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

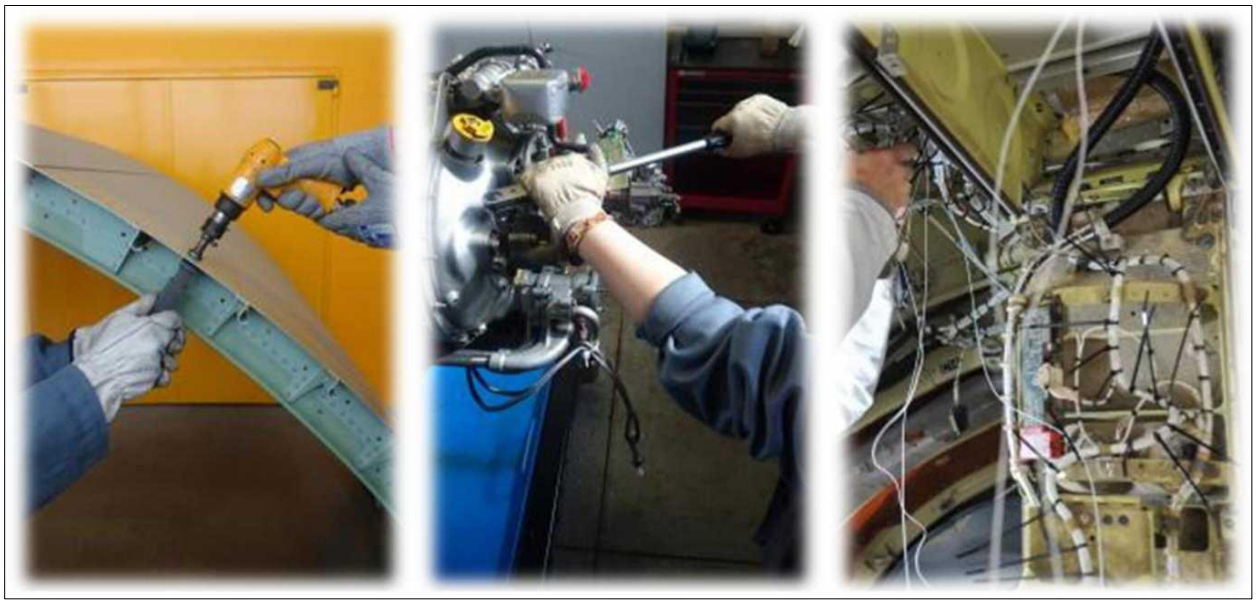
COMPETENCY BASED CURRICULUM

AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – CAPITAL GOODS & MANUFACTURING

Directorate General of Training

AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER

(Engineering Trade)

(Revised in July 2023)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Developed By

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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, chiselling, drilling, tapping, countersinking, and reaming to an accuracy ranging from ± 0.5 to ± 0.05mm. The trainee is able to make different fits viz., clearance fit, transition fit, and interference fit with great accuracy & angular tolerance of 1°. He/she makes different types of simple sheet metal components for assembly purpose and verify accuracy using appropriate measuring instruments.

The trainee learns to prepare simple sheet metal with bending, to rivet metal components using hand squeeze riveting machine, and to rivet metal components using rivet gun.

SECOND YEAR: During the second year, the trainee learns to prepare complex and large size metal components using appropriate tools.
The trainee learns to install special aeronautical fasteners; he/she is able to verify conformity and he knows the specific fasteners removal techniques. The trainee learns to perform PR sealing operations. The trainee learns to perform surface treatment and touch-ups on manufactured metal parts.
The trainee learns how to plan, assemble and dismantle different components used for the different aircraft fluid and electrical systems. In addition, he/she learns to perform basic leak tests, continuity electrical tests 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 DGT which 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)	840	840
2	Professional Knowledge (Trade Theory)	240	300
3	Employability Skills	120	60
	Total	**1200**	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry wherever not available then group project is mandatory.

On the Job Training (OJT)/ Group Project	150	150
Optional courses (10th/ 12th class certificate along with ITI certification, or, add on short term courses)	240	240

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification, or, add on short term courses.

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%.

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 some of 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
- Computer based multiple choice question examination
- Practical Examination

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 for formative assessment:

Performance Level	Evidence
(a) Marks 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) Marks 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) Marks 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.
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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.

Reference NOS: -

a) AAS/N1602
b) AAS/N1401
c) AAS/N1608
d) AAS/N1803
e) AAS/N1607
f) AAS/N1605
g) AAS/N1608
h) AAS/N1609
i) AAS/N9405
j) AAS/N9406
k) AAS/N9407
l) AAS/N9408
m) AAS/N9409
n) AAS/N9410
o) AAS/N9411
p) AAS/N9412
q) AAS/N9413
r) AAS/N9414
s) AAS/N9415
t) AAS/N9416
u) CSC/N9401
v) CSC/N9402

4. GENERAL INFORMATION

Name of the Trade	**AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER**
Trade Code	DGT/2013
NCO – 2015	3115.1000
NOS Covered	AAS/N1602, AAS/N1401, AAS/N1608, AAS/N1803, AAS/N1607, AAS/N1605, AAS/N1608, AAS/N1609, AAS/N9405, AAS/N9406 AAS/N9407, AAS/N9408, AAS/N9409, AAS/N9410, AAS/N9411 AAS/N9412, AAS/N9413, AAS/N9414, AAS/N9415, AAS/N9416, CSC/N9401, CSC/N9402
NSQF Level	Level –4
Duration of Craftsmen Training	Two Years (2400 hours + 100 hours English skills + 200 hours OJT/Group Project)
Entry Qualification	Passed 10th class examination with Science and Mathematics or with vocational subject in same sector or its equivalent.
Minimum Age	16 years as on first day of academic session.
Eligibility for PwD	NA
Unit Strength (No. Of Students)	20 (There is no separate provision of supernumerary seats)
Space Norms	400 Sq. m
Power Norms	25 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 Regular/RPL variants of National Craft Instructor Certificate(NCIC) 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. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade OR Regular/RPL variants 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 engineering/ Draughtsman group of trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade

	OR Regular/RPL variants NCIC in RoDA 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. (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.
5. Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

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

FIRST YEAR:

1. Plan and organize the work to make job as per specification applying different types of basicfitting operation and check for dimensional accuracy. (NOS: AAS/N1602)
2. Making basic adjustment of sheet metal and Joining techniques for sheet metal and metal components. (NOS: AAS/N9405)
3. Produce components by different operations and check accuracy using appropriate measuring instruments. (NOS: AAS/N9406)
4. Make different fit of components for assembling as per required tolerance observing principle of interchangeability and check for functionality. (NOS: AAS/N9408)
5. 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 ranging from ±0.5mm to ±0.05mm. (NOS: AAS/N1401)
6. Manufacture simple sheet metal with bending and check accuracy using appropriate measuring instruments and according to required tolerances ranging from ±0.5mm to ±0.05mm. (NOS: AAS/N1401)
7. Manufacture sheet metal as per drawing and join them by basic riveting observing standard procedure. (NOS: AAS/N1401 AAS/N1602)
8. Make and assemble components by different handling fitting operations and check accuracy using appropriate measuring instruments. (NOS: AAS/N1602)
9. Produce rolled and interchangeable metal components by sheet metal working operations and check accuracy using appropriate measuring instruments and according to required tolerances ranging from ±0.5mm to ±0.05mm. (NOS: AAS/N1401)
10. Read and apply engineering drawing for different applications in the field of work. (NOS: CSC/N9401)
11. Demonstrate basic mathematical concepts and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: CSC/N9402)

SECOND YEAR:

12. Perform PR sealant application. (NOS: AAS/N1602)
13. Manufacture open and closed riveted box with two different thicknesses, bent sheets, anchor nuts. (NOS: AAS/N9409)
14. Perform coating and validation of coating PR sealant application on a manufactured closed box. (NOS: AAS/N9410)
15. Perform assembly with specific fasteners.
16. Perform surface treatment, and touch- ups on manufactured metal parts. (NOS: AAS/N9415)
17. Perform corrosion treatment by observing standard procedure. (NOS: AAS/N1803)
18. Prepare the task, the corresponding material, and tools for fluid systems equipment fitting by using and processing technical documentation related and standard practices. (NOS: AAS/N1602)
19. Identify the fluid systems assembly phases and mechanical assembly knowing the operation of the different aircraft fluid systems. (NOS: AAS/N9413)
20. Perform pipe fitting assembly by different operations using standard tools and check for specified accuracy (Metallic pipes and flexible hoses). (NOS: AAS/N9414)
21. Plan, assemble and dismantle different pipes and flexible hoses and perform pipe routing inspections and leak tests. (NOS: AAS/N9416)
22. Prepare the task, the corresponding material, and tools for electrical systems equipment fitting by using and processing technical documentation and standard practices. (NOS: AAS/N1602)
23. Join cables to build a harness by using the appropriate tools. (NOS: AAS/N1609)
24. Fit and install harness on different types of panels and structure elements and perform basic electrical tests and check compliance of harness building. (NOS: AAS/N1609)
25. Read and apply engineering drawing for different applications in the field of work. (NOS: CSC/N9401)
26. Demonstrate basic mathematical concepts and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: CSC/N9402)

6. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESMENT CRITERIA
FIRST YEAR	
1. Plan and organize the work to make job as per specification applying different types of basicfitting operation and check for dimensional accuracy. (NOS: AAS/N1602)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Plan and identify tools, instruments, and equipment for marking and makethis available for use in a timely manner.
	Select raw material and visually inspect for defects
	Mark as per specification applying desired mathematical calculation andobserving standard procedure.
	Measure all dimensions in accordance with standard specifications andtolerances.
	Identify hand tools for different fitting operations and make these availablefor use in a timely manner.
	Prepare the job for hacksawing.
	Perform basic fitting operations viz., Hacksawing to close tolerance as perspecification to make the job.
	Observe safety procedure during operation as per standard norms andcompany guidelines.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
2. Making basic adjustment of sheetmetal and Joining techniques for sheet metal and metal components. (NOS: AAS/N9405)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor 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 andcompany guidelines.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.

	Fill out traceability sheets and take inventory of the tools.
3. Produce components by differentoperations and check accuracy using appropriate measuring instruments. (NOS: AAS/N9406)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Plan and organize to produce different components.
	Select raw material, tools & equipment as per drawing.
	Execute/ perform different operations such as countersinking, Counterboring, hand reaming, tapping, flanging, etc.
	Check the work / job using Vernier, screw gauge micrometer and rectify ifnecessary.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
4. Make different fit of componentsfor assembling as per required tolerance observing principle of interchangeability and check for functionality. (NOS: AAS/N9408)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	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.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
5. Make different types of simple sheet metal components for assembling using hand drill machine and check accuracy using appropriate measuring instrumentsand according to required tolerances ranging from ±0.05mm to ±0.5 mm. (NOS: AAS/N1401)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	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 andgrinding 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
6. Manufacture simple sheet metalwith bending and check accuracyusing appropriate measuring instruments and according to required tolerances ranging from ±0.05mm to ±0.5 mm. (NOS: AAS/N1401)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	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 andgrinding 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
7. Manufacture sheet metal as perdrawing and join them by basic riveting observing standard procedure. (NOS: AAS/N1401 AAS/N1602)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor use in a timely manner.
	Prepare the job for riveting.
	Perform basic fitting operations hacksawing, filing, drilling, tapping andgrinding 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.

	Fill out traceability sheets and take inventory of the tools.
8. Make and assemble componentsby different handling fitting operations and check accuracy using appropriate measuring instruments. (NOS: AAS/N1602)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor use in a timely manner.
	Prepare the job for sawing, filling, bending.
	Perform basic fitting operations hacksawing, filing, drilling, tapping andgrinding 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
9. Produce rolled and interchangeable metal componentsby sheet metal working operations and check accuracy using appropriate measuring instrumentsand according to required tolerances ranging from ±0.05mm to ±0.5 mm. (NOS: AAS/N1401)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
10. Read and apply engineering drawing for different applicationsin the field of work. (NOS: CSC/N9401)	Read and interpret the information on drawings and apply in executingpractical work.
	Read and analyse the specification to ascertain the material requirement,tools, and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out thework.
11. Demonstrate basic mathematicalconcepts	Solve different mathematical problems

and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: CSC/N9402)	Explain concept of basic science related to the field of study
SECOND YEAR	
12. Perform PR sealant application. (NOS: AAS/N1602)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Prepare the job for scouring and PR sealant application
	Observe safety procedure during above operation as per standard normsand company guidelines.
	Check for dimensional accuracy as per standard procedure.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
13. Manufacture open and closed riveted box with two different thicknesses, bent sheets, anchor nuts. (NOS: AAS/N9409)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Perform basic fitting operations hacksawing, filing, drilling, tapping andgrinding 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
14. Perform coating and validation of coating PR sealant application on a manufactured closed box. (NOS: AAS/N9410)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Prepare the job for scouring and PR sealant application.
	Observe safety procedure during operation as per standard norms andcompany guidelines.
	Check for dimensional accuracy as per standard procedure.

	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
15. Perform assembly with specific fasteners.	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Perform fitting operations with specific fasteners HI-LITE and AERONAUTICAL BLIND RIVET following standard procedure
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
16. Perform surface treatment, and touch-ups on manufactured metal parts. (NOS: AAS/N9415)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Prepare the job for specific surface treatment operations.
	Observe safety procedure during operation as per standard norms andcompany guidelines.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
17. Perform corrosion treatment by observing standard procedure. (NOS: AAS/N1803)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor use in a timely manner.
	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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
18. Prepare the task, the	Use English technical vocabulary related to the task.

corresponding material and tools for fluid systems equipment fitting by using and processing technical documentation related and standard practices. (NOS: AAS/N1602)	Follow safety standards and apply 5S methodology.
	Identify the pipe protections to be used.
	Check the storage conditions observing technical information.
	Unpack, destock and handle all types of pipe by applying standard practices.
	Set up pipes in the place provided for this purpose.
	Prepare the job by analysing the tasks and technical documents.
	Check the absence of scratch or deformation and fitting system integrity.
	Identify Part Number or Serial Number according to technical documents.
	Clean the pipe by observing safety rules and technical information.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
19. Identify the fluid systems assembly phases and mechanical assembly knowing the operation of the different aircraft fluid systems. (NOS: AAS/N9413)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Explain the role of the main elements of each fluid system
	Perform assembly by observing the functional order of each elementaccording to a typical system.
	Identify the hazards of each fluid system
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
20. Perform pipe fitting assembly by different operations using standard tools and check for specified accuracy (metallic pipes and flexible hoses). (NOS: AAS/N9414)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor use in a timely manner.
	Plan work in compliance with technical documentation and with standardinstallation of fittings and pipe.
	Perform appropriate assembly and joining techniques according to the typeof pipe and technical documentation using best practices.
	Plan work in compliance with technical documentation and with standardinstallation of fittings.
	Perform appropriate assembly and joining techniques according to the typeof flexible hose and technical documentation using best practices.

	Set and apply the right torque on the appropriate torque wrench.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
21. Plan, assemble and dismantle different pipes and flexible hoses and perform pipe routing inspections and leak tests. (NOS: AAS/N9416)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Ascertain and select tools and materials for the job and make this availablefor use in a timely manner.
	Plan work in compliance with standard installation of aluminium pipes andflexible hoses
	Apply the appropriate assembly technique according to technical documentation
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
22. Prepare the task, the corresponding material and tools for electrical systems equipment fitting by using and processing technical documentation and standard practices. (NOS: AAS/N1609)	Use English technical vocabulary related to the task.
	Follow safety standards and apply 5S methodology.
	Read and understand the technical documents.
	Choose the necessary documents and information to perform the job.
	Prepare the job by analysing the task.
	Ascertain and select tools and materials for the job and make this availablefor use in a timely manner.
	Perform cutting operations observing safety rules and technical information.
	Check for length accuracy.
	Classify and store wires by types and lengths.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure workshop cleanliness and FOD free environment.
	Fill out traceability sheets and take inventory of the tools.
23. Join cables to build a harness by using the appropriate tools. (NOS: AAS/N1609)	Use English technical vocabulary related to the task
	Enforce safety behaviour and apply 5S methodology
	Prepare the job by analysing the tasks.
	Ascertain and select tools and materials for the job and make this

	availablefor 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, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness and FOD free environment.
	Fill the traceability sheet and take inventory of the tools
24. Fit and install harness on different types of panels and structure elements and perform basic electrical tests and check compliance of harness building. (NOS: AAS/N1609)	Use English technical vocabulary related to the task
	Enforce safety behaviour and apply 5S methodology
	Plan work in compliance with standard safety norms and identify the workarea and the different parts to install.
	Ascertain and select the necessary tools and consumable supplies and makethis 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, andprotection.
	Avoid waste, ascertain unused materials and components for disposal, storethese in an environmentally appropriate manner and prepare for disposal.
	Ensure the workshop cleanliness and FOD free environment.
	Fill the traceability sheet and take inventory of the tools
25. Read and apply engineering drawing for different applications in the field of work. (NOS: CSC/N9401)	Read and interpret the information on drawings and apply in executingpractical work.
	Read and analyse the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and makeown calculations to fill in missing dimension/parameters to carry out thework.
26. Demonstrate basic mathematical concepts	Solve different mathematical problems

and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: CSC/N9402)	Explain concept of basic science related to the field of study

7. TRADE SYLLABUS

SYLLABUS FOR AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER TRADE			
FIRST YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
		Throughout the Trade, students and trainers shall recognise and comply with Safety (PPE), 5S practices, and traceability. Time and Motion concepts	
Professional Skill - 45 Hrs Professional Knowledge 20 Hrs	Plan and organize the work to make job as per specification applying different types of basic fitting operation and check for dimensional accuracy.	**Safety Skills** 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 / burns, etc. 5. Hazard identification and avoidance. 6. Safety sign for danger, warning, caution and personal safety message. 7. Preventive measures for electrical accidents and steps to be taken in such accidents. 8. Use of fire extinguishers. 9. Practice and understand	**Technical English knowledge** Technical English vocabulary related to basic fitting operations. **Safety Knowledge** 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.

		precautions to be followed whileworking in fitting jobs. 10. Safe use of tools and equipmentused in the trade. **11. Foreign Object Damage** 11. (FOD) and tool inventory 12.Identify and record FOD ontraceability sheet 13. Make the tool inventory	Introduction to 5S concept & its application. Occupational Safety & Health: Health, Safety and Environment guidelines, legislations & regulationsas applicable. **Foreign Object Damage (FOD)** FOD area signs and markings. Procedures to avoid FODs. Procedures to be followed in case ofequipment loss. **Reading Technical plans** (Technical drawing international standards, title blocks, views, lines,hatchings, cross-sections, scales, flag notes, tolerances, pictograms) **Technical plan Reading Exercises** (identify different views and parts of a technical plan)
Professional Skill - 15 Hrs Professional Knowledge 06 Hrs	Making basic adjustment of sheetmetal and Joining techniques for sheetmetal and metal components.	**12. Marking out lines, gripping suitably in vice jaws, and hacksawing to given dimensions** - Measuring with a steel rule - Marking lines - Making parallel lines to the edgewith a jenny calliper - Clamping the work piece in thebench vice to sawing - Cut Aluminium 5000 SERIES and Fe310 Steel along a marked straightline by hacksaw	**Linear measurement –** InternationalSystem of Unit of Measurement (SI) **Surface plate / marking table** **Steel rule** **Scriber** **Jenny calliper (hermaphrodite calliper)Surface gauge** **Angle plate** **Vee block (“V” block)** **Engineer’s square with stock** (Terminology, purpose, type, uses,methods and care)
Professional Skill - 30 Hrs Professional Knowledge	Produce componentsby different operations and checkaccuracy using appropriate measuring	**13. Sawing different types of metalsof different sections** - Mark in cylindrical parts using aVee block and a surface gauge - Mark in an angle using anengineer’s	**Bench vice, hacksaw and blades** (Terminology, purpose, type, uses,methods and care)

10 Hrs	instruments.	square - Hacksaw (holding-pitch selection) - Cut along a straight line in adifferent shape by hacksaw - Cut different metals on differentthicknesses - Cut sections of different metals(Aluminium 5000 SERIES, Steel Fe310)	
Professional Skill – 350 Hrs Professional Knowledge 48 Hrs	Make different fit of components for assembling as per required tolerance observing principle of interchangeability andcheck for functionality.	**14. Filing flat a large surface andcheck flatness** - Clamping the work piece in thebench vice to filing - File flat with straight file or rasp onAluminium 5000 SERIES - Cross filling - Check flatness with bevelledstraight edge **15. Filing square and check usingengineer square** - File flat and square with straightfile or rasp on Aluminium 5000 SERIES - Check the squareness of an anglewith engineer square Draw filling **16. Filing flat, square and parallel to an accuracy of ±0.5 mm** - File flat, square and parallel with straight file or rasp on Aluminium 5000 SERIES - Check dimension withVernier calliper - Marking parallel lines using surfacegauge - Marking with a Vernierheight gauge **17. Sawing and filing thin**	**Files, rasp, flat files, hand files square, round, half round, triangular, knife-edge files.** (Terminology, purpose, type, uses,methods, and care) **Cuts of files and rasps** **Cross-sectional shapes of files** **Coarseness or grade of files** **Cleaning files (file card brush).** **Sheet Metal Deburring tools.** **Callipers (Spring joint callipers)** (Definition, types, and uses) **Dividers** (Definition, types, and uses) **Marking punches** (Definition, types, and uses) **Engineer's hammers** (Definition, types, and uses) **Graduations and reading of metricVernier** (0.02 mm least count metric

		aluminium sheet metal - Mark out lines using a jennycalliper - Cut Aluminium 5000 SERIESalong marked lines - File thin sheet metal to givedimension using rasp - Checking flatness of an edge - Deburring edges in thin metalsheet **18. Filing steps and notches toaccuracy of ±0.5 mm** - Tracing with Vernier height gauge - Sawing and filing steps and notcheson different thickness of Aluminium 5000 SERIES - Check flatness, squareness withbevelled straight edge and engineering square - Check dimension with Verniercalliper and Vernier depth gauge - Deburring edges **19. Filing chamfers to an accuracyof ±0.5 mm** - Tracing with Vernier heightgauge and protractor - Clamping the work piece in thebench vice to chamfering - Filing chamfer on angle and on long edge, on different thickness ofAlu 5000 SERIES - Check dimension with bevelprotractor **20. Filing convex radii** - Tracing with Vernier	Vernier measurements). **Vernier calliper** (Parts and uses) **Vernier height gauge** (Parts, features, applications) **Bevelled straight edge, radius andfillet gauge** (Features and uses) **Measurement of angles** (Fractional units of angles, Symbolsfor degrees, minutes and seconds) **Properties of angles** (different types of angle) **Vernier bevel protractor** (Read and scale graduations on thedial with acute and obtuse angles) **Combination square**

		heightgauge and radius gauge - Punching centre to use dividerMarking with divider - Filing radius on angle and on long edge, on different thickness of Alu5000 SERIES - Check radii with radius gauge	(uses of each attachment in a combination set)
		21. Drilling with drill press - Set the drill bit in drill press chuck - Calculate de cutting speed - Identify and use the differentholding devices - Punch hole centre - Drill holes with drill press, ondifferent thickness of Aluminium5000 SERIES - Enlarge holes gradually to finaldiameter - Deburring hole with 90°countersunk cutter	**Drill press** (Bench and pillar type drilling machine and spindle speed) **Holding devices** (Features of drill chucks and functions of drill sleeves and drift) **Cutting speed and RPM** (Tables and formulas) **Feed in drilling** (Feed rate) **Drills, twist drills, drill angles** (Types, parts, and functions and ISItypes of helix for drills)
		22. Make countersink, counterbore,and spot face - Set the tools depth by successivetests on Aluminium 5000 SERIES - Countersink hole - Counterbore hole - Spot face surface - Check accuracy with depth gauge	**Deburring and chamfering** (Types of hole deburring tools) **Counterboring and spot facing** (Difference between counterboringand spot facing) **Countersinking** (Purpose, types, angles, and different applications)
		23. Make internal thread / Tappingthrough holes - Choose correct drill bit diameter tofit hand tap set - Prepare hole for threading	**Screws thread and elements** (Terminology and types) **Threads Standards used in aerospace industry** (V threads; angle, pitch, and

		(withchamfer) - Cut internal threads using handtaps with solid lubricant (ensure perpendicularity) - Check internal threads with gageor bolt	designation) **Hand taps** (Uses and features of threading tools) **Tap drill size** (Tables of ISO metric and ANSI/ASME B1.1 inch Clearance andTolerance).
		24. Ream holes with hand reamer /Reaming drilled holes using hand reamers - Choose correct drill bit diameter tofit reamer - Prepare hole for reaming (withchamfer) - Ream drilled holes using handreamers with lubricant (ensureperpendicularity) - Perform reaming on different thickness of Aluminium 5000 SERIES,Steel and Stainless Steel AISI316L -Check reamed hole with go-no gogauge	**Reamer and hand-reamer** (Straight fluted and helical fluted reamers) **Drilling size for reaming** (Hole size before reaming) **Reaming** (Procedure for hand reaming and machine reaming) **Plug gauges** (Go/No-Go gauges)
		25. Make components to assembly - Manufacture components on Aluminium 5000 SERIES as per drawing within tolerances by leveraging previously assimilatedskills **26. Make assembly with interchangeability** - Assemble components as perdrawing - Check and report assembly conformity and	**Necessity of interchangeability** (Advantages and disadvantages ofmass production and necessity forthe limit system) **The ISO and BIS system of limits &fits - Terminology and standard chart** **Fits and their classification as perISO and Indian Standard** (Clearance fit, transition fit, interference fit, and graphical representation of the different classes of fits) **Brief History of Aviation** (Main dates and precursors in the history of aviation) **Different type of aircrafts**

		interchangeability	**General aircraft main description** (Main components of an aircraft and purpose related) **Aerodynamic notions** (The four forces of the fly, the physicals laws making the fly possible, the axis and operating elements of an aircraft, the functionof the different elements on the flight of an aircraft).
Professional Skill 70 Hrs Professional Knowledge 20 Hrs	Make different types of simple sheet metalcomponents for assembling using hand drill machine and check accuracy using appropriate measuring instruments and according to requiredtolerances ranging from ±0.5mm to ±0.05mm.	**27. Make basic adjustment of sheetmetal with flanged holes** On Aluminium 5000 SERIES - Check raw material and manufacture parts as per drawing (mark and file external dimensions) - File notches and internal/externalradii in thin sheet metal - Prepare holes - Use hydraulic press and Dimpledies to make flanged holes - Check dimensions **28. Perform manual drilling** - Check raw material and manufacture parts as per drawing (mark and file external dimensions) - Mark rows and holes locations onsheet metal without scratch - Drill with pneumatic hand drills(revolver drill, 90° angle drill) - Drill holes in Aluminium 5000 SERIES, titanium TA6V, and steelAISI 316L - Drill with and without drill	**Technical English knowledge** Technical English vocabulary related to aeronautical fitting operations. **Technical plan Drawing Exercises** (identify different views and parts of a technical plan, draw plans withdifferent view of simple and intermediate workpieces) **Lightning flanged holes** **Hydraulic press and dimple die setfor flanged hole** **Pneumatic drills and drill bits** (Type and uses) **Holding devices** (Features of drill chucks and functions of drill sleeves and drift) **Cutting speed and RPM** (Tables and formulas) **Feed in drilling** (Feed rate) **Drills, twist drills, drill angles**

		bushensuring perpendicularity - Deburr holes - Check and report conformity onreport sheet	(Types, parts, and functions and ISItypes of helix for drills)
Professional Skill 30 Hrs Professional Knowledge 10 Hrs	Manufacture simple sheet metal with bending and check accuracy using appropriate measuring instruments and according to requiredtolerances ranging from ±0.5mm to ±0.05mm.	**29. Perform manual bending** - Calculate developed length ofbended sheet metal - Check raw material andmanufacture parts - Trace and file to correctdimensions - Bend Aluminium 5000 SERIESwith manual brake - Check dimensions and angles	**Sheet metal forming terminology(**Terms commonly used in sheet metal bending) **Bending calculation Determine correct bend radius** - Bending table - Bend allowance - Total developed width calculation
Professional Skill 100 Hrs Professional Knowledge 15 Hrs	Manufacture sheet metal as per drawingand Join them by basic riveting observing standard procedure.	**30. Manufacturing parts for riveting** - Check raw material and manufacture parts as per drawing (mark and file external dimensions) - Trace pitch and edge distance - File and drill on Aluminium Angles - Check and report conformity onreport sheet **31. Riveting with squeezer** - Position the parts of the assemblyusing surface plate and Vee Block - Clamp together parts - Counter-drill - Set properly and safely RivetSqueezer - Rivet parts using Rivet Squeezers - Check with rivet gauge and reportconformity on report sheet **32. Riveting using rivet**	**Solid rivets - Introduction** (Parts of solid shank rivets and the different rivet head shapes and theiruses) **Solid rivets – MS, NASM and EN Inch series designations** **Solid rivets – Metric series designations** **Solid rivets – Length calculation** **Fasteners symbolization – NAS523standard** (Read and understand documentation and tables) **Fasteners symbolization – ISO 5845-2, IS 15023 Part 2 and EN2544 standards** (Read / understand documentation /tables) **Holes preparation procedure for riveting - Drilling** (The different step to prepare

		gun -Training - Check raw material and manufacture parts on Aluminium 5000 SERIES as per drawing (markand file external dimensions) - Position the parts of the assemblyusing surface plate and Vee Block - Clamp parts together - Counter-drill - Perform riveting using rivet gunand bucking bar - Check flushness of countersunkhead solid rivets - Check with rivet gauge and reportconformity on report sheet - Check flushness of countersunkhead solid rivets - Check with rivet gauge and reportconformity on report sheet **33. Rivet gauges manufacturing** - Manufacture rivet gauge onstainless steel AISI 316L - Mark, file, drill, bend, deburr - Check dimensions with closetolerance (± 0.05mm) **34. Drilling large diameters** - Drill large diameter with hole sawand step drill on 5000 SERIES - Punch letters or numbers **35. Parts manufacturing – Flat panel**	holefor riveting) **Holes preparation procedure for riveting - Countersinking** (The tools used to countersink) **Solid rivets - Introduction** (Parts of solid shank rivets and the different rivet head shapes and theiruses) **Solid rivets – MS, NASM and EN Inch series designations** **Edge distance and edge margin** (Calculation) **Holes pitch or holes spacing** (Calculation) **Holding and clamping devices** **Tools for riveting operation with squeezers.** (Types, uses, settings, and accessories) **Evaluating the rivet.** (Riveting defects and causes) **Tools for riveting operation with rivet gun.** (The different tools and accessoriesfor riveting and their use) **Riveting operations with rivet gunand bucking bar.** (Best practices)

		- Manufacture large part on Aluminium 5000 SERIES following drawing and ensuringtolerances - Trace, cut, and file cut-out in thepanel - Use hydraulic bending machine Check and report conformity on report sheet	
Professional Skill 110 Hrs Professional Knowledge 18 Hrs	Make and assemble components by different handling fitting operations and check accuracy using appropriate measuring instruments.	**36. Parts assembly – Flat panel** - Assemble parts as per drawing /Clamp part together with temporary fasteners - Counter drill & countersink holes - Perform riveting using rivet gun and bucking bar or Rivet Squeezers - Check and report conformity onreport sheet **37. Part manufacturing – Littlefuselage** - Manufacture parts on Aluminium 5000 SERIES following drawing andensuring tolerances - Mark, roll, bend, file, step drill, cut-out, deburr. - Calculate developed length forbending - Calculate developed length forrolling - Check and report conformity onreport sheet	**Technical English knowledge** Technical English vocabulary related to basic fitting operations.
Professional Skill 90 Hrs Professional Knowledge	Produce rolled and interchangeable metal components by sheet metal working operations and check accuracy	**38. Parts assembly – Little fuselageassembly** - Assemble parts as per drawing /Clamp part together with temporary fasteners	**Electrical bonding and grounding.**(Rules to strip a metallic part for electrical bonding and overview ofbonding processes)

13 Hrs	using appropriate measuring instruments and according to required tolerances ranging from ±0.5mm to ±0.05mm.	- Drill, counter drill and countersinkholes - Perform riveting using rivet gun and bucking bar or Rivet Squeezers - Check and report conformity onreport sheet **39. Bonding Operations** - Using the Flat Panel, on a paintedpart, perform operations for Bonding: (Cleaning, brushing) - Install Bonding Straps with nutsand bolts - Apply blue varnish followingaeronautical rules - Test continuity -Check and report conformity onreport sheet **40. Little bending aircraft - ATR** - Manufacture parts and ensureclose tolerances on Aluminium 5000SERIES - Report drawing by punching thesheet metal - Mark, file precisely, drill,deburr, bend - Clamp parts together - Perform riveting with rivet gun orrivet squeezers - Achieve an esthetical and accuratepiece **41. Parts manufacturing #01 -Training beam pre-assembly** - Check raw material and manufacture parts on Aluminium5000 SERIES as perdrawing - Assemble parts as per drawing using surface plate,	**Human Factor introduction** (Areas covered by human factors) **Human Performance and Limitations – Vision and audition** (Human performance and limitations - eye and ear) **Human Performance and Limitations – Information processing model** **Human Performance and Limitations – Attention and perception** **Human Performance and Limitations – Memory**

		Vee Block, vice,and clamps - Ensure proper gap, squareness,and parallelism - Drill, counter drill and countersinkholes - Perform riveting using rivet gun and bucking bar or Rivet Squeezers - Check and report conformity on - report sheet	
Engineering Drawing 40 Hrs.			
Professional Knowledge ED - 40 Hrs	Read and apply engineering drawing for different application in the fieldof work.	**Introduction to Engineering Drawing and Drawing Instruments:** - Conventions - Sizes and layout of drawing sheets - Title Block, its position and content - Drawing Instrument **Lines- Types and applications in drawing Free hand drawing of:** - Geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches. - Free hand drawing of hand tools and measuring tools. **Drawing of Geometrical figures:** - Angle, Triangle, Circle, Rectangle, Square, Parallelogram. - Lettering & Numbering–Single Stroke. **Dimensioning:** - Types of arrow head - Leader line with text - Position of dimensioning (Unidirectional, Aligned) **Symbolic representation:** - Different symbols used in the related trades. **Concept and reading of Drawing in:** - Concept of axes plane and quadrant - Concept of Orthographic and Isometric projections - First angle and third angle projections (definition and difference) **Reading of Job drawing of related trades.**	
WORKSHOP CALCULATION & SCIENCE (40 Hours)			
Professional Knowledge WCS - 40 Hrs	Demonstrate basic mathematical conceptand principles to perform practical operations. Understand and	**Unit, Fractions** - Classification of unit system - Fundamental and Derived Units F.P.S, C.G.S, M.K.S and SI units - Measurement units and conversion - Factors, HCF, LCM and problems - Fractions - Addition, subtraction, multiplication & division	

	explain basic sciencein the field of study.	- Decimal fractions - Addition, subtraction, multiplication & division - Solving problems by using calculator **Square root, Ratio and Proportions, Percentage** - Square and square root - Simple problems using calculator - Applications of Pythagoras theorem and related problems **Ratio and proportion** - Ratio and proportion - Direct and indirect proportionsPercentage - Percentage - Changing percentage to decimal and fraction **Material Science** - Types metals, types of ferrous and non-ferrous metals - Physical and mechanical properties of metals. **Mass, Weight, Volume and Density** - Mass, volume, density, weight and specific gravity - Related problems for mass, volume, density, weight and specific gravity **Work, Power and Energy** - Work, power, energy, HP, IHP, BHP and efficiencyHeat & Temperature and Pressure - Concept of heat and temperature, effects of heat, difference between heatand temperature, boiling point & melting point of different metals and non-metals - Scales of temperature, Celsius, Fahrenheit, Kelvin and conversion betweenscales of temperature. - Concept of pressure - Units of pressure, atmospheric pressure, absolute pressure, gauge pressure and gauges used for measuring pressure **Basic Electricity** - Introduction and uses of electricity, electric current AC, DC theircomparison, voltage, resistance, and their units - Conductor, insulator, types of connections- series and parallel - Ohm's law, relation between V.I.R & related problems **Mensuration** - Area and perimeter of square, rectangle and parallelogram - Area and perimeter of Triangles - Area and perimeter of circle, semi-circle, circular ring, sector of Circle,hexagon and ellipse - Surface area and volume of solids - cube, cuboid, cylinder, sphere andhollow cylinder **Levers and Simple machines** - Simple machines - Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relationship between efficiency, velocity ratio andmechanical advantage

		Trigonometry - Measurement of angles - Trigonometrical ratio - Trigonometrical tables
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)**	**Professional Knowledge (Trade Theory)**
		Throughout the Trade, students and trainers shall recognise and comply with Safety (PPE), 5S practices, and traceability.	
Professional Skill 10 Hrs Professional Knowledge 04 Hrs	Perform PR sealant Application.	**42. Parts assembly - Training beam junction** - Assemble together sub-assemblies from 2 students - Ensure proper gap, squarenessand parallelism - Counter drill - Perform riveting using rivet gunand bucking bar or Rivet Squeezers - Check and report conformity on report sheet	**Technical English knowledge** Technical English vocabulary related to advanced fitting operations. **Technical plan DrawingExercises** (identify different views and parts of a technical plan, draw plans with different view of intermediate and complex workpieces)
Professional Skill 175 Hrs Professional Knowledge 40 Hrs	Manufacture open and closed riveted box with two different thicknesses, bended sheets, anchor nuts.	**43. Rivet removal - Flat Panel** - Remove universal and countersunk head solid rivet using best practices using driftpins - Check holes and countersunk holes after removal **44. Open riveted box manufacturing** - Manufacture complex parts on Aluminium 5000 SERIES as per drawing within tolerances by leveraging previously assimilatedskills - Check and report conformity on report sheet **45. Open riveted box manufacturing** - Manufacture complex parts	**Solid Rivet Removal** (Removal of universal head rivet and countersunk head rivet) **Metallic Material - Physical & Mechanicalproperties** **Non-Ferrous metals: Aluminium** (Properties, uses, alloys and ores from which aluminium is produced) **Non-Ferrous metals: Aluminium alloys** (Series and designation of aluminium alloys)

		onAluminium 5000 SERIES as per drawing within tolerances by leveraging previously assimilated skills - Check and report conformity on report sheet **46. Riveted closed profile boxassembly** - Perform complex assemblies onopen box by leveraging all previously assimilated skills - Perform constraint environment riveting operations - Install anchor nuts using nutplate jig / drill jig - Check and report conformity on report sheet	**Types of Ferrous & Non-Ferrous metals** (Metals commonly used for making alloy steels) **Table of symbols and densitiesof commons elements** (chemical symbol and technological symbol of commons elements) **Introduction of iron andcast iron** (Difference between Iron, steel and Cast iron, Alloy steel, carbon steel,stainless steel)
Professional Skill 90 Hrs Professional Knowledge 20 Hrs	Perform coating and validation of coating PR sealant applicationon a manufactured closed box.	**47. Sealant application** - Manufacture parts as per drawing on Aluminium 5000 SERIES and Aluminium angles - Prepare surface to sealfollowing best practices - Applicate sealants with extruder and spatula: Filet sealing, over coating, Interlaying, Filling Gap, filingcavity, overlapping, Beading. - Install rivets in wet assembly **48. Removal of PR sealant** - Remove cured sealantfollowing best practices - Clean components withoutdamaging surfaces	**Sealant types (A, B, C, and S), uses, application times (pot life and curing), storage and traceability.** **Sealant – Application tools.** **Sealing application methods.** (Preparation and application) **PR sealant removal operations on structural parts** **Sheetmetal working techniques such as growing,shrinking.** **Basic study of stress-straincurve for MS.** (Young's modulus; points and zones on the stress-strain curve) **Physical & Mechanical properties of engineeringmetal** (colour, weight, structure, and

		- Check surfaces and rivetheads **49. Coating PR sealant application – Closed box sealing** - Manufacture parts as per drawing on Aluminium 5000SERIES -Prepare surfaces for sealingfollowing best practices - Apply sealant and assembleparts as per drawing: Filet sealing, over coating, Interlaying, Filling Gap, filing cavity, Overlapping, Beading. - Install rivets in wet assembly - Install anchor Nuts - Apply sealant to installremovable panel with unmoulding agent **50. Coating PR sealant - application validation** - Check the correct application of sealant by performing underwater lowpressure leakage test - Correct defects if any.	conductivity, magnetic properties, fusibility, ductility, malleability, hardness, brittleness, toughness, tenacity, elasticity, mass, volume, density, and specific gravity) **Concept of Heat and Temperature measuring instruments.** **Specific heats of solids &liquids.** **Speed, Velocity, Acceleration& Retardation.** (The Newton's laws and theterms relating to motion)
Professional Skill 50 Hrs Professional Knowledge 15 Hrs	Perform assemblywith specific fasteners.	**51. Special Fastener installation** - Manufacture parts as perdrawing on Aluminium 5000SERIES - Drill and ream holes ensuringaccuracy - Assemble and clamp parts Install solid rivet with rivet gunor squeezers - Select the right size of fastenersusing Grip scale - Install Hi-Lite fastenersfollowing best	**Structural fasteners - Overview** (Definition, types, sizes, and materials of commons aeronautical fasteners used for structural assembly and related installation tools such Ratchet, Allen Key, and Pull Machine) **Threaded parallel shank fasteners – Hi-Lok™, Hi-Tigue™, Hi-lite™** (Composition and designation of threaded parallel shank fasteners

		practices - Install Cherry-Max Blind Fastener following best practices - Check and report conformity on reporting sheet **52. Blind rivets and Specialfasteners removal** - Remove Hi-Lite fastenerfollowing best practices - Remove Cherry-Max fastenerfollowing best practices - Check and report damages ifany **53. Knowledge of the materialsused and possible defects** - Identify the materials and theirshape - Visually inspect the material - Report different kind ofdamages on report sheet	with installation, check and removal process) **Swaged parallel shank fasteners – Lockbolts** (Composition and designation of swaged parallel shank fasteners with installation, check and removal process) **Blind fasteners – Pull type rivets** (Composition and designation of blind fasteners with installation, check and removal process) **Length determination** **Knowledge of the materials used and empirical recognition** (Classification by visual comparison) **Commercial and finished shapes** **The main defects and their visual recognition** (Origin of a defect to avoid its recurrence) **Heat treatment of steel and Aluminium Alloy** (Types and advantages)
Professional Skill 30 Hrs Professional Knowledge 10 Hrs	Perform surface treatment, and touch-ups on manufactured metal parts.	**54. Perform surface treatments** - On damaged parts, sand surface using hand pad andpower tools - Rework scratches, corrosion, nicks and gouges or indentationon flat surface - Rework scratches, corrosion, nicks and gouges or indentationon edges	**Corrosion: Definition and forms of corrosion** (The main types of corrosion; galvanic, pitting, filiform, crevice, stress, fatigue, intergranular) **Methods of corrosion protection.** (The main surface treatments for aluminium alloys; grinding, scouring)

		- Perform touch-up on reworkedarea with 1132 stick - Perform painting touch-up afterrework - Evaluate what type of damageis found **55. Perform Quality Inspectionon an existing installation** - Perform quality inspection onpreviously achieved structural assemblies; Training beam andflat panel assembly - Report results on report sheet	**Non-Destructive Testing (NDT)** (The main NDT methods used in aircraft parts inspection; visual inspection, liquid penetrant inspection, ultrasonic inspection, tap test)
Professional Skill 55 Hrs Professional Knowledge 15 Hrs	Perform corrosion treatment by observing standard procedure.	**56. Corrosion treatment elimination** - Remove corrosion on metallicparts following best practices **57. Little bending aircraft– Fouga magister** - Manufacture parts and ensureclose tolerances on Aluminium 5000 SERIES - Report drawing by punching thesheet metal - Mark, file precisely, drill,deburr, bend - Clamp parts together - Perform riveting with rivet gunor rivet squeezers - Achieve an esthetical andaccurate piece	**Corrosion reworking** (powered and non-poweredtools and equipment for corrosion removal) **International aviation legislation** (The Convention on International Civil Aviation and the International Civil Aviation Organization) **Directorate General of Civil Aviation of India** (Rules) **Civil Aviation Regulation** (Role of CAR-21, CAR-M, CAR-145, and CAR-147) **Composite material overview** (Matrices / fibre and reinforcements / resin) **Tapes, fabrics, weaving** **Laminate orientation** **Manufacturing processes of**

			composite materials (resin ratio calculation) **Sandwich materials** (The constituents of sandwich panel and the most commons cores used) **Difference between CFRP, GFRP, AFRP, technical composite textiles** (Differences and mechanical properties of FRP; Fibber Reinforced Plastics)
Professional Skill 30 Hrs Professional Knowledge 10 Hrs	Prepare the task, the corresponding material and tools for fluid systems equipment fitting by using and processing technical documentation related and standard practices.	**58. Reception of a pipe (ATA 29, 35, 38)** Perform operations of: - Checking the lack of impact onthe pipes, - Checking the protections - Handling of all types of pipes and different lengths (trolleys, protective foam, bubble wrap,transport case) **59. Operations before mountingpiping (ATA 29, 35, 38**) Perform operations of: - Identification of the pipe's plugsshutter - Installation of the corresponding plugs - Checking that the elements tobe mounted have not been damaged - Checking that their part or equipment number correspondsto the requisition sheet - Checking the expiry date	**Technical English knowledge** Technical English vocabulary related to fluid systems handling installation. **Definitions and commons damages on pipes** **Types and materials of pipes / Fluid lines and fittings** **Rigid pipe fabrication - Cutting** (cutting pipe tools) **Rigid pipe fabrication- Bending** (Bending pipe tools) **Rigid pipe fabrication - Flaring** (Flaring pipe tools) **Rigid pipe fabrication - Beading** (Beading pipe tools) **Aircraft description:** **ATA standard and ATA list** (ATA numbering system) **Brief description and routing diagram of:** Pneumatic system - **ATA 21** Flight control system - **ATA27**Fuel system – **ATA28** Hydraulic system – **ATA29** Oxygen system – **ATA35**

			GRAVINER systems (Fire detection system : principles of bi-metallic strip detector and Graviner type)
Professional Skill 90 Hrs Professional Knowledge 28 Hrs	Identify the fluid systems assembly phases and mechanical assemblyknowing the operation of the different aircraft fluid systems.	**60. Identify the aircraft fluid systems assembly** Assembly phases by team of 2students: On structure panels and mock-up(simulating ATA 29, 35, 38), perform: - Identification of the differentelements and explanations of their role - Brief presentation of thesystem operating - Identification of the hazards - Association of each element ofthe panel its symbol on the corresponding diagram - Identifying in the work card theorder of assembly of each element - Assembly on the mock-up allthe different elements - Crosschecking by another teamaccording to the technical documentation **61. Pipe routing on a diagram** On mock-up with technicaldocumentation, perform operations of: - Identification of each pipe mentioned in the work card andits belonging system - Identification of the fluid flowdirection - Identification of tools and equipment to achieve the piperouting - Checking the condition of theconnection ends	**Pipes jointing techniques** (Mains fittings) **Rigid pipes installation** (Styles and installation of clamps and rigid pipes. Gaps between pipes and the surrounding environment) **Marking of pipes** (Fluid line identification; mains symbols and colours) **Pipes torque wrenching** (Rules and abacus referring) **Pipes – Bounding and grounding** (Techniques to bond pipes) **Different flexible hose joining techniques** **Flexible hose installation** (Rules for flexible hose installation: Identify flexible hose constraints, bending radius, kinking and gaps between flexible hoses and the surrounding environment)

		- Preparation of the structurepanel and mark - Marking the path of thedifferent elements **62. Screwing and torqueing operations** On specimen and structure panels Perform operations of - Screwing different types of screws using the appropriatetools - Tightening different types of screws using ratchet socket withthe appropriate torque wrench regarding the torque required and mentioned in the work card **63. Locking techniques** Perform operations of: - Locking with nut lock washer, pin and castle nut, self-locking nut - Wire locking of nut retainer, screw, nut and piping - Locking fault identification	**Torque wrenching** (Rules and abacus referring) **Locking techniques** (Rings, adhesive, spring washers, castle nut and cotter pin, locking wires)
Professional Skill 50 Hrs Professional Knowledge 15 Hrs	Perform pipe fitting assembly by differentoperations using standard tools and check for specified accuracy (Metallic pipes and flexible hoses).	**64. Metallic pipe installation - ATA 35 and 29** by performing operations of: Combs, pipe support collars andclamps installation, torque tightening and torque sealing. Connection of the pipe in accordance with work card. Fittings torque tightening withtorque wrench. Assembly of metal pipes on different structural panels withrespect of the gaps between pipes and the	**Flight controls chain** (Flight control linkage) **Understand the principle of flight control system.** (Control rods, Pulley, Bell-crank, Walking-beam, Sectors and quadrants, Cable and cable terminal,Fittings, Turnbuckles) **Hydraulic system** (Description of components and

		surrounding environment. Checking the mounting constraints Crosschecking with: - Routing according to thediagram - Cleanliness - Marking and lockage - Marking of systems - Check tightening torques - Check the assembly complianceof the system according to the requirements defined in the documentation. Perform light pressure leakagetest **65. Flexible hose installation - ATA 29 and 38** (20h) by performing operations of: Connection of the flexible hosein accordance with work card. Assembly of fittings. Assembly of flexible hoses on different structural panels withrespect of the gaps and the surrounding environment. Checking the mounting constraints, bending radius andlack of kinking. Crosschecking with: - Routing according to thediagram - Cleanliness - Marking and lockage - Marking of systems - Check tightening torques - Check the assembly complianceof the system according to the requirements defined in the documentation. Water leakage test	standard installation and inspection procedure) **Pneumatic system** (Description of components and standard installation and inspection procedure) **Oxygen system - Safety** (Description of components, standard installation and inspection procedure, and danger of working on oxygen lines)
Profession	Plan, assemble and	**66. Perform assembly /**	Routing diagram.

alSkill 40 Hrs Professional Knowledge 15 Hrs	dismantle different pipes and flexible hoses and Perform pipe routing inspections and leak tests.	**disassembly of different mechanical subassemblies** by performing: - Application of the taskaccording to technical documentation - Assembly the mechanical sub-assembly: classification, verification, identification, and storage of the parts - Assembly of mechanical subassembly: clearance gaps,torque tightening, wire lock, lockage - Verification of the correctassembly (Cross-check by another trainee) - Verification of the proper functioning of all the assembledparts.	Definition of the appropriate marking according to the type of pipe. Technical vocabulary related to the systems. Select a torque wrench and read the Aluminium of torquing on an abacus. Locking techniques.
Professional Skill 45 Hrs Professional Knowledge 16 Hrs	Prepare the task, the corresponding material and tools forelectrical systems equipment fitting by using and processing technical documentation and standard practices.	**67. Wiring technical documentation** Define necessary documents forthe job to perform. Verify effectively and applicability of the extracteddocuments. Find and understand the main information in the different types of technical documents (texts, electrical schemes, wiringdiagrams, manufacturers norms) **68. Harness kit preparation** Analyse the work card, identifying tasks, necessary tools,and materials for: - Cutting different	**Technical English knowledge** Technical English vocabulary related to wiring handing / installation. **Documentation related towiring practices** (Symbols) **Aeronautic electrical wires and cables** (Aeronautical cables and wires: characteristics, references, types and gauges, shielded and coaxial cables, special cables, manufacturer marking, identification marking) **Wiring tools: wire preparation** (Cut and strip a wire) **Wires and cables – Cutting and cutting defects.** (Best Practices / Recognize the

		wires/cablestypes according to length definitions - Classify and store the cables fornext practical exercises.	principals cutting defects) **Tying techniques** (Textile lacing tape and plastic ties)
Professional Skill 105 Hrs Professional Knowledge 30 Hrs	Join cables to build a harness by using the appropriate tools.	**69. Shape and tie wires/cablesto build a harness** Check wires/cables: references lengths (notion of tolerances) Carry out the wires/cables identification in correlation withthe technical instructions Set wires/cables according to their destination (layout - wiringdiagram) Tie wires/cables with plastic tiesor lacing tape performing: - Capstan knot - American knot - French whipping knotPerform installation of textile/plastic protective sheathsor sleeves Install position markers (coloured scotch tape or lacingtape) Identify harness and its different branches using labels **70. Shape and tie wires/cables to build a harness - Examination**(15h) Check wires/cables: references lengths (notion of tolerances) Carry out the wires/cables identification in correlation withthe technical instructions Set wires/cables according to their destination (layout - wiringdiagram) Tie wires/cables with plastic tiesor lacing tape performing:	**Identification of bundle and harnesses** (identification marking on labels) **Mechanical protection for harness** **Stripping – Basics rules** (scalpel, cutter & stripping plier) **Stripping technique** (Preparing wire according tocable types and gauges) **Stripping defects / non-conformities** **Aeronautical shielded cables** (Composition of shielded cables) **Read a shielded cable designation.** **Tools for stripping shielded cables** (Scalpel, cutter, cutting pliers, scissors) **Stripping technique for shielded cables** **Tools for shrinking elements on shielded cables** (Infra-red gun, hot air gun) **Solder sleeves**

		- Capstan knot - American knot - French whipping knotPerform installation of textile/plastic protective sheathsor sleeves Install position markers (coloured scotch tape or lacingtape) Identify harness and its different branches using labels **71. Build Harness to be installedon panels** Prepare and assemble differentelectrical harnesses following diagram by leveraging all previously assimilated skills. Store the harnesses for the nextpractical exercises. **72. Perform electrical testsusing a multimeter** Carry out a wire continuity checkon the harness. Check wire by wire	**Crimping tools** (Normal contacts, terminals, splices, end caps crimping plier, locator & positioner). **Terminal types – Crimped contacts** **Terminal types – Terminals** **Other crimped components** **Insertion and extraction tools and associated standard practices** (Contact insertion/extraction tools / fool proofing ejector) **Insertion and extraction of normal contacts** **Connector types** - plug / sockets - mobile / fixed - Circular connectors
Professional Skill 70 Hrs Professional Knowledge	Fit and install harnesson different types of panels and structure elements and Performbasic electrical tests and check complianceof	**73. Fit and install harness on different types of attaching part** by performing operations of: - Inspecting the integrity of harness before beginning theinstallation tasks	- Rectangular connectors & ARINC connectors - Terminal block - Junction module - Connector accessories (back shells, cable clamps, fool proofing devices, protective

20 Hrs	harness building.	- 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 thework card - Installation of the attaching parts on the panels using ratchet, sockets, screwdrivers,and torque wrench - Installation harness on the different attaching points in accordance with 2D routingdrawing - Ensuring the traceability of thetasks on the associated traceability sheet - Self-check	covers, sealing pins, coupling nut, grommet). **Wiring diagram reading** (Symbols and testing) **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).
Engineering Drawing 40 Hrs.			
Professional Knowledge ED - 40 Hrs	Read and apply engineering drawing for different application in the fieldof work.	- Reading of drawing of nuts, bolt, screw thread, different typesof locking devices e.g., Double nut, Castle nut, Pin etc. - Reading of foundation drawing. - Reading of Rivets and riveted joints, welded joints. - Reading of drawing of pipes and pipe joints. - Reading of Job Drawing, Sectional View & Assembly view.	
WORKSHOP CALCULATION & SCIENCE (22 Hours)			
Professional Knowledge WCS - 22 Hrs	Demonstrate basic mathematical concept and principles to performpractical operations. Understand and explain basic sciencein the field of study.	**Friction** - Friction - Advantages and disadvantages, Laws of friction,coefficient of friction, angle of friction, simple problems related to friction - Friction - Lubrication - Friction - Co- efficient of friction, application and effects offriction in workshop practice **Centre of Gravity** - Centre of gravity - Centre of gravity and its practical applicationArea of cut out regular surfaces and area of irregular surfaces	

		- Area of cut out regular surfaces - circle, segment and sector ofcircle **Elasticity** - Elasticity - Elastic, plastic materials, stress, strain, units - Young's modulus - Elasticity - Ultimate stress and working stress **Estimation and Costing** - Estimation and costing - Simple estimation of the requirement ofmaterial etc., as applicable to the trade - Estimation and costing - Problems on estimation and costing
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. Employability Skills (Common for all CTS trades) (120 Hrs +60 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 /www.dgt.gov.in

ANNEXURE-I

LIST OF TOOLS AND EQUIPMENT			
AERONAUTICAL STRUCTURE AND EQUIPMENT FITTER (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	300mm Stainless steel	20 Nos.
2.	Steel Rule with Metric & British Graduation	600mm Stainless steel	20 Nos.
3.	Hacksaw Frame - Tubular flexible type	300 mm	20 Nos.
4.	Mini Hacksaw frame (handle)		20 Nos.
5.	Round Angle Ruler	180°	20 Nos.
6.	Try Square.	150mm - Insize 2275-300, - 150 mm blade	20 Nos.
7.	Try Square	300mm	20 Nos.
8.	Scriber		20 Nos.
9.	Center Punch 6 Inches	10 mm and Length - 120 mm	20 Nos.
10.	Drift Pin Set		20 Nos.
11.	Hammer Ball Peen 300 with handle	300 gms	20 Nos.
12.	Wooden Mallet		20 Nos.
13.	File Handle		180 Nos.
14.	File Flat - Second Cut	-250 mm	20 Nos.
15.	File Flat Smooth	-250 mm	20 Nos.
16.	File Half Round Second Cut	-150 mm	20 Nos.
17.	File Half Round Bastard		20 Nos.
18.	File Round		20 Nos.
19.	File Half Round 250 mm Smooth		20 Nos.
20.	Round File Bastard	Length 10 Inch	20 Nos.
21.	Round File Smooth	Length 10 Inch	20 Nos.
22.	File Rasp	250 mm with Handle	20 Nos.
23.	File Triangular		20 Nos.
24.	6 Needle Files	KIT of 6 different files - PFERD PF 611 (-)	20 Nos.
25.	Deburring Tool With Blade		20 Nos.
26.	File Carde Brush	Local	20 Nos.
27.	Caliper Vernier	200 mm Insize 1205	20 Nos.
28.	Sealant Spatula Kit	- (Discovery Tools) - any plastic spatula/scrapper	20 Nos.
29.	Sealant Roller with Handle	to spread PR - any plastic roll is OK	20 Nos.
30.	Tap Wrench Set Metric	Full set up to M10	20 Nos.
31.	Metric Feeler Gauge		20 Nos.

32.	Radius Gauge	1 to 7mm - Insize 4801	20 Nos.
33.	Radius Gauge	7,5 to 15 mm - Insize 4801	20 Nos.
34.	Radius Gauge	15 to 30 mm - Insize 4801	20 Nos.
35.	Drill Bushes Support Tripod		20 Nos.
36.	Drill Bush 2,5mm	2.5 mm	20 Nos.
37.	Drill Bush 3,3 Mm	3.3 mm	20 Nos.
38.	Step Drill Set	set of 3 step drill bits	20 Nos.
39.	Flute Deburring Cutter 90 Degree (HSS)	(3 Flutes) Shank 6mm, Body Dia 10.4 mm, Length 50 mm	20 Nos.
40.	Microstop Cage		20 Nos.
41.	Cutters with Solid Pilot	pilot ø 2,5 - cutter diam.10	20 Nos.
42.	Cutters with Solid Pilot	ø 3,3 diam.10	20 Nos.
43.	Cutters with Solid Pilot	ø 4,1 diam.10	20 Nos.
44.	Counter bore tool	pilot ø 4-6mm - cutter diam.12 – 15mm	05 Nos.
45.	Fluted Hand Reamers 4.76 H7 or H8	with matching GO NO GO and Fasteners	20 Nos.
46.	Fluted Hand Reamers 6 H7 or H8		20 Nos.
47.	Grip Clamps Pliers	Tools (Discovery Tools)	20 Nos.
48.	Squeeze Action T Clamps SA 1045	Squeeze Action Clamps	40 Nos.
49.	Flat Brush 25 Mm		25 Nos.
50.	Flat Brush 50 Mm		25 Nos.
B. WORKSHOP BENCHES TOOL KIT			
51.	Allen Key Set	Inches	5 Nos.
52.	Allen Key Set	Metric	5 Nos.
53.	Ratchet Spanner Set		10 Nos.
54.	Ratchet Wrench with Socket Set	Set of Socket 1/4, 3/16, 5/16, 7/32	5 Nos.
55.	Inside and Outside Spring Calipers With Divider	set of 3 tools	10 Nos.
56.	Mirror with Handle	45mm	5 Nos.
57.	Set of Marking Punches With Numbers		5 Nos.
58.	Chisel kit	3 pc set 10mm, 12mm,16mm	5 Nos.
59.	Sheetmetal Scissor Aviation Snip		5 Nos.
60.	Scissors		5 Nos.
61.	Rivet Cutter	to cut rivet at required length	10 Nos.
62.	Flute Deburring Cutter 60 Degree (HSS)	(3 Flutes) Shank 6mm, Body Dia 10.4 mm, Length 50 mm	5 Nos.
63.	Cutters with Solid Pilot	ø 4,8 diam.10	5 Nos.
64.	Bonding Brush	diam 16mm with solid pilot diam	10 Nos.

		4.1mm	
65.	Pin for Drill Bit In right angle Pneumatic Drills	2.5 mm for Drill Bit in right angle Pneumatic Drills	10 Nos.
66.	Pin for Drill Bit In right angle Pneumatic Drills	3.3 mm for Drill Bit in right angle Pneumatic Drills	5 Nos.
67.	Dial Comparator		10 Nos.
68.	Rivet Gauge	ø 2,4mm ASN-A	11 Nos.
69.	Rivet Gauge	ø 3,2mm ASN-A	21 Nos.
70.	Rivet Gauge	ø 4mm ASN-A	11 Nos.
71.	Go NO Go Plug Gauge H7 / 4.76 mm	matching reamer 4.76mm H7 and fastener	5 Nos.
72.	Hi Lok Gauge with Slide		5 Nos.
73.	Hi Lok Collar Pliers		5 Nos.
74.	Cherry Gauge with Slide		5 Nos.
75.	Drill Jig for Anchor Nut MS21055-3	Must be matching anchor nuts ordered - see OPEX	5 Nos.
76.	Drill Jig for Anchor Nut MS21047-3 & NAS1473-3	Must be matching anchor nuts ordered - see OPEX	5 Nos.
77.	Bimetallic Hole Saw Set with arbor adapter	Hole Saw Set with different diameters	5 Nos.
78.	Bimetallic Hole Saw - Diam 38mm with arbor adapter	ø 38mm	5 Nos.
79.	Bimetallic Hole Saw - Diam 22mm with arbor adapter	ø 22mm	5 Nos.
80.	Foot operated Air Pump with Pressure Gauge		5 Nos.
C. GENERAL MACHINERY INSTALLATION (for 2 Batches)			
81.	Air Compressor	15KW	1 No.
82.	Spare Air Compressor	5KW	1 No.
83.	Refrigerated Air Dehumidifier		1 No.
84.	Air Line Filter		1 No.
85.	Air Reserve Compressor Tank	2000L	1 No.
86.	Coil Hose 12 mm X 8 mm with both side connectors		26 Nos.
87.	QRC Connectors	for pneumatic system	150 Nos.
88.	Brass PU Connectors 1/4 X 12	for pneumatic system	100 Nos.
89.	Brass PU Connectors 3/8 X 12	for pneumatic system	100 Nos.
90.	Pneumatic Piping: Supply, Fabrication and Assembly	As per the design. for pneumatic	1 No.

		system	
91.	Flexible Blue PU pipe - diam 12mm - Length 3m	to connect guns to pneumatic system	20 Nos.
92.	Workshop Bench with Tool Storage Racks	with 4 stations on each bench	5 Nos.
93.	Workbench Protective Mat		5 Nos.
94.	Vice with vice jaw pads	with spinning base	20 Nos.
95.	Vertical Drill Machine with Stand	1KW	5 Nos.
96.	Vice For vertical Drill Press		5 Nos.
97.	Hydraulic -Shear Machine - 2100mm (Rajkot)	To shear MS Plate up to 5mm thickness and 4ft width	1 No.
98.	Belt Saw	0.75KW	1 No.
99.	Sheetmetal Bench Shear with Stand	300mm	1 No.
100.	Cast Iron Surface Plates with Stands	1000 x 700mm	1 No.
101.	Hydraulic Press with Dimple Die Sets	minimum 10 T - 1 dimple die must be 38mm diam.	1 No.
102.	Rolling Sheetmetal Machine		1 No.
103.	Manual Sheetmetal Bending Machine	1200mm	1 No.
104.	Hydraulic Sheetmetal Bending Machine		1 No.
105.	Metallic Cabinets		10 Nos.
106.	Pigeon Hole Cabinets		2 Nos.
107.	Yellow Cabinet for Chemicals		1 No.
108.	Sheet Stand with Wheel Fittings		2 Nos.
109.	Display Board	To store & display Pneumatic Tools as per 5S	2 Nos.
D. HANDLING MACHINE			
110.	Hand Squeeze Riveter	Manual	5 Nos.
111.	Pneumatic Gun Type Drilling Machine	4500 to 6000 RPM (Manual Chuck With Key)	20 Nos.
112.	Pneumatic Gun Type Boring Machine	500 to 800 RPM (Manual Chuck with Key)	5 Nos.
113.	Pneumatic Right Angle Drilling Machine	90° (Manual pin type)	5 Nos.
114.	Pneumatic Angle Drilling Machine	45° (Manual pin type)	5 Nos.
115.	Pneumatic Straight Drilling Machine	Manual Chuck with Key	5 Nos.
116.	Extruder Gun	Manual Extruder Gun for PR	5 Nos.
117.	Pneumatic Rivet Gun	Power 3x	10 Nos.
118.	Pneumatic "C" Riveting Machine		2 Nos.
119.	Pneumatic Squeeze Riveting Machine		2 Nos.
120.	Rivet Die Flush 3/16 SH	Flat head	4 Nos.
121.	Rivet Die Flush1/4 Sh	Flat head	4 Nos.

122.	Riveting Die For Rivet Gun Set		10 Nos.
123.	Rivet Die Cup 2.4 mm 3/16		2 Nos.
124.	Rivet Die Cup 2.4 mm 1/4		2 Nos.
125.	Rivet Die Cup 3.2 mm 3/16		2 Nos.
126.	Rivet Die Cup 3.2 mm 1/4		2 Nos.
127.	Rivet Die Cup 4.0 mm 3/16		2 Nos.
128.	Rivet Die Cup 4.0 mm 1/4		2 Nos.
129.	Bucking Bar Set	Material STEEL: Set of 5 Bucking Bars	2 Nos.
E. TOOLS FOR FITTER WORKSHOP			
130.	Steel Rule With Metric & British Graduation	1000mm	2 Nos.
131.	Set Of Marking Punches With Symbols		2 Nos.
132.	Micrometer 0/25		2 Nos.
133.	Micrometer 25/50		2 Nos.
134.	Micrometer 50/75		1 No.
135.	Micrometer 75/100		1 No.
136.	Support For Comparator (Dial Gauge)	AEC 2019 099 or equivalent	2 Nos.
137.	Comparator	Stand + Dial + Support	4 Nos.
138.	Height Vernier Gauge	600mm - equivalent In size 1250	2 Nos.
139.	Depth Vernier Gauge	300mm – In size 1240	1 No.
140.	V Block		4 Nos.
141.	Forming Punch - Blade For Bending Machine	Radius 4mm	1 No.
142.	Hand Grinder Portable		2 Nos.
143.	Tile Cutter Portable		1 No.
F. TOOLS FOR WIRING WORKSHOP			
144.	Worktable for wiring harness practical	minimum 150cm x 400 cm (can be 1 or several tables)	1 No.
145.	Height Adjustable Stools		20 Nos.
146.	Metallic Cabinets Cupboard		3 Nos.
147.	Side Cutting Plier/ Knippex	86 05 150 S02 or equivalent	11 Nos.
148.	Cutting Pliers	79 02 125 S1 or equivalent	11 Nos.
149.	Crimping Tool	Aeronautical	5 Nos.
150.	Wire stripper	Aeronautical	5 Nos.
151.	Megger	500v DC	2 Nos.
152.	Cable Cutter	- 405.10 or equivalent	3 Nos.
153.	Electrician Scissors	- 412.16 or equivalent	11 Nos.
154.	Cable Tie Gun		10 Nos.
155.	Multimeter - Good Quality (Semi Professional)		5 Nos.
156.	Hot Air Gun		5 Nos.

157.	Ratchet Wrench with Socket Set	46 pcs 1/4" Dr. Socket Set	10 Nos.
158.	reels stand for wires (tailor made)	according to design	1 No.
G. TOOLS AND MATERIAL TO MAKE WIRING INTEGRATION PANELS			
159.	Frame Steel for integration panels	according to design - for Front & Back panels	5 Nos.
160.	Aluminum sheet metal GRADE 5000	4x8ft x 2mm thickness - for Front & Back panels	5 Nos.
161.	Aluminum sheet metal GRADE 5000	4x8ft x 1.5mm thickness - for panels stiffeners	10 Nos.
162.	Aluminum angle	25x25mm - thickness 2 mm - length 120 cm	10 Nos.
163.	Anchor nuts	equivalent MS21047-3	500 Nos.
164.	Solid rivet countersunk head	diam 2.4mm - length 8 mm	1000 Nos.
165.	Support cable ABS0731A01		30 Nos.
166.	Screw NAS1801-3 or equivalent	length 10 mm - diam must match anchor nuts	200 Nos.
167.	Screw NAS1801-3 or equivalent	length 12 mm - diam must match anchor nuts	200 Nos.
168.	Screw NAS1801-3 or equivalent	length 14 mm - diam must match anchor nuts	200 Nos.
169.	Screw NAS1801-3 or equivalent	length 16 mm - diam must match anchor nuts	400 Nos.
170.	Screw NAS1801-3 or equivalent	length 18 mm - diam must match anchor nuts	400 Nos.
171.	Screw NAS1801-3 or equivalent	length 20 mm - diam must match anchor nuts	400 Nos.
172.	Screw NAS1801-3 or equivalent	length 22 mm - diam must match anchor nuts	400 Nos.
173.	Strut equivalent NSA5527 - any material	length 5mm - inner diam 5mm - outer diam 10 to 14mm	200 Nos.
174.	Strut equivalent NSA5527 - any material	length 7 mm - inner diam 5mm - outer diam 10 to 14mm	200 Nos.
175.	Strut equivalent NSA5527 - any material	length 9 mm - inner diam 5mm -	200 Nos.

		outer diam 10 to 14mm	
176.	Strut equivalent NSA5527 - any material	length 11mm - inner diam 5mm - outer diam 10 to 14mm	200 Nos.
177.	Strut equivalent NSA5527 - any material	length 13mm - inner diam 5mm - outer diam 10 to 14mm	100 Nos.
178.	Strut equivalent NSA5527 - any material	length 15 mm - inner diam 5mm - outer diam 10 to 14mm	100 Nos.
179.	Strut equivalent NSA5527 - any material	length 17mm - inner diam 5mm - outer diam 10 to 14mm	100 Nos.
180.	Strut equivalent NSA5527 - any material	length 20mm - inner diam 5mm - outer diam 10 to 14mm	100 Nos.
181.	V support NSA935504-01 or equivalent		200 Nos.
182.	V support NSA935504-02 or equivalent		200 Nos.
183.	V support NSA935504-03 or equivalent		100 Nos.
184.	V support NSA935504-04 or equivalent		100 Nos.
185.	washer equivalent NAS1149F0332P		1000 Nos.
186.	collars	number, type and diameter according to Harnesses	500 Nos.
187.	blind rivet diam 4mm x length 8mm	to install integration panels	3000 Nos.
H. TOOLS & ACCESSORIES FOR PIPING WORKSHOP			
188.	Dynamometric Key (Torque Wrench)	2 to 25 N.m	4 Nos.
189.	Torque Wrench Adaptor Set		3 Nos.
190.	flat socket for torque wrench	size 17	4 Nos.
191.	flat socket for torque wrench	size 24	4 Nos.
192.	flat socket for torque wrench	size 46	4 Nos.
193.	flat wrench	size 14	4 Nos.
194.	flat wrench	size 22	4 Nos.
195.	flat wrench	size 38	4 Nos.
196.	Ratchet Wrench with Socket Set	46 pcs 1/4" Dr. Socket Set	5 Nos.
197.	Set of A Hydraulic Pipe Wrench		5 Nos.
198.	Wire Lock Twist Pliers	not reversible	10 Nos.
199.	Cutter Pliers		10 Nos.
200.	Electrical Drill Gun	18v	3 Nos.
201.	Workshop Bench with Tool Storage		2 Nos.
202.	Protective Mat		2 Nos.
203.	Worktable Vice with vice jaw pads	4 vice per workbench	8 Nos.

204.	Worktable vice spinning base		1 No.
205.	Height Adjustable Stools		20 Nos.
206.	Metallic Cabinets Cupboard		2 Nos.
207.	Used Air Conditioner Compressor of CAR		3 Nos.
208.	Used Engine of BIKE		1 No.
209.	Used Fuel Injection Pump of CAR		2 Nos.
210.	Water Pump Pliers 11225/10 Grove Joint		10 Nos.
I. TOOLS AND MATERIAL TO MAKE PIPING SIMULATION PANELS			
211.	Frame Steel for simulation panels	according to design	10 Nos.
212.	Aluminum sheet metal for simulation panels	4x8ft x 2mm thickness	10 Nos.
213.	Aluminum sheet metal GRADE 5000	4x8ft x 1.5mm thickness - for panels stiffeners	5 Nos.
214.	Blind rivet diam 4mm x length 8mm	to install simulation panels	2000 Nos.
215.	Hexagonal head screw - stainless steel	M6 - Length 110mm	450 Nos.
216.	Hexagonal head bolt - stainless steel	M6	850 Nos.
217.	Washer	external diam 12mm - inner diam.6mm	450 Nos.
218.	Wall shelves - to store pipes	200x50cm	10 Nos.
219.	Rubber Hose R1 W/End Fitting	3/8" X 1mtr	5 Nos.
220.	Rubber Hose R1 W/End Fitting	1/2" X 50 cm	5 Nos.
221.	Rubber Hose R1 W/End Fitting	1/2" X 30 cm	5 Nos.
222.	Rubber Hose R1 W/End Fitting	1/2" X 75 cm	5 Nos.
223.	Gi Hyd Male Tee	3/8"	10 Nos.
224.	Gi Hyd Male Elbow	3/8"	10 Nos.
225.	Gi Hyd Male Tee	1/2"	25 Nos.
226.	Gi Hyd Male Elbow	1/2"	25 Nos.
227.	Push in Union Connector		24 Nos.
228.	Push in Union Y Connector		24 Nos.
229.	Push in Union Tee Connector		24 Nos.
230.	Male Female Set For 1/4th Inch Pipe		200 Nos.
231.	Male Female Set For 0.5 Inch Pipe		200 Nos.
232.	Male Female Set For 1 Inch Pipe		200 Nos.
233.	Fabric Based Bakelite Sheet	90 mm X 60 mm	200 Nos.
234.	Aluminum Pipe Al 6063	Size 1" OD X 3mm - 20m	2 Nos.
235.	Aluminum Pipe Al 6064	1/2" OD X 1.6 mm - 20m	2 Nos.
236.	Aluminum Pipe Al 6065	1/4" OD- 60m	2 Nos.
237.	Straight Joint	1/4"	50 Nos.
238.	Straight Joint	1/2"	50 Nos.
239.	Mini Plastic pipes		30 Mtr.
240.	Straight Couplings for mini Pipes	same diam as Mini plastic pipe	15 Nos.

241.	T Couplings for Plastic Pipes	same diam as Mini plastic pipe	15 Nos.
242.	Y Couplings for Plastic Pipes	same diam as Mini plastic pipe	15 Nos.
243.	Pipe Bending tool - Hydraulic	To prepare pipe simulation panels	1 No.
244.	Tube Bender - manual	1/4" - to prepare pipe simulation panels	1 No.
245.	Tube Bender - manual	1/2" - to prepare pipe simulation panels	1 No.
246.	Tube Bender - manual	1" - to prepare pipe simulation panels	1 No.
247.	Tube Cutter	To prepare pipe simulation panels	2 Nos.
J. LIST OF WORKSHOPS CONSUMABLES			
CONSUMABLES FOR FITTER			
248.	sheet of Fe310 - Th.5 mm	sheet of 4x8 ft	1 No.
249.	sheet of Aluminum 5052 - Th.1.2 mm	sheet of 4x8 ft	3 Nos.
250.	sheet of Aluminum 5052 - Th.1.5 mm	sheet of 4x8 ft	5 Nos.
251.	sheet of Aluminum 5052 - Th.2 mm	sheet of 4x8 ft	9 Nos.
252.	sheet of Aluminum 5052 - Th.3 mm	sheet of 4x8 ft	3 Nos.
253.	sheet of Aluminum 5052 - Th.5 mm	sheet of 4x8 ft	3 Nos.
254.	sheet of Aluminum 5052 - Th.10 mm	Pre-cut blocks 102x162mm	30 Nos.
255.	sheet of Aluminum 5052 - Th.20 mm	Pre-cut blocks 61x61mm	30 Nos.
256.	sheet of AISI 316L - Th.2 mm	sheet of 4x8 ft	2 Nos.
257.	sheet of Steel - Th.5 mm	sheet of 4x8 ft	1 No.
258.	sheet of Titanium TA6V - Th.2 mm	sheet of 4x8 ft	1 No.
259.	Cleco Pin Sheet Metal 2,5 mm		2000 Nos.
260.	Cleco Pin Sheet Metal 3,2 mm		2000 Nos.
261.	Cleco Pin Sheet Metal 4 mm		1000 Nos.
262.	WNX Pin Sheet Metal 2,5 mm	2.4 mm	120 Nos.
263.	WNX Pin Sheet Metal 3,2 mm	3.2 mm	240 Nos.
264.	WNX Pin Sheet Metal 4 mm	4 mm	100 Nos.
265.	Alligator Clip for Sheet Metal		100 Nos.
266.	Pipe Fe310 - diam 32 mm	length in meter	3 Nos.
267.	Pipe Fe310 - diam 30 mm	length in meter	3 Nos.
268.	Rod steel - diam 6h10	length in meter	3 Nos.
269.	Angle Aluminum (21x21x1.5 mm)	length in meter	4 Nos.
270.	Angle Aluminum (30x30x3 mm)	length in meter	28 Nos.
271.	Angle Aluminum (25x25x2.5 mm)	length in meter	16 Nos.
272.	Angle Aluminum (20x20x2 mm)	length in meter	11 Nos.
273.	Universal Head Solid rivet - Diam2.4 - L10	minimum Quantity - see given design	20000 Nos.
274.	Universal Head Solid rivet - Diam3.2 - L15		40000 Nos.

275.	Universal Head Solid rivet - Diam4 - L15		5000 Nos.
276.	Countersink Head Solid rivet - Diam2.4 - L10		20000 Nos.
277.	Countersink Head Solid rivet - Diam3.2 - L15		40000 Nos.
278.	Countersink Head Solid rivet - Diam4 - L15		5000 Nos.
279.	Anchor Nut (Nut Plate) Two Lugs	MS21047-3 Or Equivalent	100 Nos.
280.	Anchor Nut (Nut Plate) Angle	MS21055-3 Or Equivalent	50 Nos.
281.	Screw equivalent Nas 1801 - 03 - 10	Must match anchor nuts	200 Nos.
282.	Screw equivalent Nas 1801 - 03 - 12	Must match anchor nuts	200 Nos.
283.	Nuts	diam 6mm	100 Nos.
284.	Washers	diam 6mm	100 Nos.
285.	Hacksaw Blade For Aluminum		50 Nos.
286.	Makita Band Saw	B16689 (3 blades in each pack) or equivalent	8 Nos.
287.	Makita Band Saw	B16695 (3 blades in each pack) or equivalent	4 Nos.
288.	Wirelock 0,6mm Stainless Steel	3Kg	1 No.
289.	Wirelock 0,8mm Stainless Steel	3Kg	1 No.
290.	Blue Varnish Bonding		2 Nos.
291.	Alodine Stick	*1 stick for 2 students*	10 Nos.
292.	Blue Prussian		4 Nos.
293.	Pr Sealant A2 - 2 hours to dry	1/2 cartridge	20 Nos.
294.	Grey Painting	F70	1 No.
295.	Drill Bit Set 2,0 To 12mm		10 Nos.
296.	Drill bit for Aluminum	4.5mm	100 Nos.
297.	Drill Bit for Aluminum - Short Length - 60 Mm	2.5 mm	1000 Nos.
298.	Drill Bit for Aluminum - Short Length - 60 Mm	3.3 mm	500 Nos.
299.	Drill Bit for Aluminum - Short Length - 60 Mm	4.1 mm	100 Nos.
300.	Drill Bit for Aluminum - Long Length - 120 Mm	2.5 mm	500 Nos.
301.	Drill Bit for Aluminum - Long Length - 120 Mm	3.3 mm	250 Nos.
302.	Drill Bit For Steel - Length 60mm (cobalt)	2.5 mm	50 Nos.
303.	Drill Bit For Steel - Length 60mm (cobalt)	3.3 mm	50 Nos.
304.	Drill Bit For Steel - Length 60mm (cobalt)	4.1 mm	50 Nos.
305.	Drill Bit for Aluminum - Short Length - 60 Mm	any size from 5.5 to 5.8 mm	50 Nos.
306.	Hi-Lite EN6115T3-5 Or Equivalent And Associated Collar	Protruding head - L 8mm	50 Nos.
307.	Hi-Lite EN6114T3-5 Or Equivalent And Associated Collar	Countersunk head - L 8mm	50 Nos.
308.	- FASTENER 3.2mm	For 6mm thickness assembly	100 Nos.

309.	- FASTENER 4mm	For 6mm thickness assembly	100 Nos.
310.	Flat Bonding Strap with flat round heads	max. 15cm long - (head inner diam 6mm - any material	100 Nos.
CONSUMABLES FOR WIRING			
311.	Single core electrical copper wire	LIGHT GREY Diam 0.5 to 1mm^2	4000 mtr
312.	Single core electrical copper wire	WHITE Diam 0.5 to 1mm^2	4250 mtr.
313.	Single core electrical copper wire (in metre)	WHITE Diam 1.5 to 2mm^2	900 mtr.
314.	Single core electrical copper wire (in metre)	WHITE Diam 3 to 4mm^2	300 mtr.
315.	Single core electrical copper wire (in metre)	LIGHT BLUE Diam 0.5 to 1mm^2	3000 mtr.
316.	Single core electrical copper wire (in metre)	LIGHT BLUE Diam 1.5 to 2mm^2	300 mtr.
317.	Single core electrical copper wire (in metre)	BLUE Diam 3 to 4m m^2	300 mtr.
318.	Single core electrical copper wire (in metre)	LIGHT GREEN Diam 0.5 to 1mm^2	3500 mtr.
319.	Single core electrical copper wire (in metre)	RED Diam 0.5 to 1mm^2	1750 mtr.
320.	Single core electrical copper wire (in metre)	RED Diam 3 to 4mm^2	300 mtr.
321.	Fiber Optic wire (in metre)		50 mtr.
322.	Coaxial Wire (in metre)		50 mtr.
323.	Twisted wire (in metre)	red and yellow Diam 2mm^2	200 mtr.
324.	CAT6/CAT7 Wire (in metre)		100 mtr.
325.	Cable Tie (Tie-Rap)	NSA935401-03 or equivalent	5000 Nos.
326.	Cable Tie (Tie-Rap)	NSA935401-04 or equivalent	5000 Nos.
327.	Cable Tie (Tie-Rap)	NSA935401-05 or equivalent	2500 Nos.
328.	Cable Tie (Tie-Rap)	NSA935401-10 or equivalent	500 Nos.
329.	Lacing Tape	Roll NSA8420-3	11 Nos.
330.	Lacing Tape	Roll NSA8420-7	1 No.
331.	Silicone Tape 1 Inch		12 Nos.
332.	Silicone Tape 2 Inches		5 Nos.
333.	self-amalgamating tape (roll)	1 inch wide	3 Nos.
334.	nuts	NSA 5050-3	50 Nos.
335.	Two lugs floating nut plate or equivalent		200 Nos.
336.	Solders Sleeve and Heat Shrinkable Sleeve	ASNE0160-1-0H or equivalent	160 Nos.
337.	Solders Sleeve and Heat Shrinkable Sleeve	ASNE0160-1-1H or equivalent	75 Nos.
338.	Solders Sleeve and Heat Shrinkable Sleeve	ASNE0718-02 or equivalent	5 Nos.
CONSUMABLES FOR PIPING			
339.	Threaded Rod	M6	10 Nos.
340.	torque seal		20 Nos.
341.	tie rap	NSA935401-03	5000 Nos.
342.	Gi Nut	6 mm	400 Nos.
343.	Gi Washer	6 mm	400 Nos.
344.	One hole bolt - any diam	to fit on 10mm thick sheet metal	100 Nos.
345.	Normal nut	for the above bolt	100 Nos.

346.	Normal bolt - any diam	to fit on 10mm thick sheet metal	60 Nos.
347.	THREE holes nut	for the above bolt	60 Nos.
348.	Normal bolt - any diam	to fit on 10mm thick sheet metal	160 Nos.
349.	Normal nut	for the above bolt	160 Nos.
350.	Tab washer	DIN125 or equivalent	500 Nos.
351.	Tab washer	MS9276, MS9582 or equivalent	500 Nos.
352.	Spring washer	MS25338 or equivalent	500 Nos.
353.	external tooth lock-washer	MS35335 or equivalent	500 Nos.
354.	One-hole bolt 6mm diam	to fit on 10mm thick sheet metal	40 Nos.
355.	castle nut 6 diam	MS24665 or equivalent, for the above bolt	40 Nos.
356.	pin for 6mm bolt	for the above set	500 Nos.
357.	One-hole bolt 10mm diam	to fit on 10mm thick sheet metal	40 Nos.
358.	castle nut 10mm diam	MS24665 or equivalent, for the above bolt	40 Nos.
359.	pin for 10mm bolt	for the above set	500 Nos.
360.	normal bolt	to fit on 10mm thick sheet metal	200 Nos.
361.	normal nut	for the above bolt	40 Nos.
362.	normal washer	for the above bolt	500 Nos.
363.	self-locking nut	nylon ring locking	150 Nos.
364.	self-locking nut	elliptic locking	150 Nos.
365.	LOCTITE 542 - liquid (in bottle)	moderate strength	1 No.
366.	Tubeless Valve	1 shot use	50 Nos.
OTHER CONSUMABLES			
367.	Cut Resistance Gloves	3M	105 Nos.
368.	Nitrile Gloves	size S	1000 Nos.
369.	Nitrile Gloves	size M	1000 Nos.
370.	Earmuffs	3M	21 Nos.
371.	Safety Goggles.	3M	30 Nos.
372.	Safety Shoes	Karam	21 Nos.
373.	First Aid Kit	1 per workshop	3 Nos.
374.	Isopropyl Alcohol	liters	60 Nos.
375.	Aprons		21 Nos.
376.	Roll of Paper Towel		10 Nos.
377.	Box of White Cloths		10 Nos.
378.	Pack of Cloth		3 Nos.
379.	Oil Cans		10 Nos.
380.	Grease	(in Kg)	1 No.

381.	Block of Tallow / Paraffin		5 Nos.
382.	Adhesive Masking Tape	25mm	50 Nos.
383.	Adhesive Masking Tape	50mm	50 Nos.
384.	Roll of Scotch-Brite™	General Purpose Hand Pad 7447 Type or Equivalent	4 Nos.
385.	Emery Paper	150 Grit	50 Nos.
386.	Black Marker	thin tip - to be used in all exercises (important)	250 Nos.
387.	Blue Marker	thin tip - to be used in all exercises (important)	50 Nos.
388.	Shielded Harness (for practice) *	aviation	As required
389.	RF & Optical fibre cable (for practice) *	aviation	As required
K. LIST OF MISCELLANEOUS AND SECURITY EQUIPMENT			
390.	Projector		1 No.
391.	Wireless Internet Router		1 No.
392.	Laptop For Trainers		1 No.
393.	Fire Extinguisher		3 Nos.
394.	Padlock		40 Nos.
395.	Green Bin For Recycled Material		1 No.
396.	Red Bin for other Material		1 No.
397.	Blue Bin For Metallic Material		1 No.
398.	Lamination Machine		1 No.
399.	Instructor Table and Chair		3 Nos.
400.	Laser Color Printer		1 No.
401.	Safety Shower and Eye Washer		1 No.

Note: -

(*) the discarded/ expired products from aviation industry can be used for demonstration purpose

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 member attended the Trade committee meeting for revision of the course curriculum of Aeronautical Structure and Equipment Fitter CTS held at CSTARI, Kolkata on 11.07.2023			
S No.	**Name & Designation Shri/Mr./Ms.**	**Organization**	**Remarks**
1.	Sunil Kumar Gupta, DDG	CSTARI, Kolkata	Member
2.	N.R. Aravindan, Director	CSTARI, Kolkata	Member
3.	Sawalkar S.N., Dy. General Manager	HAL, Nasik	Member
4.	TK Sarkar, Hon Flying Officer (Retd)	Ex. Air force	Member
5.	LK Mukherjee, Consultant (Academic)	WBSCVT&SD, Kolkata	Member
6.	Bharat Yadav, TO	NSTI, Kanpur	Member
7.	Amalendu Jana, Manager	TCL-VSB, Kolkata	Member
8.	Prakash Rukmaiah, CEO	Ray-Q, Bangalore	Member
9.	Dr. Rabin Debnath, Dy. Director	DIT, Govt. of West Bengal	Member
10.	R.N. Manna, Ex-AD	CSTARI, Kolkata	Member
11.	Samir Sarkar, Ex-AD	CSTARI, Kolkata	Member
12.	Ms. Shiva Ganju, Group CHRO	Defsys Solutions pvt. ltd.	Member
13.	Venu Madhav Kaparthi, General Manager	Defsys Solutions pvt. ltd.	Member
14.	Julien Henry, Head of Dassault Skill Academy	DASI Dassault Skill Academy, New Delhi	Member
15.	Mayur Yaul	Dassault Skill Academy, New Delhi	Member
16.	Virat Rastogi	Ace Aerospace, Kanpur	Member
17.	Luc Sadaune	Aerocampus Aquitane	Member
18.	Sk. Altaf Hossain, AD	CSTARI, Kolkata	Member
19.	KVS Narayana, TO	CSTARI, Kolkata	Member
20.	B. Sharanappa, AD	CSTARI, Kolkata	Member
21.	P.K. Bairagi, TO	CSTARI, Kolkata	Member
22.	Haradhan Das, Ex- TO	CSTARI, Kolkata	Member

23.	Stephane Cesaire	DASI Dassault Skill Academy, New Delhi	Member
24.	Posina Venkat Rao	DASI Dassault Skill Academy, New Delhi	Member
25.	Akhilesh Pandey, AD	CSTARI, Kolkata	Member
26.	Budhaditya Biswas, TO	CSTARI, Kolkata	Member
27.	B.K. Nigam, TO	CSTARI, Kolkata	Member
28.	Pradip Biswas, Jr. D/M	CSTARI, Kolkata	Member
29.	Hemant Kujur, Jr. D/M	CSTARI, Kolkata	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