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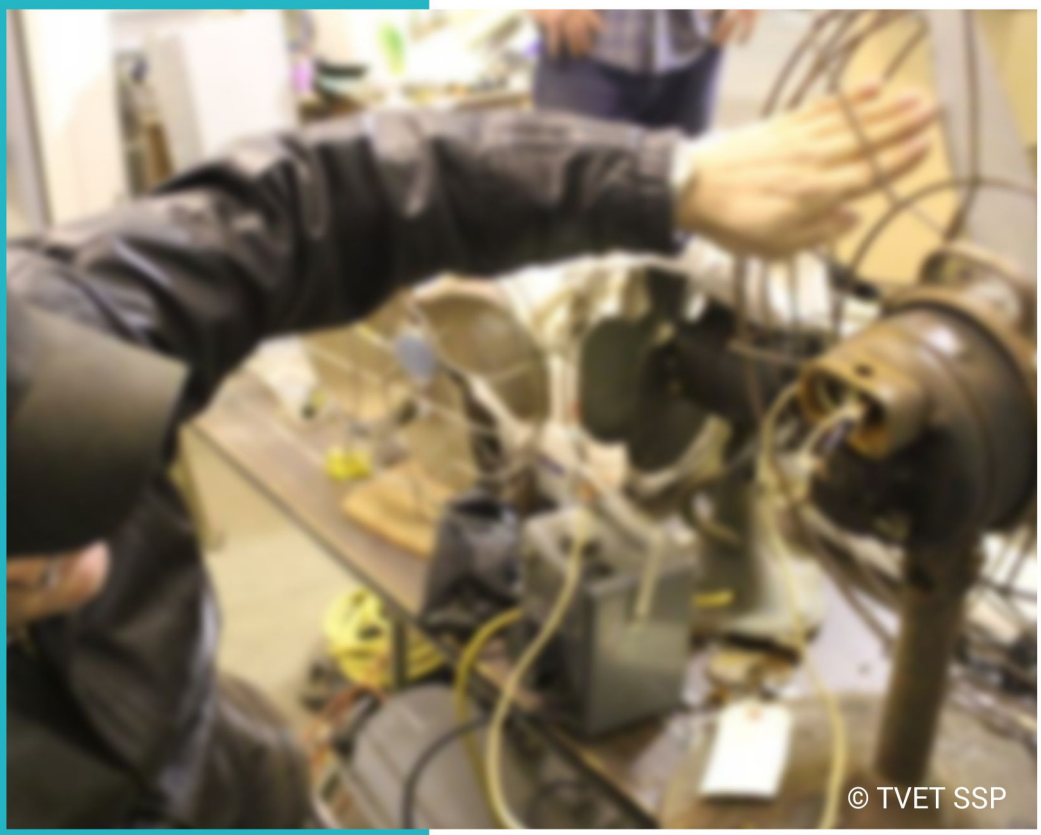
FAN MANUFACTURING TECHNICIAN



CBT CURRICULUM

National Vocational Certificate Level 2

Version 1 - May, 2019

NAVTTC

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Introduction

Description of the training programme for Fan Manufacturing Technician

In order to build the capacity of technical and vocational training institutes in Pakistan through provision of demand driven competency-based trainings in manufacturing sector, the NAVTTC, and TEVT Sector Support Program (TSSP) have joined hands together to develop qualifications for the manufacturing sector. These qualifications will not only build the capacity of existing workers of this sector but also support the youth to acquire skills best fit for this sector. The benefits and impact of development of these qualifications will be on both demand and supply side.

Based upon this demand of industry, these competency-based qualifications for Fan Manufacturing Technician are developed under National Vocational Qualification Framework (NVQF) (Level 2 to 4). The qualifications mainly cover competencies along with related knowledge and professional skills which are essential for getting a job or self-employment.

The qualifications are also in line with the vision of Pakistan's National Skills Strategy (NSS), National TVET Policy and National Vocational Qualification Framework (NVQF). NSS provides policy directions, support and an enabling environment to the public and private sectors to impart training for skills development to enhance the social and economic profile. The National Vocational & Technical Training Commission (NAVTTC) has approved the Qualification Development Committee (QDC). The QDC consisted of experts from the relevant industries from different geographical locations across Pakistan and academicians, who were consulted during the development process to ensure input and ownership of all the stakeholders. The National Competency Standards could be used as a referral document for the development of curricula to be used by training institutions.

Purpose of the training programme

The purpose of the training is to provide skilled manpower to improve the existing capacity of the manufacturing sector. This training will provide the requisite skills to the trainees to manufacture fans. It will enable the participants to meet the challenges in the field of the manufacturing industry. Further, to improve the skill level of the technician and to prepare them for the manufacturing industry to meet the market competition nationally and internationally.

The core purpose of this qualification is to produce employable fan manufacturing technicians, who could manufacture fans according to national and international standards.

In addition, this qualification will prepare unemployable youths to find employment in manufacturing sector.

Competencies to be gained after completion of course

At the end of the course, the trainee must have attained the following competencies:

- Comply with Perform Personal Health and Safety Guidelines
- Communicate the Workplace Policy and Procedure
- Perform Basic Communication (Specific)
- Perform Basic Computer Application(Specific)
- Measure basic electrical units in series and parallel circuits

Possible available job opportunities available immediately and later in the future

Fan Manufacturing Technicians are employed in Fan related industries. Experienced Fan Manufacturing Technicians may advance through promotions with the same employer or by moving to more advanced positions with other employers. They can become:

- Fan Technician
- Fan Winder
- Fan Quality Inspector
- Fan Supervisor

Trainee entry level

The entry in National Vocational Certificate Level II" Fan Manufacturing Technician (Assistant Electrician)" is given below:

Title	Entry requirements
National Vocational Certificate level 2, in "Fan Manufacturing" (Assistant Electrician)	Entry for assessment of this qualification is open. However, entry into formal training institutes, based on this qualification may require skills and knowledge equivalent to middle (Grade 8).

Minimum qualification of Trainer

Teaching staff should have at least Bachelors in Engineering or Technology with 2 years' experience in relevant field **OR** DAE with 5 years' experience in relevant field

Teaching staff should also hold or be working towards a formal teaching qualification.

Other formal qualifications in the light engineering industry would be useful in addition to the above.

Recommended Trainer: Trainee ratio

The recommended maximum trainer: trainee ratio for this programme is 1 trainer for 20 trainees.

Medium of instruction i.e. language of instruction

Instruction will be in Urdu and English language.

Duration of the course (Total time, Theory & Practical time)

This curriculum comprises of 05 modules. The recommended delivery time is 220 hours. Delivery of the course could therefore be full time, 6 days a week. Training providers are at liberty to develop other models of delivery, including part-time and evening delivery.

The full structure of the course is as follow:

Module	Total Duration (Hours)	Theory[1] (Hours)	Practical[2] (Hours)
Comply with Perform Personal Health and Safety Guidelines	30	6	24
Communicate the Workplace Policy and Procedure	20	4	16
Perform Basic Communication (Specific)	30	6	24
Perform Basic Computer Application(Specific)	40	8	32
Measure basic electrical units in series and parallel circuits	100	20	80

[1] Learning Module hours in training provider premises
[2] Training workshop, laboratory and on-the-job workplace

Sequence of modules

This National Vocational Certificate is made up of 05 modules. A suggested distribution of these modules is presented below. This is not prescriptive and training providers may modify this if they wish.

Each module covers a range of learning components. These are intended to provide detailed guidance to teachers (for example the Learning Elements component) and give them additional support for preparing their lessons. The detail provided by each module will contribute to a standardized approach to teaching, ensuring that training providers in different parts of the country have clear information on what should be taught.

The sequence of different modules for this National Vocational Certificate Level is shown below:

Sequence of the modules for National Vocational Certificate Level-2 in "Fan Manufacturing Technician (Assistant Electrician)"

Module 5: Measure basic electrical units in series and parallel circuit	Module 1: Comply with Perform Personal Health and Safety Guidelines
	Module 2: Communicate the Workplace Policy and Procedure
	Module 3: Perform Basic Communication (Specific)
	Module 4: Perform Basic Computer Application(Specific)

Summary – Overview of the curriculum

Module Title and Aim	Learning Units	Theory (Hours)	Workplace (Hours)	Timeframe of modules
Module 1: Comply with Perform Personal Health and Safety Guidelines	LU1. Identify Personal Hazards at Workplace LU2. Apply Personal Protective and Safety Equipment (PPE) LU3. Comply Occupational Safety and Health (OSH) LU4. Dispose of hazardous Waste/materials from the designated area.	6	24	30
Module 2: Communicate the Workplace Policy and Procedure	LU1. Identify workplace communication procedures LU2. Communicate at workplace LU3. Draft Written Information LU4. Review Documents	4	16	20
Module 3: Perform Basic Communication (Specific)	LU1. Communicate in a team to achieve intended outcomes LU2. Follow Supervisor's instructions as per organizational SOPs LU3. Develop Generic communication skills at workplace	6	24	30

Module Title and Aim	Learning Units	Theory (Hours)	Workplace (Hours)	Timeframe of modules
Module 4: Perform Basic Computer Application(Specific)	LU1. Create Word Documents LU2. Use internet for Browsing	8	32	40
Module 5: Measure basic electrical units in series and parallel circuits. **Aim:** The aim of this module is to develop knowledge, skills and understanding required to measure basic electrical units in series and parallel circuits	**LU1:** Measure electrical current and resistance **LU2:** Perform voltage measurement **LU3:** Measure electrical power **LU4:** Perform capacitance and inductance measurement **LU5:** Perform low voltage transformer test **LU6:** Construct rectifier circuit	20	80	100

Modules

Module 1: Comply with Perform Personal Health and Safety Guidelines (102200844)

Objective of the module: This Competency Standard identifies the competencies required to protect/apply occupational Safety, health and Environment at workplace according to the industry's approved guidelines, procedures and interpret environmental rules/regulations. Trainee will be expected to identify and use Personal Protective Equipment (PPE) according to the work place requirements. The underpinning knowledge regarding Observe Occupational Safety and Health (OSH) will be sufficient to provide the basis for the job at workplace.

Duration: 30 Hours **Theory:** Hours **Practical:** Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Identify Personal Hazards at Workplace	**The trainee will be able to:** Identify risk to personal health Identify hygiene and safety at work place Identify processes Identify tools, equipment and consumable materials that have the potential to cause harm Report, identified risk to		**Total** **hrs** **Theory:** hrs **Practical:** hrs		**Theory:** Class room with multimedia facility **Practical :** Workshop

	Health, hygiene and safety to concerned			**Consumable :**	
LU2: Apply Personal Protective and Safety Equipment (PPE)	**The trainee will be able to:** List the Personal Protective equipment Select personal protective equipment in terms of type and quantity according to work orders. Wear personal protective equipment according to job requirements. Clean personal protective equipment Stored Personal Protective equipments in		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	**Theory:** Class room with multimedia facility **Practical :** Workshop

	proper place after use.				
LU3: Comply Occupational Safety and Health (OSH)	**The trainee will be able to:** Maintain cleanliness and hygiene as per organizational policy Comply with Health, hygiene and safety precautions before starting work Comply organizational Health, hygiene and safety guidelines during work Deal with resolvable problems according to prescribed procedures Report un resolvable problems to concerned Place the tools equipment etc at their prescribed place after completion of work		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	**Theory:** Class room with multimedia facility **Practical :** Workshop
LU4: Dispose of	**The trainee will be able**		**Total**		

hazardous Waste/materials from the designated area	**to:** Identify hazardous waste materials which needs to be disposed off Segregate hazardous or non-hazardous waste carefully from the designated area as per approved procedure Use proper disposal hazardous containers for dispose-off hazardous waste as per procedure Take necessary precautions like putting masks and gloves while disposing hazardous waste/ materials as per standard operating procedure		**hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	

Module 2: Communicate the Workplace Policy and Procedure (041700839)

Objective of the module: This unit describes the performance outcomes, skills and knowledge required to develop communication skills in the workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision.

Duration: 20 Hours **Theory:** Hours **Practical:** Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Identify workplace communication procedures	**The trainee will be able to:** Identify organizational communication requirements and workplace procedures with assistance from relevant authority Identify appropriate lines of communication with supervisors and colleagues. Seek advice on the communication method/equipment most appropriate for the task		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	**Theory:** Class room with multimedia facility **Practical :** Workshop

LU2: Communicate at workplace	**The trainee will be able to:** Use effective questioning, and active listening and speaking skills to gather and convey information Use appropriate non-verbal behavior at all times Encourage, acknowledge and act upon constructive feedback		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	**Theory:** Class room with multimedia facility **Practical :** Workshop
LU3: Draft Written Information	**The trainee will be able to:** Identify and comply with required range of written materials in accordance with organizational policy and procedures Draft and present assigned written information for approval, ensuring it is written		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	**Theory:** Class room with multimedia facility **Practical :** Workshop

	clearly, concisely and within designated timeframes. Ensure written information meets required standards of style, format and detail. Seek assistance and/or feedback to aid communication skills development				
LU4: Review Documents	**The trainee will be able to:** Check draft for suitability of tone for audience, purpose, format and communication style Check draft for readability, grammar, spelling, sentence and paragraph construction and correct any inaccuracies or gaps in content. Check draft for		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	

	sequencing and structure Check draft to ensure it meets organizational requirements Ensure draft is proofread, where appropriate, by supervisor or colleague				

Module 3: Perform Basic Communication (Specific) (001100851)

Objective of the module: This unit describes the skills and knowledge required to assist in the development of communication competence by providing information regarding different forms of communication and their appropriate use.

By the end of this program, learners will be able, to communicate more effectively and efficiently by: working in a team, follow supervisor's instructions and develop generic communication work skills at workplace.

Duration: 30 Hours **Theory:** Hours **Practical:** Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Communicate in a team to achieve intended outcomes	**The trainee will be able to:** Treat team members with respect Maintain positive relationships to achieve common organizational goals Get work related information from team Identify interrelated work activities to avoid		**Total** **hrs** **Theory:** hrs **Practical:** hrs		**Theory:** Class room with multimedia facility **Practical :** Workshop

	confusion Adopt communication skills, which are designed in a team. Identify problems in communication with a team Resolve Communication barrier through discussion and mutual agreement			**Consumable :**	
LU2: Follow Supervisor's instructions as per organizational SOPs	**The trainee will be able to:** Receive the instructions from Supervisor Carry out the instructions of the supervisor Report to the supervisor as per organizational SOPs		**Total** **hrs** **Theory:** hrs **Practical:** hrs	**Consumable :**	**Theory:** Class room with multimedia facility **Practical :** Workshop
LU3: Develop Generic communication skills at	**The trainee will be able to:** Develop basic reading skills		**Total** **hrs** **Theory:**	**Consumable :**	**Theory:** Class room with multimedia facility

workplace	Develop Basic writing Skills Develop basic listening skills		hrs **Practical:** hrs		**Practical :** Workshop

Module 4: Perform Basic Computer Application (Specific) (061100856)

Objective of the module: This unit describes the skills and knowledge required to use spreadsheet to prepare a page of document, develops familiarity with Word, Excel, Access, PowerPoint, email, and computer graphics basics.

It applies to individuals who perform a range of routine tasks in the workplace using a fundamental knowledge of spreadsheets, Microsoft office and computer graphics in under direct supervision or with limited responsibility.

Duration: 40 Hours **Theory:** Hours **Practical:** Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Create Word Documents	**The trainee will be able to:** Open word processing application Create a word document Customize page layout with relevant name setting Set up page in a word document Edit word document as required		**Total** **hrs** **Theory:** hrs **Practical:** hrs		**Theory:** Class room with multimedia facility **Practical :** Workshop

	Use simple formatting tools when creating the document Save word document to directory Insert table in a word document Insert appropriate images into document as necessary Insert header/footer in a word document Insert section break in a word document Set style in word document Select basic Print settings Print the document			**Consumable :**	
LU2: Use internet for Browsing	**The trainee will be able to:** Use search engines to open		**Total** **hrs**		**Theory:** Class room with multimedia facility

	website Search data on different topics Refine search to increase relevance of information or content Navigate a website to access the information or content required		**Theory:** hrs **Practical:** hrs	**Consumable :**	**Practical :** Workshop

Module 5: Measure basic electrical units in series and parallel circuits

Objective of the module: The objective of this module is to develop knowledge, skills and understanding required to measure basic electrical units in series and parallel circuits

Duration: 100 hours **Theory:** 20 hours **Practical:** 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Measure electrical current and resistance	**The trainee will be able to:** • Arrange tools, material and equipment for measurement of electric current • Construct series arrangement of resistances in a closed loop circuit • Construct parallel arrangement of resistances in a closed loop circuit • Perform measurement of electrical resistance in a series or parallel circuit • Perform measurement of alternating current in a series or parallel circuit • Perform measurement of direct current in a series / parallel circuit	• Define electric current (AC and DC) • Understand function of ampere meter (AC and DC) • Define resistance • Differentiate between series and parallel circuits • Understand function of ohm meter and ampere meter	**Total** 20 Hours **Theory:** 4 Hours **Practical:** 16 Hours	• Ampere meter • Ohm meter • Resistance decade box • AC/DC supplies • Multimeter • Connecting leads/wires	**Theory** Classroom equipped with teaching aids (multimedia and flip charts) **Practical** Laboratory OR Workshop, Industrial Visits
LU2: Perform voltage	**The trainee will be able to:** • Arrange tools, material and equipment for measurement of	• Define voltage • Understand the function of voltmeter	**Total** 10 Hours	• Voltmeter • Series and parallel circuits	**Theory** Classroom equipped with teaching aids

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
measurement	voltage • Perform measurement of AC Voltage in a series or parallel circuit • Perform measurement of DC voltage in a series or parallel circuit	• Knowledge about measurement of voltage in series and parallel circuits (AC and DC) using volt meter	**Theory:** 2 Hours **Practical:** 8 Hours	• AC/DC power supply • Resistance decade box	(multimedia and flip charts) **Practical** Laboratory OR Workshop, Industrial Visits
LU3: Measure electrical power	**The trainee will be able to:** • Arrange tools, material and equipment for measurement of electrical power • Perform measurement of electrical power for the series or parallel circuit	• Define electric power • Understand the function of wattmeter • Knowledge about measurement of electric power in series and parallel circuits using watt meter	**Total** 10 Hours **Theory:** 2 Hours **Practical:** 8 Hours	• Watt meter • AC/DC power supply • Different types of load (lamp, fan, electric iron, single phase motor)	**Theory** Classroom equipped with teaching aids (multimedia and flip charts) **Practical** Laboratory OR Workshop, Industrial Visits
LU4: Perform capacitance and inductance measurement	**The trainee will be able to:** • Arrange tools, material and equipment for measurement of capacitor or inductor • Perform measurement of capacitor or inductor with LCR meter • Perform open circuit or short circuit test for the capacitor	• Define capacitor and capacitive reactance • Define inductor and inductive reactance • Knowledge about measurement of capacitance and inductance by LCR meter	**Total** 20 Hours **Theory:** 4 Hours **Practical:** 16 Hours	• Capacitors of different values • Inductors of different values • LCR meter • Ohm meter • Multimeter	**Theory** Classroom equipped with teaching aids (multimedia and flip charts) **Practical** Laboratory OR Workshop, Industrial

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		• Describe capacitor open circuit and short circuit testing procedure			Visits
LU5: Perform low voltage transformer test	**The trainee will be able to:** • Arrange tools, material and equipment for the transformer test • Perform open circuit or short circuit test for the low voltage transformer	• Understanding about low voltage transformers and their step up and step down functions • Describe transformer open circuit and short circuit testing procedure	**Total** 20 Hours **Theory:** 4 Hours **Practical:** 16 Hours	• Low voltage transformer with different turn ratio • Ampere meter • Volt meter • Ohm meter • Multimeter	**Theory** Classroom equipped with teaching aids (multimedia and flip charts) **Practical** Laboratory OR Workshop, Industrial Visits
LU6: Construct rectifier circuit	**The trainee will be able to:** • Arrange tools, material and equipment for the rectifier circuit • Construct half wave and full wave rectifier circuit • Construct bridge arrangement from diodes for full wave rectification • Measure output voltage of rectifier with oscilloscope	• Knowledge about rectifier (diode) • Understanding about half wave and full wave (centre tapped and bridge) rectifier circuits • Understanding about usage of oscilloscope for frequency and voltage measurement	**Total** 20 Hours **Theory:** 4 Hours **Practical:** 16 Hours	• Step down transformer • Capacitors of different values • Diodes of different values • Resistors of different values • Oscilloscope • Bread board • AC/DC Power supply	**Theory** Classroom equipped with teaching aids (multimedia and flip charts) **Practical** Laboratory OR Workshop, Industrial Visits

General assessment guidance for Fan Manufacturing Technician Curriculum

Good practice in Pakistan makes use of sessional and final assessments, the basis of which is described below. Good practice by vocational training providers in Pakistan is to use a combination of these sessional and final assessments, combined to produce the final qualification result.

Sessional assessment is going on all the time. Its purpose is to provide feedback on what students are learning:

- to the student: to identify achievement and areas for further work
- to the teacher: to evaluate the effectiveness of teaching to date, and to focus future plans

Assessors need to devise sessional assessments for both theoretical and practical work. Guidance is provided in the assessment strategy

Final assessment is the assessment, usually on completion of a course or module, which says whether or not the student is "competent". It is – or should be – undertaken with reference to all the objectives or outcomes of the course and is usually formal. Considerations of security – ensuring that the student who gets the credit is the person who did the work – assume considerable importance in final assessment.

Methods of assessment

For lessons with a high quantity of theory, written or oral tests related to learning outcomes and or learning content can be conducted. For workplace lessons, assessment can focus on the quality of planning the related process, the quality of executing the process, the quality of the product and/or evaluation of the process.

Methods include direct assessment, which is the most desirable form of assessment. For this method, evidence is obtained by direct observation of the student’s performance.

Examples for direct assessment of a Fan Manufacturing Technician include:

- Work performances, for example Perform cast iron casting
- Demonstrations, for example demonstrating calibration of different measuring instruments
- Direct questioning, where the assessor would ask the student why he is performing winding continuity test
- Paper-based tests, such as multiple choice or short answer questions on usage of different electrical and mechanical tools or different fabrication processes

Indirect assessment is the method used where the performance could not be watched and evidence is gained indirectly.

Examples for indirect assessment of a Fan Manufacturing Technician include:

- Work products, such as a winded fan motors, aluminium die casted fan parts
- Workplace documents, such as a log of raw materials that has been tagged ready for storage
- Indirect assessment should only be a second choice (In some cases, it may not even be guaranteed that the work products were produced by the person being assessed)

Principles of assessment

All assessments should be valid, reliable, fair and flexible:

Fairness means that there should be no advantages or disadvantages for any assessed person. For example, it should not happen that one student gets prior information about the type of work performance that will be assessed, while another candidate does not get any prior information.

Validity means that a valid assessment assesses what it claims to assess. For example, if winding of fan motor skills are to be assessed and certificated, the assessment should involve performance criteria that are directly related to that winding activity. An interview about the effect of the different wires and insulation papers on fan motor would not meet the performance criteria.

Reliability means that the assessment is consistent and reproducible. For example, if the work performance of preparing sand mould as per pattern has been assessed, another assessor (e.g. the future employer) should be able to see the same work performance and witness the same level of achievement.

Flexibility means that the assessor must be flexible concerning the assessment approach. For example, if there is a power failure during the assessment, the assessor should modify the arrangements to accommodate the students' needs.

Assessment strategy for Fan Manufacturing Technician Level II (Assistant Electrician)

This curriculum consists of 05 modules:

- Comply with Perform Personal Health and Safety Guidelines
- Communicate the Workplace Policy and Procedure
- Perform Basic Communication (Specific)
- Perform Basic Computer Application(Specific)
- Measure basic electrical units in series and parallel circuits

Sessional assessment

The sessional assessment for all modules shall be in two parts: theoretical assessment and practical assessment. The sessional marks shall contribute to the final qualification.

Theoretical assessment for all learning modules must consist of a written paper lasting at least one hour per module. This can be a combination of multiple choice and short answer questions.

For practical assessment, all procedures and methods for the modules must be assessed on a sessional basis. Guidance is provided below under Planning for assessment.

Final assessment

In general, the final assessment shall be conducted in two parts: theoretical assessment and practical assessment. The final assessment marks shall contribute to the final qualification.

The final theoretical assessment shall consist of two sub-parts. Part A shall last for 2 hours and shall consist of half multiple choice and half short-answer questions. Part B shall last for 1 hour and shall consist of short answer and at least two extended answer questions.

For the final practical assessment, each student shall be assessed over a period of two days, with two 3-hour sessions on each day. This represents a total of four sessions comprising 12 hours of practical assessment for each student.

The assessment team

The number of assessors must meet the needs of the students and the training provider. For example, where two assessors are conducting the assessment, there must be a maximum of five students per assessor. In this example, a group of 20 students shall therefore require assessments to be carried out over a four-day period. For a group of only 10 students, assessments would be carried out over a two-day period only.

Planning for assessment

Sessional assessment: Assessors need to plan how they will conduct sessional assessments for each module. The tables on the following pages are for assessors to use to insert how many hours of theoretical and practical assessment will be conducted and what the scheduled dates are.

Final assessment: Training providers need to decide ways to combine modules into a cohesive two-day final assessment programme for each group of five students. Training providers must agree on different work performances for practical assessments in advance.

Complete list of tools and equipment

Sr. No.	Description	Specification (for example)	Quantity in numbers or sets or units (for example)
General Tools and Equipment			
1.	Measuring tape	0-15Ft	**10**
2.	Venire calipers	0-304mm	10
3.	Micro meter	0-25mm	10
4.	Steel ruler	0-12 INCH	10
5.	Wire gauge	0-32 mm	10
6.	Digital micrometer	0-25mm	10
7.	SWG gauge	0-25mm	10
8.	Go and Not Go gauges for Quality inspection	0-25mm	10
9.	Digital Venire caliper	0-304mm	5
10.	Digital weighing scale	0-7kg	5
11.	Feeler gauge	2-40 Thousand	10
12.	Pneumatic screw driver along with compressor	0-3 bar	5
13.	Punching pliers	3.5-7.5mm	10
14.	Hand grinder	0.800watt	5
15.	Rubber Hammer		10
16.	Soldering iron	100-300wats	5
17.	Coil tamping tools	1-3500(cst) centistokes	5
18.	Viscosity meter	0-1000 GU	5
19.	Gloss meter	0-1500 µm	5
20.	Film thickness meter	0-1000 Ċ	5
21.	Pyrometer	0-3 bar	5
22.	Spray gun		5
23.	Mechanical Tool kit		5

24.	Master gauges of measuring instruments		5
25.	Maintenance kit for measuring instruments		5
26.	Scissor/cutter	0-8 inches	10
27.	steel wire brush	0-200 mm	5
28.	Lacing needle	0-3 mm	10
29.	Allen Key set	1.5-36mm	10
30.	Racks		4
31.	Trolleys		4
32.	Fire Extinguishers	CO_2 Fire/DRV Powder/Foam Extinguisher	5
33.	Magnifying glass	40-100mm	10
34.	Thermocouple	0-75 Ċ	10
35.	Sound level meter	30-130 dBA	5
36.	Varnishing booth		2
37.	Paint booth with accessories		2
38.	Powder coating booth		2
39.	PPEs (Goggles, Heat resistant fireproof gloves, Safety Helmet with protective glass shield, Safety Shoes, Heat resistant fireproof Apron with hood, Mask) for metal casting		
40.	Computer		10
41.	printer		4
Electric Tools and Equipment			
1.	Ampere meter	0-50 Amp	5
2.	Ohm meter	400 Ω	5
3.	Resistance decade box	400 Ω	5
4.	Volt meter	250 Volts	5
5.	Series and parallel circuits		5
6.	AC/DC power supply	220-250	5
7.	Watt meter	200 Watt	5
8.	Different types of load (lamp, fan, electric iron, single phase motor)	0.5A – 1.5 hP	3 each
9.	Capacitors of different values	2.0-4.5 µf 450 Volt	5 each

10.	Inductors of different values	20.200 nH	5 each
11.	LCR meter	1-100MΩ	5
12.	Low voltage transformer	22 KV	5
13.	Step down transformer	500 VA	5
14.	Diodes of different values	6-10 A	5 each
15.	Resistors of different values	2.7 K – 5.7 K	5 each
16.	Oscilloscope	0-10 GSa/sec	5
17.	Bread board		10
18.	Mili Ohm Meter		5
19.	Anemometer	(80cm)0.4m/s – 30.0 m/s	5
20.	Power factor meter	0.5-10	5
21.	Temperature meter	40.300Ċ	5
22.	Insulation tester	50-1000 V	5
23.	Die electric tester	110-230 V˜	5
24.	Frequency meter	50-60 Hz	5
25.	Tachometer	1500 rpm	5
26.	Test Bench (ampere meter, volt meter, ohm meter, watt meter, test lamp)		5
27.	Insulation tester (High voltage tester)	0-2500 V	5
28.	Multi meter		5
29.	Electric Toolkit		5
Foundry Shop Tools			
1.	Wheel barrow	200 KG	2
2.	Flasks		5
3.	Trowels		10
4.	Slicks		10
5.	Lifters		4
6.	Bellows		4
7.	Vent wires		10
8.	Steel boards		5
9.	Riddles		10

10.	Shovels		10
11.	Rammers		10
12.	Strike off bars		10
13.	Draw spikes		5
14.	Sprue pins		20
15.	Ladles		5
16.	Tong		5
17.	Skimmer		10
18.	Ladle shank		5
19.	Grinder		5
20.	Hammer		10
21.	Pouring cup		5
22.	Mallet		
Machines			
1.	Coil making machine		2
2.	Ceiling fan winding machine		2
3.	Paper cutting machine		2
4.	Paper insertion machine		2
5.	Fan winding machine (for AC and DC)		2
6.	Powder coating machine		2
7.	Baking oven	200 Ċ	2
8.	Curing Oven(Powder Coating)		2
9.	Drying oven(varnishing process)		2
10.	Air compressor with filter unit	1-7.5 bar	2
11.	Core baking ovens(Sand casting)	0-700 F^o	2
12.	Crucible furnace		2
13.	Aluminum die casting machine		1
14.	• Mould for aluminum die casting machine		
15.	Centrifugal/rotary casting machine		1
16.	• Mould for aluminum Centrifugal/rotary casting machine		

17. 18.	Spot Welding machine • Jigs and fixtures for spot welding machine	3.5 KVA – 15 KVA	1
19. 20.	Riveting press • Jigs and fixtures for riveting press	35 – 140 KG / cm^2	1
21.	Balancing machine		2
22.	Drill machine	1.50-1400 KW/rpm	5
23.	Bearing press machine		1
24.	Brinell, Rockwell and Vickers hardness testers	250 – 3000	1 each
25.	Power Press Machine	0-7 KG /cm^2	2
26. 27.	Hydraulic press • Different types of jigs and fixtures for hydraulic press machine	30 MPa	2
28.	Wire cutting machine for fan safeguard		1
29.	Cutting die for cutting fan blades and shanks on die press machine (punch and cavity)	35-140 KG / cm^2	2
30.	Punching die for punching holes in fan blades and shanks		2
31.	Bending die for bending fan blades and shanks as per design		2
32.	Cutting die for cutting rotor/stator as per design (punch and cavity)		2
33.	Punching die as per requirement for punching slots in stator and rotor sheets		2
34.	Bending die for bending steel wires as per design (punch and cavity)		2

List of consumable supplies

Appropriate quantities of:

- De-greasing chemicals
- Cotton cloth
- Pages for printer
- Leatherized/ insulated paper
- Insulation paper
- Insulated winding wire
- Coarse cotton thread
- Insulation sleeves
- Soldering wire
- Soldering paste
- Varnish
- Paint
- Solvent
- Cotton cloth
- Sand paper
- Buffing mob
- Polishing lustre
- Powder paints
- Sand papers of different grains
- Different filler material
- Different types of corrugated sheets
- Thermo-pore sheets
- Coarse paper sheet
- Bubble sheets
- Packing tape
- Boring bits
- Fillet rods
- Wooden planks
- Different types of nails.
- Sandpapers
- Polishing material (spirit, lacquer, thinner & shellac).
- Soft cotton cloth
- Elfie
- Wooden glue
- Paint and paint brushes
- Putty
- Moulding sand
- Bentonite
- Molasses
- Chalk powder
- Graphite powder
- Dust bag
- Fuel for furnace (gas/coal/oil)
- Aluminium blocks/scraps
- Fire clay and fire bricks
- Cast iron blocks/scraps

- Flux (limestone) for cast iron casting
- Flux for aluminium melting
- Degasser
- Grain refiner
- Different types of thermoplastic materials
- Colorants
- Different types of cutters and knives
- Aluminium or its alloys
- Crucible
- Cotton cloth
- Fuel for aluminium casting furnace
- Lubricants used during aluminium melting process
- Aluminium sheet (for cutting of fan blades)
- Mild steel (for cutting of fan blades shank)
- Aluminium fan blade
- Mild steel shanks
- Electrical sheet
- Steel wire
- Inner and outer mild steel ring
- Axle/Shaft
- Armature
- Fan body and plate
- Cutting bits of lathe machine
- Taps
- Boring tool for lathe machine
- Lubricants used for lathe machine
- Coolants used for lathe machine
- Metal wire brush
- Rotor and stator
- Steel rod
- Threading tool for lathe machine
- Flat file for finishing 10”
- Drill bits
- Steel pipe
- Grinding wheel dresser
- Weights for balancing machine
- Bearings
- Screws
- Jane
- Spring washers
- Plastic bags

Credit values

The credit value of the National Vocational Certificate (Level 2 to Level 4) of Fan Manufacturing Technician Qualification is defined by estimating the amount of time/ instruction hours required to complete each competency unit and competency standard. The NVQF uses a standard credit value of 1 credit = 10 hours of learning (Following Higher Education Commission (HEC) guidelines.

The credit values are as follows:

Competency Standard	**Estimate of hours**	**Credit**
Comply with Perform Personal Health and Safety Guidelines	30	3
Communicate the Workplace Policy and Procedure	20	2
Perform Basic Communication (Specific)	30	3
Perform Basic Computer Application(Specific)	40	4
Measure basic electrical units in series and parallel circuits	100	10

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