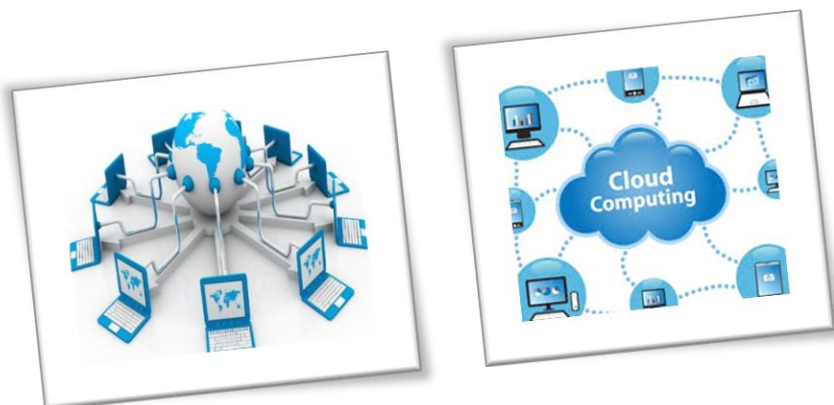


CURRICULUM OF “COMPUTER NETWORKING AND CLOUD COMPUTING”

‘Jr. Programmer/Network Assistant’



June 2021



**National Vocational & Technical
Training Commission**

INTRODUCTION	3
DEFINITION/ DESCRIPTION OF THE TRAINING PROGRAMME FOR COMPUTER NETWORKING AND CLOUD COMPUTING	3
PURPOSE OF THE TRAINING PROGRAMME	3
OVERALL OBJECTIVES OF TRAINING PROGRAMME	3
COMPETENCIES TO BE GAINED AFTER COMPLETION OF COURSE.....	3
TRAINEE ENTRY LEVEL.....	4
MINIMUM QUALIFICATION OF TRAINER	4
RECOMMENDED TRAINER: TRAINEE RATIO	4
MEDIUM OF INSTRUCTION I.E. LANGUAGE OF INSTRUCTION	4
DURATION OF THE COURSE (TOTAL TIME, THEORY & PRACTICAL TIME)	5
SEQUENCE OF THE MODULES.....	6
SUMMARY – OVERVIEW OF THE CURRICULUM	7
MODULES	11
JR PROGRAMMER/NETWORK ASSISTANT.....	11
<i>Module 1 : Install and Configure WAMP</i>	<i>11</i>
<i>Module 2 : Design Database.....</i>	<i>13</i>
<i>Module 3 : Create Database in MySQL using WAMP Server.....</i>	<i>15</i>
<i>Module 4 : Manipulate and Back up Database using Structured Query Language (SQL).....</i>	<i>18</i>
<i>Module 5 : Install / Configure JDK (Java Development Kit)</i>	<i>22</i>
<i>Module 6 : Install / Configure Eclipse IDE and Run Simple/ Programme</i>	<i>24</i>
<i>Module 7 : Create and run Graphic User Interface(GUI)Proram using Java.....</i>	<i>29</i>
<i>Module 8 :Create and run Spring boot application</i>	<i>31</i>
<i>Module 9 : Work in ateam Environment.....</i>	<i>36</i>
GENERAL ASSESSMENT GUIDANCE FOR “COMPUTER NETWORKING AND CLOUD COMPUTING”JR.PROGRAMMER/NETWORK ASSISTANT	40
ASSESSMENT STRATEGY FOR “COMPUTER NETWORKING AND CLOUD COMPUTING”.....	42
COMPLETE LIST OF TOOLS AND EQUIPMENT	45
LIST OF CONSUMABLE SUPPLIES.....	51
CREDIT VALUES.....	53
MEMBERS OF VALIDATION COMMITTEE.....	54

Introduction

Definition/ Description of the training programme for Computer Networking and Cloud Computing “Jr. Programmer/Network Assistant”

In large companies, computers in the workplace need to be connected to a single unit to get work done. Whether it's a company or some other shared hub, computers need to be able to share resources to accomplish goals and Cloud Computing provides huge computation and storage resources on demand and exciting most of individuals and businesses. Large user-base is attracted to use cloud computing mainly due to pay-per-usage and on-demand resource provisioning characteristics.

Purpose of the training programme

The Computer Networking and Cloud Computing 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 specific objectives of developing these qualifications are as under:

- Improve the professional competence of the trainees
- Provide opportunities for recognition of skills attained through non-formal or informal pathways
- Improve the quality and effectiveness of training and assessment for Computer Networking and Cloud Computing industry

Overall objectives of training programme

The overall objectives of the Computer Networking and Cloud Computing program are producing skilled staff to:

- Network Administrator
- Network Assistant
- Network Technicians
- Jr Programmer

Competencies to be gained after completion of course

- Install and configure WAMP
- Design Database
- Create Database in MySQL using WAMP server
- Manipulate and Backup Database using Structured Query Language (SQL)
- Install/Configure JDK (Java Development Kit)
- Install / Configure Eclipse IDE and Run Simple/Program
- Create and Run Spring Boot Application
- Work in a Team Environment

Trainee entry level

The entry requirement for this qualification would be level 2 in Computer networking and cloud computing

Minimum qualification of trainer

Teaching staff qualification should be BS (EE) with specialization in computer, BS (Computer Engineering, Computer Science, Software Engineering, I.T, Computer Networks, Cyber security, Data Science, and IOT) or equivalent.

Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this programme is 1 trainer for 25 trainees.

Medium of instruction i.e., language of instruction

Instruction will be Urdu and English.

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

This curriculum comprises 09 modules. The recommended delivery time is 600 hours. Delivery of the course could therefore be full time, 5 days a week, for 06 months. Training providers are at liberty to develop other models of delivery, including part-time and evening delivery.

The full structure of the course is as follow:

Module Level-3	Theory ¹ Days/hours	Workplace ² Days/hours	Total hours	Credit hours
Module 1 Install and configure WAMP	12	39	51	5.1
Module 2 Design Database	15	48	63	6.3
Module 3 Create Database in MySQL using WAMP server	15	48	63	6.3
Module 4 Manipulate and Backup Database using Structured Query Language (SQL)	15	69	84	8.4
Module 5 Install/Configure JDK (Java Development Kit)	12	42	54	5.4
Module 6 Install / Configure Eclipse IDE and Run Simple/Program	14	72	86	8.6
Module 7 Create and run GUI program using Java	10	87	97	9.7
Module 8 Create and Run Spring Boot Application	15	57	72	7.2
Module 9 Work in a Team Environment	12	18	30	3
Total	120	480	600	60

¹ Learning Module hours in training provider premises

² Training workshop, laboratory and on-the-job workplace

Sequence of the modules

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 (for example the Materials Required component). 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. Each module also incorporates the industrial needs of Pakistan.

The distribution table is shown below:

Level-3

Module-1 Install and configure WAMP 51 hrs.	Module-2 Design Database 63 hrs.	Module-3 Create Database in MySQL using WAMP server 63 hrs.
Module-9 Work in a Team Environment 30 hrs.	Module-4 Manipulate and Backup Database using Structured Query Language (SQL) 84 hrs.	Module-5 Install/Configure JDK (Java Development Kit) 54hrs.
Module-6 Install / Configure Eclipse IDE and Run Simple/Program 86 hrs.		Module-8 Create and Run Spring Boot Application 72 hrs.
Module-7 Create and run GUI program using Java 97 hrs.		

Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1 Install and configure WAMP Aim: The aim of this module to develop advanced knowledge, skills and understanding to Install and configure WAMP Server	LU1. Install WAMP server LU2. Run and Configure WAMP Server	12	39	51
Module 2: Design Database Aim: The aim of this module to develop advanced knowledge, skills and understanding to Design Database	LU1. Select database tables and their relationship LU2. Create UML diagram	15	48	63
Module 3: Create Database in MySQL using WAMP server Aim: The aim of this module to develop advanced knowledge, skills and understanding to Create Database in MySQL using WAMP server	LU1. Create database LU2. Create Tables LU3. Drop/truncate table	15	48	63

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 4: Manipulate and Backup Database using Structured Query Language (SQL) Aim: The aim of this module to develop advanced knowledge, skills and understanding to Manipulate the Database using Structured Query Language (SQL)	LU1. Insert data into tables LU2. Display data from DB (database) tables LU3. Aggregate Function and Joins LU4. Create backup in SQL format LU5. Create backup in CSV format LU6. Restore backup of required database	15	69	84
Module 5: Install / Configure JDK (Java Development Kit) Aim: The aim of this module to develop advanced knowledge, skills and understanding to Install / Configure JDK (Java Development Kit)	LU1. Download and Install JDK setup LU2. Set /troubleshoot Environment variable	12	42	54

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 6: Install / Configure Eclipse IDE and Run Simple Programme Aim: The aim of this module to develop advanced knowledge, skills and understanding to Install / Configure Eclipse IDE and run simple programme	LU1. Install Eclipse IDE in PC LU2. Configure Eclipse LU3. Create new Java project LU4. Create class in project LU5. Run Programme LU6. Write a program to Read/Write file in Java	14	72	86
Module 7: Create and run Graphic user interface (GUI) Program Using Java Aim: The aim of this module to develop advanced knowledge, skills and understanding to Create and run Graphic user interface (GUI) Program Using Java	LU1. Configure java plugin in Eclipse LU2. Create Java application LU3. Run application and test result	10	87	97
Module 8: Create and run Spring boot application Aim: The aim of this module to develop advanced knowledge, skills and understanding to Create and run Spring boot application	LU1. Create Spring boot project LU2. Import project In Eclipse LU3. Create a Resource Representation Class LU4. Create a Resource Controller LU5. Build and compile maven project LU6. Run and test application	15	57	72

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 9: Work in a Team Environment Aim: The aim of this module to develop advanced knowledge, skills and understanding to work in a team environment	LU1. Obtain and convey Workplace information LU2. Participate in workplace meetings and discussions LU3. Identify own role and responsibility within team LU4. Support the co-workers	12	18	30

Modules

Module 1 : Install and Configure WAMP

Objective of the module: After this competency standard candidate will be able to install and configure WAMP Server

Duration:	51Hours	Theory:	12hours	Practical:	39hours
------------------	---------	----------------	---------	-------------------	---------

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Install WAMP Server setup	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Download latest version of WAMP server setup. 2. Uninstall old version of WAMP server if installed 3. Open the downloaded installer file of WAMP server 4. Complete installation package as per instructional manual. 	<ul style="list-style-type: none"> • Knowledge of server and its types • Knowledge of WAMP server and its types • Method to Run the downloaded WAMP server.exe setup latest one • Process to Select the location, if need to set other than the default. • Knowledge of Open-source software's <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to install WampServer 32bit or 64bit. • Practice to Install Word Press on 	<p>Total: 21hrs</p> <p>Theory: 6hrs</p> <p>Practical: 15hrs</p>	<ul style="list-style-type: none"> • Computer system • Internet • WAMP setup 	Computer Lab

		WAMP Server			
LU 2. Run and Configure WAMP Server	Trainee will be able to: <ol style="list-style-type: none"> 1. Run WAMP server from program menu 2. Configure WAMP server 	<ul style="list-style-type: none"> • Knowledge of system tray WAMP server icon. • Configure and test the web server. • Techniques to fix issues of Apache Server • Understand the basic of http. conf and identify the Port80. • Knowledge of local host and phpMyAdmin in WAMP server. • Knowledge disabling the internet information services from window program option. • Process of restart and check again the local host <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to configure setting on WAMP server 	<p>Total: 30hrs</p> <p>Theory: 6hrs</p> <p>Practical: 24hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet • Operating System (Windows, Linux) • Bootable OS Flash drive/DVD WAMP 	Class Room and Computer Lab

Module 2 : Design Database

Objective of the module: After this module the candidate will be able to design database structure

Duration:	63Hours	Theory:	15hours	Practical:	48hours
------------------	---------	----------------	---------	-------------------	---------

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Select database tables and design their relationship	Trainee will be able to: <ol style="list-style-type: none"> 1. List down all the tables required for database 2. List down columns for each table 3. Create primary keys for each table 4. Develop relationship for each table if required. 5. Create associate table if required for many to many relationships 6. assign foreign keys 	<ul style="list-style-type: none"> • Define tables used for data base • Explain Null constraint and Unique constraints for table requirements • Differentiate between the entities and tables. • Define all attributes/Column types in the table. • Explain the primary key and other keys in the table. • Differentiate between different relationships • Design process of relationships • Entity Relationship Diagram • Identify the optional and mandatory cardinalities in relationships. • Explain the process in case of many to many relationships. <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create primary key and foreign key between tables 	Total: 31hrs Theory: 7hrs Practical: 24hrs	<ul style="list-style-type: none"> • Web Browser • Search Engines • MS Office • Antivirus software • Any other Application Software • Computer system 	Class Room Computer Lab

		<ul style="list-style-type: none"> Practice to create two tables of many to many relationships and assign foreign key in between them 			
LU2. Create UML diagram	Trainee will be able to: <ol style="list-style-type: none"> Draw UML diagram of identified table. Make relationship between tables. 	<ul style="list-style-type: none"> Define UML Diagrams Types of UML Diagrams UML Diagram Symbols UML diagram creators Draw Relationship diagram for given scenario any case study. Data Flow Diagram Construct context diagram between any database System Benefits and limitations of Context Diagram Differentiate of Context Diagram vs. Data Flow Diagram <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> Practice to construct relationship diagram and data flow diagram in MS Vision or MS Word Practice to create a table relationship by using the Relationships window 	Total: 32hrs Theory: 8hrs Practical: 24hrs	<ul style="list-style-type: none"> Web Browser Search Engines Antivirus software Computer system 	Class Room and Computer Lab

Module 3 : Create Database in MySQL using WAMP Server

Objective of the module: After this competency standard the candidate will be able to setup environment in MySQL using WAMP server

Duration:	63Hours	Theory:	15hours	Practical:	48hours
------------------	---------	----------------	---------	-------------------	---------

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create database	Trainee will be able to: <ol style="list-style-type: none"> 1. Start WAMP Server 2. Access PhpMyAdmin command in WAMP server 3. Create new Database by following the creation wizard 	<ul style="list-style-type: none"> • Process the WAMP server on and off • Describe connection between PhpMyAdmin with WAMP server • Explain process to create database through Command • Explain Process of create database through wizard PhpMyAdmin <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to create the database using MySQL 	Total: 23hrs Theory: 5hrs Practical: 18hrs	<ul style="list-style-type: none"> • Internet • Computer system 	Class Room and Computer Lab
LU2. Create Tables	Trainee will be able to: <ol style="list-style-type: none"> 1. Select the created database 2. Create table with name "orders" by DDL Query. 3. Input number of columns as per given data 4. Create table with name 	<ul style="list-style-type: none"> • Process created table from PhpMyAdmin like "Test DB". • Define and explain the Structured Query Language (SQL) and its three types, Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL). 	Total: 20hrs Theory: 5hrs Practical:	<ul style="list-style-type: none"> • Web Browser • Internet • Computer system 	Class Room and Computer Lab

	<p>5. Create primary keys for tables</p>	<ul style="list-style-type: none"> • Process of SQL DDL commands to create various tables. • Explain all Data Types of MySQL • Define schema. • Explain table and file naming scheme <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to Perform a task of two to three tables in which one table with column of Primary Key, constraints with null and not null, identity and second table with Primary and foreign key 	15 hrs		
<p>LU3. Drop/truncate table</p>	<p>Trainee will be able to:</p> <ol style="list-style-type: none"> 1. Create a table 2. Insert rows in table 3. Perform TRUNCATE operation on created table 4. Perform DROP operation on created table 	<ul style="list-style-type: none"> • Knowledge of different ways to delete data in SQL • Knowledge of how delete command work • Differentiate between Delete AND Truncate commands • Knowledge to truncate table work • Differentiate between truncate and drop command • knowledge of truncate and drop commands on various tables • Knowledge of Integrity constraints <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to Apply operations of truncate and drop on given scenario in LU2(Perform a task of 	<p>Total: 20hrs</p> <p>Theory: 5hrs</p> <p>Practical: 15 hrs</p>	<ul style="list-style-type: none"> • Web Browser • Internet • Computer system 	<p>Class Room and Computer Lab</p>

		two to three tables in which one table with column of Primary Key, constraints with null and not null, identity and second table with Primary and foreign key)			
--	--	--	--	--	--

Module 4 : Manipulate and Backup Database using Structured Query Language (SQL)

Objective of the module: After this competency standard the candidate will be manipulate the tables using Data Manipulation Language.

Duration:	84Hours	Theory:	15hours	Practical:	66hours
------------------	---------	----------------	---------	-------------------	---------

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Insert data into tables	Trainee will be able to: <ol style="list-style-type: none"> 1. Select the table to insert data 2. Insert data in row using PhpMyAdmin insert wizard 3. Insert rows by writing SQL query 4. Execute the query and show data inserted. 	<ul style="list-style-type: none"> • Process of creating new table • Process of adding content in database table • Explain all commands of DML • Define and explain the structure of Insert command • Use of “insert into” command and put some dump values in various tables. • Apply “insert into” command and put some dump values into various tables. • Technique of writing and executing query to insert some rows through PhpMyAdmin wizard. • Knowledge of commit, break point and transaction <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to create table and insert some rows in the table and display all record inserted in the table 	Total: 15hrs Theory: 3hrs Practical: 12hrs	<ul style="list-style-type: none"> • Computer System • Internet Connection • Printer • Scanner 	Class Room and Computer Lab

LU2. Display data from DB (database) tables	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform selection on created table 2. Select all column from table 3. Display selected number of columns using select statement 4. Select unique values of column 5. Select records using “where” clause as instructed. 	<ul style="list-style-type: none"> • Explain structure of Select statement • Explain Select * command • Retrieve records through Select* and select with list of columns • Explain WHERE clause in Select Statement • Explain and use logical operators AND, OR, NOT, special operators such as BETWEEN, IS NULL, LIKE, IN, and EXISTS etc.in conjunction with the WHERE clause. • Explain Sorting, filtering and conditional <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to select statement with WHERE clauses apply through logical and special operators on samples tables. 	<p>Total: 11hrs</p> <p>Theory: 2hrs</p> <p>Practical: 9hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Printer • Scanner • DVD or BLU-RAY writer 	Computer Lab
LU3. Aggregate Function and Joins	Trainee will be able to: <ol style="list-style-type: none"> 1. Apply GROUP BY clause for aggregate functions 2. Perform select query and show the total count of status in table 3. Apply “SUM and GROUP BY” clause and join between two 	<ul style="list-style-type: none"> • Describe and use the ORDER BY clause to sort a listing in ascending or descending order. • Explain the GROUP BY clause in conjunction with an SQL aggregate function • Describe various types of aggregate functions, SUM, MIN, MAX, COUNT and AVG. 	<p>Total: 15hrs</p> <p>Theory: 3hrs</p> <p>Practical:</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Printer • Scanner 	Computer Lab

	tables	<u>Practical Activity:</u> <ul style="list-style-type: none"> Practice to retrieve commands through ORDER BY, GROUP BY, through all aggregate functions on various tables Practice to calculate average, sum, Max, Min from given table. 	12 hrs		
LU4. Create backup in SQL format	Trainee will be able to: <ol style="list-style-type: none"> Select the database for backup Export database in “SQL” file format 	<ul style="list-style-type: none"> Explain database backup types Develop a comprehensive backup plan. Perform effective backup management. Perform periodic databases restore testing. Explain database backup methods <u>Practical Activity:</u> <ul style="list-style-type: none"> Practice to generate the backup using MySQL dump utility of selected database and export in SQL file form 	Total: 15 hrs Theory: 3 hrs Practical: 12 hrs	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Operating System (Windows, Linux) 	Class Room and Computer Lab
LU5. Create backup in CSV format	Trainee will be able to: <ol style="list-style-type: none"> Select the database for backup Export database in “CSV” file format 	<ul style="list-style-type: none"> Process to restore the database within the defined RTO and RPO explain MySQL database methods: Usage of CSV file format to exchange data between applications such as Microsoft Excel, Open Office, Google Docs, etc. Explain the disaster recovery plan 	Total: 11 hrs Theory: 2hrs	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Operating 	Class Room and Computer Lab

		<p>(DRP) database portion drafted and documented.</p> <ul style="list-style-type: none"> Keep your knowledge and know-how on database and OS backup and recovery tools up to date. <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Generate the incremental backup using Binary Log of selected database and export in SQL file format 	<p>Practical:</p> <p>9 hrs</p>	<p>System (Windows, Linux)</p>	
<p>LU6. Restore backup of required database</p>	<p>Trainee will be able to:</p> <ol style="list-style-type: none"> Create empty database Restore backup of required database using WAMP server and backup file 	<ul style="list-style-type: none"> Process of Back up both system and user databases. Knowledge about separate maintenance plan for system databases, i.e., master, model, msdb. Master supports only full backups; tempdb backup is not required, as it gets rebuilt during SQL Server startup. <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to perform backup the selected database and specific table Practice to perform restore the selected database and specific table using different server 	<p>Total:</p> <p>11 hrs</p> <p>Theory:</p> <p>2hrs</p> <p>Practical:</p> <p>9 hrs</p>	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines MS Outlook System (Windows, Linux) 	<p>Class Room and Computer Lab</p>

Module 5: Install / Configure JDK/Open JDK (Java Development Kit)

Objective of the module: After this competency standard candidate will be able to download and install JDK setup and set/troubleshoot environment.

Duration: 54 hours **Theory:** 12 hours **Practical:** 42 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Download and install JDK setup	The trainee will be able to: <ol style="list-style-type: none"> 1. Download JDK version. 2. Save installer file 3. Uninstall old version of Java if installed 4. Perform Complete installation package as per instructional manual 	<ul style="list-style-type: none"> • Knowledge of JDK and JRE • Process of Installation any Browser in system. • Describe downloading file location and setup on system • System Requirements for Installing the JDK <ul style="list-style-type: none"> • Downloading the JDK Installer <p><u>Practical Activity: -</u></p> <ul style="list-style-type: none"> • Practice to download and install Java on computer 	Total: 27 hrs Theory: 6 hrs Practical: 21 hrs	<ul style="list-style-type: none"> • Pen/Pencil • Notebooks • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • JDK 8+ Tool 	Class room Lab
LU2: Set /troubleshoot Environment variable	The trainee will be able to: <ol style="list-style-type: none"> 1. Include the java JDK path in "Environment Variable" 2. Include the java JRE path 	<ul style="list-style-type: none"> • Understanding of path and environment variable • Knowledge of configuring PATH 	Total: 27 hrs Theory:	<ul style="list-style-type: none"> • Pen/Pencil • Notebooks • Desktop/Laptop (Minimum 6GB 	Class room Lab

	<p>in “Environment Variable”</p> <p>3. Verify JAVA Runtime environment</p> <p>4. Troubleshoot JAVA Runtime environment configuration</p>	<p>environment variable Explain JAVA commands to test environment</p> <ul style="list-style-type: none"> • Knowledge about command prompt • Understand how to check Java Version on Windows Using Command Line • On command prompt run “java – version” • How rechecks the installation. <p><u>Practical Activity: -</u></p> <ul style="list-style-type: none"> • Practice to set the System Environment Variables for windows • Practice to remove System Environment Variables • Verify environment variable using Java command • Practice to Perform the activity to check whether JDK is installed in computer or not 	<p>6 hrs</p> <p>Practical:</p> <p>21 hrs</p>	<p>RAM and 100GB ROM)</p> <ul style="list-style-type: none"> • Internet • JDK Tool JRE 	
--	--	--	---	--	--

Module 6 : Install / Configure Eclipse IDE and Run Simple Program

Objective of the module: After this competency standard candidate will be able to install and configure eclipse IDE in PC and create new Java project.

Duration: 86 hours **Theory:** 14 hours **Practical:** 72 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Install Eclipse IDE in PC	The trainee will be able to: <ol style="list-style-type: none"> 1. Check the compatibility of JDK according to Eclipse and system 2. Download package for "Eclipse IDE for Java EE Developers" 3. Install Eclipse 	<ul style="list-style-type: none"> • Introduction of IDE(integrated development environment) • Knowledge of Types of IDE in terms of java • Knowledge about the purpose of using Eclipse • Knowledge of Web browser to download Eclipse IDE • Understanding and purpose of JDK • Different types of packages for Eclipse IDE • Understanding concept of Eclipse IDE for java • Download Eclipse for java Eclipse installer • After downloading unzip, the folder • Knowledge about executable file • Create exe file <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to Download "Eclipse IDE for Java" 	Total: 11 hrs Theory: 2 hrs Practical: 9 hrs	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java EE • JDK Tool • JRE 	Class Room/ Computer Lab

		<ul style="list-style-type: none"> Practice to Perform Installation and run the Eclipse. 			
LU2: Configure Eclipse	The trainee will be able to: <ol style="list-style-type: none"> Open Workspace Launcher pop up screen. Provide directory location for projects workspace Add JDK installed directory path in eclipse IDE 	<ul style="list-style-type: none"> Knowledge of Eclipse workspace About directories and how to create Understanding default workspace Differentiate between JDK and JRE Describe JDK and JRE works Method changing default workspace Setting up your eclipse workspace on system Procedure to Install and run the JREs in eclipse and select directory path) <p><u>Practical Activity: -</u></p> <ul style="list-style-type: none"> Practice to select the launch configuration in eclipse 	Total: 11 hrs Theory: 2 hrs Practical: 9 hrs	<ul style="list-style-type: none"> Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) Internet Eclipse IDE Java EE JDK 8+ Tool JRE 	Computer Lab
LU3: Create new Java project	The trainee will be able to: <ol style="list-style-type: none"> Create new java project using project creation wizard in eclipse Follow the steps in wizard and finish project creation 	<ul style="list-style-type: none"> Method of using Eclipse Method to start the IDE and picking a workspace Understand Eclipse terminology Start the java project About wizards and perform all steps Process to install the Eclipse IDE Method to follow to create a java project in Eclipse Process to Compile, build and run 	Total: 11 hrs Theory: 2 hrs Practical: 9 hrs	<ul style="list-style-type: none"> Pen/Pencil Notebooks Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) Internet Eclipse IDE Java EE JDK 8+ Tool 	Computer Lab

		<p>java program</p> <p>Practical Activity</p> <ul style="list-style-type: none"> Practice to design a simple java program to “simple programme” and elaborate all steps 		<ul style="list-style-type: none"> JRE 	
<p>LU4:</p> <p>Create class in project</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> Create new class in default package Follow the creation wizard and complete class creation. Add main function in your class. 	<ul style="list-style-type: none"> Understanding Packages in java programming Different types of packages Knowledge of wizards Discuss the steps of wizards to create class Understand Class variables and its types Function and its types Describe the main function <p>Practical Activity</p> <ul style="list-style-type: none"> Perform steps of wizards in lab Execute java program and elaborate the steps of main function 	<p>Total:</p> <p>11 hrs</p> <p>Theory:</p> <p>2 hrs</p> <p>Practical:</p> <p>9 hrs</p>	<ul style="list-style-type: none"> Pen/Pencil Notebooks Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) Internet Eclipse IDE Java EE JDK 8+ Tool JRE 	Class Room/Computer Lab
<p>LU5:</p> <p>Run Program</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> Open-source file “Hello.java” in editor panel Write print statement in main function to print “HelloWorld” in eclipse console 	<ul style="list-style-type: none"> Differentiate between source file and object file Basic structure of programming Basic syntax of java programming Basic concept of identifier and keywords Discuss the steps to write program 	<p>Total:</p> <p>17 hrs</p> <p>Theory:</p> <p>2 hrs</p> <p>Practical:</p>	<ul style="list-style-type: none"> Pen/Pencil Notebooks Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) Internet 	Class Room/Computer Lab

	<p>3. Build and rectify if any error occurs</p> <p>4. Run project as java application successfully displaying output</p>	<ul style="list-style-type: none"> • Knowledge about error types • Java program write in eclipse step by step and verify the program • Basic structure of programming • Basic syntax of java programming • Steps to start new java project in eclipse • File Reader • Buffered File Reader • File Input Stream • File Output Stream • Basic Input/output function • Data types • Console application • Short cut keys (display the result <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Execute HelloWorld program and display output on console • Practice to Write a program to display number (Even/Odd) • Practice to Develop program to calculate factorial of given number • Write a program for Array Sorting 	15 hrs	<ul style="list-style-type: none"> • Eclipse IDE • Java EE • JDK 8+ Tool • JRE 	
LU6: Write a program to Read/Write file in Java	<p>The trainee will be able to:</p> <p>1. Create a new java project in Eclipse</p> <p>2. Write a program in java to</p>	<ul style="list-style-type: none"> • Explain Eclipse • Versions of Eclipse • Download, Install, & Configure Eclipse Workspace on Your Machine: 	<p>Total:</p> <p>14 hrs</p> <p>Theory:</p>	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) 	Class Room/Computer Lab

	<p>create a text file "sample.txt" in working directory</p> <p>3. Write sample string in file using java file write statements</p> <p>4. Write a code which can read "sample.txt" and print content on console</p> <p>5. Run program and verify output result in console</p>	<ul style="list-style-type: none"> • Steps to start new java project in eclipse • File Reader • Buffered File Reader • File Input Stream • File Output Stream • Basic Input/output function • Data types • Console application • Short cut keys (display the result) <p><u>Practical Activity: -</u></p> <ul style="list-style-type: none"> • Download and configure Eclipse on your machines. • Deleting al directory with all sub directories and files 	<p>2 hrs</p> <p>Practical:</p> <p>12 hrs</p>	<ul style="list-style-type: none"> • Internet • Eclipse IDE • Java EE • JDK 8+ Tool • JRE 	
--	--	---	---	--	--

Module 7: Create and run GUI program using Java

Objective of the module: The aim of this module is to get knowledge, skills and understanding to create and run GUI program using Java

Duration: 97 hours **Theory:** 10 hours **Practical:** 87 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Configure java plugin in Eclipse	The trainee will be able to: <ol style="list-style-type: none"> 1. Open Eclipse IDE 2. Install java plugin in Eclipse 3. Complete the installation of new software 4. Restart eclipse 	<ul style="list-style-type: none"> • Procedure for Open Eclipse IDE • Knowledge of Java and Eclipse • Procedure of downloading Java plug in Eclipse. • Method of installation java in Eclipse step by step. • Process of restart eclipse (select File etc) <p>Practical Activity:</p> <ul style="list-style-type: none"> • Download and Install Java plugin Eclipse 	Total: 34 hrs Theory: 4 hrs Practical: 30 hrs	<ul style="list-style-type: none"> • Pen/Pencil • Notebooks • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java • JDK 8+ Tool • JRE 	Class Room/Computer Lab
LU2. Create Java application	The trainee will be able to: <ol style="list-style-type: none"> 1. Open Eclipse IDE 2. Choose Java Project as instructed 3. Enter the Java project details 	<ul style="list-style-type: none"> • Process to open Eclipse IDE • Process of selecting Java project • Identify Java project details step by step <p>Practical Activity:</p> <ul style="list-style-type: none"> • Write a program that displays four lines of text in four Labels: • Write your name, ID, Address, 	Total: 33 hrs Theory: 3 hrs Practical: 30 hrs	<ul style="list-style-type: none"> • Pen/Pencil • Notebooks • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE 	Class Room/Computer Lab

		Phone in labels respectively. <ul style="list-style-type: none"> • Set the background of the labels to white. • Set the text color of the labels to black, blue, cyan, green respectively. • Set the font of each label to Times Roman, bold, and 20 pixels. • Set the border of each label to a line border with yellow color. 		<ul style="list-style-type: none"> • Java • JDK 8+ Tool • JRE 	
LU3. Run application and test result	The trainee will be able to: <ol style="list-style-type: none"> 1. Write Java code for "HelloWorld" for GUI application 2. Run project as java application 3. Verify output result in console 	<ul style="list-style-type: none"> • Understand syntax of java code for GUI application • Compile the program in Java • Display output on console <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to develop an app of simple adding subtracting, multiplication and division of three numbers Java for the GUI. 	Total: 30 hrs Theory: 3 hrs Practical: 27 hrs	<ul style="list-style-type: none"> • Pen/Pencil • Notebooks • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java • JDK Tool • JRE 	Class Room/Computer Lab

Module 8 Create and Run Spring Boot Application

Objective of the module: After this competency standard candidate will be able to Create and run Spring boot application.

Duration: 72 hours **Theory:** 15 hours **Practical:** 57 hours

Learning Unit	• Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: - Create Spring boot project	The trainee will be able to: <ol style="list-style-type: none"> 1. Initializer Open Spring URL 2. Create java spring boot web application 3. Add “spring web” in dependency as instructed 4. Download created spring boot project 	<ul style="list-style-type: none"> • Introduction of spring framework • Use of Spring framework • Discuss spring initializer/Spring boot • Working with Properties of spring boot • Spring boot features • Spring tools for eclipse IDE • Pre-boot spring application • Knowledge of Cloud foundry • Procedure to deploy cloud foundry • Spring boot web <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Install the spring boot instruction for java developer 	Total: 12 hrs Theory: 3 hrs Practical: 9 hrs	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java /EE • JDK 8+ Tool • JRE • Spring boot • Spring web 	Class Room/Computer Lab
LU2: - Import project In Eclipse	The trainee will be able to: <ol style="list-style-type: none"> 1. Extract the downloaded project 2. Launch the Eclipse IDE 	<ul style="list-style-type: none"> • Knowledge about Eclipse IDE • Understand the concept of import and export • Knowledge about Maven 	Total: 12 hrs Theory:	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB 	Class Room/Computer Lab

	<ol style="list-style-type: none"> 3. Import the extracted spring boot project in Eclipse as “Existing Maven Project” 4. Perform Maven update and clean install commands on project. 	<ul style="list-style-type: none"> • Using Maven within Eclipse IDE • understanding Maven’s life cycle • Maven dependency issue • Discuss Maven common problem and solution • Discuss the fix error “Updating Maven project” <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Perform lab to import the extracted spring boot project in eclipse as existing Maven project also update Maven and clean install command 	3 hrs Practical: 9 hrs	ROM) <ul style="list-style-type: none"> • Internet • Eclipse IDE • Java /EE • JDK 8+ Tool • JRE • Spring boot • Spring boot CLI • Maven 	
LU3: - Create a Resource Representation Class	The trainee will be able to: <ol style="list-style-type: none"> 1. Create new class and named it as per instruction 2. Add properties in the class as per instructions 3. Create setter and getter method for class properties 4. Create constructors for Class 	<ul style="list-style-type: none"> • Introduction to class • Basic syntax of class • Discuss the class body • Discuss all properties with spring and spring boot • Knowledge about setter and getter • Required setter and getter • Naming convention for setter and getter • Common mistakes when implementing setter and getter • Introduction of constructor • Basic concept of constructor <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Perform lab task to create new class 	Total: 12 hrs Theory: 3 hrs Practical: 9 hrs	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java • JDK 8+ Tool • JRE • Spring boot • Spring boot CLI • Maven 	Class Room/Computer Lab

		and add class as per instruction <ul style="list-style-type: none"> • Perform lab setter and getter method 			
LU4: - Create a Resource Controller	The trainee will be able to: <ol style="list-style-type: none"> 1. Create spring boot REST Controller Class as per instructions 2. Add HTTP GET method in REST Controller as per instructions 	<ul style="list-style-type: none"> • Knowledge of: • Introduction of controller class in spring boot • Use of controller class • Differentiate between controller and rest controller annotation in spring maven • Knowledge of HTTP • Working of Get method • Basic syntax of get method use in Rest controller • Use of HTTP get method <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Perform lab task to rest controller class • Perform lab task HTTP get method in REST controller • Perform task with different scenario as per instructions 	Total: 12 hrs Theory: 3 hrs Practical: 9 hrs	<ul style="list-style-type: none"> • Pen/Pencil • Notebooks • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java /Java EE • JDK 8+ Tool • JRE • Spring boot • Spring boot CLI • Maven 	Class Room/Computer Lab

LU5: - Build and compile Maven project	The trainee will be able to: <ol style="list-style-type: none"> 1. Perform maven update command on spring boot project 2. Perform maven clean command on project using eclipse 3. Perform maven install command on project using eclipse 4. Compile project successfully using maven in Eclipse 	<ul style="list-style-type: none"> • Knowledge of Maven • Discuss the syntax of update command • Use of update command • Discuss the syntax of clean command • Use of clean command • Syntax of install command • Use of install command • Running code with Maven • Discuss the procedure creates a new Maven project via Eclipse <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Build and run Maven project after importing into Eclipse IDE 	Total: 14 hrs Theory: 2 hrs Practical: 12 hrs	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java /EE • JDK 8+ Tool • JRE • Spring boot • Spring boot CLI • Maven 	Class Room/Computer Lab
LU6: - Run and test application	The trainee will be able to: <ol style="list-style-type: none"> 1. Run your spring boot project as java application 2. Test REST API by accessing your HTTP GET method 	<ul style="list-style-type: none"> • Discuss the procedure to Run the spring Boot Application • Introduction of Rest API • Basic principle of Rest API • Mechanics of test a Rest API with live integration test • Basic syntax of Get method • Discuss the steps Rest API testing • Testing tools for REST API <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Install and Run Spring Boot 	Total: 11 hrs Theory: 2 hrs Practical: 9 hrs	<ul style="list-style-type: none"> • Desktop/Laptop (Minimum 6GB RAM and 100GB ROM) • Internet • Eclipse IDE • Java /EE • JDK 8+ Tool • JRE • Spring boot • Spring boot CLI 	Class Room/Computer Lab

		<ul style="list-style-type: none"> • Run GET Method on REST API • Perform different task with different scenario • Testing rest API using reset • Client extension in chrome browser using dummy API 		Maven	
--	--	--	--	-------	--

Module 9: Work in a Team Environment

Objective of the module: The aim of this module to get knowledge, skills and understanding to work in a team environment.

Duration: 30 hours **Theory:** 12 hours **Practical:** 18 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Obtain and convey Workplace information	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Assess the specific and relevant information from the appropriate sources 2. Convey the information using the appropriate medium and ideas 3. Use appropriate non-verbal communication 4. Identify appropriate lines of communication with supervisors and colleagues 5. Use the defined workplace 	<ul style="list-style-type: none"> • Describe the importance of effective communication • State different Sources of information • State different mode of communication • Explain types of non-verbal communication • Explain mode of communication while operating machines • Explain the method of recording the information/instructions. 	<p>Total:8hrs</p> <p>Theory:5hrs</p> <p>Practical:3hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen • White board marker <p>Non-Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer 	<ul style="list-style-type: none"> • Class Room/Lab

	<p>procedures for storage of information</p> <p>6. Inform co-workers and superiors about any deviation</p>	<p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Role Play each trainee introduce himself. • Convey the job description and company general rules and regulations to fellow workers 		system	
<p>LU2: Participate in workplace meetings and discussions</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Express your own opinions 2. Listen other's point of view without interruption 3. Prepare simple questions about workplace procedures 	<ul style="list-style-type: none"> • Describe the protocol of meeting • Describe the role and objective of team. <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Participate in mock meeting for preparation to perform job. 	<p>Total:7hrs</p> <p>Theory:2hrs</p> <p>Practical:5hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker <p>Non Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system 	<ul style="list-style-type: none"> • Class Room/Lab

LU3: Identify own role and responsibility within team	The trainee will be able to: <ol style="list-style-type: none"> 1. Identify the individual role and responsibilities within the team environment. 2. Recognize the roles and responsibility of other team members. 3. Report relationships within team and external to team 4. Share report with co-workers. 	<ul style="list-style-type: none"> • Describe the importance of creating cooperative work environment • Describe the role and objective of team. • Explain risk of failure team work on the project. • Describe the importance of resolving the co-worker's problems • State plan work and organize required resources in coordination with team <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Role Play, get instruction regarding job order from supervisor and convey it to co-workers according 	Total: 7hrs Theory: 2hrs Practical: 5hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker <div>Non-Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • White board marker 	<ul style="list-style-type: none"> • Class Room/Lab
--	---	---	---	--	--

LU4: Support the co-workers	The trainee will be able to: <ol style="list-style-type: none"> 1. Hand over the required materials and tools timely to interfacing team 2. Work together with co-workers in an effective manner. 3. Address the problems of co-worker effectively 4. Report to immediate boss 	<ul style="list-style-type: none"> • Describe the importance of creating cooperative work environment • Describe the importance of resolving the co-worker's problems <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Role Play, Support and guide stressed co-worker in his work-related activity 	Total: 7hrs Theory: 2hrs Practical: 5hrs	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners <p>Non-Consumable</p> <ul style="list-style-type: none"> • White board • Multimedia • Internet Computer system 	<ul style="list-style-type: none"> • Class Room/Lab
------------------------------------	---	---	---	---	--

General assessment guidance for “Computer Networking and Cloud Computing”

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 has "passed". It is – or should be – undertaken with reference to all the objectives or outcomes of the course, and is usually fairly 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 Computer Networking and Cloud Computing:

- Work performances, for example Create a simple app using app inventor that connects with Arduino board over Bluetooth and receive the sensor data to be displayed.
- Work Performances, for example Develop a regulated power supply that will power up your digital circuit
- Demonstrations, for example Design a Fan dimmer circuit.

- Direct questioning, where the assessor would ask the student why he is preparing for a particular application.
- Paper-based tests, such as short answer questions on health and safety, communication skills etc.

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

Examples for indirect assessment of Computer Networking and Cloud Computing include:

- Work products, CC&CC Project portfolio
- Workplace documents, such as a report on health and safety etc.

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, let's imagine if you have **thousands of sensors**, collecting various data all around us. A solution that scale would be to have these microcontrollers sending data securely to the Cloud.

Reliability means that the assessment is consistent and reproducible. The results for the particular application should be the same.

Flexibility means that the assessor has to 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 “Computer Networking and Cloud Computing” “Jr. Programmer/Network Assistant”

This curriculum consists of 09 modules

- Install and configure WAMP
- Design Database
- Create Database in MySQL using WAMP server
- Manipulate the Database using Structured Query Language (SQL)
- Install/Configure JDK (Java Development Kit)
- Install / Configure Eclipse IDE and Run Simple/Program
- Create and run GUI program using Java
- Create and Run Spring Boot Application
- Work in a Team Environment

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 half-hour per module. This can be 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

Final assessment shall be 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 short-answer questions. This part shall cover the technical, functional and generic modules:

For Level -3

- Install and configure WAMP
- Design Database
- Create Database in MySQL using WAMP server
- Manipulate the Database using Structured Query Language (SQL)
- Install/Configure JDK (Java Development Kit)
- Install / Configure Eclipse IDE and Run Simple/Program
- Create and run GUI program using Java
- Create and Run Spring Boot Application
- Work in a Team Environment

For the final practical assessment each student shall be assessed over a period of one day, with Four-hour sessions for each student. During this period, each student must be assessed on his/her ability to the following parameters of security services;

- Area of responsibility
- Tasks
- Guards
- Resources and duties

Complete list of tools and equipment

Sr#	Description	Quantity
1.	Android Studio	Free
2.	Arduino Uno	25
3.	USB mini wire	25
4.	Audio signal generator.	20
5.	AutoCAD software	5
6.	AVO meter/ Digital multimeter	25
7.	Backup software	Free
8.	Bluetooth module	30
9.	BLU-RAY writer	5
10.	Bootable DVD	30
11.	Bootable OS Flash drive/CD	30
12.	Bread board	25
13.	Bread board / Basic electronics trainer kit	25
14.	Bread board / Digital Trainer Kit.	25
15.	Breadboard	25
16.	C IDE	Free
17.	C/C++ IDE	Free
18.	C/Python IDE	Free
19.	Cable CAT 5,6	?
20.	Cable connectors	?
21.	cable taster	
22.	Cables	

23.	Card reader	50
24.	Circuit Breaker.	25
25.	Computer	25
26.	Computer Networks	1
27.	Computer system	25
28.	Computer System Minimum 5th generation with 8 GB RAM and SSD	25
29.	Connecting leads	?
30.	Connecting Wires (FF, FM etc)	10 buses
31.	Connectivity	?
32.	Controller	?
33.	Data sheet of diodes	
34.	Data sheet of FET's.	
35.	Data sheet of SCR	
36.	Data sheet of Transistor.	
37.	Data sheet of Zener diode.	
38.	DC supply (5 V)	25
39.	DC\AC supply	25
40.	Digital clock	3
41.	Digital Multimeter	25
42.	Digital Trainer Kit.	20
43.	Disk Tools	
44.	DLD trainer	20
45.	Dual trace Oscilloscope 0-20MHZ	20
46.	Dual trace-Oscilloscope	?
47.	DVD or BLU-RAY writer	25
48.	Electrician	1
49.	Electrician Tool kit.	1

50.	ESP32	25
51.	Etcher software	
52.	External Hard disks	
53.	Filtration capacitor	
54.	Firewall	
55.	Firewall software.	
56.	Firmware(s)	
57.	Flash Drive	5
58.	Function Generator	25
59.	Hard Disk drives and Solid-State disks.	25
60.	Hard disks	25
61.	Instructional manual	5
62.	Insulation remover	25
63.	Internet	1
64.	Java IDE	2
65.	Keyborad	25
66.	Lamp holder	120
67.	Laptop	01
68.	Load (Lamp)	120
69.	Logic Probe.	5
70.	LoRA concentrator board	5
71.	LoRa module	5
72.	Manageable switch	4
73.	Mass Storage	5
74.	Modem/DSL	2
75.	Mouse	25
76.	MQTT broker	25

77.	MS Office	2
78.	MS Power BI	2
79.	Multi Meter	5
80.	Multimedia projector	1
81.	Networking Devices (Router, Modem, Hub, Firewall, Access Points, Switches etc)	2 Sets
82.	Networking Tool Kit	4 kits
83.	NFC	4
84.	Nodemcu Board	4
85.	NodeMCU module	4
86.	Nose Plier	25
87.	Office Suit	2
88.	OS Bootable DVD	2
89.	OS Bootable Mass storage device	2
90.	Oscilloscope	5
91.	Outlook	
92.	Pen-drive	5
93.	Pi Controller	50
94.	Plier	50
95.	Potentiometer	5
96.	Power Supply	25
97.	Printer	2
98.	Projector	01 for each lab/class
99.	Projector screen	01 for each lab/class
100.	Python IDE	2
101.	RAID	2

102.	RAID card	2
103.	RAM	2 of each type
104.	RapidMiner (CD/Mass Storage)	2
105.	Raspberry Pi Adapter (5V, 2A)	4
106.	Raspberry Pi module	4
107.	Raspberry pi	4
108.	RFID antennas	2
109.	RFID reader	2
110.	Rheostat	2
111.	ROM	5
112.	Router	4
113.	Router software/Firmware.	2
114.	RS232 interfaces	25
115.	Scanner	2
116.	Screw	5
117.	SD card	5
118.	SD card reader	5
119.	Search Engines	1
120.	Series board.	25
121.	Server machine	1
122.	Signal generator	5
123.	Simulator (Packet Tracer)	2
124.	Smartphone	2
125.	Software Development kit	2
126.	Software for Software based RAID.	2
127.	Software to test network.	2
128.	Solder	5

129.	Source of data sheets	2
130.	SPI Interface	5
131.	Step down Transformer	25
132.	Step down Transformer (Normal and center tapped)	25
133.	System (Windows, Linux)	2
134.	Tool kit.	5
135.	Trainer	5
136.	Troubleshooting software.	2
137.	UART transmitter	120
138.	USART transmitter	5
139.	USB micro cable	5
140.	USB mini cable	5
141.	Valid public cloud subscription	1
142.	Voltmeter	12
143.	VPN software.	2
144.	Vulnerability scanning tool	2
145.	Webcam	2
146.	Webcam (digital camera)	2
147.	Weka Software (CD/Mass Storage)	01
148.	White board	1 each class/lab
149.	Wifi module	5
150.	Wifi router	02
151.	Wire Tester	02
152.	Wireless router	02
153.	ZigBee modules	5

List of consumable supplies

1. Note books
2. Inventory registers
3. Pen
4. Pencils
5. Sharpeners
6. Erasers
7. White board markers (Different colors)
8. A4 papers
9. Valid cloud subscription
10. LEDs
11. Female to female header wires
12. Male to female header wires
13. Jumper wires
14. Resistances, capacitors, diodes, zener diode, relays, transistor etc.
15. PVC wires
16. Digital gates
17. Diac,
18. Triac,
19. FETs
20. RJ 45,
21. Category 5 & 6 cable
22. Coaxial cable
23. DVD RWR
24. Soldering wire
25. Soldering paste
26. Two-way switch
27. One way switch
28. AND gate (7408 2-input Quad)
29. Coupling capacitors
30. DIAC
31. Diodes
32. FET (JFET/MOSFET)
33. Humidity Sensor
34. IC 74147
35. IC 7445 BCD to decimal decoder
36. Inductors
37. Lamp
38. LM741 IC
39. Load (LED)
40. MOSFET
41. NAND gate (7400 2-input Quad)
42. Network cable CAT5, CAT6
43. NOR gate (7402 2-input Quad)
44. Power diodes (general purpose, Fast recovery & Schottky)
45. Push Button

46. PVC Pipe/Duct.
47. Resistive load
48. RFID tags
49. Safety procedures
50. Safety signs
51. SCR
52. Seven segment display
53. Single pole switch
54. Socket
55. Solenoid Valves
56. Temperature Sensor
57. Test Indicator.
58. TRIAC
59. UJT
60. White Board marker
61. Wooden/PVC board.
62. X-NOR gate (74266 2-input Quad)
63. X-OR gate (7486 2-input Quad)
64. Zener Diode
65. IR Sensor
66. IR Ultrasonic Sensor
67. NOT gate (7404 Hex NOT gate)
68. NOT gate (7404 Hex)
69. Occupancy Sensor
70. One 7404 IC – hex inverter (NOT gate)
71. OR gate (7410 3-input)
72. OR gate 7432 2-input Quad

Credit values

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

The credit values are as follows:

Competency Standard	Estimate of hours	Credit
Module 1: Install and configure WAMP	51	5.1
Module 2: Design Database	63	6.3
Module 3: Create Database in MySQL using WAMP server	63	6.3
Module 4: Manipulate and Backup Database using Structured Query Language (SQL)	84	8.4
Module 5: Install/Configure JDK (Java Development Kit)	54	5.4
Module 6: Install / Configure Eclipse IDE and Run Simple/Program	86	8.6
Module 7: Create and run GUI program using Java	97	9.7
Module 8: Create and Run Spring Boot Application	72	7.2
Module 9: Work in a Team Environment	30	3
Total	600	60

Members of Curriculum Validation Committee

The following members participated in the qualification validation process at PITAC, Lahore.

Date: 20th to 24th Dec, 2021

S#	Name	Designation
1.	Ms Saima Asghar	DACUM expert, Lahore
2.	Mr Muzammil Hasan	Manager Research, KICS, UET, Lahore
3.	Mr Muhammad Akram	Manager Telecom Networks, Faisalabad
4.	Mr Kashif Bashir	Manager KICS, UET Lahore
5.	Mr Azhar Hussain	Sr Team Lead systems, Orient petroleum, Inc Islamabad
6.	Mr Ameer Hamza	Network Manager, ST&IT department KPK Peshawar
7.	Engr Muhammad Aleem	Industrial Automation Department University of Sargodha (CBT&A assessor)
8.	Dr Ahmad Mustafa	PTEVTA, Lahore
9.	Mr Atif Bashir	Project Manager, NCBA &E west Canal, Lahore
10.	Muhammad Abdul Moez	Structural Engineer, RMCE Lahore
11.	Mr. Sadiq Orakzai	Director Academics, KPK TEVTA
12.	Mr Faisal Sarwar	IPS, PBTE Lahore
13.	Mr Abdul Basit	Assistant Programmer, DM&R division, NESPAK Islamabad
14.	Ms Sheeba ch	Networking Incharge, Bahria University Islamabad.
15.	Ms Samia Amir Hamza	CBT Assessor, Expert, GCU Faisalabad