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ARTIFICIAL INTELLIGENCE DATA TECHNICIAN

LEARNER GUIDE

National Vocational Certificate Level 3

Version 1 - November, 2019

NAVTTC

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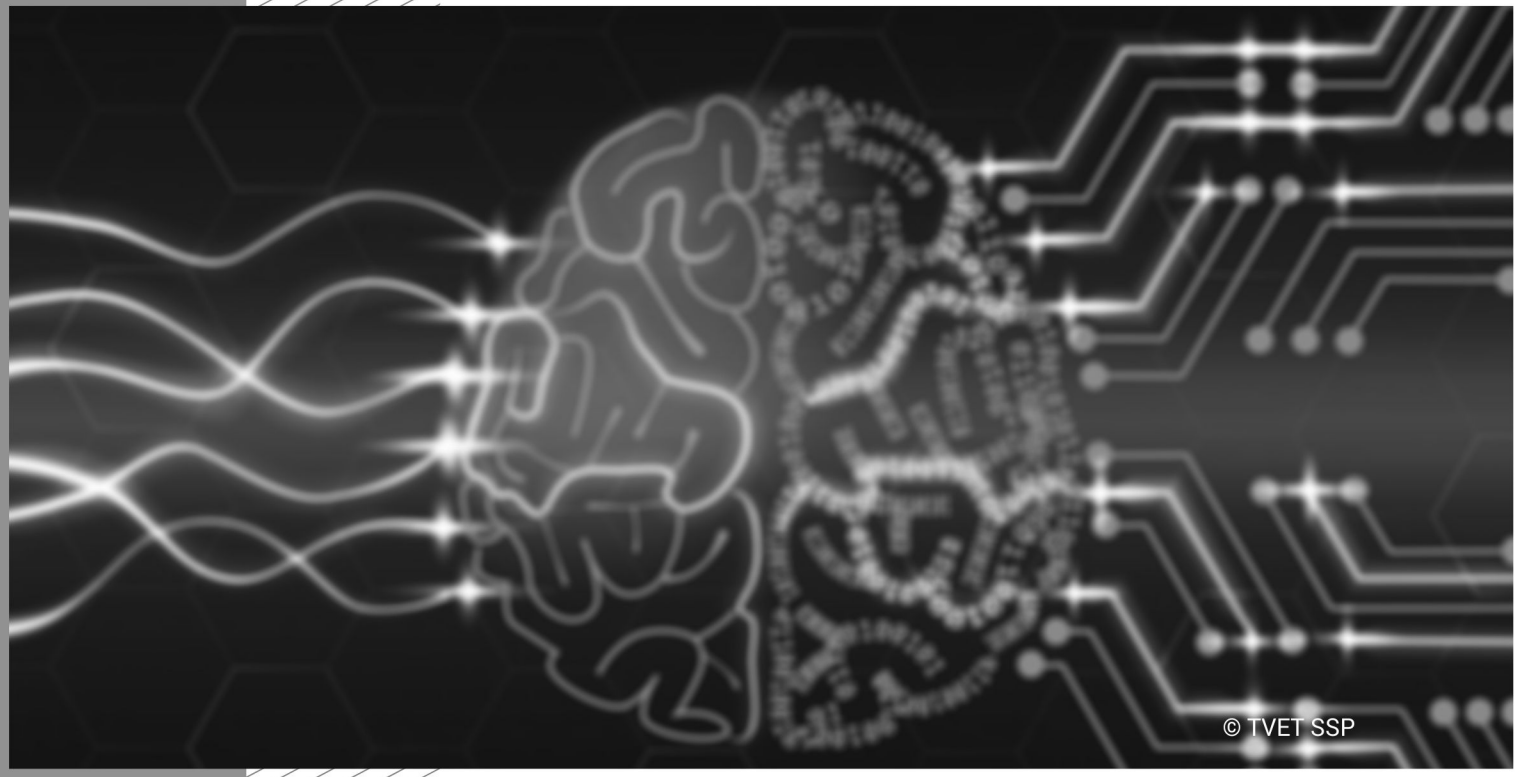

LEARNER GUIDE

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Introduction

Welcome to your Learner's Guide for the Artificial Intelligence Data Technician programme. It will help you to complete the programme and to go on to complete further study or go straight into employment.

The Artificial Intelligence Data Technician programme is to engage young people with a programme of development that will provide them with the knowledge, skills and understanding to start this career in Pakistan. The programme has been developed to address specific issues, such as the national, regional and local cultures, the manpower availability within the country, and meeting and exceeding the needs and expectations of their customers.

The main elements of your learner's guide are:

- **Introduction:**
  - This includes a brief description of your guide and guidelines for you to use it effectively
- **Modules:**
  - The modules form the sections in your learner's guide
- **Learning Units:**
  - Learning Units are the main sections within each module
- **Learning outcomes**:
  - Learning outcomes of each learning units are taken from the curriculum document
- **Learning Elements:**
  - This is the main content of your learner's guide with detail of the knowledge and skills (practical activities, projects, assignments, practices etc.) you will require to achieve learning outcomes stated in the curriculum
  - This section will include examples, photographs and illustrations relating to each learning outcome
- **Summary of modules**:
  - This contains the summary of the modules that make up your learner's guide
- **Frequently asked questions**:
  - These have been added to provide further explanation and clarity on some of the difficult concepts and areas. This further helps you in preparing for your assessment.
- **Multiple choice questions for self-test**:
  - These are provided as an exercise at the end of your learner's guide to help you in preparing for your assessment.

Module: 061900928 Code in Programming Language suitable for AI

This module will give the candidate, skills that will be used for the programming purposes in the applied Languages in the field of AI.

Duration 200 hours **Theory:** 50 hours **Practical:** 150 hours

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU1: Perform Python Installation	**You will be able to** 1. Navigate to python website to Downloads 2. Choose an appropriate Python version 3. Check system requirements 4. Download the chosen Python setup files 5. Double click on the downloaded setup files 6. Enter admin username-password to authorize installation 7. Choose appropriate install options 8. Click install Click add python to PATH	• Demonstrate basic browser use and navigation • Understand the concept of given software version requirements based on system specification. Demonstrate installing software from source Practical-1 Given a clean system, download and install the appropriate python version and run the python terminal to confirm successful installation	• Computer system with support for python • Internet facility • Terminal/cmd application Text/Code editing application

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
	environment variable		
LU2: Create and Execute a Program	**You will be able to** 1. Open a text document 2. Code a python program 3. Save the text file as .py file 4. Open terminal/cmd application 5. Navigate to directory containing python program Run the program with python	• Demonstrate basic file operations • Have introductory knowledge of python Demonstrate basic python operation: Keywords, identifiers, statements, comments, variables, data types, operations and namespaces. Practical-1 Write a "Hello World" program in a text file, save it as a .py file and execute that .py file in python terminal. Practical-2 Write python program to perform given mathematical operations and print the results over terminal.	
LU3: Control Flow of Program	**You will be able to** 1. Code an "if" statement 2. Code an "elif" statement 3. Code an "else" statement 4. Code a "while" loop 5. Code a "for" loop	• Demonstrate conditional statements • Demonstrate controlled loops. Demonstrate program execution sequence Practical-1 Code python programs according to given tasks incorporating Inline comparisons, single	

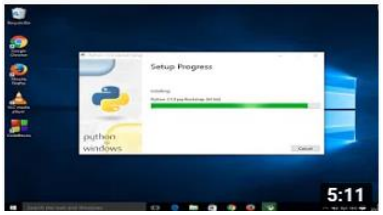
Learning Unit	Learning Outcomes	Learning Elements	Materials Required
	6. Write a “switch” statement 7. Use “continue” & “break” statements in loops	conditions, compound conditions, string comparisons and nested conditions. Practical-2 Code python programs according to given tasks incorporating counter loops, conditional loops, nested loops and loop combinations.	
		Practical-3 Code python programs according to given tasks incorporating both conditional statements and loops..	
LU4: Write Modular Programs	**You will be able to** 1. Write a “def” statement to define a function 2. Write a “class” statement to create a class with multiple functions and data elements	• Understand and demonstrate the concept of functions. Demonstrate how class objects work in python. Practical-1 Write python program(s) to perform given mathematical operations using functions and print the results over terminal.	
		Practical-2 Code a class object from scratch incorporating certain functions to be reused in a separate program according to given task specifications.	
LU5: Handle Errors	**You will be able to**	1) Demonstrate different types of exceptions	

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
and Exceptions	1. Define a “try” block 2. Apply some error prone code in try block 3. Handle the possible exceptions using “except” block 4. Apply “finally” block to statements that will always run	Practical-1 Write a program to identify and handle following exceptions: 1. NULL exceptions 2. Overflow exceptions 3. Underflow exceptions 4. TypeError 5. ZeroDivisionError Also perform object disposal / resource de-allocation using “finally” block	
LU6: Perform File Handling	**You will be able to** 1. Open a python script file 2. Open a file with “r” flag in read mode using “open” statement 3. Read the file line by line or all at once into a python variable Open a file with “w” flag in write mode	Understand the concept of read and write operations and permissions Practical-1 Open a file as “read only” and display its contents over terminal both line-by-line and as whole. Practical-2 Open a file with write permissions, alter that file and show its contents over the terminal	

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU7: Use Package Manager	**You will be able to** 1. Select an appropriate package to install 2. Open terminal/cmd application 3. Use “pip install <package name>” command to install the package 4. Uninstall a package with “pip uninstall <package name>” command	Demonstrate the use of package manager Practical-1 Install “numpy” and “beautifulsoupX” using pip install manager and import these package in a python file to validate installation. Afterwards uninstall these packages using “pip uninstall <package name>” command.	

Examples and illustrations

Videos

	How to Download and Install Python 3.6 on Windows 10 URL https://www.youtube.com/results?search_query=perform+python+installation
	Python Tutorial For Beginners (Complete Course) URL https://www.youtube.com/watch?v=IMGzzK9Wn4w
	control flow of program in python URL https://www.youtube.com/results?search_query=control+flow+of+program+in+python

Example and Illustrations

Relevant topics and web links

S.No	Links and definitions
1	Python For Beginners https://www.python.org/about/gettingstarted/

Module: 061900929 Setup Environment

After this competency standard the candidate will be able to setup environment in order to work on the programming and a variety of applications of the software's/hardware's

Duration 50 hours **Theory:** 10 hours **Practical:** 40 hours

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU1: Initialize application program interface	**You will be able to** 1. Open terminal/cmd 2. Change directories 3. Rename files 4. Move files from one directory to another 5. Copy files from one directory to another 6. Select/delete only particular types of files 7. Open a file 8. Open an application 9. Zip and unzip files/folders 10. Download files from a source (network location) Connect to a server using ssh	• Introduction to terminals/CMD • Demonstrate execution of commands. Demonstrate of files and compressed files Practical-1 • Changes, Rename, Move, Copy and Delete files as per instruction. • Download and install given version of python and connect to server. • Given list of commands, enter those to install python on operating system. .	• Computer system with python and pip installed • Stable internet connection • Terminal/cmd application • Text/Code editing application Virtual environment package

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU2: Create and manage specific working environment	**You will be able to** 1. Install virtual environment with pip 2. Create a virtual environment 3. Activate a virtual environment 4. Deactivate a virtual environment 5. Check if the environment is active for a python/pip version 6. Install packages in virtual environment 7. Run scripts in virtual environment	• Demonstrate basic of virtual environment. Demonstrate compatibility between different version of pip and Python. Practical-1 • Follow given steps to install virtual environment in python using pip package manager. • Perform a task by writing and executing python script in virtual environment	
LU3: Install Packages with Pip	**You will be able to** 1. Select an appropriate package to install 2. Open terminal/cmd 3. Activate a virtual environment	Demonstrate the use of package manager Practical-1 Install “numpy” and “beautifulsoupX” using pip install manager and import these package in a python file to validate installation.	

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
	if required 4. Use “pip install <package name>” command to install the package 5. Import package in a python environment **1.** Uninstall a package with “pip uninstall <package name>” command	Afterwards uninstall these packages using “pip uninstall <package name>” command.	

Module Summary:

Module Title and Aim	Learning Units	Duration
Module 16: Apply Work Health and Safety Practices (WHS) **Aim:** This module aims to develop the knowledge, skills and understanding needed to 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 **LU5:** Perform data plotting	
Module 17: Identify and Implement Workplace Policy and Procedures **Aim:** This module aims to develop the knowledge, skills and understanding needed to 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	
Module 18: Manage Personal Finances **Aim:** This module aims to develop the	**LU1**: Develop a personal budget **LU2**: Develop long term personal budget **LU3**: Identify ways to maximize future finances	

Module Title and Aim	Learning Units	Duration
knowledge, skills and understanding needed to Manage Personal Finances		
Module 19: Code in Programming Language suitable for AI **Aim:** This module aims to develop the knowledge, skills and understanding needed to Code in Programming Language suitable for AI	**LU1:** Perform Python Installation **LU2:** Create and Execute a Program **LU3:** Control Flow of Program **LU4:** Write Modular Programs **LU5:** Handle Errors and Exceptions **LU6:** Perform File Handling L**U7:** Use Package Manager	200 hrs
Module 20: Setup Environment **Aim:** This module aims to develop the knowledge, skills and understanding needed to Setup Environment	**LU1:** Initialize application program interface **LU2:** Create and manage specific working environment **LU3:** Install Packages with Pip	50 hrs
Module 21: Perform Computer Application Skills **Aim:** This module aims to develop the knowledge, skills and understanding needed to 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	

Module summary

Frequently Asked Questions

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared "Competent" in the summative assessment to attain the certificate.
3. What are the entry requirements for this course?	The entry requirement for this course is 8th Grade or equivalent.
4. How can I progress in my educational career after attaining this certificate?	You shall be eligible to take admission in the National Vocational Certificate Level-3 in Artificial Intelligence Data Technician). You shall be able to progress further to National Vocational Certificate Level-4 in Artificial Intelligence Data Technician (Supervisor); and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).
5. If I have the experience and skills mentioned in the competency standards, do I still need to attend the course to attain this certificate?	You can opt to take part in the Recognition of Prior Learning (RPL) program by contacting the relevant training institute and getting assessed by providing the required evidences.

6. What is the entry requirement for Recognition of Prior Learning program (RPL)?	There is no general entry requirement. The institute shall assess you, identify your competence gaps and offer you courses to cover the gaps; after which you can take up the final assessment.
7. Is there any age restriction for entry in this course or Recognition of Prior Learning program (RPL)?	There are no age restrictions to enter this course or take up the Recognition of Prior Learning program
8. What is the duration of this course?	The duration of the course work is 3220 hours
9. What are the class timings?	The classes are normally offered 25 days a month from 08:00am to 01:30pm. These may vary according to the practices of certain institutes.
10. What is equivalence of this certificate with other qualifications?	As per the national vocational qualification's framework, the level-4 certificate is equivalent to Matriculation. The criteria for equivalence and equivalence certificate can be obtained from The Inter Board Committee of Chairmen (IBCC).
11. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website.
12. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	You shall be able to take up jobs in the artificial intelligence data technician industry which comprises of development of applications for play store as well as testing and optimization of the apps.
13. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels.

14. Is this certificate recognized by any competent authority in Pakistan?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body.
15. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards.
16. How much salary can I get on job after attaining this certificate?	The minimum wages announced by the Government of Pakistan in 2019 are PKR 17,500. This may vary in subsequent years and different regions of the country. Progressive employers may pay more than the mentioned amount.
17. Are there any alternative certificates which I can take up?	There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field.
18. What is the teaching language of this course?	The leaching language of this course is Urdu and English.
19. Is it possible to switch to other certificate programs during the course?	There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field.
20. What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
21. Does this certificate enable me to work as freelancer?	You can start your small business/ software house related to artificial intelligence data technician and you can work as freelancer as well after the completion of the course. You may need additional skills on entrepreneurship to support your initiative.

Test Yourself (Multiple Choice Questions)

MODULE	**Code in Programming Language suitable for AI**	
Question **1**	If Ali has to write a function to choose from a given set of options. Which of the following statements should he use?	A "If" statement B "Switch" statement C "While" statement D "For" statement
Question **2**	You have to display a sequence of numbers. Which statement should you use?	A "If" statement B "Switch" statement C "While" statement D "For" statement

Question 3 Which of the following is a conditional loop statement?

A "If" statement

B "Switch" statement

C "While" statement

D "For" statement

Question 4 You are tasked with creating a function which keeps on printing a given integer until one of two conditions are met. Which comparative statement should be used?

A and

B or

C not

D >=

Question	**5**	A number 5.6 is changed into an integer with a command toint(). What value would you get?	A 6 B 5 C 4 D 3

MODULE	**Setup Environment**

Question	**6**	How do we install packages in python	A Pip. B Numpy. C Pandas. D Clc.

Question 7 Why do we use virtual environments

A Installing packages in the environment.

B Installing that environment.

C Initializing all the variables.

D Switching to that virtual environment.

Question 8 What does activating an environment mean?

A An operator

B Used to rename object

C A reference is an alias for an object

D None of these

Question 9 Which library is used for dealing with arrays?

A Beauitifulsoup.

B Pandas.

C Numpy.

D Anaconda.

Question 10 What does ssh do?

A Allows you to run a python 2 app in python 3.

B Speed up downloading of files.

C Access a computer over the internet remotely.

D Allocate more ram for the application.

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