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# FAN MANUFACTURING TECHNICIAN



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## CBT CURRICULUM

National Vocational Certificate Level 3

Version 1 - May, 2019



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**Document Version**

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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:

- Apply Work Health and Safety Practices (WHS)
- Identify and Implement Workplace Policy and Procedures
- Communicate at Workplace
- Perform Computer Application Skills
- Manage Personal Finances
- Perform parts assembling

### **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 Assembler
- Fan Quality Inspector
- Fan Supervisor

### **Trainee entry level**

The entry in National Vocational Certificate Level III” Fan Manufacturing Technician (Assembler)” is given below:

Title	Entry requirements
National Vocational Certificate Level III” Fan Manufacturing Technician (Assembler)”	Entry for assessment of this qualification is open. However, entry requirement into formal training institute for this qualification is holding the National Vocational Certificates of level 2, in “Fan Manufacturing Technician” Fabricator, Foundry Man and Painter.

**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 06 modules. The recommended delivery time is 310 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:

<b>Module</b>	<b>Total Duration (Hours)</b>	<b>Theory<sup>1</sup> (Hours)</b>	<b>Practical<sup>2</sup> (Hours)</b>
Apply Work Health and Safety Practices (WHS)	30	6	24
Identify and Implement Workplace Policy and Procedures	20	4	16
Communicate at Workplace	30	6	24
Perform Computer Application Skills	40	8	32
Manage Personal Finances	30	6	24
Perform parts assembling	160	32	128

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<sup>1</sup> Learning Module hours in training provider premises

<sup>2</sup> Training workshop, laboratory and on-the-job workplace

## Sequence of modules

This National Vocational Certificate is made up of 5 modules. A suggested distribution of these modules for this National Vocational Certificate Level 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 III in “Fan Manufacturing Technician (Assembler)”

Module 6: Perform parts assembling	Module 1: Apply Work Health and Safety Practices (WHS)
	Module 2: Identify and Implement Workplace Policy and Procedures
	Module 3: Communicate at Workplace
	Module 4: Perform Computer Application Skills
	Module 5: Manage Personal Finances



## Summary – Overview of the curriculum

Module Title and Aim	Learning Units	Theory (Hours)	Workplace (Hours)	Timeframe of modules
<b>Module 1:</b> Apply Work Health and Safety Practices (WHS)	LU1. Implement safe work practices at work place LU2. Participate in hazard assessment activities a work place LU3. Follow emergency procedures at workplace LU4. Participate in OHS consultative processes	6	24	30
<b>Module 2:</b> Identify and Implement Workplace Policy and Procedures	LU1. Identify workplace policy & procedures LU2. Implement workplace policy & procedures LU3. Communicate workplace policy& procedures LU4. Review the implementation of workplace policy & procedures	4	16	20
<b>Module 3:</b> Communicate at Workplace	LU1. Communicate within the organization LU2. Communicate outside the organization LU3. Communicate effectively in workgroup LU4. Communicate in writing	6	24	30

<b>Module Title and Aim</b>	<b>Learning Units</b>	<b>Theory (Hours)</b>	<b>Workplace (Hours)</b>	<b>Timeframe of modules</b>
<b>Module 4:</b> Perform Computer Application Skills	LU1. Prepare In-page documents as per required information LU2. Prepare Spreadsheets as per required information LU3. Use MS Office as per required information LU4. Perform computer graphics in basic applications LU5. Create Email account for communications	8	32	40
<b>Module 5:</b> Manage Personal Finances	LU1. Develop a personal budget LU2. Develop long term personal budget LU3. Identify ways to maximize future finances	6	24	30

Module Title and Aim	Learning Units	Theory (Hours)	Workplace (Hours)	Timeframe of modules
<p><b>Module 6:</b> Perform parts assembling</p> <p><b>Aim:</b> The aim of this module is to develop knowledge, skills and understanding required to perform assembling of different fan parts</p>	<p><b>LU1:</b> Perform balancing of ceiling fan body &amp; plates</p> <p><b>LU2:</b> Press bearings in body and plates</p> <p><b>LU3:</b> Perform rotor balancing</p> <p><b>LU4:</b> Press armature (for DC fans) / stator (for AC fans) in fan body housing</p> <p><b>LU5:</b> Assemble fan body and plate</p> <p><b>LU6:</b> Perform fan motor testing</p> <p><b>LU7:</b> Install fan blades</p> <p><b>LU8:</b> Test fan with blades</p>	32	128	160

## Modules

### Module 1: Apply Work Health and Safety Practices (WHS) (102200846)

**Objective of the module:** This unit describes the skills to work with safety and participate in hazard assessment activities, follow emergency procedures and participate OHS practices in process.

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Implement safe work practices at work place	<p><b>The trainee will be able to:</b></p> <ul style="list-style-type: none"> <li>Implement relevant rules and procedures of WHS at work place.</li> <li>Comply with duty of care requirements</li> <li>Use personal protective equipment according to safe work practices</li> <li>Contribute to WHS consultative activities</li> <li>Raise WHS issues with relevant personnel</li> </ul>		<p><b>Total</b></p> <p>hrs</p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>		<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>

				<b>Consumable :</b>	
<b>LU2:</b> Participate in hazard assessment activities a work place	<p><b>The trainee will be able to:</b></p> <p>Identify hazards or WHS issues in the workplace to relevant personnel</p> <p>Assess and control risks according to own level of responsibility, in line with workplace procedures</p> <p>Report hazards or WHS issues in the workplace to relevant personnel</p> <p>Document risk control actions as required</p>		<p><b>Total hrs</b></p> <p><b>Theory:</b> hrs</p> <p><b>Practical:</b> hrs</p>	<b>Consumable :</b>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>
<b>LU3:</b> Follow emergency procedures at workplace	<p><b>The trainee will be able to:</b></p> <p>Report emergencies or incidents promptly to relevant personnel</p>		<p><b>Total hrs</b></p>		<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>

	<p>Deal with emergencies in line with own level of responsibility</p> <p>Implement evacuation procedures as required</p>		<p><b>Theory:</b> hrs</p> <p><b>Practical:</b> hrs</p>	<p><b>Consumable :</b></p>	
<p><b>LU4:</b> Participate in OHS consultative processes</p>	<p><b>The trainee will be able to:</b></p> <p>Contribute to workplace meetings, inspections or other consultative activities</p> <p>Raise OHS (Occupational Health and Safety) issues with designated persons in accordance with organizational procedures</p> <p>Take actions to eliminate workplace hazards or to reduce risks</p>		<p><b>Total</b> hrs</p> <p><b>Theory:</b> hrs</p> <p><b>Practical:</b> hrs</p>	<p><b>Consumable :</b></p>	

## Module 2: Identify and Implement Workplace Policy and Procedures (041700840)

**Objective of the module:** This unit describes the skills and knowledge required to develop and implement a workplace policy & procedures and to modify the policy to suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Identify workplace policy & procedures	<p><b>The trainee will be able to:</b></p> <p>Identify the workplace policy &amp; procedures</p> <p>Apply appropriate strategies that can be used to measure whether your workplace health and safety obligations are being met.</p> <p>Assure the policies are realistic, resources and personnel to implement</p> <p>Implement the policy &amp;</p>		<p><b>Total</b></p> <p>hrs</p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>		<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>

	<p>procedures that reflects the organizations commitments</p> <p>Ensure the appropriate methods of implementation, outcomes and performance indicators</p>			<b>Consumable :</b>	
<b>LU2:</b> Implement workplace policy & procedures	<p><b>The trainee will be able to:</b></p> <p>Apply and assign responsibility for recording systems to track continuous improvements in policy &amp; procedures</p> <p>Implement strategies for continuous improvement in effective and efficient information</p>		<p><b>Total hrs</b></p> <p><b>Theory:</b> hrs</p> <p><b>Practical:</b> hrs</p>	<b>Consumable :</b>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>
<b>LU3:</b> Communicate workplace policy& procedures	<p><b>The trainee will be able to:</b></p> <p>Communicate procedures to help implement workplace</p>		<p><b>Total Hrs</b></p> <p><b>Theory:</b></p>	<b>Consumable :</b>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical:</b> Workshop</p>



	<p>policy</p> <p>Inform those involved in implementing the policy about expected outcomes, activities to be undertaken and assigned responsibilities</p>		<p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>		
<p><b>LU4:</b> Review the implementation of workplace policy &amp; procedures</p>	<p><b>The trainee will be able to:</b></p> <p>Identify the trends that may require remedial actions</p> <p>Record the trends that may require remedial actions.</p> <p>Ensure policy and procedures as required are made for continuous improvement of performance</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	



### Module 3: Communicate at Workplace (001100852)

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Communicate within the organization	<b>The trainee will be able to:</b> Communicate within a department Communicate with other departments. Use various media to communicate effectively Communicate orally and written		<b>Total</b>  <b>hrs</b>  <b>Theory:</b> hrs  <b>Practical:</b> hrs	<b>Consumable :</b>	<b>Theory:</b> Class room with multimedia facility  <b>Practical :</b> Workshop
<b>LU2:</b> Communicate outside the organization	<b>The trainee will be able to:</b> Deal with vendors Deal with clients/customers Interact with other organisations		<b>Total</b>  <b>hrs</b>  <b>Theory:</b>		<b>Theory:</b> Class room with multimedia facility  <b>Practical :</b>

	<p>Use various media to communicate effectively</p> <p>Work with people of different cultures / backgrounds</p>		<p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p>Workshop</p>
<p><b>LU3:</b> Communicate effectively in workgroup</p>	<p><b>The trainee will be able to:</b></p> <p>Assess the issues to provide relevant suggestion to group members</p> <p>Resolve the issues/ problems /conflicts within the group</p> <p>Arrange group working sessions to increase the level of participation in the group processes</p> <p>Communicate messages to group members clearly to ensure interpretation is valid</p> <p>Communicate style /manner to reflect professional standards/ awareness of appropriate cultural practices</p> <p>Act upon constructive feedback</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>
<p><b>LU4:</b> Communicate in writing</p>	<p><b>The trainee will be able to:</b></p> <p>Identify relevant procedures for written</p>		<p><b>Total</b></p> <p><b>hrs</b></p>		

	<p>information</p> <p>Use strategies to ensure correct communication in writing .i.e.</p> <ul style="list-style-type: none"> <li>• correct composition</li> <li>• clarity</li> <li>• comprehensiveness</li> <li>• accuracy</li> <li>• appropriateness</li> </ul> <p>Draft assigned written information for approval, ensuring it is written within designated timeframes</p> <p>Ensure written information meets required standards of style, format and detail</p> <p>Seek assistance / feedback to aid communication skills development</p>		<p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	
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#### Module 4: Perform Computer Application Skills (061100858)

**Objective of the module:** This unit describes the skills and knowledge required to use spreadsheet applications, prepare in page documents, 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
<b>LU1:</b> Prepare In-page documents as per required information	<b>The trainee will be able to:</b>  Set keyboard preferences according to information requirements  Layout Page according to information requirements  Toggle between Languages  Identify the usage of tool bar		<b>Total</b>  <b>hrs</b>  <b>Theory:</b> hrs  <b>Practical:</b> hrs	<b>Consumable :</b>	<b>Theory:</b> Class room with multimedia facility  <b>Practical :</b> Workshop

	<p>Insert Columns as per requirement</p> <p>Print the document</p>				
<p><b>LU2:</b> Prepare Spreadsheets as per required information</p>	<p><b>The trainee will be able to:</b></p> <p>Create workbook according to information requirements</p> <p>Insert sheet according to information requirements</p> <p>Enter basic formulae / functions using cell referencing when required</p> <p>Correct formulas when error messages occur</p> <p>Use a range of common tools during spreadsheet development</p> <p>Edit columns and rows within the spreadsheet</p> <p>Filter data</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>



	<p>Save the spreadsheet to a folder on a storage device</p> <p>Format spreadsheet using formatting features as required</p> <p>Incorporate object and chart in spreadsheet</p> <p>Print spreadsheet</p>				
<p><b>LU3:</b> Use MS Office as per required information</p>	<p><b>The trainee will be able to:</b></p> <p>Use Microsoft Word for documentation</p> <p>Use Microsoft Excel for documentation</p> <p>Use Microsoft PowerPoint for presentation</p> <p>Perform OneNote</p> <p>Perform Outlook for emails</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>

	Perform Publisher applications				
<b>LU4:</b> Perform computer graphics in basic applications	<p><b>The trainee will be able to:</b></p> <p>Perform graphic fundamentals in basic applications</p> <p>Draw Points and lines to make images</p> <p>Draw Dots in space to make images</p> <p>Draw lightening blot Shapes to make images</p> <p>Enlarge circles and rectangles to block in forms</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<b>Consumable :</b>	
<b>LU5:</b> Create Email account for communications	<p><b>The trainee will be able to:</b></p> <p>Make email account for communications</p> <p>Compose text of an</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p>		

	<p>email message according to organizational guidelines as required</p> <p>Create an automatic signature for the user</p> <p>Attach files to email message where required</p> <p>Send email message</p> <p>Reply to / forward a received message using available features</p> <p>Save an attachment to the relevant folder</p> <p>Save email message using available settings</p> <p>Adjust email accounts to restrict and quarantine possible email security problems</p> <ul style="list-style-type: none"> <li>• Print email message as per requirements</li> </ul>		<p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	
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## Module 5: Manage Personal Finances (041300867)

**Objective of the module:** This unit of competency describes the outcomes required to manage develop, implement and monitor a personal budget in order to plan regular savings and manage debt effectively.

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Develop a personal budget	<p><b>The trainee will be able to:</b></p> <p>Calculate current living expenses using available information to prepare a personal budget.</p> <p>Keep a record of all income and expenses for a short period of time to help estimate ongoing expenses.</p> <p>Subtract total expenses from total income to determine a surplus or deficit budget for the specified period.</p> <p>Find reasons for a deficit</p>		<p><b>Total</b></p> <p>hrs</p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>

	<p>budget and ways to reduce expenditure identified.</p> <p>Identify ways to increase income</p>				
<p><b>LU2:</b> Develop long term personal budget</p>	<p><b>The trainee will be able to:</b></p> <p>Analyze income and expenditure and set long term personal financial goals.</p> <p>Develop a long-term budget based on the outcomes of short-term budgeting.</p> <p>Identify obstacles that might affect the business</p> <p>Formulate a regular savings plan based on budget</p>		<p><b>Total</b></p> <p><b>hrs</b></p> <p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p><b>Theory:</b> Class room with multimedia facility</p> <p><b>Practical :</b> Workshop</p>
<p><b>LU3:</b> Identify ways to maximize future finances</p>	<p><b>The trainee will be able to:</b></p> <p>Determine sources to maximize personal</p>		<p><b>Total</b></p> <p><b>hrs</b></p>		<p><b>Theory:</b> Class room with multimedia facility</p>

	<p>income,</p> <p>Get further education or training to maintain or improve future income</p> <p>Identify the need for debt to finance living and other expenses</p> <p>Determine the appropriate levels of debt and repayment</p> <p>Consolidate existing debt, where possible, to minimize interest costs and fees</p> <p>Seek professional money management services</p>		<p><b>Theory:</b></p> <p>hrs</p> <p><b>Practical:</b></p> <p>hrs</p>	<p><b>Consumable :</b></p>	<p><b>Practical : Workshop</b></p>
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## Module 6: Perform parts assembling

**Objective of the module:** The aim of this module is to develop knowledge, skills and understanding required to perform assembling of different fan parts

**Duration:** 160 hours    **Theory:** 32 hours    **Practical:** 128 hours

Learning units	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b>  Perform balancing of ceiling fan body & plates	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Mount ceiling fan body and plates on mandrel</li> <li>Remove or add weights from body and plates for balancing if required</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge about balancing</li> <li>Understanding of balancing requirements of ceiling fan body and plates</li> <li>Understanding of balancing machine operation</li> </ul>	<b>Total</b> 25 Hours  <b>Theory:</b> 5 Hours  <b>Practical:</b> 20 Hours	<ul style="list-style-type: none"> <li>Balancing machine</li> <li>Drill machine</li> <li>Punching plier</li> <li>Weights for balancing machine</li> <li>Drill bits</li> <li>Ceiling fan body and plates</li> <li>Air compressor</li> <li>Adhesives</li> </ul>	<b>Theory</b>  Classroom equipped with teaching aids (multimedia and flip charts)  <b>Practical</b>  Laboratory OR Workshop, industrial visits
<b>LU2:</b>  Press bearings in fan body and plates	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Set press machine as per requirement</li> <li>Select bearing as per requirement</li> <li>Press bearing in housing</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge about bearing types and their uses</li> <li>Understanding of bearing construction and numbering method.</li> <li>Understanding of bearing adjuster press machine operation.</li> <li>Understanding of bearing fitting and sizing requirements</li> </ul>	<b>Total</b> 10 Hours  <b>Theory:</b> 2 Hours  <b>Practical:</b> 8 Hours	<ul style="list-style-type: none"> <li>Bearing press machine</li> <li>Bearings</li> <li>Fan body and plates</li> </ul>	<b>Theory</b>  Classroom equipped with teaching aids (multimedia and flip charts)  <b>Practical</b>  Laboratory OR Workshop,

Learning units	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
					Industrial visits
<b>LU3:</b>  Perform rotor balancing	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>• Load rotor on balancing machine as per requirement</li> <li>• Remove weights(if required) from rotor for balancing</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge about balancing</li> <li>• Understanding of balancing requirements of fan rotor</li> <li>• Understanding of balancing machine operation.</li> </ul>	<b>Total</b> 15 Hours  <b>Theory:</b> 3 Hours  <b>Practical:</b> 12 Hours	<ul style="list-style-type: none"> <li>• Balancing machine</li> <li>• Drill machine</li> <li>• Punching plier</li> <li>• Weights for balancing machine</li> <li>• Drill bits</li> </ul>	<b>Theory</b>  Classroom equipped with teaching aids (multimedia and flip charts)  <b>Practical</b>  Laboratory OR Workshop, Industrial visits
<b>LU4:</b>  Press armature (for DC fans) stator (for AC fans) in fan body housing	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>• Load fixture on press machine</li> <li>• Load fan body in the jig</li> <li>• Place stator/armature in the body and press accordingly</li> <li>• Check air gap with feeler gauge</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge about fixtures.</li> <li>• Understanding the usage of press machine.</li> <li>• Understanding of loading fixture and fan body on press machine.</li> <li>• Knowledge of fitting requirements of stator in the fan body.</li> <li>• Understanding of usage of filler gauge for fitting</li> </ul>	<b>Total</b> 25 Hours  <b>Theory:</b> 5 Hours  <b>Practical:</b> 20 Hours	<ul style="list-style-type: none"> <li>• Hydraulic press machine</li> <li>• Fixture for holding fan body on hydraulic press machine</li> <li>• Feeler gauge</li> <li>• Stator/armature</li> <li>• Fan body housing</li> </ul>	<b>Theory</b>  Classroom equipped with teaching aids (multimedia and flip charts)  <b>Practical</b>  Laboratory OR Workshop, Industrial visits
<b>LU5:</b>  Assemble fan body and plate	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>• Place plate on the fan body</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge about assembly process drawing.</li> <li>• Understanding of assembly process sequence.</li> </ul>	<b>Total</b> 25 Hours	<ul style="list-style-type: none"> <li>• Fan body and plate</li> <li>• Screw driver</li> <li>• Filler gauge</li> </ul>	<b>Theory</b>  Classroom equipped with



Learning units	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	<ul style="list-style-type: none"> <li>Align screw holes of fan body and plate accordingly.</li> <li>Press the plate on the fan body and fasten the screws</li> </ul>	<ul style="list-style-type: none"> <li>Understanding of fan alignment requirements.</li> </ul>	<b>Theory:</b> 5 Hours  <b>Practical:</b> 20 Hours	<ul style="list-style-type: none"> <li>Hanger</li> <li>Cotter pin</li> </ul>	teaching aids (multimedia and flip charts)  <b>Practical</b> Laboratory OR Workshop, Industrial visits
<b>LU6:</b>  Perform fan motor testing	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Mount the fan motor onto the hanger.</li> <li>Connect to the power supply</li> <li>Inspect Eccentricity, Noise and Short Circuit/ Continuity.</li> <li>Inspect motor Direction</li> <li>Inspect volt, ampere, watts and Power Factor.</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge about fan motor construction.</li> <li>Knowledge about supply wire attachments in their respective slots.</li> <li>Knowledge and understanding of functional testing.</li> <li>Understanding of ensuring quality testing parameters (eccentricity, noise, short circuit/ continuity, vibration, direction of rotation, volt, ampere, watts, etc.)</li> <li>Knowledge of using different motor testing equipment.</li> </ul>	<b>Total</b> 25 Hours  <b>Theory:</b> 5 Hours  <b>Practical:</b> 20 Hours	<ul style="list-style-type: none"> <li>Fan motor</li> <li>Watt meter</li> <li>Volt meter</li> <li>Ampere meter</li> <li>Frequency meter</li> <li>Tachometer</li> <li>Sound level meter</li> <li>LCR meter</li> <li>power factor meter</li> </ul>	<b>Theory</b> Classroom equipped with teaching aids (multimedia and flip charts)  <b>Practical</b> Laboratory OR Workshop, Industrial visits
<b>LU7:</b>  Install Fan blade	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Place jane between plate and blades</li> <li>Mount the blades with screws and spring</li> </ul>	<ul style="list-style-type: none"> <li>Understanding of installation of blades with fan motor</li> </ul>	<b>Total</b> 10 Hours  <b>Theory:</b>	<ul style="list-style-type: none"> <li>Fan_blades</li> <li>Pneumatic screw driver along with compressor</li> <li>Fan motor</li> <li>Screws</li> </ul>	<b>Theory</b> Classroom equipped with teaching aids (multimedia and

Learning units	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	washers.		2 Hours <b>Practical:</b> 8 Hours	<ul style="list-style-type: none"> <li>Jane</li> <li>Spring washers</li> </ul>	flip charts) <b>Practical</b> Laboratory OR Workshop, Industrial visits
<b>LU8:</b> Test Fan with Blades	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Mount the fan for testing</li> <li>Make connections and supply power to the fan</li> <li>Check speed with tachometer</li> <li>Check ampere, volt, and watt</li> <li>Check balancing and air flow of blades</li> </ul>	<ul style="list-style-type: none"> <li>Understanding of fan mounting methods</li> <li>Knowledge and understanding of final lot testing</li> <li>Understanding of blade weighing balance and angle.</li> <li>Understanding of ensuring quality testing parameters (Eccentricity, Noise, Short Circuit/ Continuity, vibration, Direction of rotation, volt, ampere, watts, power factor, speed, air delivery, etc.)</li> </ul>	<b>Total</b> 25 Hours <b>Theory:</b> 5 Hours <b>Practical:</b> 20 Hours	<ul style="list-style-type: none"> <li>Assembled Fan</li> <li>Watt meter</li> <li>Volt meter</li> <li>Ampere meter</li> <li>Frequency meter</li> <li>Tachometer</li> <li>Sound level meter</li> <li>Annometer</li> <li>Power factor meter</li> <li>LCR meter</li> </ul>	<b>Theory</b> Classroom equipped with teaching aids (multimedia and flip charts) <b>Practical</b> 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 III (Assembler)**

This curriculum consists of 05 modules:

- Apply Work Health and Safety Practices (WHS)
- Identify and Implement Workplace Policy and Procedures
- Communicate at Workplace
- Perform Computer Application Skills
- Manage Personal Finances
- Perform parts assembling

### **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)
<b>General Tools and Equipment</b>			
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 Ć	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 <sub>2</sub> Fire/DRV Powder/Foam Extinguisher	5
33.	Magnifying glass	40-100mm	10
34.	Thermocouple	0-75 °C	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
<b>Electric Tools and Equipment</b>			
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	40.300°C	5
22.	Insulation tester	50-1000 V	5
23.	Die electric tester	110-230 V $\tilde{~}$	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
<b>Foundry Shop Tools</b>			
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		
<b>Machines</b>			
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 C	2
8.	Curing Oven(Powder Coating)		2
9.	Drying oven(vernishing process)		2
10.	Air compressor with filter unit	1-7.5 bar	2
11.	Core baking ovens(Sand casting)	0-700 F°	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.	Spot Welding machine	3.5 KVA – 15 KVA	1
18.	• Jigs and fixtures for spot welding machine		
19.	Riveting press	35 – 140 KG / cm <sup>2</sup>	1
20.	• Jigs and fixtures for riveting press		
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 <sup>2</sup>	2
26.	Hydraulic press	30 MPa	2
27.	• Different types of jigs and fixtures for hydraulic press machine		
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 <sup>2</sup>	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:

<b>Competency Standard</b>	<b>Estimate of hours</b>	<b>Credit</b>
Apply Work Health and Safety Practices (WHS)	30	3
Identify and Implement Workplace Policy and Procedures	20	2
Communicate at Workplace	30	3
Perform Computer Application Skills	40	4
Manage Personal Finances	30	3
Perform parts assembling	160	16

