Curriculum

OF

Artificial Intelligence
(Level- 2)

National Vocational and Technical Training Commission

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Review by

Data of Approval from NCRC

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Generics

1) Maintain Health and Safety

2) Perform safety practices at work place

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INTRODUCTION

Since the invention of computers and machines, their capability to perform various tasks went on growing exponentially. Humans have developed the power of computer systems in terms of their diverse working domains, their increasing speed, and reducing size with respect to time. A branch of Computer Science named Artificial Intelligence (AI) pursues creating the computers or machines as intelligent as human beings.

Artificial Intelligence is a method of making a computer, a computer-controlled robot, or a software think intelligently like the human mind. AI is accomplished by studying the patterns of the human brain and by analyzing the cognitive process. The outcome of these studies develops intelligent software and systems.

John McCarthy defines artificial intelligence as, it is "The science and engineering of making intelligent machines, especially intelligent computer programs". Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans thinks. AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

Artificial intelligence has become a powerful driving force in a wide range of industries, helping people and businesses create exciting, innovative products and services, enable more informed business decisions, and achieve key performance objectives.

The measurable objectives of this document are to develop Competency Standards (CS) in the area of AI. These CS are designed as a comprehensive training program to the study of AI for both male and female trainees at Diploma /DAE (Level-5). This training program covers basics of the subjects like introduction to AI, its principles & constituents, and its applications in a wide range of organizations etc.; entrepreneurship skills; the economic and managerial aspects of Artificial Intelligence, the historical and modern insights into the IT industry; the marketing, organizational and technological issues involved. It involves the management of multiple activities such as studying the computer intelligence, machines and relevant software. It also involves marketing efforts to attract the intelligence sharing in both entrepreneurial and industrial sectors. AI has a wide range of applications in today's society, its salient feature is that it can solve complex problems with an effective manner in a number of industrial sectors. Fig. 1 shows some of the industrial sectors where AI can be applied.

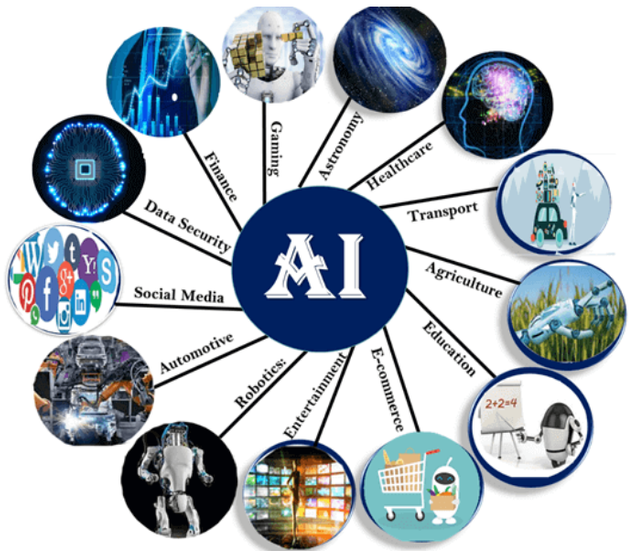


Figure. 1 Some Applications of Artificial Intelligence

For example, in order to start learning the AI concept for E-commerce, Finance, one need to understand the fundamentals of quantitative analysis which includes data processing, portfolio management, trading signal generation, high-frequency trading, etc. For the algorithm development of AI based applications, a language called Python is highly recommended for the code development.

PURPOSE OF THE TRAINING PROGRAM

The purpose of this qualification is to give understanding of artificial intelligence in IT sector according to the high-tech industrial trends. Artificial intelligence is a transformative technology, generally refers to the ability of digital computing devices that can imitate a wide variety of human tasks with high intellectual accuracy. Trainees will be able to be introduced with the historically significant AI systems and their underlying AI concepts. They will explore different classical and modern AI techniques, and understand the three essential ingredients that drive modern AI – machine learning, data science, big-data and algorithms using modern scientific AI techniques. Trainees will also examine the ethical and social aspects of AI technologies as well as the exciting future trends such as:

- Explain the core elements and the historical development of artificial intelligence in modern era
- Give an account of essential artificial intelligence trends
- Demonstrate an understanding of different ways to maintain artificial intelligence sharing
- Understand how products are marketed both historically and currently
- Discuss central challenges in artificial intelligence field today, such as that of the impacts of sharing ideas/intelligence images and corporate social responsibility practices for implementation
- Core challenges in artificial intelligence field today, such as the human, economic and environmental both at national and international levels.

OVERALL OBJECTIVES OF TRAINING PROGRAM

The objective of the course is to present component about the concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation. Develop a basic understanding of the building blocks of AI for data science and robotics with python. Students will implement an AI with different project in industrial perspective

In particular, this course will teach you about:

- Fundamentals of python programming for artificial intelligence
- Mathematics for artificial intelligence

- Introduction to artificial intelligence with robotics- mechanism, electronics, control boards, 3d modelling, object recognition with robotic arm structure, IoT based home automation

COMPETENCIES TO BE GAINED AFTER COMPLETION OF COURSE

Competency covers during this course are the following e concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation. Develop a basic understanding of the building blocks of AI for data science and robotics with python. Students will implement an AI with different project in industrial perspective. Students will able to gain the following competencies.

- Fundamentals and advanced python programming for artificial intelligence
- Mathematics for artificial intelligence
- Introduction to artificial intelligence with robotics- mechanism, electronics, control boards, 3D modelling, object recognition with robotic arm structure, IoT based home automation
- Introduction to artificial intelligence with data science- database system, data preprocessing, data handling, data exploration, forecasting for stock market and text analytics
- Machine learning- fundamentals of artificial intelligence, supervised, unsupervised and deep learning, feed forward, back propagation, k means and convolutional neural network
- Artificial intelligence project develop object detection system, character recognition system, fraud detection system, forecasting for stock market Chat bot, and self-driving vehicle

JOB OPPORTUNITIES AVAILABLE IMMEDIATELY AND LATER IN THE FUTURE

After completing **LEVEL 5** students will be able to get the following jobs:

- AI lab Assistant

- Robotic lab Assistant
- Assistant Database Administrator
- Artificial Intelligence Supervisor
- Expert Python Developer
- Assistant Data Analyst
- Expert Freelancer
- Assistant Data Scientist
- Associate Robot programmer
- Robot programming supervisor

After completing **LEVEL 4** students will be able to get the following jobs

- Assistant Lab Instructor AI
- Assistant Lab Instructor Robotics
- Junior AI Developer
- Intermediate Freelancer
- Intermediate Level Python Developer
- Junior Database Developer
- Robotics technician
- Robotics programming assistant

After completing **LEVEL 3** students will be able to get the following jobs

- Data Manipulator
- Entry Level Python Developer
- Robotic System operator
- Entry level robot programmer

TRAINEE ENTRY LEVEL

An interested individual with Matric science or equivalent, preferably F.Sc or equivalent, with comfort level of English language and mathematics. Satisfactory completion of

Appropriate admission assessment test may also be applicable.

MINIMUM QUALIFICATION OF TRAINER

Teaching staff should have B.CS (4 yrs)/B.SC Engineering (C.S)/ Software Engineering /DAE (AI Technology)/ Bachelor's degree (B Tech)/AI Technologist / professional experience in AI based industrial projects with at least 2-5 years working experience in relevant field.

RECOMMENDED TRAINER: TRAINEE RATIO

The recommended trainer and trainee ratio is 1:24 per class

MEDIUM OF INSTRUCTION

Instructions must be in Urdu, English or Local Language. Most of the language, code and terminology will be in English. As a result, trainees must be able to read and write in English in order to successfully complete the course.

DURATION OF COURSE (TOTAL TIME, THEORY AND PRACTICAL)

OVERVIEW OF THE CURRICULUM

This curriculum is for the course of Artificial intelligence comprises of 45 (forty-five) modules. The recommended delivery time is 600 hours for the entire course. Delivery of the course could therefore be full time, 5 days a week, for 3 Years or equivalent according to levels. Trainers are at liberty to develop other models of delivery, including part-time and/ or evening delivery. The full structure of the course is as follow

MODULE TITLE	LEARNING UNITS	THEORY DAYS/HOURS	WORKPLACE DAYS/HOURS	TIMEFRAME OF MODULES
Module 1: **0619I&CT-15 Apply Mathematics-I (Calculus and Analytical Geometry)**	**LU-1.** Identify Mathematical Model **LU-2.** Identify Limits **LU-3.** Identify the Differentiation **LU-4.** Identify the Integral calculus **LU-5.** Identify Analytical Geometry	**16 Hours**	**72 Hours**	**88 Hours**
Module 2: **0619I&CT-16 Apply Structured Computer Programming**	**LU-1.** Setup Python on Windows **LU-2.** Develop a computer program (simple) **LU-3.** Execute Python Syntax **LU-4.** String Handling in python **LU-5.** Develop a program based on control structures IF statement **LU-6.** Develop a program based on control structures ELIF statement **LU-7.** Develop a program based on control structures IF_ELSE statement **LU-8.** Develop program using List **LU-9.** Develop a program using Tuples **LU-10.** Develop a program using Sets **LU-11.** Develop a program using dictionary	**49 Hours**	**120 Hours**	**169 Hours**

MODULE TITLE	LEARNING UNITS	THEORY DAYS/HOURS	WORKPLACE DAYS/HOURS	TIMEFRAME OF MODULES
	LU-12. Develop program using WHILE loop structure **LU-13.**Develop program using FOR loop **LU-14.**Develop program using functions			
Module 3: **0619I&CT-17Demonstrate Data Science Fundamentals and Methodology**	**LU-1.** Identify basic Data Science operation **LU-2.** Identify the tools for data science **LU-3.** Identify Applications and areas of Data science **LU-4.** Classify Characteristics of Data Science **LU-5.** Identify Challenges of Data Science **LU-6.** Identify Domains of Data Science **LU-7.** Process flow of Data Science	**21 Hours**	**102 Hours**	**123 Hours**
Module 4: **0619I&CT-18 Utilize Libraries in Python**	**LU-1.** Explore NumPy library **LU-2.** Explore Pandas libraries **LU-3.** Explore Matplotlib library **LU-4.** Explore Keras Library	**10 Hours**	**72 Hours**	**82 Hours**
Module 5: **0619I&CT-20 Demonstrate Artificial Intelligence Fundamentals and Methodology**	**LU-1.** Identify the Foundation of AI **LU-2.** Identify the Approaches of AI **LU-3.** Identify Tools for AI **LU-4.** Identify the Deduction, Reasoning and problem Solving in AI **LU-5.** Identify the AI Goals **LU-6.** Identify the Artificial Intelligence Areas **LU-7.** Identify the Real-World Applications of AI	**21 Hours**	**105 Hours**	**126 Hours**

MODULE TITLE	LEARNING UNITS	THEORY DAYS/HOURS	WORKPLACE DAYS/HOURS	TIMEFRAME OF MODULES
GENERIC =12	Total Hours of Course	120	480	= 600

DETAIL OF CURRICULUM

Module 1: 0619I&CT-15 Demonstrate Mathematics-I (Calculus and Analytical Geometry)

Objective: This module covers the skills and knowledge required to perform Limits, Differential, Integral and Analytic Geometry for artificial intelligence

Duration: 88 Hours **Theory: 16 Hours** **Practical: 72 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1. Identify Mathematical Model	▪ Determine function ▪ Identify function ▪ Identity types of function ▪ Identify the variable in function	Knowledge & Understanding of the concept function , types of function and variable in function **PRACTICAL ACTIVITY** **Given f(x) = $x^2 - 2x + 8$ and g(x) =**	Theory – 3.2 Hrs. Practical – 15 Hrs. Total – 18.2 Hrs	pen , paper and calculator	Classroom or Workshop

		$\sqrt{x+6}$ **evaluate each of the following.** **(i) f(-3), (ii) g(-10)**			
LU-2. Identify Limits	▪ Learn and apply limits and continuity ▪ Calculate limits ▪ Identify the techniques of finding limits ▪ Identify indeterminate forms of limits ▪ Identify the concepts continuous and discontinuous functions and their applications	Knowledge & Understanding the concept of limits and continuity Understand the techniques of finding limits Understand indeterminate forms of limits Understand the concepts continuous and discontinuous functions and their applications **PRACTICAL ACTIVITY** **Evaluate** $\lim_{x\to 3}(5x^2-7x+9)$	Theory – 3.2 Hrs. Practical – 15 Hrs. Total – 18.2 Hrs	pen , paper and calculator	Classroom or Workshop
LU-3. Identify the Differentiation	▪ Identify the concepts of differentiation ▪ Identify and apply geometrical and physical meaning of derivatives ▪ Identify rules of	understand the concepts of differentiation understand and apply geometrical and physical meaning of derivatives understand rules of differentiation, techniques of differentiation	Theory – 3.2 Hrs. Practical – 15 Hrs. Total – 18.2 Hrs	pen , paper and calculator	Classroom or Workshop

	differentiation, techniques of differentiation ▪ Identify and calculate differentiation, rates of change ▪ Identify and calculate tangents and normal lines ▪ Identify and apply chain rule ▪ Identify and calculate differentiation ▪ Identify and calculate linear approximation ▪ Identify and apply applications of differentiation: extreme value functions, mean value theorems, maxima and minima of a function for single-variable, concavity	understand and calculate tangents and normal lines understand and apply chain rule understand and calculate differentiation understand and calculate linear approximation understand and apply applications of differentiation: extreme value functions, mean value theorems, maxima and minima of a function for single-variable, concavity **PRACTICAL ACTIVITY** **Find the equation of the tangent line to the graph of** $f(x)=\sqrt{x^2+3}$ **at the point (−1,2).**			
LU-4. Identify the Integral calculus	▪ Identify the basic concepts of Integration ▪ Identify and calculate Indefinite Integrals	Understand the basic concepts of Integration and Apply techniques of integration Understand and calculate Riemann sums	Theory – 3.2 Hrs. Practical – 15 Hrs. Total – 18.2 Hrs	pen , paper and calculator	Classroom or Workshop

	▪ Identify the techniques of integration ▪ Identify and calculate Riemann sums and Definite Integrals ▪ Identify and calculate Applications of definite integrals ▪ Identify and calculate Improper integral ▪ Identify and apply Integration ▪ Identify Area under the curve	and Understand and apply definite integrals , Improper integral and Area under the curve **PRACTICAL ACTIVITY** **Evaluate the integral** $\int x \cos x^2 dx$			
LU-5. Identify Analytical Geometry	▪ Identify and understand the Straight lines in three dimensions ▪ Identify and understand the equations for planes	Knowledge & Understanding understand the Straight lines in three dimensions understand the equations for planes **PRACTICAL ACTIVITY** **Find the equation of the tangent line to the graph of** $f(x) = \sqrt{x^2 + 3}$ **at the**	Theory – 3.2 Hrs. Practical – 12 Hrs. Total – 15.2 Hrs.	pen , paper and calculator	Classroom or Workshop

		point (−1,2).			

Objective: This module covers the skills and knowledge required to perform python programming, its operator and variables with looping, different types of list, conditional statements, and functions.

Duration: 169 Hours **Theory: 49 Hours** **Practical: 120 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1. Setup Python on Windows	▪ Download python installer ▪ Run the Installer ▪ Complete the installation process as per instruction ▪ Download python IDLE ▪ Complete the installation process as per instruction ▪ Identify interpreter vs. script mode	▪ What is python ▪ Why Python and what python can do? ▪ Python Syntax compared to other programming languages ▪ Key Difference in python 2 and 3 version ▪ Understand environment variable during python installation. ▪ Difference between python shell and IDLE? ▪ Compiler vs. Interpreter ▪ IDEs and Code Editors for python ▪ How to choose the IDEs for Python. **PRACTICAL ACTIVITY** ▪ Install python and setup the environment variable ▪ (if needed)	Theory – 3.5 Hrs. Practical – 12 Hrs. Total – 15.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

LU-2. Develop a computer program (simple)	▪ Analyze a given problem ▪ Open the idle for coding ▪ Code a simple program ▪ Save a program file with .py extension ▪ Compile a code ▪ Debug the code (in case of error) ▪ Run a code	▪ Python IDE and command line environment understanding ▪ Python basic syntax structure ▪ Python indentation **PRACTICAL ACTIVITY** **Write your name using print () function**	Theory – 3.5 Hrs. Practical – 12 Hrs. Total – 15.5 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU-3. Execute Python Syntax	▪ Identify python variables ▪ Identify the python keywords ▪ Identify the python data types ▪ Identify the numeric types in python ▪ Specify a python variable type ▪ Identify the indentations and whitespace ▪ Implement python Boolean ▪ Implement python operators	▪ Understand python variables ▪ Understand the python keywords ▪ Understand the python data types ▪ Understand the numeric types in python ▪ Understand a python variable type ▪ Understand the indentations and whitespace ▪ Understand python Boolean ▪ Understand python operators **PRACTICAL ACTIVITY** **Assign two variables a and b with values 5 and 10 respectively. Add a and b operand and print the output**	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

LU-4. String Handling in python	▪ Identify the python strings ▪ Display the string with print function ▪ Assign string to a variable ▪ Assign multiline string to a variable ▪ Get character position of string as array ▪ Slicing the string ▪ Negative indexing on string ▪ Determine string length ▪ Use string methods ▪ Check the phrase and character in the string ▪ String concatenation ▪ Use format () method ▪ Implement escape character	▪ Understand the python strings ▪ Understand the syntax of string ▪ Understand different keywords/methods for strings ▪ Understand slicing of the string ▪ Understand Negative indexing on string ▪ Check the phrase and character in the string ▪ Understand String concatenation ▪ Understand Implementation of escape character **PRACTICAL ACTIVITY** **Assign variables s and t as "favo" and "rite" Concatenate the s and t and print the result**	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU-5. Develop a program based on control structures IF statement	▪ Identify the different logical conditions ▪ Identify the different logical operators ▪ Identify the short hand if and if else ▪ Initialize two variables, a and b ▪ Assign a value to variable ▪ Check if whether b is greater than a ▪ Print the statement if the condition is true	▪ Understand the IF logical conditions ▪ Understand the syntax of IF logical conditions ▪ Understand the different logical operators ▪ Understand the short hand if and if else ▪ Understand the usage of condition statement **PRACTICAL ACTIVITY** **Assign a number 56 to variable called score. Use IF**	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

		statement to check if the value of score is greater than 50. If value of score greater than 50 then print "You have passed the exams"			
LU-6. Develop a program based on control structures ELIF statement	▪ Initialize two variables, a and b ▪ Assign a value to variable ▪ Check if whether a is greater than b with if statement ▪ Check condition that if a is greater than b for ELIF statement ▪ Print the statement which is true.	▪ Understand the syntax of ELIF logical conditions ▪ Understand the ELIF logical conditions ▪ Understand the usage of ELIF condition statement **PRACTICAL ACTIVITY** ▪ **Assign a number 56 to variable called score** ▪ **Use ELIF statement, print "You have Failed but Keep Trying!" if variable score is greater than 40**.	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU-7. Develop a program based on control structures IF_ELSE statement	▪ Initialize two variables, a and b ▪ Assign a value to variable ▪ Check if a is greater than b with if statement ▪ If condition is not true print the statement under the else statement ▪ Implement nested if else statement ▪ Use a pass statement	▪ Understand the syntax of IF_ELSE logical conditions ▪ Understand the ELIF logical conditions ▪ Understand the usage of IF_ELSE condition statement ▪ Understand the use of pass statement ▪ Understand keywords/methods use during conditional statement	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

		▪ Understand the usage of IF_ELSE condition statement **PRACTICAL ACTIVITY** ▪ **Assign a number 56 to variable called score. If score is greater than 50 print " You Loss" else print " You Win" by using IF ELSE statement**			
LU-8. Develop program using List	▪ Declaration of list ▪ Access list elements ▪ Use of negative indexing ▪ Specify the range of indexes ▪ Change the value of specific item in a list ▪ Determine the list length ▪ Apply different list methods	▪ Understand the properties of list ▪ Understand the syntax of list ▪ Understand the Declaration of list ▪ Understand how to Access and modify elements in lists ▪ Understand use of indexing and range in list. ▪ Understand the methods, keywords & constructor use in lists. ▪ Understand the usage of list **PRACTICAL ACTIVITY** ▪ **Declare the list name "FruitBasket" containing items apple, banana and cherry and Print the second item of the list.**	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

LU-9. Develop a program using Tuples	▪ Declaration of Tuples ▪ Access tuples elements ▪ Use of negative indexing ▪ Specify the range of indexes ▪ Change the value of specific item in a tuple ▪ Apply different tuples methods and keywords ▪ Add item to tuple	▪ Understand the properties of tuples ▪ Understand the syntax of tuples ▪ Understand the Declaration of Tuples ▪ Understand how to Access elements in tuples ▪ Understand use of indexing and range in tuples ▪ Understand the methods, keywords & constructor use in tuples. ▪ Understand the usage of tuples **PRACTICAL ACTIVITY** **Declare the tuple name "FruitBasket" containing items apple, banana, cherry, kiwi, melon, and mango Print the last item of the tuple using negative indexing.**	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU-10. Develop a program using Sets	▪ Declaration of Set ▪ Access Set elements ▪ Use of negative indexing ▪ Specify the range of indexes ▪ Change the value of specific item in a Set ▪ Apply different Set methods and keywords	▪ Understand the properties of set ▪ Understand the syntax of set ▪ Understand the Declaration of set ▪ Understand how to Access elements in set ▪ Understand use of indexing and range in set ▪ Understand the methods, keywords & constructor use in set.	Theory – 3.5 Hrs. Practical – 9 Hrs. Total – 12.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

		▪ Understand the usage of sets **PRACTICAL ACTIVITY** **Declare the sets name "FruitBasket" containing items apple, banana, cherry, kiwi, melon, and mango. Loop through the set using For Loop and print the sets items.**			
LU-11. Develop a program using dictionary	▪ Create and print a dictionary ▪ Access dictionary elements ▪ Use of negative indexing ▪ Specify the range of indexes ▪ Change the value of specific item in a dictionary ▪ Apply different dictionary methods and keywords ▪ Create a nested dictionary.	▪ Understand the properties of dictionary ▪ Understand the syntax of dictionary ▪ Understand the Declaration of dictionary ▪ Understand how to Access elements in dictionary ▪ Understand use of indexing and range in dictionary ▪ Understand the methods, keywords & constructor use in dictionary. ▪ Understand the implementation of nested dictionary ▪ Understand the usage of dictionary **PRACTICAL ACTIVITY** **Declare the dictionary name "MyCar" containing items brand: Ford, model: Mustang and year: 1964 Print the value of the key named as model**	Theory –3.5 Hrs. Practical – 6 Hrs. Total – 9.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

LU-12. Develop program using WHILE loop structure	▪ Initialize a variable with value in it ▪ Declare While Keyword with count variable to condition till it execute ▪ Print the statement whenever condition is true. ▪ Increment the variable count until conditions get false ▪ Use Break statement ▪ Use the continue statement ▪ Use While loop with else statement	▪ Understand the properties of WHILE loop structure ▪ Understand the syntax of WHILE loop structure ▪ Understand the keywords and methods use in WHILE loops structure ▪ Understand the WHILE loop with conditional statement. ▪ Understand the limitation of WHILE loop ▪ Understand the usage of WHILE loop **PRACTICAL ACTIVITY** **Declare the list name "*FruitBasket*" containing items apple, banana and cherry. Initiate While loop taking list checking each item on list as variable x. and print the items in list.**	Theory –3.5 Hrs. Practical – 6 Hrs. Total – 9.5 Hrs..	Computer Python Python IDE	Classroom or Workshop
LU-13. Develop program using FOR loop	▪ Declare the List ▪ Print the items in a list ▪ Apply looping in a through a string ▪ Use break statement in a For loop ▪ Use the continue statement ▪ Use the range () function ▪ Use For loop with else statement	▪ Understand the properties of FOR loop structure ▪ Understand the syntax of FOR loop structure ▪ Understand the keywords and methods use in FOR loops structure ▪ Understand the FOR loop with conditional statement. ▪ Understand the limitation of FOR loop	Theory –3.5 Hrs. Practical – 6 Hrs. Total – 9.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

	▪ Apply nested loop ▪ Use Pass statement	▪ Understand the usage of FOR loop **PRACTICAL ACTIVITY** **Print square of 2 starting from 2 ending at 15 with the increment of 3 using range function in FOR Loop.**			
LU-14. Develop program using functions	▪ Create function ▪ Use of function call ▪ Identify the types of functions ▪ Passing values/list in a function ▪ Use the Return statement in function ▪ Use default parameter values ▪ Send keyword arguments ▪ Use of arbitrary arguments ▪ Use of the pass statement ▪ Implement recursion in a function ▪ Implement Lambda function	▪ Understand the concept of function and its properties and types ▪ Understand the syntax of function ▪ Understand how to create the function ▪ Understand how to call the functions ▪ Understand the scopes of variable in functions ▪ Understand the difference between arguments and parameters ▪ Understand the types of arguments can be pass through functions ▪ Understand the types of parameters can be pass through functions ▪ Understand the keywords/methods used in functions ▪ Understand to the pass Passing values/list in a function ▪ Understand the Return statement in function	Theory –3.5 Hrs. Practical – 6 Hrs. Total – 9.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

		▪ Understand the Implementation of recursion in a function ▪ Understand Implementation of Lambda function ▪ Understand the usage of functions **PRACTICAL ACTIVITY** **Create a function name as *"My_Funtion*:" with a parameter x. Returns 5 times x when call function with values 5,9 and 10**			

Module 3: 0619I&CT-17 Demonstrate Data science Fundamentals and Methodology

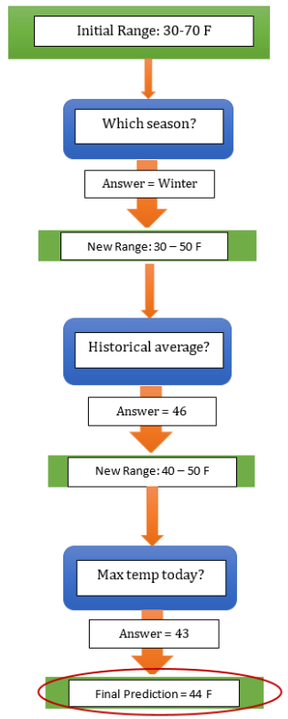
Objective: This module covers the knowledge and skills required to understand fundamentals and methodology, basic operations, tools, areas, characteristics , domain and process flow of data science.

Duration: 123 Hours **Theory: 21 Hours** **Practical: 102 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place

LU-1. Identify basic Data Science operation	▪ Apply Data Science in AI ▪ Identify the types of Data Scientist ▪ Identify what kind of problem can be solve in Data Science ▪ Identify Data Architecture ▪ Identify Data Analytics	▪ Understand Data Science in AI ▪ Understand the types of Data Scientist ▪ Understand what kind of problem can be solve in Data Science ▪ Understand the applications of AI ▪ Understand Data Architecture ▪ Understand Data Analytics **PRACTICAL ACTIVITY** **Draw Data Architecture Diagram**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU. 2 Identify the tools for data science	▪ Identify Data Wrangling ▪ Concept of Acquiring data from different Source ▪ Structured, Semi-Structured and Unstructured Data ▪ Identify the Common data formats of Data Science ▪ Identify the Use of Statistical analysis, and data visualization ▪ Identify the use of Excel sheet for data analysis	▪ Understand the concept of Data Wrangling ▪ Understand the concept of Acquiring data from different Source ▪ Understand the concept of Structured, Semi-Structured and Unstructured Data ▪ Understand the concept of the Common data formats of Data Science ▪ Understand the concept of the Use of Statistical analysis, and data visualization ▪ Understand the use of Excel sheet for data analysis	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

	▪ Identify the Extraction and preparation of dataset ▪ Identify Feature Selection ▪ Identify parallel processing	▪ Understand the concept of the Extraction and preparation of dataset ▪ Understand the concept of Feature Selection ▪ Understand the concept of parallel processing **PRACTICAL ACTIVITY** **From the following Decision Process for Temperature Prediction diagram Draw the Machine Learning Decision Tree for Temperature Prediction.**			


Initial Range: 30-70 F
Which season?
Answer = Winter
New Range: 30 – 50 F
Historical average?
Answer = 46
New Range: 40 – 50 F
Max temp today?
Answer = 43
Final Prediction = 44 F

LU-3 Identify Applications and areas of Data science	▪ Identify Data Science for Health Care ▪ Demonstrate use of data science in Sports ▪ Demonstrate use of data science in Amazon ▪ Demonstrate use of data science in Netflix ▪ Demonstrate use of data science in Market analysis	▪ Understand the use of Data Science for Health Care ▪ Understand the use of data science in Sports ▪ Understand the use of data science in Amazon ▪ Understand the use of data science in Netflix ▪ Understand the use of data science in Market analysis **PRACTICAL ACTIVITY** **Draw the mind map representing the Data Science and predictive analysis in Health Care**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18.5 Hrs.	Computer Internet Python Python IDE	Classroom or Workshop
LU-4 Classify Characteristics of Data Science	▪ Understand the three V's of Data science ▪ Identify the term "Volume" ▪ Identify the term "Velocity" ▪ Identify the term "Variety"	▪ Understand the three V's of Data science ▪ Understand the term "Volume" for Data science ▪ Understand the term "Velocity" for Data science ▪ Understand the term "Variety" for Data science **PRACTICAL ACTIVITY** **Draw the V's of Data science**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Internet Python Python IDE	Classroom or Workshop

LU-5 Identify Challenges of Data Science	▪ Identify the concept of Data Acquisition ▪ Identify the concept of Informed Search and Analytics ▪ Identify the concept of High Volume of Data ▪ Identify the concept of High Velocity of Processed Data ▪ Identify the concept of Information Storage and Analytics ▪ Identify the concept of Data Security and Privacy ▪ Identify the concept of High variety of information ▪ Identify the concept of High veracity of Data ▪ Identify the ethics to handle data	▪ Understand the concept of Data Acquisition ▪ Understand the concept of Informed Search and Analytics ▪ Understand the concept of High Volume of Data ▪ Understand the concept of High Velocity of Processed Data ▪ Understand the concept of Information Storage and Analytics ▪ Understand the concept of Data Security and Privacy ▪ Understand the concept of High variety of information ▪ Understand the concept of High veracity of Data ▪ Understand the ethics to handle data **PRACTICAL ACTIVITY** **Draw the Data Acquisition process.**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

LU-6 Identify Domains of Data Science	▪ Identify need of Statistic in Data Science ▪ Identify need of Data Engineering ▪ Identify need of Visualization ▪ Identify need of Advance Computing	▪ Identify need of Statistic in Data Science ▪ Identify need of Data Engineering ▪ Identify need of Visualization ▪ Identify need of Advance Computing **PRACTICAL ACTIVITY** **Draw the diagram showing different domain of data science**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

LU-7 Process flow of Data Science	▪ Identify problem statement ▪ Identify the Machine Learning Algorithm to be used ▪ Identify the implementation of algorithm in dataset ▪ Identify the visualization of analysis	▪ Identify problem statement ▪ Identify the Machine Learning Algorithm to be used ▪ Identify the implementation of algorithm in dataset ▪ Identify the visualization of analysis **PRACTICAL ACTIVITY** **Using logistic regression draw a plot determining whether it will rain or not on the basis of temperature and humidity.** ▪	Theory – 3 Hrs. Practical – 12 Hrs. Total – 15 Hrs.	Computer Python Python IDE	Classroom or Workshop

Module 4: 0619I&CT-18 Utilize Libraries in Python

Objective: This competency standard covers the general overview of python most used libraries like NumPy, Pandas, Matplotlib and Keras.

Duration: 82 Hours **Theory: 10 Hours** **Practice: 72 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials	Learning

				Required	Place
LU-1. Explore NumPy library	▪ Trainee will be able to: ▪ Install NumPy ▪ Use various NumPy data types in a program ▪ Use NumPy to perform indexing and slicing ▪ Compute on NumPy arrays ▪ Sort arrays using NumPy ▪ Use NumPy's structured arrays	▪ Knowledge and Understanding of Basic function of installation of NumPy library. ▪ Knowledge and understanding of indexing and slicing ▪ Knowledge and understanding of NumPy arrays ▪ Knowledge and understanding of mathematical operations on arrays **PRACTICAL ACTIVITY:** **Import NumPy library and perform basic mathematical operation on given data set.** **A= [2, 3, 5,11, 03, 45]**	Theory-2.5 Hrs. Practical-18 Hrs. Total-20.5 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU-1. Explore pandas' libraries	▪ Trainee will be able to: ▪ Install pandas.	▪ Knowledge and understanding of importing Pandas library.	Theory-2.5 Hrs. Practical-18 Hrs.	Computer Python	Classroom or Workshop

	▪ Introduce pandas' objects ▪ Operate data using pandas. ▪ Handle missing data ▪ Combine datasets	▪ Knowledge and understanding of work on Pandas data frame. ▪ Knowledge and understanding of create tables using Pandas library. **PRACTICAL ACTIVITY:** ▪ **Import pandas library and create data frame of IRIS data set.** ▪ **Show data frame of IRIS data set in table format.** ▪ **Append, remove and reposition data in data frame.**	Total-20.5 Hrs	Python IDE	
LU-2. Explore Matplotlib library	▪ Trainee must be able to: ▪ Import matplotlib ▪ Perform simple scatter plot ▪ Visualize errors ▪ Use density and contour plots	▪ Knowledge and understanding of Basic types of plots, graph and charts. ▪ Knowledge and understanding of visualization of data. ▪ Knowledge and understanding of histograms.	Theory-2.5 Hrs. Practical-18 Hrs. Total-20.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

	▪ Use histograms, binning and density ▪ Use multiple subplots ▪ Perform three-dimensional plotting	▪ Knowledge and understanding of three dimension plotting. **PRACTICAL ACTIVITY:** **Create bar plot using matplot library on IRIS data set.**			
LU-3. Explore Keras Library	▪ Trainee must be able to ▪ Install Keras. ▪ Load image data from MNIST. ▪ Pre-process input data for keras ▪ Pre-process class labels for keras ▪ Define model architecture ▪ Compile model ▪ Fit model on training data ▪ Evaluate model on test data	▪ Knowledge and understanding of datasets. ▪ Knowledge and understanding of how to load data set in python. ▪ Knowledge and understanding of applying pre-process technique on data set. ▪ Knowledge and understanding of how to compile model. ▪ Knowledge and understanding of evaluation of model with test data. **PRACTICAL ACTIVITY:**	Theory-2.5 Hrs. Practical-18 Hrs. Total-20.5 Hrs.	Computer Python Python IDE	Classroom or Workshop

		Install Keras library and import it in a program.			

Module 5: 0619I&CT-20 Demonstrate Artificial Intelligence Fundamentals and Methodology

Objective: This module introduces fundamentals, methodology, areas, goals and applications of Artificial Intelligence

Duration: 126 Hours **Theory: 21 Hours** **Practical: 105 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1. Identify the Foundation of AI	▪ Draw the map showing history of AI. ▪ Draw the biological concept of neuron ▪ Draw the basic diagram of the perceptron ▪ Draw the Flow chart showing the type of Artificial Intelligence, Reactive machines, Limited memory, Theory of mind, Self-awareness. ▪ Explain the steps of the of Turing Test ▪ Draw the components of intelligence	▪ Understand what is AI ▪ Understand why need we need AI ▪ Understand the applications of AI ▪ Understand the term Artificial Intelligence ▪ Understand the history of AI ▪ Understand biological concept of neuron ▪ Identify the perceptron ▪ Classify the intelligence types, naturalist, musical, logical-mathematical, existential, interpersonal, bodily-kinesthetic, linguistic, intra-personal, and spatial. ▪ Recognize the type of artificial intelligence, reactive machines, limited memory, theory of mind, self-awareness.	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

		▪ Understand the history of AI. ▪ Understand the concept of Turing Test ▪ Undemand the components of intelligence ▪ Understand the components of AI ▪ Understand the terminologies of AI ▪ Understand the difference between machine learning AI, Deep learning &Artificial Intelligence ▪ Understand the difference between the conventional and AI programming **PRACTICAL ACTIVITY** **Draw the basic diagram of the perceptron**			
LU-2. Identify the Approaches of AI	▪ Draw the Machine learning Process Diagram. ▪ Explain the purpose of Microsoft Azure Machine Learning ▪ Explain the purpose of Google Cloud Prediction API ▪ Recognize the tool for website machine	▪ Identify the Statistical Approach in AI ▪ Identify the Cybernetics & Brain Simulation Approach in AI ▪ Identify the Symbolic Approach in AI ▪ Identify the Cognitive Simulation Approach in AI ▪ Discuss the Libraries of AI and their purposes.	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

	learning framework ▪ Recognize the tools for Mobile App Development Framework	▪ Discuss Microsoft Azure Machine Learning ▪ Discuss Google Cloud Prediction API ▪ Recognize the tool for website machine learning framework ▪ Recognize the tools for Mobile App Development Framework **PRACTICAL ACTIVITY** **Draw the mind map showing the tool for website machine learning framework**			
LU-3. Identify the Deduction, Reasoning and problem Solving in AI	▪ Demonstrate deduction method in AI ▪ Draw a structure Reasoning and Problem Solving in AI ▪ Demonstrate Search and Optimization in AI ▪ Draw the Knowledge representation in AI ▪ Draw the working model of each types of agents and environment in artificial intelligence	▪ Understand the deduction method in AI ▪ Understand the Reasoning and Problem Solving in AI ▪ Understand the Search and Optimization in AI ▪ Understand the Knowledge representation in AI ▪ Understand the agents and environment working models concept in AI **PRACTICAL ACTIVITY** **Draw the working model of each types of agents**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

		and environment in artificial intelligence ▪			
LU-4. Identify the AI Goals **LU-5.**	▪ Demonstrate Single Agent Path finding Problems ▪ Draw the algorithm for Breadth-First Search ▪ Draw the algorithm for Depth-First Search ▪ Draw the algorithm for A * Search ▪ Draw the algorithm for Greedy Best First Search ▪ Draw the algorithm for Draw the Algorithm of Fuzzy Logic System	▪ Understand the planning in AI ▪ Understand the learning in AI ▪ Understand finding Problems. ▪ Understand the different types of search algorithm for AI ▪ Understand the fuzzy logic in AI **PRACTICAL ACTIVITY** **Draw the algorithm for Breadth-First Search**	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop
LU-6. Identify the Artificial Intelligence Areas	▪ Draw the working strategy of the Machine Learning ▪ Draw the working strategy Reinforcement Learning ▪ Draw the working strategy the Computer Vision ▪ Draw the working strategy the Natural	▪ Understand the concept and algorithms of the Deep Learning ▪ Understand the concept and algorithms of the Reinforcement ▪ Understand the concept, motion, manipulation and application of AI in Robotics ▪ Understand the concept and algorithms of the	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

	Language Processing ▪ Draw the working strategy the Recommender System ▪ Draw the workflow of Internet of Things	Computer Vision ▪ Understand the concept and algorithms of the Natural Language Processing ▪ Understand the concept and algorithms of the Recommender System ▪ Understand the concept and algorithms of Expert system ▪ Understand the concept and algorithms of Internet of things (IoT) and AI applications with it. ▪ Understand the concept of gaming and computation mechanism design with AI **PRACTICAL ACTIVITY** **Draw the work flow the Computer Vision generalized algorithm**			
LU-7. Identify the Real-World Applications of AI	▪ Draw the charts showing how AI helped in goods management ▪ Draw the charts showing how AI helped in Aviation	▪ Understand the application of Goods management ▪ Understand the application of AI in Aviation ▪ Understand the application of AI for Education ▪ Understand the application of Healthcare	Theory – 3 Hrs. Practical – 15 Hrs. Total – 18 Hrs.	Computer Python Python IDE	Classroom or Workshop

	▪ Draw the charts showing how AI helped in for Education ▪ Draw the charts showing how AI helped in Healthcare ▪ Draw the charts showing how AI helped in Heavy Industry ▪ Draw the charts showing how AI helped in of Finance Sector	▪ Understand the application of Heavy Industry ▪ Understand the application of Finance Sector **PRACTICAL ACTIVITY** **Draw the charts showing how AI helped in for Education**			

Apply Occupational Health and Safety on HVAC Systems

Perform Safety Practices at Work Place

Objective: This module covers the knowledge and skills required to this learning module is designed to provide skills and knowledge to Identify Hazards at Workplace, Observe Occupational Health and Safety (OHS).

Duration: 4 Hours **Theory: 1 Hours** **Practice: 3 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1. Identify Hazards at Workplace	**Trainee will be able to:** • Read and interpret work processes and procedures correctly to identify risk of hazards at workplace • Recognize engineering processes, tools, equipment and consumable materials that have the potential to cause harm • Identify any potential hazards at workplace • Take appropriate action to minimize the risk / hazards	• Types of hazards that are most likely to cause harm to health and safety • Health and safety precautions • Techniques and methods to identify the risks of hazards at workplace • Dealing with hazard to avoid any accident or injury **<u>Practical Activity:</u>** • Use personal protective equipment • Identify potential hazards and risk. • Take actions to eliminate	Theory-0.5Hrs. Practical-03Hrs. Total- 3.5 Hrs.	• Self-contained breathing apparatus • Fall protection (such as personal fall arrest systems, harnesses and lanyards) • Head protection (such as hard hats) • Hearing Protection Equipment (earplugs and earmuffs) • Foot protection (such as boots with metatarsal	Class Room and workshop

		the potential hazards		guards and puncture-resistant soles) • Hand protection (such as gloves and barrier creams) • Body Protection (such as high-visibility vests, coveralls, welding	
LU 2. Observe Occupational Health and Safety (OHS)	**Trainee will be able to:** • Work safely while complying with health and safety precautions, regulations and other relevant guidelines • Identify health and safety hazards in the workplace, so that the potential for	• Dealing with hazards to avoid any accident or injury • Safety reporting procedures and documentation • Personal Protective Equipment use • Fire-fighting methods	Theory-0.5Hrs. Practical-03Hrs. Total- 3.5 Hrs.	• Self-contained breathing apparatus • Fall protection (such as personal fall arrest systems, harnesses and lanyards)	Class Room, workshop and field visit

	personal injury, damage to equipment or workplace is prevented, and corrective action is taken • Deal with problems which are within your control, and report those that cannot be resolved to safety officer • Wear, adjust, and maintain Personal Protective Equipment to ensure correct fit and optimum protection in compliance with company procedures • Keep work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is prevented	**Practical Activity:** • Perform work safely • Report potential hazard and improvements • Ensure housekeeping in order to remove the obstructions and storing tools to minimize the slip trip and fall hazard.		• Head protection (such as hard hats) • Hearing Protection Equipment (earplugs and ea rmuffs) • Foot protection (such as boots with metatarsal guards and puncture-resistant soles) • Hand protection (such as gloves and barrier creams) Body Protection (such as high-visibility vests, coveralls, welding , torque wrench) • Engine Petrol	

Maintain Health and Safety

Objective: This module covers the knowledge and skills required to this learning module is designed to provide skills and knowledge to Identify Hazards at Workplace, Observe Occupational Health and Safety (OHS).

Duration: 4 Hours **Theory: 1 Hours** **Practice: 3 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1. Identify Hazards at Workplace	**Trainee will be able to:** • Read and interpret work processes and procedures correctly to identify risk of hazards at workplace • Recognize engineering processes, tools,	• Types of hazards that are most likely to cause harm to health and safety • Health and safety precautions • Techniques and methods to identify the risks of hazards at workplace • Dealing with hazard to avoid any accident or	Theory-0.5Hrs. Practical-03Hrs. Total- 3.5 Hrs.	• Self-contained breathing apparatus • Fall protection (such as personal fall arrest systems, harnesses	Class Room and workshop

	equipment and consumable materials that have the potential to cause harm • Identify any potential hazards at workplace • Take appropriate action to minimize the risk / hazards	injury **<u>Practical Activity:</u>** • Use personal protective equipment • Identify potential hazards and risk. • Take actions to eliminate the potential hazards		and lanyards) • Head protection (such as hard hats) • Hearing Protection Equipment (earplugs and earmuffs) • Foot protection (such as boots with metatarsal guards and puncture-resistant soles) • Hand protection (such as gloves and barrier creams) • Body Protection	

				(such as high-visibility vests, coveralls, welding	
LU 2. Observe Occupational Health and Safety (OHS)	**Trainee will be able to:** • Work safely while complying with health and safety precautions, regulations and other relevant guidelines • Identify health and safety hazards in the workplace, so that the potential for personal injury, damage to equipment or workplace is prevented, and corrective action is taken • Deal with problems which are within your control, and report those that cannot be resolved to safety officer • Wear, adjust, and maintain Personal Protective Equipment to ensure correct fit and optimum protection in compliance with company procedures	• Dealing with hazards to avoid any accident or injury • Safety reporting procedures and documentation • Personal Protective Equipment use • Fire-fighting methods **<u>Practical Activity:</u>** • Perform work safely • Report potential hazard and improvements • Ensure housekeeping in order to remove the obstructions and storing tools to minimize the slip trip and fall hazard.	Theory-0.5Hrs. Practical-03Hrs. Total- 3.5 Hrs.	• Self-contained breathing apparatus • Fall protection (such as personal fall arrest systems, harnesses and lanyards) • Head protection (such as hard hats) • Hearing Protection Equipment (earplugs and ea rmuffs) • Foot protection (such as boots with metatarsal guards and puncture-	Class Room, workshop and field visit

	• Keep work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is prevented			resistant soles) • Hand protection (such as gloves and barrier creams) Body Protection (such as high-visibility vests, coveralls, welding , torque wrench) • Engine Petrol	

DEVELOP PROFESSIONALISM

Objective: This module covers the knowledge and skills required to this learning module is designed to provide skills and knowledge to Recognize occupational health and safety on HVAC systems along with Apply safety in on-job HVAC systems.

Duration: 4 Hours **Theory: 1 Hours** **Practice: 3 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Recognize occupational health and safety on HVAC systems	**Trainee will be able to:** • Recognize the objectives and contents of general OHS and environmental protection in HVAC Systems • Identify Pressure	• Types of hazards that are most likely to cause harm to health and safety • hazards at workplace • Techniques and methods to identify the risks of hazards at workplace	Theory-0.5Hrs. Practical-03Hrs. Total- 3.5 Hrs.	• Self-contained breathing apparatus • Fall protection (such as personal fall arrest systems, harnesses	Class Room and workshop

	safety devices (including pressure gauge, safety valve, safety diaphragm and fusible plug) • Identify the types, utilization, maintenance and limitations of HVAC Tools • Use of Personal protective equipment • Apply safe operation procedures for HVAC Units • Handling and safe practice of refrigerants & chemicals to avoid hazards • Use of safe practice of Refrigerants and compressor safeties to minimize the risk • Recognize Hazards of Compression and Absorption systems that have the potential to cause harm	**Practical Activity:** • Identify different sign and symbols of occupational health and safety that are used at the workplace for various job functions • Use personal protective equipment		and lanyards) • Head protection (such as hard hats) • Hearing Protection Equipment (earplugs and earmuffs) • Foot protection (such as boots with metatarsal guards and puncture-resistant soles) • Hand protection (such as gloves and barrier creams) • Body	

				Protection (such as high-visibility vests, coveralls, welding	
LU2. Apply safety in on-job HVAC systems	**Trainee will be able to:** • Identify the safety standards of electrical and mechanical workplace • Asses safety requirements of on-job HVAC systems • Work safely while complying installation of HVAC Units including domestic & commercial units • Work safely while complying in Servicing of HVAC systems • Work safely while complying in trouble shooting of HVAC systems	• Safety reporting procedures and documentation • Personal Protective Equipment use • First aid treatment methods including methods of resuscitation • Fire-fighting methods • Safe methods of handling heavy loads **<u>Practical Activity:</u>** • Perform work safely • Use personal protective equipment • Identify potential hazards	Theory-0.5Hrs. Practical-03Hrs. Total- 3.5 Hrs.	• Self-contained breathing apparatus • Fall protection (such as personal fall arrest systems, harnesses and lanyards) • Head protection (such as hard hats) • Hearing Protection Equipment (earplugs and e armuffs) • Foot protection (such as boots with metatarsal	Class Room, workshop and field visit

				guards and puncture-resistant soles) • Hand protection (such as gloves and barrier creams) Body Protection (such as high-visibility vests, coveralls, welding , torque wrench) • Engine Petrol	