraulic system	Pipes, components, fasteners,	3Nos.
141.	Aircraft pneumatic pipes and equipment		3Nos.

142.	Aircraft fuel pipes and equipment		3Nos.
143.	Aircraft oxygen pipes and equipment		3Nos.
144.	Aircraft mechanical flight control chain	Rod, cables, pulley, flaps, ailerons, cable tensioner, shaft	3Nos.
145.	Aircraft mechanical assemblies	Landing gear, wing, gearboxes	3Nos.
146.	Composite pipes fasteners and collars		30Nos.
147.	Metal pipes fasteners and collars		30Nos.
148.	Flexible pipes fasteners and collars		30Nos.
149.	Flexible sleeves		30Nos.
150.	Thermal insulation sleeving		10Nos.
151.	Overheating detection system		10Nos.
152.	Nut lock washers		300Nos.
153.	Wire coil for Wirelock		10Nos.
154.	Nut retainer		300Nos.
155.	Pin and castle nut		50Nos.
156.	Self-locking nut		300Nos.
157.	Hydraulic didactic bench		1 No.
158.	Set of a hydraulic Pipe wrench		3Nos.
159.	Tensiometer		3Nos.
160.	Seal kit for each type of pipes and system		
TOOLS FOR WIRING WORKSHOP			
161.	Stripping pliers	IDEAL Strip master 45-2835	7Nos.
162.	Crimping pliers for splices	DMC AD1377S	7Nos.
163.	Crimping pliers for isolating terminals	AMP 47386	7Nos.
164.	Crimping pliers for lugs	AMP 576778	7Nos.
165.	Crimping pliers for lugs	AMP 576779	7Nos.
166.	Crimping pliers for lugs	AMP 576780	7Nos.
167.	Crimping pliers for lugs	AMP 576781	7Nos.
168.	Crimping pliers for lugs	AMP 576782	7Nos.
169.	Crimping pliers for contacts	DMC 22520 / 1-01	7Nos.
170.	Positioners for DMC 22520/1-01	DMC 22520 / 1-02 (TH1A)	7Nos.
171.	Cable cutters	FACOM 412.16	3Nos.
172.	Hot air gun	STEINEL HG2320E	11Nos.
173.	Infrared generator	IR 1759-MK4-AT3130E	11Nos.
174.	Connector pliers	FACOM 410	11Nos.
175.	Multimeter	Chauvin Arnoux CA5220	11Nos.
176.	Strap wrench	GLENAIR TG70	11Nos.
177.	Connector assembly tools	38999 Series	7Nos.

178.	Bit 3/32" x 50 mm	WERA 840/4	5Nos.
179.	Fool proofing extraction tool for EN 3545	AIR LB 001901 003 00	5Nos.
180.	Key for male split nut for EN 3545	AIR LB 001901 001 00	5Nos.
181.	Hexagon key	FACOM 83H.5/32"	5Nos.
LIST OF WORKSHOP CONSUMABLES			
182.	Metal drill bit set 2,0 to 12 mm		10Nos.
183.	Metal drill bit 2,5 mm		100Nos.
184.	Metal drill bit 3,2 mm		50Nos.
185.	Metal drill bit 4,8 mm		25Nos.
186.	Reamer 3,2 mm		42Nos.
187.	Reamer 4,8 mm		42Nos.
188.	Belt for belt saw		10Nos.
189.	Belt for manual belt sander		50Nos.
190.	Belt for belt band	120	10Nos.
191.	Disc for linisher	120	20Nos.
192.	Blade for hacksaw for Aluminum		40Nos.
193.	Solid round rivet 2,5 mm	2017	2000Nos.
194.	Solid countersunk rivet 2,5 mm	2017	2000Nos.
195.	Solid round rivet 3,2 mm	2017	2000Nos.
196.	Solid countersunk rivet 3,2 mm	2017	2000Nos.
197.	Solid round rivet 4 mm	2017	1000Nos.
198.	Solid countersunk rivet 4 mm	2017	1000Nos.
199.	Solid round rivet 4,8 mm	2017	2000Nos.
200.	Solid countersunk rivet 4,8 mm	2017	2000Nos.
201.	Carbide drill bit 2,5 mm		50Nos.
202.	Carbide drill bit 3,2 mm		50Nos.
203.	Carbide drill bit 4,8 mm		25Nos.
204.	Honeycomb 6mm thickness 12,7 mm		2 m^2
205.	Honeycomb 6mm thickness 19 mm		2 OS
206.	Plastic scraper set		21Nos.
207.	Diamond grinding wheel	80 mm	12Nos.
208.	Kevlar drill bit 2,5 mm		50Nos.
209.	Kevlar drill bit 3,2 mm		50Nos.
210.	Kevlar drill bit 4,8 mm		25Nos.
211.	Carbide micrometric cutter with pilot 3,2 mm		12Nos.
212.	Carbide micrometric cutter with pilot 4 mm		12Nos.
213.	Carbide micrometric cutter with pilot 4,8 mm		12Nos.

214.	Sheetmetal Aluminum 2017 th 1,0 mm	2000 x 1000 mm	2Nos.
215.	Sheetmetal Aluminum 2017 th 1,2 mm	2000 x 1000 mm	2Nos.
216.	Sheetmetal Aluminum 2017 th 1,5 mm	2000 x 1000 mm	18Nos.
217.	Sheetmetal Aluminum 2017 th 2,0 mm	2000 x 1000 mm	15Nos.
218.	Block Aluminum 2017 th 10,0 mm	120 x 100 mm	42Nos.
219.	Block Aluminum 2017 th 20,0 mm	120 x 100 mm	21Nos.
220.	Sheetmetal Aluminum 5086 th 1,0 mm	2000 x 1000 mm	1 No.
221.	SheetmetalAluminum 5086 th 1,2 mm	2000 x 1000 mm	1 No.
222.	Sheetmetal Aluminum 5086 th 1,5 mm	2000 x 1000 mm	8Nos.
223.	Sheetmetal Aluminum 5086 th 2,0 mm	2000 x 1000 mm	6Nos.
224.	Angle Aluminum 5086 2mm 25 x 25 mm	2000 mm	45Nos.
225.	Angle Aluminum 5086 2mm 20 x 20 mm	2000 mm	45Nos.
226.	Sheetmetal 316L th 1,5 mm	2000 x 1000 mm	4Nos.
227.	Sheetmetal 316L th 2,0 mm	2000 x 1000 mm	4Nos.
228.	Sheetmetal TA6V th 1,5 mm	2000 x 1000 mm	4Nos.
229.	Sheetmetal TA6V th 2,0 mm	2000 x 1000 mm	4Nos.
230.	Wirelock 0,6 mm Stainless steel	3 kg	1 No.
231.	Sheetmetal S320 steel 1,5 mm	2000 x 1000 mm	1 No.
232.	Sheetmetal S320 steel 2 mm	2000 x 1000 mm	1 No.
233.	Angle steel S320 3mm 40 x 40 mm	6000 mm	40Nos.
234.	Resin LY5052 1 Kg kit		12Nos.
235.	Carbon UD	1 roll	1 No.
236.	Plain weave carbon	1 roll	1 No.
237.	Plain wave Fibreglass	1 roll	1 No.
238.	PTFE coated Fibreglass	1 roll	1 No.
239.	Vacuum gauge		21Nos.
240.	Nylon Bagging Film	1 roll	1 No.
241.	Release film non perforated	1	1 No.
242.	Fibreglass Bleeder Cloth	1 roll	1 No.
243.	Peel Ply	1 roll	1 No.
244.	Release film perforated	1 roll	1 No.
245.	Sealant tape		20Nos.

246.	Sanding discs ROLOC 50 mm	^ 120	200Nos.
247.	Sand drum kits	120	200Nos.
248.	PR sealant 1436 A		12Nos.
249.	PR sealant 1436 B		12Nos.
250.	Blue varnish bonding		2Nos.
251.	Adhesive tape ^	25 mm	20Nos.
252.	Adhesive tape	50 mm	20Nos.
253.	Aluminum Liquid shim		8Nos.
254.	Blue prussian		4Nos.
255.	LGP Fasteners 3,2 mm		220Nos.
256.	LGP Fasteners 4,8 mm		220Nos.
257.	Hi-lite Fasteners 3,2mm		220Nos.
258.	Hi-lite Fasteners 4,8mm		220Nos.
259.	Cherry-max Rivets 2,5mm		1150Nos.
260.	Cherry-max Rivets 3,2mm		1150Nos.
261.	Cherry-max Rivets 4,8mm		1150Nos.
262.	Hi-lite Fasteners Collar 3,2 mm		220Nos.
263.	Hi-lite Fasteners Collar 4,8 mm		220Nos.
264.	LGP Fasteners Collar 3,2 mm		220Nos.
265.	LGP Fasteners Collar 4,8 mm		220Nos.
LIST OF MISCELLANEOUS AND SECURITY EQUIPMENT			
266.	Green bin for recycled material		2Nos.
267.	Red bin for composite material		2Nos.
268.	Blue bin for metallic material		2Nos.
269.	Safety shower		1 No.
270.	Eye washer		1 No.
271.	Dust mask	FFP3	50Nos.
272.	Earmuffs		6Nos.
273.	Ear plugs		2000Nos.
274.	Safety glasses		25Nos.
275.	Safety Gloves		100Nos.
276.	Vinyl Gloves		200Nos.
277.	Cleaning solvent Die stone DLS		50L

NOTE:

1. All tools must be hardened, toughened and grounded.
2. Equivalent tool kit, workshop, bench tool kit, general machinery installation, handling machine, tool for structure workshop, composite tools, tools and accessories for pneumatic, hydraulics and wiring workshop should be used as per availability in the Indian market.
3. No additional items are required to be provided to the batch working in the second and third shift except the items under trainee's tool kit.
4. Internet facility is desired to be provided in the class room.

ANNEXURE-II

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 Expert members contributed/ participated for finalizing the course curriculum of Aeronautical Structure and Equipment Fitter Trade held at NSTI Campus-2, Bangalore on 03.10.2018.			
S No.	**Name & Designation Shri/Mr./Ms**	**Organization**	**Remarks**
1.	Bruno Penot	Dassavult Aviation, France	Chairman
2.	Joseph Marianadin, Dy. Production Manager	DASSAULT RELIANCE AEROSPCE LTD, 3-1A, Sector-9, MIHAN SEZ, Nagpur- 441108	Member
3.	LK Mukherjee, DDT	CSTARI, Kolkata	Member
4.	Nirmalya Nath, ADT	CSTARI, Kolkata	Coordinator
5.	Valeru David Raju, Head- HR & Admin.	DASSAULT RELIANCE AEROSPCE LTD, 3-1A, Sector-9, MIHAN SEZ, Nagpur- 441108	Member
6.	P Raja Kumar-Head Operations	Larsen & Turbo Ltd., Precision Manufacturing systems complex, Coimbatore	Member
7.	Jaideep Das-DGM Marketing & Business Development (Missiles & Aerospace Business)	Larsen & Toubro Ltd. Hyderabad	Member
8.	Ujjwal Khanna, Head- HR	DEFSYS SOLUTIONS PVT LIMITED, Gurgaon.	Member
9.	M. Suresh, DGM	Skill Development HMA, HAL, Bangalore-17	Member
10.	S.P. Ravindranathan, DGM	Technical Training Institute HAL, Bangalore-17	Member
11.	Dinesha A.G.	Mahindra Aerostructures Pvt. Ltd., Kolar , Bangalore	Member
12.	P. Balasundaram	Maini Precision Products – Aero Division Bommasandra, Bangalore	Member

13.	V. Gopalakrishnan	NIMI-Guindy, CTI-Campus, Chennai	Member
14.	Jerome Bove	French Embassy in India, 27, Palace Road, Bangalore	Member
15.	Suresh Latchovmanassamy	SIMRA India	Member
16.	G. Giri, DDT	NSTI-II, Bangalore	Member
17.	C. Chandra Sekhar, Director	NSTI-II, Bangalore	Member
18.	Sekhar G. Raigonde, Joint Director	NSTI-II, Bangalore	Member
19.	Mayur. S. Yaul	Parshuram ITI, Nagpur	Member
20.	Venkata Rao Posina	Dassault Aircraft Services India Private Limted	Member
21.	N.M. Kajale	Govt. I.T.I, Aundh, Pune-411067	Member

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


कौशलं बलम्