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सत्यमेव जयते  
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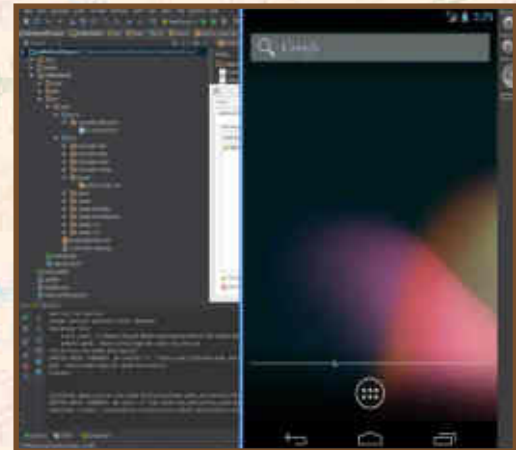


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# Facilitator Guide



Sector  
Telecom

Sub-Sector  
Handset (Terminal Applications) Dev.

Occupation  
Terminal Equipment Application

Reference ID: Tel/Q2300, Version 5.0 NSQF  
Level: 4

**Telecom Terminal  
Equipment  
Application  
Developer  
(Android)**



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**This book is sponsored by  
Telecom Sector Skill Council of India**

Estel House, 3rd Floor, Plot No:- 126, Sector 44

Gurugram, Haryana 122003

Phone: 0124-2222222

Email: [tssc@tsscindia.com](mailto:tssc@tsscindia.com)

Web: [www.tsscindia.com](http://www.tsscindia.com)

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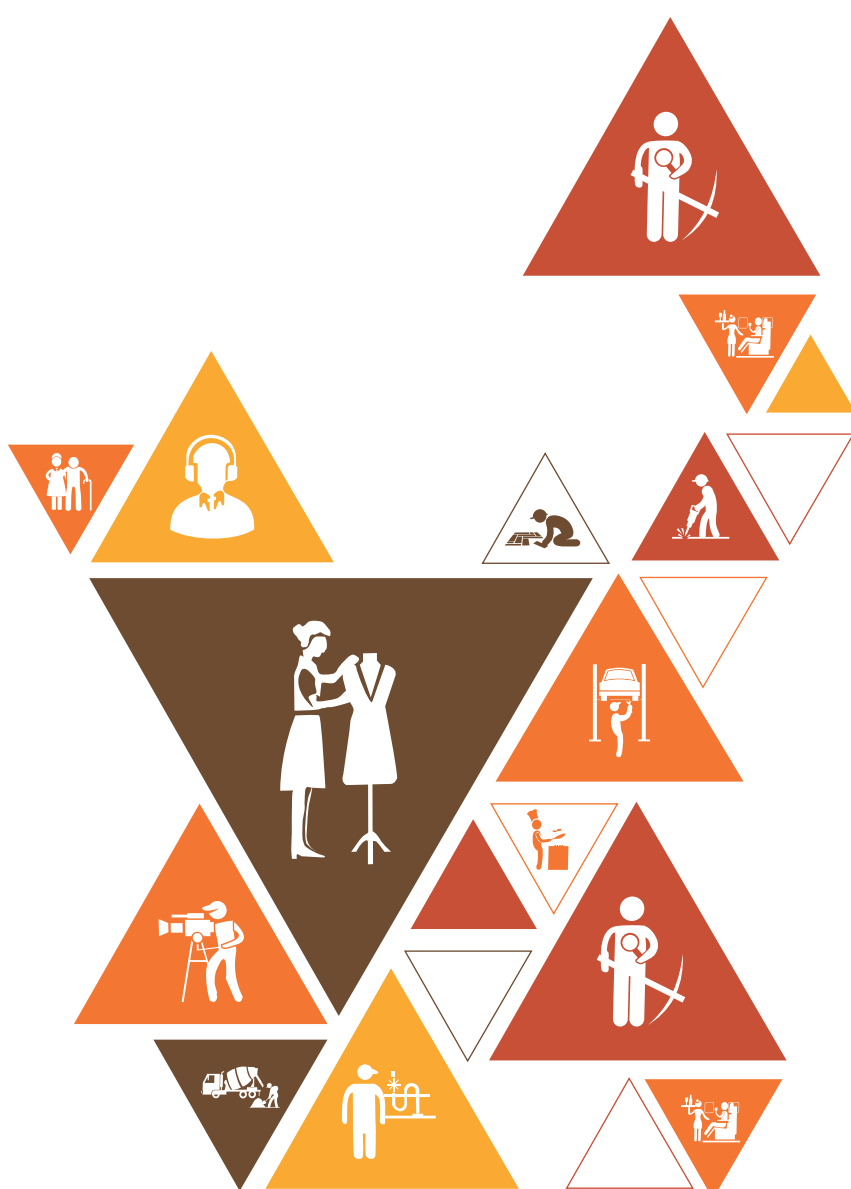
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**Shri Narendra Modi**  
Prime Minister of India

“ Skilling is building a better India.  
If we have to move India towards  
development then Skill Development  
should be our mission. ”



## Acknowledgements

The Telecom Sector Skill Council would like to express its gratitude to all the individuals and institutions who contributed in different ways towards the preparation of this “Facilitator Guide”. Without their contribution it could not have been completed. Special thanks are extended to those who collaborated in the preparation of its different modules. Sincere appreciation is also extended to all who provided peer review for these modules.

The preparation of this Guide would not have been possible without the Telecom Industry’s support. Industry feedback has been extremely encouraging, from inception to conclusion, and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This Facilitator Guide is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

## About this Guide

In the last five years, the growth of the Indian telecommunications sector has outpaced the overall economic growth. This sector is poised for strong growth of about 15% in short term during 2013–17, driven by growth in organised retail, technological advancements, changing consumer preferences and government support. With over 1 billion subscribers, India is the second largest telecom market in the world.

The sector currently employs over 2.08 million employees and is slated to employ more than 4.16 million employees by 2022. This implies additional creation of 2.1 million jobs in the nine-year period.

This Facilitator Guide is designed to impart theoretical and practical skill training to students for becoming an Telecom Terminal Equipment Application Developer (Android).

Individuals at this job must have good programming skills in Java, multithreading and operating system concepts. They must also possess problem solving & analytical skills.

This Facilitator Guide is based on Telecom Terminal Equipment Application Developer (Android) Qualification Pack (TEL/Q2300) & includes the following National Occupational Standards (NOSs):

1. Set-up Android framework/development environment and creating user interface - TEL/N2300
2. Developing Android Value Added Services Application - TEL/N2301
3. Test and Publish Android Applications - TEL/N2302
4. Organise work and Resources as per Health and Safety Standards-TEL/N9101
5. Interact effectively with Team members and customers -TEL/N9102
6. DGT/VSQ/N0102 Employability Skills (60 Hours)

Post this training, the participant will be able to create applications for Android platform that can be used on smart phone and tablets. They will also be able to handle end-to-end activities for application development ranging from installing requisite frameworks, setting-up of development environment, developing apps, security frameworks, testing and deployment.

We hope that this Facilitator Guide will provide a sound learning support to our young friends who want to build an attractive career in the telecom industry.

## Symbols Used



Ask



Tips



Notes



Objectives



Do



Activity



Elaborate



Facilitation Notes



Learning Outcomes



Say



Resources



Summary

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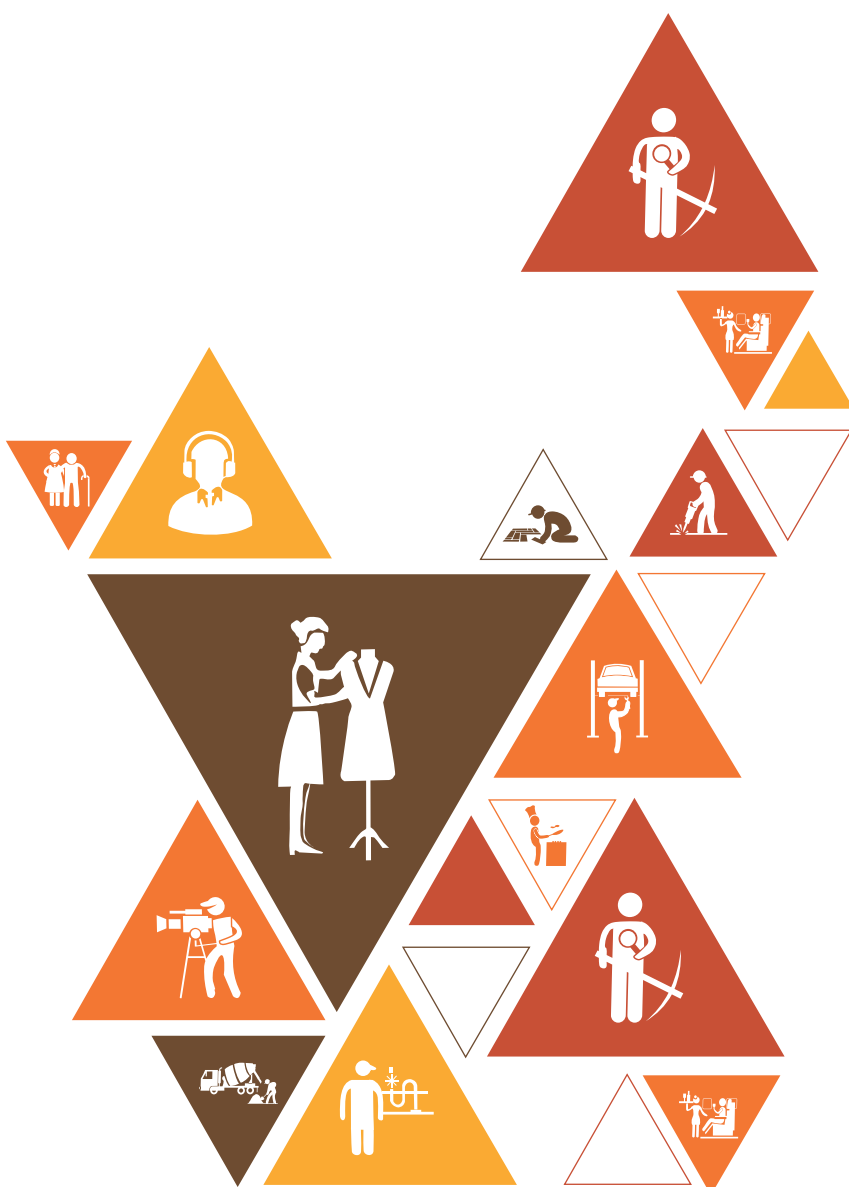
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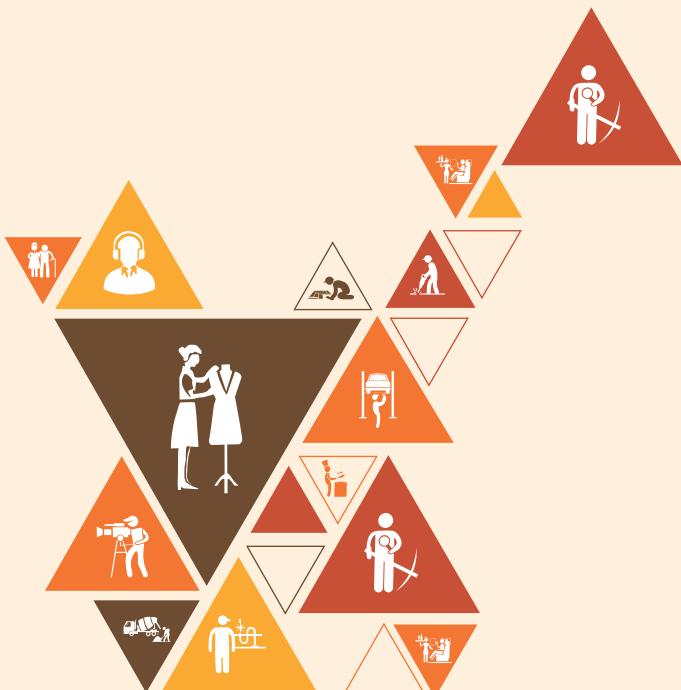
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# 1. Roles and Responsibilities of Telecom Terminal Equipment Application Developer (Android)

- Unit 1.1 – Introduction to the Program
- Unit 1.2 – History of Communication
- Unit 1.3 – Signals
- Unit 1.4 – Networks
- Unit 1.5 – Channel Access Methods
- Unit 1.6 – Mobile Operating Systems
- Unit 1.7 – Windows Mobile
- Unit 1.8 – Versions of Android
- Unit 1.9 – Basic requirements for installing Android on the Device
- Unit 1.10 – Android Installation



## Key Learning Outcomes

At the end of this module, you will be able to:

1. Gain knowledge about the history of communication.
2. Learn about signals
3. Learn about networks
4. Explain about channel access methods.

## UNIT 1.1: Introduction to the Program

### Unit Objectives

At the end of this unit, students will be able to:

- Learn the basics of Telecommunication and its working

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board..

### 1.1.1 Note

The key learning outcomes and unit objectives have been mentioned at the beginning of the module. Make sure that these outcomes and objectives are shared with the participants at the beginning, and when the module gets over do a collective feedback to make sure all have been covered.

This is the first session of the program. Introduce yourself, the program and its purpose in detail. Explain the background, the duration of the assessment and finally how the program will help them to get a job. Ensure that the participants understand how their entire month will be structured and how they will benefit from the course. Answer their questions satisfactorily.

This is the first session of the program which introduces us to the program.

### 1.1.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'.

### 1.1.3 Do

Introduce yourself with your name and background and your role in the training program.

Give them a background of the training program. Talk about:

1. The total duration of the program
2. How the day will be divided
3. Periodic assessments
4. Final assessments
5. Your expectations from them about their conduct, laying ground rules

### 1.1.4 Say

Now that you have understood what the program is about let us get to know each other better.

### 1.1.5 Activity

Take a ball of wool and get the participants in a circle. You are also a part of the circle. Tell them here is a ball of wool, I am going to take a piece of the thread in my hand and throw the ball to anyone. So please be alert and do not let the ball fall. Whoever gets the ball, please introduce yourself (name, and one adjective that best describes you) hold a piece of the thread and throw it to anyone you want. Slowly a web of the wool will be created with everyone holding the thread..

Debrief

Ask them now that we know each other can you see what we have created. Wait for answers. Tell them, “We have created a web, a web of energy.” Ask everyone to loosen their hold on the thread and say, “See if we lose energy how the web loses energy and when we hold it tight the web is strong. Similarly as we do this program and study together, each is responsible for the learning and environment in the group. So be responsible, alert and engaged.”

Skill Practice	Time	Resources
Ice Breaker	1 hr	Small writing pads, pens, white board, marker and ball of wool

### 1.1.6 Say

Let us begin the session by discussing about the program.

### 1.1.7 Say

Terminal Equipment Application Development for Android is a platform where companies build the Android Operating System and its applications for the community.

### 1.1.8 Do

- Share with the participants about the aim of the training program.
- Share with them about the company that invented android and discuss how it has turned out to be the most used operating system till date.
- Explain them the job role of a Telecom Terminal Equipment Application Developer (Android).

### 1.1.9 Elaborate

This program is aimed at training candidates for the job of a “Telecom Terminal Equipment Application Developer (Android)”, in the “Telecom” Sector/ Industry.

Job Role of a Telecom Terminal Equipment Application Developer (Android):

- Terminal Equipment Application Developer (Android) is responsible for creating applications for Android platform that can be used on smartphone and tablets running on Android Operating System.
- The developer handles end-to-end activities for application development ranging from installing requisite frameworks, setting-up of development environment, developing apps, security frameworks, testing and deployment.
- Must have good programming skills in Java, multithreading and operating system concepts.
- Must have problem solving & analytical skills and their translation to specified outcome.

### 1.1.10 Activity

Ask the participants to generate 10 to 15 words about whatever they have understood about the training program so far. Capture each response, as it comes in, on the whiteboard. You can use this opportunity to introduce essential terms, too.

Skill Practice	Time	Resources
Word Tree	2 hrs	Chalk/Marker, blackboard/Flipchart

### 1.1.11 Activity

Ask the participants to refer to the participant handbook and study in detail about responsibilities and attributes of a Telecom Terminal Equipment Application Developer (Android), so that when they are asked questions regarding it they are able to answer.

Skill Practice	Time	Resources
Self Study	2 hrs	Chalk/Marker, blackboard/Flipchart

### 1.1.12 Say

Let us now discuss about the overview of the program and the basic skills which a Telecom Terminal Equipment Application Developer (Android) must possess.

### 1.1.13 Do

Share with the participants about the overview of the program and the basic skills which a Telecom Terminal Equipment Application Developer (Android) must possess.

### 1.1.14 Elaborate

This program will facilitate an overview of:

- Understanding the Android Application Development Framework
- Setting up Android Application Development Environment
- Creating Android Projects
- Creating adaptive and responsive user interface for various devices and form factors
- Deploying app to an emulator or device

The skills that this program trains you in are:

- Communication skills
- Liaisoning and coordination skills
- Reading and writing skills for technical literature related to mobile applications.
- Technical skills
- Task management skills
- Programming skills

### 1.1.15 Do

Tell the participants to get ready for an activity

### 1.1.16 Activity

Ask the participants to refer to the participant handbook and study in detail about overview of the program and the basic skills which a Telecom Terminal Equipment Application Developer (Android) must possess, so that when they are asked questions regarding it they are able to answer them.

Skill Practice	Time	Resources
Self study	2 hrs	Small writing pads, pens and Participant Handbook

### 1.1.17 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.1.18 Summary

1. Computers are the devices that are used for doing random arithmetic calculations automatically.
2. E-mails, documents, videos, songs, etc. can be easily transformed into signal with the help of a computer and then transferred through the internet to the other computer.
3. A telecommunication system comprises of three fundamental parts :-
  - Transmitter
  - Transmission medium
  - Receiver



## UNIT 1.2: History of Telecommunication

### Unit Objectives

At the end of this unit, students will be able to:

- Discuss about the history of telecommunication

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.2.1 Note

This is the second session of the program which talks about history of Telecommunication in India.

### 1.2.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.2.3 Do

1. Begin with revising the topics explained in the previous session. Ask the following questions
  - List down the job role of a Telecom Terminal Equipment Application Developer (Android).
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.2.4 Say

Now let us begin with a new session which is about the history of telecommunication in India. In the previous sessions we have had a clear understanding about the objectives of the program, now we will talk about the history of telecommunication in India.

### 1.2.5 Say

Communication was thought to have started very early when civilizations were set up. The electric telegraph was invented in 1816 by English inventor Francis Ronalds' using static electricity. In 1876, telephone was invented by Alexander Bell and Alisha Gray. The invention of telephone gave birth to the invention of cell phones and mobile phones in the early 18th and 19th centuries.

### 1.2.6 Do

- Show them some pictures of telegraph, telephones, cell phones and modern day smart phones.
- Share with them about smart phone subscription in India.
- Discuss with them about different brands of smart phones.

### 1.2.7 Elaborate

Refer to participant handbook (Pg-4-7) to explain about history of telecommunication in India in detail.

### 1.2.8 Do

Tell the participants to get ready for an activity

### 1.2.9 Activity

Ask the participants to refer to the participant handbook and study in detail about the history of communication, so that when they are asked questions regarding it they are able to answer them.

Skill Practice	Time	Resources
Self-study	2 hrs	Small writing pads, pens and Participant Handbook

### 1.2.10 Activity

Running the activity:

1. While showing the animations, make them understand what they are watching.
2. Ask them if they want to ask anything out of curiosity.

Skill Practice	Time	Resources
Audio/Visual Program	1 hr	Computer, slide show projector

### 1.2.11 Say

Let us now discuss about computers and internet.

### 1.2.12 Do

- Share knowledge with the participants about how computers help in setting up the internet.
- Discuss with the participants about how the internet works.
- Share with the participants about the terms like transmitter, receiver and the transmission medium.

### 1.2.13 Elaborate

- Internet being a wireless data communication medium works because of the hardware like modem.
- Optical fibres help in transmission of the data throughout the world wirelessly.

Refer to the participant handbook (Pg-5-6) to explain in detail about computer and internet.

### 1.2.14 Activity

Ask the participants to get into groups and discuss and explain to each other, diagrammatically about the working of the internet and the role hardware device plays in the transmission.

Skill Practice	Time	Resources
Group Discussion	2 hrs	Small writing pads, pens and participant handbook

### 1.2.15 Say

Let us conclude the session by revisiting what we have learnt so far.

### 1.2.16 Say

As we all went through different fundamentals that make up the basics of telecommunication, we understood how the signals move wirelessly and how the data can be transferred world wide.

### 1.2.17 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

## UNIT 1.3: Signals

### Unit Objectives

At the end of this unit, students will be able to:

- Understand the basics of signals in telecom

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.3.1 Note

This is the third session of the program which talks about signals.

### 1.3.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.3.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are the different modes of communication?
  - What is a transmitter, a receiver and the transmission medium?
  - What is internet?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.3.4 Say

Now let us begin with a new session which is about Signals. In the earlier sections, we learnt about history and basics of Telecommunication; we will now see what are signals.

### 1.3.5 Say

A signal is a medium which helps in the transmission of data from one point to another point. Without a signal wireless electronic devices don't work. Signals are classified into two categories:

1. Analog Signal
2. Digital Signal.

### 1.3.6 Do

Share with the participants different diagrams of the signals.

### 1.3.7 Activity

Running the activity

1. While showing them the videos, make them understand what they are watching.
2. Ask them if they want to ask anything out of curiosity.

Skill Practice	Time	Resources
Audio/Visual Program	1 hr	Videos/ slides on different types of signals, projector and a computer.

### 1.3.8 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.3.9 Summary

1. Signals play a very important role in a telecommunication system since they carry the information.
2. An analog signal can be defined as the signal which changes with respect to the information.
3. A digital signal is that type of signal which carries information in binary form (in combinations of 0s and 1s).

## UNIT 1.4: Networks

### Unit Objectives

At the end of this unit, students will be able to:

- Understand Networks

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.4.1 Note

This is the fourth session of the program which talks about networks.

### 1.4.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.4.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are the different types of signals?
  - What is a transmission medium?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.4.4 Say

Now let us begin with a new session which is about learning the networking fundamentals. We have already gone through signals and internet. Now we will learn what connects information across the world.

### 1.4.5 Say

Now let us understand about Networks.

### 1.4.6 Say

A mutual working of transmitters and receivers over large distances is termed as a network. To transmit information from one place to another in a digital communication system, a controlling unit called a router/modem is used.

### 1.4.7 Do

Share with the participants about different generations of networking.

### 1.4.8 Elaborate

The different generations of mobile networking are:

- GSM 2nd Generation
- UMTS 3rd Generation
- HSPA 3rd Generation
- LTE 4th Generation

Refer to the participant handbook (Pg-8-9) to explain in detail about various mobile operating systems.

### 1.4.9 Activity

Divide the participants in four groups and make them play a quiz on networking and different generations of networking. At the end of the activity repeat what has learnt so far.

Skill Practice	Time	Resources
Quiz	2 hrs	Participant Handbook

### 1.4.10 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.4.11 Summary

1. The mutual working of transmitters and receivers over large distances is termed as telecommunication networks.
2. To transmit information from one place to another in a digital communication system, a controlling unit called a router is used.
3. The mobile phone services started with the zero generation (0G) services which only supported few calls. Further advancements brought 1G, 2G, 3G and 4G services respectively.
4. Basic components of mobile phone:
  - Battery
  - Input
  - SIM Card
  - Memory Card
5. 3GPP is a collaboration between the organisational partners who belong to Asia, Europe and North America.
6. Generations of mobile communication that come under 3GPP:
  - GSM (2nd Generation)
  - UMTS (3rd Generation)
  - HSPA
  - LTE (4th Generation)



## UNIT 1.5: Channel Access methods

### Unit Objectives

At the end of this unit, students will be able to:

- Learn about channel access methods
- Understand about Multiplexers and Demultiplexers

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.5.1 Note

This is the fifth session of the program which talks about various methods involved in channel access.

### 1.5.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.5.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are the different generations of networking?
  - What do you understand by CDMA, UMTS, GSM and LTE?
  - Who are the different modes of communications?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.5.4 Say

Now let us begin with a new session which is about learning channel access methods and how we connect multiple systems to a single system for transmission of data.

### 1.5.5 Say

Now let us understand about multiplexers and de-multiplexers.

### 1.5.6 Say

Multiplexing is a method by which multiple signals are converted into one signal over a shared medium. The device that helps in multiplexing is called as a multiplexer or MUX and the device that helps in Demultiplexing is called as a de-multiplexer or DEMUX.

Demultiplex (DEMUX) is the reverse of the multiplex (MUX) process – it combines multiple unrelated analog or digital signal streams into one signal over a single shared medium.

### 1.5.7 Do

Share with the participants about CDMA

### 1.5.8 Elaborate

CDMA is an abbreviation for code Division Multiple Access which is one of the fundamental channel access schemes. It has a wider radio spectrum and is used in 3rd generation mobile phone systems.

Refer to the participant handbook (Pg-10-11) to explain in detail about channel access methods.

### 1.5.9 Activity

Divide the participants in four groups and make them map out the important points regarding multiplexers and de-multiplexers.

At the end of the activity, reiterate about the use of channel access methods in networking and communication.

Skill Practice	Time	Resources
Board activity	1 hr	Participant Handbook

### 1.5.10 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.5.11 Summary

1. Multiplexing is a method by which multiple signals are converted into one signal over a shared medium
2. In a multiplexed signal the communication channel is divided into many logical channels.
3. The device which helps in the multiplexing is called a Multiplexer or MUX

## Answers to exercises for PHB

1. Which component helps in transmitting the signal in a telecommunication system?  
Ans a: Modem
2. Out of the following options which one describes the 2nd generation communication systems?  
Ans d: GSM
3. Who invented the telephone?  
Ans a: Alexander Graham Bell
4. Channel access scheme is based on which method?  
Ans b: Multiplexing
5. A digital signal carries the information in which form?  
Ans b: Binary (0 and 1)
6. A MUX has  
Ans b: Several inputs and one output
7. In digital communication which device is used to transmit the information  
Ans a: MUX
8. DS-CDMA is used in which mobile generation systems?  
Ans c: 3rd Generation
9. LTE along with GSM and UMTS/HSPA makes which mobile generation system?  
Ans d: 4th Generation
10. Which device is used to convert the multiplexed signals into readable signals on the receiver's end?  
Ans c: Demux

## UNIT 1.6: Mobile Operating Systems

### Unit Objectives

At the end of this unit, students will be able to:

- Learn about Symbian OS and its core structure

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.6.1 Note

This is the sixth session of the program which talks about mobile operating systems.

### 1.6.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.6.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are the different generations of networking?
  - Define CDMA, UMTS, GSM and LTE.
  - What are the different modes of communications?
  - What are channel access methods?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.6.4 Say

Now let us begin with a new session which is about learning different mobile operating systems. In the previous sessions we have had a clear understanding about the hardware and networking fundamentals, now we will talk about different operating systems.

### 1.6.5 Say

Now let us understand about different mobile operating systems.

### 1.6.6 Say

A mobile operating system is an operating system for smart phones, tablets and other mobile devices. It combines features of a computer operating system with other features useful for mobile or handheld use like camera, music player etc.

### 1.6.7 Do

Share with the participants about Symbian OS.

### 1.6.8 Elaborate

Symbian is a mobile operating system which is designed for smartphones. It has been used by several major brands like Nokia, Samsung, Motorola and Sony Ericsson worldwide. Symbian OS is written in C++ language which is mainly done with the help of a software development kit (SDK). The Symbian UI variants/platforms are as following:

- S60
- S80
- S90
- UIQ
- MOAP (Mobile oriented applications Platform) Japan only
- OPP (Successor of MOAP)

Refer to the participant handbook (Pg-16-19) to explain about Symbian OS in detail.

### 1.6.9 Activity

Show the participants different versions of Symbian OS and the UI associated with it in different handsets.

At the end of the activity, reiterate what has been taught.

Skill Practice	Time	Resources
Audio/Visual Program	1 hr	Slides/videos

### 1.6.10 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.6.11 Summary

1. User interface is a virtual space where interactions between a human and machine take place. This interaction helps the human users to operate the machine really effectively.
2. Qt is a framework which is used for the development of applications of the operating system with the graphical user interface
3. The Symbian operating system is written in C++. Since C++ is also used in creating software in computers, therefore, C++ is used along with the Symbian standards to write the operating system
4. Eclipse is an integrated development environment which is used for programming computers. Mostly written in JAVA, Eclipse can also write programs in other computer languages which include C++, COBOL, D, C, Fortran etc.
5. The layers in which Symbian is written are:
  - User Interface Layer
  - Application Services Layer
  - . Java ME
6. Operating System Services and Layer Generic operating system services
  - Communication services
  - Multimedia and Graphics Services
  - Connectivity Services
7. Base Services Layer
8. Kernel Services and Hardware Interface Layer

## UNIT1.7: Windows Mobile

### Unit Objectives

At the end of this unit, students will be able to:

- Learn about different features of a Windows OS.
- Learn about different features of Blackberry OS.

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.7.1 Note

This is the seventh session of the program which talks about windows mobile.

### 1.7.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.7.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What is a User Interface UI?
  - What are the different versions of Symbian OS?
  - Which are the platforms where Symbian OS is written?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.7.4 Say

Now let us begin with a new session which is about other kinds of mobile operating system, Windows Mobile and BlackBerry OS.

### 1.7.5 Say

Now let us understand about Windows Mobile.

### 1.7.6 Say

Windows Mobile is a family of mobile operating systems which was developed by Microsoft for smart phones and pocket computers. Some of the standard features in the windows phone are multitasking, navigation etc.

### 1.7.7 Do

Share with the participants about Virtual Private Networking and Point-to-Point Tunnelling Protocol.

### 1.7.8 Elaborate

VPN is a private network which is made by the computer itself so that other computers can be connected to it via internet. Whereas, PTPP (Point-to-Point Tunnelling Protocol) is a method by which VPNs (Virtual Private Networking) are implemented.

Refer to the participant handbook (Pg-20-21) to explain in detail about Windows Mobile.

### 1.7.9 Say

Now let us understand about BlackBerry OS.

### 1.7.10 Say

BlackBerry OS is a mobile operating system which was developed by BlackBerry Ltd for the smart phones. The features that BlackBerry supports are synchronizing data with applications like Microsoft Exchange, tasks, calendar etc.

### 1.7.11 Do

Share with the participants about Mobile Information Device Profile (MIDP).

### 1.7.12 Elaborate

MIDP stands for Mobile Information Device Profile. It is a mobile specification which is published for using Java on mobile phones.

Refer to the participant handbook (Pg-21-22) to explain in detail about BlackBerry OS



### 1.7.13 Activity

Show the participants different videos on windows mobile handsets and blackberry OS handsets and the functions they carry.

At the end of the activity, reiterate about what has been taught

Skill Practice	Time	Resources
Audio/ Video Program	2 hrs	Slides/Videos

### 1.7.14 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.7.15 Summary

1. Windows mobile comes with some basic installed applications:
  - Internet Explorer Mobile (Default Browser)
  - Windows Media Player
  - Microsoft Office
2. Virtual Private Networking is a private network which is made by a computer itself so that other computers can be connected to it via internet.
3. The Point-to-Point Tunneling Protocol is a method by which virtual private networks (VPNs) are implemented.
4. MIDP stands for Mobile Information Device Profile. It is a mobile specification which is published for using Java on mobile phones and personal digital assistants (hand held personal computer).

## UNIT 1.8: Android OS

### Unit Objectives

At the end of this unit, students will be able to:

- Understand about an Android OS
- Understand the features of an Android device

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.8.1 Note

This is the eighth session of the program which talks about Android OS (Operating System).

### 1.8.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.8.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What do you understand by terms like VPN, PTPP and MIDP?
  - What are the handsets that use Windows OS and BlackBerry OS?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.8.4 Say

Now let us begin with a new session which is about learning Android OS.

### 1.8.5 Say

Now let us understand about Android OS.

### 1.8.6 Do

Share with the participants about different android Features.

### 1.8.7 Elaborate

With Android you can view the Weather details, play games and even switch on and off different functions like Wi-Fi, mobile Bluetooth and mobile network etc.

Refer to the participant handbook (Pg-23-25) to explain about various Android Features.

### 1.8.8 Activity

Show the students different Android features like UI and games and how we can view a weather report by simply tapping on a button.

At the end of the activity, reiterate about what has been taught.

Skill Practice	Time	Resources
Audio/ Video Program	6 hrs	An Android Phone or a computer installed with an Android Emulator like Blue stacks

### 1.8.9 Do

Share with the participants about source code.

### 1.8.10 Elaborate

A source code can be defined as that programming language which is written in a readable computer language in the form of text.

Refer to the participant handbook (Pg-23) to explain the participants about source code.

### 1.8.11 Activity

Type a simple “Hello, World” program in C language and show them the output so that they can better understand how the source code works.

At the end of the activity, reiterate about what has been taught.

Skill Practice	Time	Resources
Audio/ Video Program	6 hrs	Computer installed with C language

### 1.8.12 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.8.13 Summary

1. Android is a Linux based operating system which is developed by Google. This operating system is designed for touchscreen smart-phones and tablets.
2. Source code can be defined as that programming language which is written in a readable computer language in the form of text.
3. ARM stands for Acorn RISC (Reduced instruction set computing) Machine.
4. Different versions are:
  - Froyo, Android (2.2 - 2.2.3)
  - Gingerbread, Android (2.3 - 2.3.7)
  - Ice Cream Sandwich, Android (4.0 – 4.0.4)
  - Jelly Bean, Android (4.1 – 4.3.1)
  - KitKat, Android (4.4 – 4.4.4)
  - Lollipop, Android (5.0 – 5.1.1)

## Answers to exercises for PHB

Choose the correct Answer:

1. Microsoft Windows is

Ans a: an Operating System

2. Symbian is an operating system designed by

Ans b: Nokia

3. Eclipse is a

Ans b: Integrated Development Environment

4. Google Play Store is a platform for downloading applications for which mobile operating system

Ans a. Android

5. Android version 4.4 is known as

Ans a: Kitkat

6. The minimum amount of RAM required to run an android system is

Ans b: 256 MB

7. RISC stands for

Ans a: Reduced instruction system computing

8. The private network made by the computer so that other computers can get connected to it via internet is known as

Ans a. Virtual private network

9. Windows media player is the application for which mobile operating system

Ans d: Windows Mobile

10. What is used to run java on mobile phones

Ans a. MIDP

## UNIT 1.9: Basic Requirements for Installing Android on the Device

### Unit Objectives

At the end of this unit, students will be able to:

- Learn the basic hardware and system requirements for installing Android

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.9.1 Note

This is the ninth session of the program which talks about basic requirements for installing Android on the device.

### 1.9.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.9.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are the different versions of Android?
  - What are the different features of an Android device?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.9.4 Say

Now let us begin with a new session which is about learning the basic requirements of installing Android.

### 1.9.5 Say

Now let us understand about the basic requirements.

### 1.9.6 Say

The basic requirements to install Android on a device are the configurations of the following hardware:

- Chipset
- Memory
- Storage
- Primary Display
- Navigation Keys
- Camera
- Bluetooth
- USB

The details of the hardware requirements and system requirements can be read in detail in the participant handbook (Pg-35-39).

### 1.9.7 Activity

Ask the participants to study in detail about the hardware and system configurations for installing Android on a device by referring to participant handbook, so that when they are asked questions related to it, they are able to answer it.

Skill Practice	Time	Resources
Self-Study	2 hrs	Participant Handbook

### 1.9.8 Activity

Divide the participants in a group of 4 and make them play a quiz based on installation of android (including system requirements). At the end of the activity, reiterate about what has been discussed.

Skill Practice	Time	Resources
Quiz	2 hrs	Participant Handbook

### 1.9.9 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 1.9.10 Summary

1. A chipset is defined as the type of hardware which holds a collection of circuits which are required to work as one unit in order to perform a task with the system.
2. The minimum memory requirements for installing Android on the device should be 128 MB RAM (Random Access Memory) and 256 MB external flash memory or the storage memory.
3. Bluetooth is wireless technology developed for data transfer under personal area networks from one device to another.
4. USB is a way of data transfer from a personal computer to an android device and vice-versa.



## UNIT 1.10: Android Installation

### Unit Objectives

At the end of this unit, students will be able to:

- Perform Android installation on different Operating Systems on a Computer

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 1.10.1 Note

This is the tenth session of the program which talks about Android Installation.

### 1.10.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 1.10.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are the hardware requirements for installing Android?
  - What are the basic system requirements for installing Android?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 1.10.4 Say

Now let us begin with a new session which is about learning to install Android on the computer.

### 1.10.5 Activity

Ask the participants to divide themselves into four groups and perform android installation.

At the end of the activity go around and check whether each group has installed it or not.

Skill Practice	Time	Resources
Installation practice	7 hrs	Computer

### 1.10.6 Elaborate

Refer the Participant Handbook (pages- 40-52) for steps regarding the installation of Java Development kit and Android Studio. Follow the links and show the participants how to follow the links and install Android on the computer.

### 1.10.7 Activity

Ask the participants to divide themselves into four groups and perform android installation.

At the end of the activity go around and check whether each group has installed it or not.

Skill Practice	Time	Resources
Installation practice	7 hrs	Computer

### 1.10.8 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

## Answers to exercises for PHB

Choose the correct Answer:

1. Hardware which holds a collection of circuits is called as:  
Ans c: Chipset
2. The minimum Random Access Memory(RAM) for installing Android on the system should be  
Ans b: 128 MB
3. Which of the following is an Object Oriented Programming Language  
Ans c: Java
4. An object has  
Ans a: States and behaviour
5. Which is the correct syntax of writing the method name  
Ans d: public void myMethodName()
6. Using blank line in the program in Java  
Ans b: is independent of the blank line
7. `System.out.println("")`  
Ans d: Is a command to avoid printing the argument
8. `/* this is an android learning process */`  
Ans a: Is a comment line
9. Eclipse is a(an)  
Ans c: Integrated development environment
10. Java is case sensitive  
Ans a: True





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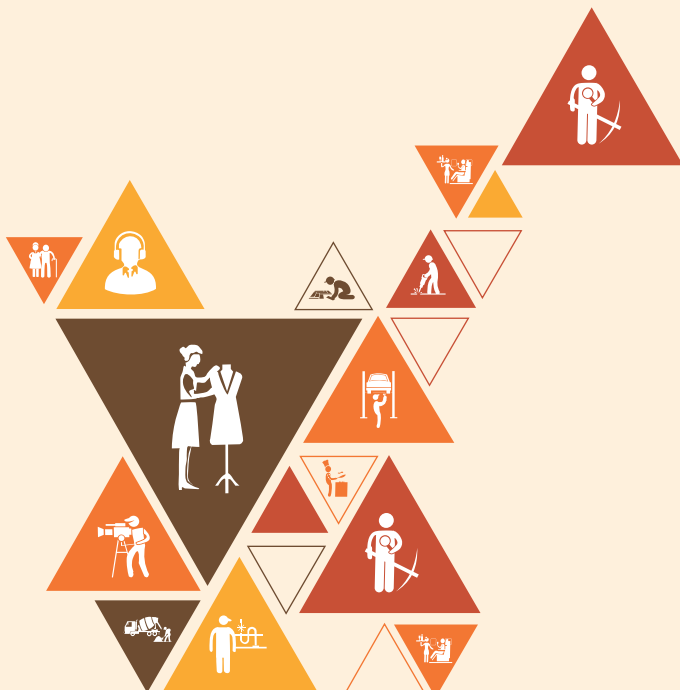


## 2. Set up Android framework/Development Environment and creating user interface

Unit 2.1 – Creating a Simple Project

Unit 2.2 – Running the Project

Unit 2.3 – Creating and Running a Simple User Interface



TEL/N2300

## Key Learning Outcomes

At the end of this module, you will be able to:

1. Understand and develop system flow and coding
2. Conceptualize applications
3. Create Android Virtual Device

## UNIT 2.1: Creating an Android Project

### Unit Objectives

At the end of this unit, students will be able to:

- Learn how to create an Android Project
- Identify components of a class definition and their functions

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 2.1.1 Note

This is the eleventh session of the program which talks about Android project.

### 2.1.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 2.1.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What is Java Development kit?
  - What is Android Studio?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 2.1.4 Say

Now let us begin with a new session which is about learning to create a simple Android Project.

### 2.1.5 Elaborate

Refer to participant handbook to explain the participants about creating android projects.

## 2.1.6 Activity

First show the participants how a simple Android Project is written. Then compile it and show them the output. After that divide the participants into four groups and make them practice the same programs for them to get a better working understanding of the source code.

At the end of the activity, reiterate about what has been learnt.

Skill Practice	Time	Resources
Creating an Android Project	11 hrs	Computers

## 2.1.7 Notes for Facilitation

- Ask participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question



## UNIT 2.2: Running the Project

### Unit Objectives

At the end of this unit, students will be able to:

1. Learn to enable On-device developer options
2. Understand how to run an application on an Android Emulator
3. Describe the procedure to run the application on a real device

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 2.2.1 Note

In this unit we will learn how to run the Android project on a real device. Before running we need to configure if the device is compatible with the computer.

### 2.2.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 2.2.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - How did we create the new android project
  - What is Android Studio?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 2.2.4 Say

Now let us begin with a new session which is about running the Android Project that we created in the previous session on various real devices

### 2.2.5 Elaborate

Refer to participant handbook to explain the participants about running the android projects on various devices and on various operating systems.

## 2.2.6 Activity

First show the participants how to compile and show the output of the project. After that, divide the participants into four groups and make them practice the same programs for them to get a better working understanding of the source code.

At the end of the activity, reiterate about what has been learnt.

Skill Practice	Time	Resources
Running Android Project	11 hrs	Computers

## 2.2.7 Notes for Facilitation

- Explain the steps for running the project on various devices. Help them to understand the steps.
- Encourage other participants to answer it and to encourage peer learning in the class.
- Clarify all doubts of the participants.
- Ask them to answer the questions given in the participant handbook.
- Ensure that all the participants answer every question.

## UNIT 2.3: Creating and Running a Simple User Interface

### Unit Objectives

At the end of this unit, students will be able to:

1. Create and run a simple User Interface
2. Understand how to add a text field
3. Learn how to add a button

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 2.3.1 Note

In this unit we will learn how to create a simple user interface like adding a text field and a button and running it to see the output.

### 2.3.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session,

### 2.3.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - How did we run the android project
  - What are the various OS on which it can run?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 2.3.4 Say

Now let us begin with a new session which is about adding user interface to our project that is adding a text field and a button and running it to show the output

### 2.3.5 Elaborate

Refer to participant handbook to explain the steps for adding a textfield and a button and run it to show the output

### 2.3.6 Activity

First show the participants how to add a text field and a button in the project and run it. After that divide the class into four groups and make them work as a team for better understanding of the concept. At the end of the activity, reiterate about what has been learnt.

Skill Practice	Time	Resources
Add simple user interface like text field and button to the Project and run it	11 hrs	Computers

### 2.3.7 Notes for Facilitation

- Explain the steps for adding simple user interface tools like textfield and button to the project and running it. Help them to note down the steps.
- clarify doubts of the participants if any
- Encourage other participants to answer it and to encourage peer learning in the class
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

## Answers to exercises for PHB

Choose the correct Answer:

1. Which software is used for developing the Android Application?

Ans c: Android Studio

2. To support more than a couple of virtual devices, what should be the version level of Android?

Ans a: Higher

3. The file which defines the fundamentals of an application which developing in Android Studio is known as:

Ans b: Manifest file

4. USB Debugging helps in:

Ans a: Installing an App on the Device

5. Deployment target window shows

Ans b: Only Emulators

6. The file for defining an earlier performed activity is

Ans b: Manifest.xml

7. What does android:layout\_width and android:layout\_height in the syntax signify?

Ans: b and d height and width

8. At what percentage of devices will the application run if the API level is 19 and later?

Ans c: 73.9%

9. "view" element of the layout is defined by

Ans a: Activity\_main.xml

10. What is the correct syntax for declaring the width or height of a view?

Ans d: match\_parent



## Key Learning Outcomes



**At the end of this module, you will be able to:**

1. Learn to create various layouts
2. Understand messaging services - sending and processing SMS
3. Understand how to perform networking operations
4. Learn about different types of mobile processors
5. Learn about different type of storages
6. Understand how to save the data in the internal as well as external storage
7. Understand how to work with SQLite
8. Create and loading the database
9. Deleting and Updating database

## UNIT 3.1: Basic Layout, Short messaging Services and Networking

### Unit Objectives

At the end of this unit, students will be able to:

- Write the source code for different layouts of an Android device
- Send an SMS using code
- Configure the networking with a source code

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 3.1.1 Note

This is the twelfth session of the program which talks about basic layout, short messaging services and networking.

### 3.1.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 3.1.3 Do

1. Begin with revising the things explained in the previous session. Ask the following questions
  - What are emulators?
  - What is a layout?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 3.1.4 Say

Now let us begin with a new session which is about learning to create projects on User Interfaces, Short Messaging Service and networking Source codes.



### 3.1.5 Elaborate

Refer to participant handbook (Pg-76-115) to explain about creating projects on user interface, Short Messaging Service and networking Source codes.

### 3.1.6 Activity

First, create any one of the user interfaces to illustrate the participants. Then compile it and show them the output. After that divide the participants into four groups and make them practice other interfaces for them to get a better working understanding of the source code. Also, show them how to send an SMS using code and how the network can be set-up using code.

At the end of the activity, reiterate about what has been learnt.

Skill Practice	Time	Resources
Writing user interfaces, SMS and networking source codes	28 hrs	Computer

### 3.1.7 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 3.1.8 Summary

1. Linear layout is the simple and most basic layout. It is arranged in both horizontal direction and vertical direction. We will study the code for both the layouts and then run on the emulator to check the application.
2. Relative layout displays the child views in relative positions
3. Table layout is used to display child views in rows and columns. Image, text, button view can be shown in different child views through table layout.

## UNIT 3.2: Data Storage

### Unit Objectives

At the end of this unit, students will be able to:

1. Learn about different type of storages
2. Understand how to save the data in the internal as well as external storage

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 3.2.1 Note

This is the thirteenth session of the program which talks about data Storage

### 3.2.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 3.2.3 Do

1. Begin with revising the things explained in the previous session. Ask the following questions
  - Name different user interfaces.
  - What is an XML file and what is the role of activity file?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 3.2.4 Say

Now let us begin with a new session which is about learning about data Storage How the data can be stored in the internal memory, the external memory and how SQL helps in the data management in an Android device will be learnt in this session.

### 3.2.5 Elaborate

Explain the participants in detail about data storage techniques like internal storage and external storage, explain about the public and private files and difference between them.

### 3.2.6 Activity

Divide the class into four groups and ask them to create source code for data management

Skill Practice	Time	Resources
Writing source code for data management	22 hrs	Participant Handbook, Computer

### 3.2.7 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 3.2.8 Summary

1. A processor may be defined as an electrical circuit whose function is to perform operations on some external data source which may usually be a memory or some other data stream.
2. Types of processors:
  - Nvidia Tegra
  - Northbridge
  - Southbridge
3. Snapdragon is a product of Qualcomm which is nothing but a package of System on a Chip (SoC) semiconductor for mobile devices.
4. Two ways in which file can be saved:-
  - Public Files- Public files are those files that stay on the device even if the user does any modification.
  - Private Files- Private files are the files which are accessible for applications and they get deleted as soon as the application is removed.

## UNIT 3.3 Working with SQLite

### Unit Objectives

At the end of this unit, students will be able to:

1. Learn how to create and load databases
2. Learn to delete and update databases

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 3.3.1 Note

In this unit, the participants will learn how to create and load databases, and learn how to delete and update databases.

### 3.3.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 3.3.3 Do

1. Begin with revising the things explained in the previous session. Ask the following questions
  - what is a scroll view layout?
  - What is a layout?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 3.3.4 Say

Now let us begin with a new session which is about learning to create projects on User Interfaces, Short Messaging Service and networking Source codes.

### 3.3.5 Elaborate

Refer to participant handbook to explain the concepts of database. How to create a database, load the database, update a table and delete a table in SQLite

### 3.3.6 Activity

First, create a database and load it. work on update and delete database.

After that divide the participants into four groups and make them practice working with databases. At the end of the activity, reiterate about what has been learnt.

Skill Practice	Time	Resources
Writing user interfaces, SMS and networking source codes	28 hrs	Computer

### 3.3.7 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 3.3.8 Summary

1. Explain the databases are used for storing useful information for future retrieval.
2. For repeating or structured data, such as some contact information, it is ideal to save the data on a database. The APIs needed to access the database on Android are available in `android.database.sqlite.package`
3. Tables are created inside the database to store the required information.

## Answers to exercises for PHB

Choose the correct Answer:

1. Tegra is a processor of which manufacturer  
Ans b:Nvidia
2. Which hardware component is responsible for handling communication among the CPU, RAM, video cards etc:  
Ans a: Northbridge
3. Which files stay in the system even after the user does any modification?  
Ans b: Public Files
4. Handling computers input and output functions is done by?  
Ans b:Southbridge
5. A formal declaration of how the data should be arranged in SQLITE database is called as:  
Ans: Schema
6. A class which keeps the constants that are helpful in defining the names for URLs, tables and columns and allows using the same constants across all other packages in the same package is called as  
And d: Public
7. Correct syntax for the table to query  
Ans a:FeedEntry.TABLE\_NAME
8. A clause defines a  
Ans c: Column
9. To test against what is bound inside the clause, we use  
Ans c: Arguement
- 10.The files that stay on the system even after any manipulation is being done are known as  
Ans b: Public Files



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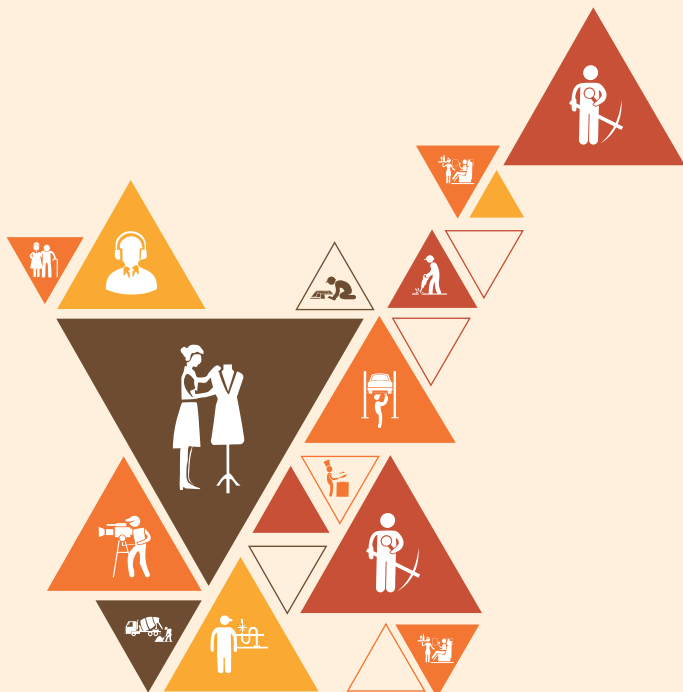
## 4. Testing and Publishing

Unit 4.1 – Testing and Publishing

Unit 4.2 – Security

Unit 4.3 – Networking and Publishing

Unit 4.4 – Support and Maintenance



TEL/N2302

## Key Learning Outcomes

At the end of this module, you will be able to:

1. Test an App
2. Make the application secure
3. Publish the app online



## UNIT 4.1: Testing and Publishing

### Unit Objectives

At the end of this unit, students will be able to:

- Understand the testing techniques
- Publish the application on Google play and third party websites

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 4.1.1 Note

This is the fourteenth session of the program which talks about testing and publishing.

### 4.1.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 4.1.3 Do

1. Begin with revising the things explained in the previous session. Ask the following questions
  - What is SQLite?
  - What is meant by a database?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 4.1.4 Say

Now let us begin with a new session which is about learning how to test the applications we have written and then we will learn how we can publish those applications on Google Play or on a third party Website.

### 4.1.5 Do

Refer to the participant handbook (Pg-134-140 and 144-145) to explain about how to test an application and then publish it on Google Play or a third party Website.

### 4.1.6 Activity

Provide each participant with a system and ask them to test an application and then publish it.  
Go around the class to check whether the participants are testing the application correctly or not.  
At the end of the activity reiterate what has been taught to end the activity successfully.

Skill Practice	Time	Resources
Testing an application and publishing	32 hrs	Participant Handbook, Computer

### 4.1.7 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 4.1.8 Summary

1. Some areas in the development of android which should be taken into consideration are as following:
  - Activity lifecycle
  - Database and file system operations
  - Device hardware
2. Types of testing are:
  - Unit Testing
  - Alpha Testing
  - Beta Testing
  - UI Testing
  - User Acceptance Test
  - Performance Test
  - System Test
3. Debugging may be defined as resolving defects that prevent proper function of software or a device.

## UNIT 4.2: Security

### Unit Objectives

At the end of this unit, students will be able to:

- Learn about security of an Android device
- Understand Malwares

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 4.2.1 Note

This is the fifteenth session of the program which talks about security.

### 4.2.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 4.2.3 Do

1. Begin with revising the things explained in the previous session. Ask the following questions
  - What is testing?
  - What is meant by debugging?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 4.2.4 Say

Now let us begin with a new session which is about learning how to ask for permissions and make the applications secure.

#### 4.2.5 Do



Refer to the participant handbook to explain how to make an application secure.

#### 4.2.6 Activity



Ask the participants to refer to Participant Handbook and study in detail about how to make an application secure, so that when they are asked question regarding it they are able to answer it.

Skill Practice	Time	Resources
Self-study	6 hrs	Participant Handbook

#### 4.2.7 Notes for Facilitation



- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

#### 4.2.8 Summary



1. Malware or malicious software is a type of software which is used to tamper with computer operations, gain access into private computers and gather sensitive information. Malware may be made to spy on one computer or the other without the knowledge of the user.
2. The most common malware are as under:
  - Virus
  - Trojan horse

## UNIT 4.3: Networking and Publishing

### Unit Objectives

At the end of this unit, students will be able to:

1. Understand about networking and publishing
2. Understand the importance of networking and publishing
3. Know the process involved in networking and publishing

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

### 4.3.1 Note

This is the fifteenth session of the program which talks about networking and publishing of a project.

### 4.3.2 Say

Good morning and a very warm welcome to this training program 'Telecom Terminal Equipment Application Developer (Android)'. Before we begin this session let us have a quick recap of the previous session.

### 4.3.3 Do

1. Begin with revising the things explained in the previous session. Ask the following questions
  - What is a malware?
  - Name a malware that you know
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

### 4.3.4 Say

Now let us begin with a new session which is about learning how to ask for permissions and make the applications secure.

### 4.3.5 Do

Refer to the participant handbook to explain about network protocols, configuration of application and publishing a project through network.

### 4.3.6 Activity

Ask the participants to refer to Participant Handbook and study in detail the steps to publish a project, configure the application, type of protocols used. Publish it through email and website.

Skill Practice	Time	Resources
Configure the application, release the application	6 hrs	Participant Handbook

### 4.3.7 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question

### 4.3.8 Summary

1. we read the steps of networking and publishing.
2. Publishing is the process of releasing the application so that users can access it.
3. configuring the application for release
4. Releasing it through email and website.

## Answers to exercises for PHB

Choose the correct Answer:

1. The internal acceptance testing done on the developers' site is known as:  
Ans c:Alpha Testing
2. Removing an error from the program is known as:  
Ans b: Debugging
3. Testing of the whole system is known as:  
Ans c: System Testing
4. The number of permissions that an application requests should be:  
Ans b: Minimum
5. A Trojan horse is:  
Ans b:Not detectable and does not infect files
6. Testing done by a selected number of users to check the performance of the application is called as:  
Ans b: Performance Testing
7. The extension used by android application at the time of release is:  
Ans a:APK
8. In unit testing if the developer is unable to implement the solution according to the design, the test will  
Ans b: Fail
9. Publishing an application is:  
Ans a: Releasing the Application for the user
10. Providing access to the content provider uses which attributes:  
Ans a:Boolean

## UNIT 4.4: Support and Maintenance

### Unit Objectives

At the end of this unit, students will be able to:

1. Learn about various procedures for maintaining an Android App
2. Understand how to maintain the device
3. Know how to get rid of the junk files to clean the system

### Resources to be Used

Participant Handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board.

#### 4.4.1 Note

This is the sixteenth session of the program which talks about maintaining the user's android device by deleting messages, media files and uninstalling the unused applications.

#### 4.4.2 Say

Good morning and a very warm welcome to this training program 'Terminal Equipment Application Developer(Android)'. Before we begin this session let us have a quick recap of the previous session.

#### 4.4.3 Do

1. Begin with revising the things explained in previous session. Ask the following questions
  - What are permissions?
  - What is signature protection level?
2. Encourage the participants to give their response
3. Ensure that the class should not lose focus
4. Clarify if they have any doubts
5. Tell them about what they are going to learn in this session

#### 4.4.4 Say

Now let us begin with a new session which is about learning the techniques of maintaining user's device.



#### 4.4.5 Say

Let us understand about different ways of maintaining the smart device. delete messages, media files, uninstalling apps, and clearing the cache.

#### 4.4.6 Say

Android Smartphones when used over tie get filled with applications, photos, cache memory and other sort of data like messages, emails etc. which are responsible for slowing down the system.

#### 4.4.7 Do

Share with the participants about maintaining the Android Device.

Refer to the participant handbook for step by step maintenance activities

#### 4.4.8 Activity

Ask the participants to practice how to maintain the android device.

Provide each participant with a system to perform the task and then go around and see whether they are performing it correctly or not.

At the end of the activity, reiterate about what has been learnt

Skill Practice	Time	Resources
Practical	12 hrs	Slides/ mobile handset

#### 4.4.9 Notes for Facilitation

- Ask the participants if they have any questions
- Encourage other participants to answer it and to encourage peer learning in the class
- Clarify all doubts of the participants
- Ask them to answer the questions given in the participant handbook
- Ensure that all the participants answer every question



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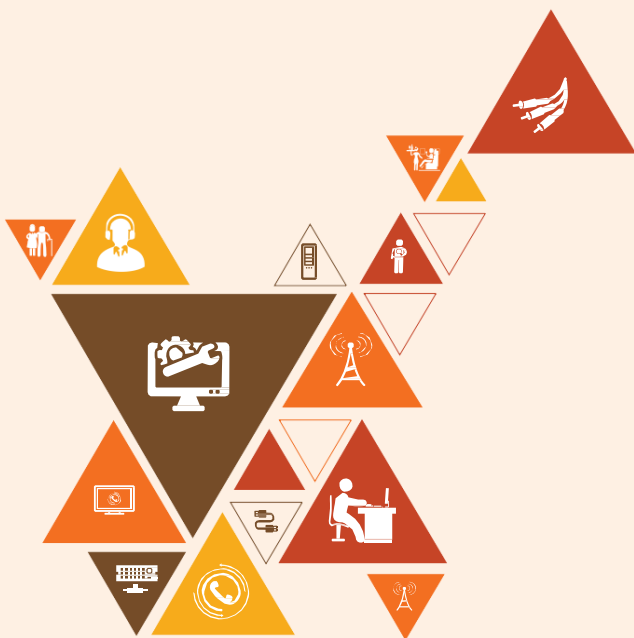
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# 5. Plan work effectively Organize Resources and Implement safety Practices

- Unit 5.1 – Work Place Health and Safety
- Unit 5.2 – Different types of Health Hazards
- Unit 5.3 - Importance of safe working Places
- Unit 5.4 - Reporting Safety Hazards
- Unit 5.5 - Waste Management
- unit 5.6 - Organization's focus on Greening of Jobs



**TEL/N9101**

## Key Learning Outcomes



At the end of this module, you will be able to:

1. Explain about workplace health and safety
2. understand different types of health hazards
3. Demonstrate various first-aid techniques
4. Understand the importance of safety at workplace
5. understand basic hygiene practices and hand washing techniques
6. Explain the need for Social Distancing
7. Understand the hazard reporting methods at workplace
8. Explain e-waste and process of disposing them
9. Explain the greening of jobs

## UNIT 5.1: Workplace Health and Safety

### Unit Objectives

At the end of this unit, the participants will be able to:

1. Understand about workplace health and safety
2. Explain tips to design a safe workplace
3. Explain precautions to be taken at a workplace

### Resources to be Used

- Participant handbook, white board marker pen, notebook, whiteboard, flipchart, laptop, overhead projector, laser pointer, etc.

### Notes

- In this unit, we will discuss about workplace health & safety.

### Say

Good morning and welcome back to this training program on Telecom E-Waste Handler. In this session, we will discuss about workplace health & safety practices.

### Ask

Ask the trainees the following questions:

- What do you understand by workplace safety?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson.

### Say

In this session, we will discuss the following points:

- Safety: Tips to design a safe workplace
- Non-Negotiable employee safety habits

Let us participate in an extempore activity to understand this unit better.

## Activity



- This activity will be based on individual performance.
- Provide each trainee with a printout/Xerox copy of the safety hazard report
- Now ask each of them to fill up the report individually
- After completing, collect all the forms and evaluate them
- End the session by providing constructive feedback

Activity	Duration (in mins)	Resources Used
Role-play – Safety Hazard Report	40 minutes	Participant handbook, whiteboard, notebook, laptop, pen, pencil, marker, printout/Xerox copy of safety hazard report, etc.

## Do



- Ensure that the report contains all possible hazards in the workplace, safety measures, and ways to counter the hazards if they occur
- Guide the trainees throughout the activity
- Ask the trainees if they have any questions
- Encourage other trainees in the class to answer it and encourage peer learning in the class
- Explain the consequences of not following the safety guidelines at the workplace

## UNIT 5.2: Different types of Health Hazards

### Unit Objectives

At the end of this unit, participants will be able to:

1. Understand the health hazards
2. Demonstrate First Aid Techniques

### Resources to be Used

- Participant handbook, pen, notebook, whiteboard, markers, flipchart, laptop, overhead projector, laser pointer, equipment and tools, safety signs and symbols, safety equipment

### Notes

- In this unit, we will discuss about different types of health hazards and first aid techniques

### Say

- Good morning and welcome back to this training program on Telecom E-Waste Handler. In this session, we will discuss about different types of health hazards.

### Ask

Ask the trainees the following questions:

- What is a health hazard?
- Can you name any health hazards that may occur at the workplace?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson.

### Notes for Facilitation

Illness, injuries, and pain are part of human life. This can happen anyway. Every individual is prone to illness and injuries at anytime and anywhere.

In case of any of these, some kind of immediate medical attention or treatment is needed to reduce the discomfort, pain, and deterioration of the condition

Explain the first aid techniques for injuries due to various causes. For burns, electric shock, fracture due to accidental fall etc.

Explain the concept of CRP and give a demonstration using a video how to administer CRP for a patient suffering a heart attack.

Through a demonstration explain the use of various safety gadgets used in the workplace.

## Say



In this session, we will discuss the following points:

- First aid
  - First aid techniques
    - For burns
    - For broken bones and fractures
    - For heart attack/stroke
    - For head injury
  - Using breathing apparatus
  - Briefing and guidance for firefighters
  - Evacuation process
  - Special evacuation requirements for specially-abled persons
  - Importance of fire safety drills
- Let us participate in an activity to understand this unit better.

## Activity



- This session will be in the form of a "Show and Explain " activity.
- In this activity, bring a few PPE (relevant to the job role) to the class and demonstrates each of them - safety helmet, safety goggles, gloves, ear muff, respirator, harness, safety boots, etc.
- Now ask the trainees to identify the PPE and state their usage
- After the session, you will select a few volunteers and make them wear PPEs.
- The focus of this activity is to select and use appropriate personal protective equipment compatible with the work and compliant with relevant occupational health and safety guidelines.

Activity	Duration (in mins)	Resources Used
Practical activity - PPE	40 minutes	Participant handbook, laptop, overhead projector, internet connection, various protective equipment like safety helmet, safety goggles, gloves, ear muff, respirator, harness, safety boots, etc.

## Do

- Ensure that all trainees participate in the activity
- Share your inputs and insight to encourage the trainees and add to what they talk about

## Summarize

- Ask the participants what they have learnt so far.
- Ask if they have any questions related to what they have talked about so far.
- Close the discussion by summarizing the different health hazards and video demo of how to wear the PPE kits and first aid techniques.



## UNIT 5.3: Importance of safe working practices

### Unit Objectives

At the end of this unit, participants will be able to:

1. Explain Basic Hygiene Practices
2. Understand the importance of Social Distancing
3. Demonstrate the safe working practices

### Resources to be Used

- Participant handbook, pen, notebook, whiteboard, flipchart, markers, laptop, overhead projector, laser pointer, etc.

### Notes

- In this unit, we will discuss about the importance of safe working practices.

### Say

Good morning and welcome back to this training program on Telecom E-Waste Handler. In this session, we will discuss about the importance of safe working practices

### Ask

Ask the trainees the following questions:

- List a few personal hygiene tips that you regularly follow.
- How social distancing helps to reduce the spread of Covid 19?
- What are the various covid protocols people followed during the pandemic?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson.

## Elaborate



In this session, we will discuss the following points:

- Basic hygiene practices
  - Personal hygiene
  - Personal hygiene practices at home
- Importance of social distancing
  - Social distancing and isolation
  - Self-quarantine
  - Disposing off the PPE kits
- Safe workplace practices
  - Supplies and Accessories in the first aid box
  - CPR

## Say



- Let us participate in a practical activity to understand this unit better.

## Notes for Facilitation



- Familiarize the trainees with the first aid box and the supplies inside it.
- Explain the importance of first aid and why is it good to know how to administer CRP for a patient who has suffered a heart attack.
- Answer all the questions/doubts raised by the trainees in the class
- Encourage other trainees to answer queries/questions and boost peer learning in the class

## Practical

- Gather all the trainees in the laboratory and divide them into groups of two
- Ask each group to demonstrate the correct process for performing CRP
- Ensure the students follow all the steps of CPR in the correct sequence
- This activity can also be performed on a dummy, if available

Activity	Duration (in mins)	Resources Used
Practical activity - CPR	60 minutes	Participant handbook, whiteboard, notebook, laptop, pen, marker, dummy (if available), etc.

## Do

- Prepare in advance and use appropriate energisers
- Encourage the students to explore how the training session can help them improve their work
- Keep the ambience constructive and positive
- Ensure each contribution is given fair consideration

## Answers for Exercises for PHB

1. Burnt area should be kept under Lukewarm for a minimum of 10 minutes
2. Emergency exits should be easily accessible in case of fire
3. Antiseptic Cream or Solution must be applied to the wound to reduce the risk of infection
4. The RICE which is Rest, Ice, Compression and Elevation therapy must be applied to control and reduce swelling
5. CPR is Cardio Pulmonary Resuscitation

## UNIT 5.4: Reporting Safety Hazards

### Unit Objectives

At the end of this unit, participants will be able to:

1. Discuss the process of reporting in case of emergency (safety hazards)
2. Understand methods of reporting hazards

### Resources to be Used

Participant handbook, pen, notebook, whiteboard, flipchart, markers, laptop, overhead projector, laser pointer, etc.

### Say

Good morning and welcome to this training program on Customer Care Executive (Repair Centre)  
In this session, we will discuss about reporting safety hazards.

### Ask

Ask the trainees the following questions:

- What is a safety hazard?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson.

### Elaborate

In this session, we will discuss the following points:

- Methods of reporting safety hazards
- Describing hazard matrix
- Hazard report form

### Say

Let us participate in an activity to understand this unit better.

## Notes for Facilitation

- Explain the trainees about reporting the safety hazards to the people concerned.
- Explain the 6C's of communication protocols followed in the organizations.
  - Communicate First
  - Communicate Rightly
  - Communicate Credibly
  - Communicate Empathetically
  - Communicate to instigate appropriate action
  - Communicate to promote respect
- Explain about the Hazard report form
- Ask the trainees if they have any questions
- Encourage other trainees to take part in the activity and encourage peer learning in the class
- Discuss the exercises at the end of the chapter in the Participant Handbook and encourage them to answers.

## Activity

- Divide the class into small groups
- Conduct a quiz and ask questions related to the unit
- Display all questions on the projector screen
- Display the correct answer after all groups have got their chances of answering a given question

Activity	Duration (in mins)	Resources Used
Quiz – Interpreting Signs	40 minutes	Laptop, internet connection, overhead projector, white screen, whiteboard, markers, laser pointer

## Do

- Ask a student to maintain the scores on the whiteboard
- Jot down the crucial points on the whiteboard as the students speak
- Share your inputs and insight to encourage the students and add to what they talk about
- Ensure that all students participate in the class
- Ask a student to summarise what was discussed in the session
- Demonstrate enthusiasm for the subject matter, course and participant's work

## UNIT 5.5: Waste Management

### Unit Objectives

At the end of this unit, participants will be able to:

1. explain what is e-waste?
2. Understand the concept of waste management
3. Explain the process of recycling e-waste

### Resources to be Used

- Participant handbook, pen, notebook, whiteboard, flipchart, markers, laptop, overhead projector, laser pointer, etc.

### Say

Good morning and welcome back to this training program on Telecom Customer Care Executive (Repair Centre).

In this session, we will discuss about waste management.

### Ask

Ask the trainees the following questions:

- What do you understand by waste management?
- What are the sources of medical waste?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson.

### Elaborate

In this session, we will discuss the following points:

- Introduction to e-waste
  - What is e-waste?
- Electronic goods/gadgets are classified under three major heads
- E-waste management process
- Recyclable and non-recyclable waste
- Colour codes of waste collecting bins
- Waste disposal methods
- Sources of waste
- Source of Pollution
- Types of Pollution – Air, Water, Soil, Noise, Light

## Say

Let us participate in an extempore activity to understand this unit better.

## Activity

- This activity will be based on individual performance.
- In this activity, you will give two topics to the trainees
- The first topic in this session will be air pollution.
- The second topic on which the trainees will prepare their extempore will be on waste disposal method.
- You will randomly pick up trainees and separate them into two groups.
- Ensure that the trainees are equal in number.
- Allot the trainees 2 minutes to prepare the topic you will give them.
- After the time is up, you will call out any trainee and ask them to speak on the topic for 5 minutes.
- The trainee, with a simple explanation but rich content, will be appreciated with accolades.

Activity	Duration (in mins)	Resources Used
Extempore	40 minutes	Participant Handbook, Whiteboard, Notebook, Pen, Pencil, Marker, etc.

## Do

- Do a de-briefing of the activity
- Conduct a doubt clarification session if needed.
- Encourage the quiet and shy trainees to open up and speak

## Notes for Facilitation

- Encourage other participants to answer it and encourage peer learning in the class
- Answer all the doubts in case any of the participants

## UNIT 5.6: Organization's focus on Greening of Jobs

### Unit Objectives

At the end of this unit, participants will be able to:

1. Understand the concept of ESG
2. Explain the different factors of ESG

### Resources to be Used

- Participant handbook, pen, notebook, whiteboard, flipchart, markers, laptop, overhead projector, laser pointer, etc.

### Say

Good morning and welcome back to this training program on Telecom Customer Care Executive (Repair Centre).

In this session, we will discuss about greening of Jobs

### Ask

Ask the trainees the following questions:

- What is ESG?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson.

### Elaborate

In this session, we will discuss the following points:

- What is ESG?
  - ESG stands for Environmental, Social, and Governance.
  - Environmental, social, and governance (ESG) investing refers to a set of standards for a company's behaviour used by socially conscious investors to screen potential investments.
  - Investors are increasingly applying these non-financial factors as part of their analysis process to identify material risks and growth opportunities.
- Factors of ESG
  - Environmental
  - Social
  - Governance



## Say

Let us participate in a group discussion to explore the unit a little more.

## Activity

- Conduct a group discussion in the class on the factors of ESG
- Ask the participants what they have learnt from this exercise
- Ask if they have any questions related to what they have talked about so far
- Close the discussion by summarising the importance of the ESG in recent times

Activity	Duration (in mins)	Resources Used
Group Discussion	45 minutes	Participant Handbook, Whiteboard, Notebook, laptop, Pen, Pencil, Marker, microphone and speakers etc.

## Do

- Do a de-briefing of the activity
- Conduct a doubt clarification session if needed.
- Encourage the quiet and shy trainees to open up and speak
- Ensure a friendly and cordial atmosphere during the group discussion
- Give chance to each and everybody to give their opinion
- Guide the students in identifying key points

## Notes for Facilitation

- Encourage other participants to answer it and encourage peer learning in the class
- Answer all the doubts in case any of the participants
- Discuss the proper combination technique in group discussion
- Make sure everybody understood the concept of greening of Jobs

## Ask



- If they can, why can't you?
- Discuss concepts related to 'Creativity and Innovation' with the participants as given in the Participant Handbook.

## Say



- Recall the stories on motivation.
- What is the inner drive that motivates people to succeed?
- Let's learn more about such creative and innovative entrepreneurs with the help of an activity.

## Team Activity



- This is a group activity.
- Think of any one famous entrepreneur and write a few lines about him or her.

### Activity De-brief

- Why did you choose this particular entrepreneur?
- What is his/her brand name?
- What creativity does he/she possess?
- What was innovative about their ideas?

## Do



- Conduct a doubt clarification session if needed.
- Encourage the non-participating trainees to open up and speak

## Summarize



- Summarize the unit by asking participants if they know of some people who are highly creative and innovative in their approach.
- Ask them to share some experiences about these people with the class.

## Notes for Facilitation



- Source for stories on innovations:  
<http://www.rediff.com/getahead/report/achievers-top-31-amazing-innovations-from-young-Indians/20151208.htm>

## Answers for Exercises for PHB

1. ESG stand for Environmental, Social, Governance
2. Governance factors include tax strategy, structure of the company, relationship with the stakeholders
3. The three causes of air pollution emissions from the car, factories emitting chemical dust, and pollen
4. Mining waste includes chemical gases
5. Landfill is a Waste that can't be recycled or reused
6. Green and blue coloured bins are used for disposing the waste
7. The plastics cans are trashed in Blue colored bin.
8. discarded electrical and electronic components are considered as e-Waste
9. glass part of e-waste is recycled and used again
10. E-waste is made up of hazardous substances like lead, mercury and Cadmium

## 6. Communication and Interpersonal Skills



Unit 6.1 - Interaction with supervisor, peers, customers and differently-abled persons

Unit 6.2 - Explain the importance of developing sensitivity towards disabled persons



## Key Learning Outcomes



**At the end of this module, you will be able to:**

1. Understand what communication is and the importance of communication in the workplace
2. Understand effective communication and how to communicate effectively for success
3. Discuss types of communication - verbal and non-verbal
4. Communicate at workplace
5. Communicate effectively with superiors
6. Communicate effectively with colleagues and customers using different modes viz face-to-face, telephonic and email communication
7. Understand the hurdles to effective communication
8. Conduct professionally at the workplace
9. Respect differences in gender and ability
10. Communicate effectively with a person with disabilities
11. Show respect for disabled people

## UNIT 6.1: Interaction with supervisor, peers and customers

### Unit Objectives

At the end of this unit, the participants will be able to:

1. Understand the importance of communication
2. Understand types of communication

### Resources to be Used

- Participant handbook, pen, notebook, whiteboard, flipchart, markers, laptop, overhead projector, laser pointer, equipment and tools

### Notes

- In this unit, we will discuss how to communicate effectively with supervisor, peers and customers

### Say

Good morning and welcome to this training program on Customer Care Executive (Repair Centre)  
In this session, we will discuss about effective communication with supervisor, peers and customers

### Ask

Ask the trainees the following questions:

- What is communication?
- What is non-verbal communication?
- What are the barriers to effective communication?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson

## Elaborate



In this session, we will discuss the following points:

- What is communication?
- Why is communication important?
- Effective communication
  - Effective communication for success
  - Significance of clear and effective communication
- Types of communication
  - Verbal communication
  - Non-Verbal communication
    - Signs and symbols
    - Gestures and expressions
- Communication at workplace
  - Communication with supervisors
  - Communication with colleagues & customers
  - Face-to-face communication
  - Telephonic communication
  - Email communication
- Importance of timely completion of tasks
- Standard operating procedure
- Escalation matrix
  - Escalation mechanism
  - Escalation through CRM
- Escalation Issues at work
  - What does it mean to escalate an issue at work?
  - When should you escalate an issue at work?
- Hurdles for effective communication
- Professional conduct
- Respect gender differences
- Communication with a disabled person
  - Communicating with people with a hearing impairment
  - Respect People with disability
  - Safety at the workplace for people with disability
    - Responsibilities of an employer towards disabled people
- Workplace adaptations for people with disability
  - Workplace adaptations

## Say



In this session, we will discuss the following points:

Let us participate in the activity to understand all about effective communication

## Activity

### **Scenario 1:**

- This is an activity involving two. One volunteer as boss and the other as team member
- Provide the trainees with a scenario mentioned below
- You are the boss for a team of 15 members. You want to convey your displeasure regarding the performance of one of your team member. How would you convey this to him/her
- State what measures you will take to convey this matter to them.

### **Scenario 2:**

- This is an activity involving two. One volunteer as boss and the other as team member
- Provide the trainees with a scenario mentioned below
- You are the boss for a team of 15 members. You want to appreciate one of your team mate's performance. He closed a big business deal of Rs.1 cr. How would you do?
- State what measures you will take to appreciate to them.

Activity	Duration (in mins)	Resources Used
Mock activity	60 minutes	Participant handbook, whiteboard, laptop, notebook, pen, pencil, marker, etc.

## Do

- Ensure that all trainees participate in the class.
- Encourage the non-participating trainees to open up and speak.
- Do a de-briefing for this activity. You tell them, scolding is always done in private, one to one, whereas appreciation is always done in open in front of others, for them to feel happy about it and at the same time others get motivated to give their best performance.

## Notes for Facilitation

- Ask them to answer the questions given in the participant manual.
- Ensure that all the participants answer every question.
- Answer all the doubts raised by the trainees in the class
- Discuss the proper communication technique in all the class activity



## UNIT 6.2: Explain the importance of developing sensitivity towards differently abled people

### Unit Objectives

At the end of this unit, participants will be able to:

3. Communicate Effectively with person with disabilities
4. Respect people with disability, at workplace

### Resources to be Used

- Participant handbook, pen, notebook, whiteboard, markers, flipchart, laptop, overhead projector, laser pointer, equipment and tools

### Notes

- In this unit, we will discuss about how to communicate effectively with people who has disabilities

### Say

- Good morning and welcome back to this training program on Telecom Customer Care Executive (Repair Centre).
- In this session, we will discuss about how to communicate with people who are differently abled

### Ask

Ask the trainees the following questions:

- What is an effective communication?
- Have they ever got an opportunity to help/assist a disabled person?

Write down the trainees' answers on the whiteboard/flipchart.

Draw appropriate cues from the answers and start teaching the lesson

## Notes for Facilitation

A **disability** is any condition that makes it more difficult for a person to do certain tasks or interact with the people around them (socially or materially). These conditions, or defects, may be cognitive, developmental, intellectual, mental, physical, sensory, or a combination of multiple conditions

As a co-worker, one should be empathetic with them and talk to them politely and with respect. Every work place has guidelines for handling these kinds of people. And all employees need to adhere to those guidelines.

## Say

In this session, we will discuss the following points:

- What is a disability
- General tips for communication with disabled people
- Respect people with disability
- Work place safety for people with disability
- Work place adaptation by people with disability

## Do

- Ensure that all trainees have understood the purpose of this module
- Encourage them to participate in the discussion

## Summarize

- Ask the participants what they have learnt so far.
- Ask if they have any questions related to what they have talked about so far.
- Explain them how to interact with differently abled people, respect them and assist and support them to complete their work if need be.
- Learnt about effectively communicating with people who are differently abled.

## Ask



- If they can, why can't you?
- Discuss concepts related to 'Creativity and Innovation' with the participants as given in the Participant Handbook.

## Say



- Recall the stories on motivation.
- What is the inner drive that motivates people to succeed?
- Let's learn more about such creative and innovative entrepreneurs with the help of an activity.

## Team Activity



- This is a group activity.
- Think of any one famous entrepreneur and write a few lines about him or her.

### Activity De-brief

- Why did you choose this particular entrepreneur?
- What is his/her brand name?
- What creativity does he/she possess?
- What was innovative about their ideas?

## Do



- Conduct a doubt clarification session if needed.
- Encourage the non-participating trainees to open up and speak

## Summarize

- Summarize the unit by asking participants if they know of some people who are highly creative and innovative in their approach.
- Ask them to share some experiences about these people with the class.

## Notes for Facilitation

- Source for stories on innovations:  
<http://www.rediff.com/getahead/report/achievers-top-31-amazing-innovations-from-young-Indians/20151208.htm>

## Answers for Exercises for PHB

1. What are the three points you will focus on when you talk to people face to face?
  - i. Adjust the tone of voice, don't be too loud
  - ii. Make eye contact
  - iii. Use appropriate language
  - iv. Maintain adequate distance
  - v. Acknowledge, nod during interaction
  - vi. Use appropriate non-verbal gestures to communicate with persons with disabilities
2. Before sending the mail it's important to check the Grammar and Spelling of the content
3. When you interact through phone, provide your identity details like Name and Company
4. Add your Signature at the bottom of your mail.
5. The Customer Care Executives are responsible for handling Effective Communication



**Skill India**  
कौशल भारत - कुशल भारत



सत्यमेव जयते  
GOVERNMENT OF INDIA  
MINISTRY OF SKILL DEVELOPMENT  
& ENTREPRENEURSHIP



N · S · D · C  
National  
Skill Development  
Corporation

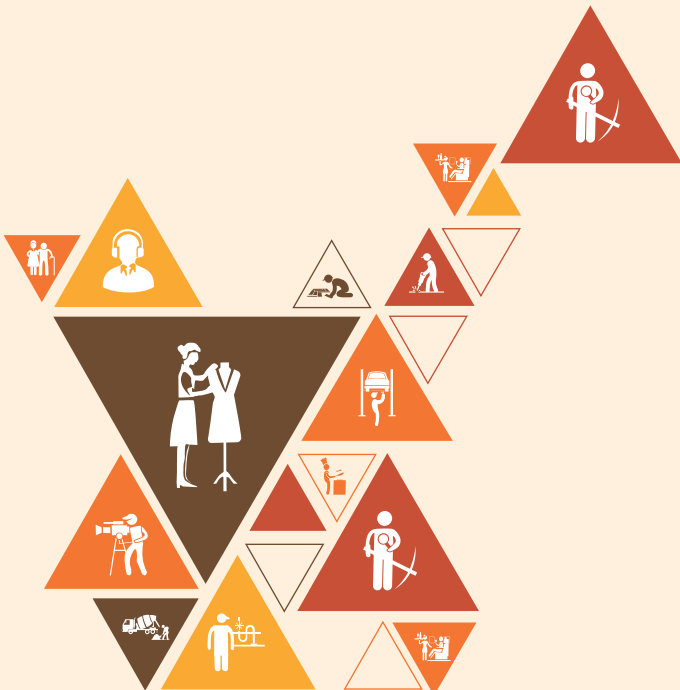
Transforming the skill landscape



## 7. Annexures

Annexure I: Training Delivery Plan

Annexure II: Assessment Criteria



## Annexure I

### Training Delivery Plan

Training Delivery Plan			
<b>Program Name:</b>	Certificate Course in Telecom Terminal Equipment Application Developer (Android)		
<b>Qualification Pack Name &amp; Ref. ID</b>	Telecom Terminal Equipment Application Developer (Android)-TEL/Q2300		
<b>Version No.</b>	4.0	<b>Version Update Date</b>	30-12-2021
<b>Pre-requisites to Training (if any)</b>	NA		
<b>Training Outcomes</b>	<p><b>By the end of this program, the participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• Create android project using android application development environment.</li> <li>• Create and manage databases.</li> <li>• Integrate messaging/networking activities and location-based services.</li> <li>• Develop the android services.</li> <li>• Test and publish the android applications.</li> <li>• Organize work and resources as per health and safety standards.</li> <li>• Inclusive communication, interpersonal skills, and sensitization towards gender and persons with disability (PWD).</li> </ul>		

## Facilitator Guide

Sl. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
1	Role and Responsibilities of a Telecom Terminal Equipment Application Developer (Android)	Introduction to the program Introduction to the Telecom Sector and Role of Telecom Terminal Equipment Application Developer (Android)	<ul style="list-style-type: none"> <li>• Explain the overview of the Program</li> <li>• Explain the role and responsibilities of Telecom Terminal Equipment Application Developer (Android)</li> <li>• Rules for Efficient Learning in the class room</li> <li>• Discuss the outcome of this training program and the employment opportunities for the trainees.</li> <li>• History of communication</li> <li>• signals used for communication</li> </ul>	Bridge module	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Laptop with software like MS Office and internet, Whiteboard, Marker, Projector	6 T (4:00) P (2:00)
2		Communication Network & Channel Access Methods	<ul style="list-style-type: none"> <li>• Modes of Mobile Communication</li> <li>• Generations of Mobile communication</li> <li>• Channel Access Methods</li> <li>• Multiplexing Technology</li> </ul>				6 T(4:00) P(2:00)
3		Mobile Operating System, Windows Mobile and Versions of Android	<ul style="list-style-type: none"> <li>• Mobile Operating Systems</li> <li>• Definition of Mobile Operating Systems</li> <li>• Application Development Environment</li> <li>• Windows Mobile</li> <li>• Versions of Android</li> <li>• Blackberry OS, MIDP</li> </ul>				4 T(2:00) P(2:00)
4		Basic Requirements for Android Installation and Android Installation Steps	<ul style="list-style-type: none"> <li>• Features of Android OS</li> <li>• Versions of Android OS</li> <li>• System requirement for installing Android Studio</li> <li>• Installation of Android Studio</li> </ul>				14 T(6:00) P(8:00)
5	TEL/N2300: Set up Android framework/Development Environment and creating user interface	Creating a Simple Project	<ul style="list-style-type: none"> <li>• Create an android project using the IDE</li> <li>• Create files and folders as per the requirement of the project</li> <li>• Design the layout using various predefined tags</li> <li>• develop various components of an android applications such as screen, views and groups, images etc</li> <li>• Implementation procedure for JDK and IDE</li> <li>• Fundamentals of themes and styles</li> <li>• Components of Android project and applications</li> <li>• Object Oriented Program (OOP) concepts in Java (Classes and Objects, Multi-threading,</li> </ul>	TEL/N2300-PC1-PC3,PC4-PC6,PC7,PC8,PC13,KU2,KU5,KU11, KU12	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Laptop with software like MS Office and internet, Whiteboard, Marker, Projector, JDK software, IDE for android application development	66 T(30:00) P(36:00)
6		Running the project	<ul style="list-style-type: none"> <li>• perform testing of the functionality and UI of the app using different emulators</li> <li>• concept of activity and activity lifecycle</li> <li>• fundamentals of SDK and its tools</li> <li>• Procedure to create AVD</li> </ul>	TEL/N2300-PC17,KU9,KU3, KU4			
7		Creating a Project with Simple Userinterface	<ul style="list-style-type: none"> <li>• Define height,width and background for the project using XML elements</li> <li>• Make it interactive by placing various controls and Menus in the project</li> </ul>	TEL/N2300-PC7,PC12,			22 T(10:00) P(12:00)

8	TEL/N2301 Developing Android VAS Application	Basic Layout, Short Messaging Services and Networking	<ul style="list-style-type: none"> <li>• implement changes in layout, add Graphic User Interface (GUI) and create necessary code for sending and receiving Short Messaging Service (SMS)</li> <li>• send SMS using intent and also setup SMS receiving</li> <li>• create different layout and incorporate email service</li> <li>• integrate location based services</li> <li>• execute various tasks such as long running tasks, repeated tasks, asynchronous tasks on a separate thread repeatedly</li> </ul>	TEL/N2301- PC7,PC8,PC9,PC1 1,PC19	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Tablets of different brands Laptop with software like MS Office and internet, Whiteboard, Marker, Projecto, SQLite	28 T:10:00 P(18:00)
9		Data Storage	<ul style="list-style-type: none"> <li>• implement data persistence to prevent loss of data</li> <li>• Explain the various techniques of storage of data namely cloud storgae, internal storage, external storage (SD Card) and static resources</li> <li>• android local data storage techniques</li> </ul>	TEL/N2301- PC1,PC3,KU3			26 T:10:00 P(16:00)
10		Working with SQLite	<ul style="list-style-type: none"> <li>• Explain the Structured Query Language (SQL) commands to select, insert, update or delete data in the database</li> <li>• Explain the integration of the database with application</li> <li>• database and data persistence tools and techniques</li> <li>• process to create a database</li> <li>• concepts and application of SQL</li> </ul>	TEL/N2301- PC4,PC5, KU3,KU4,KU5			26 T:10:00 P(16:00)
11	TEL/N2302 Test and Publish Android Application	Testing and Publishing	<ul style="list-style-type: none"> <li>• Explain different testing methodologies</li> <li>• Explain different cases and scenarios for the purpose of testing</li> <li>• Discuss functional testing, compatibility and performance of the application with different mobile phones</li> <li>• carry out network testing to check connectivity parameters</li> <li>• Demonstrate User Interface (UI/UX) testing based on various parameters</li> <li>• types of testing for applications</li> <li>• performance parameters used in application testing</li> </ul>	TEL/N2302-PC1- PC3,PC4,PC5, KU1, KU3	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Laptop with software like MS Office and internet, Whiteboard, Marker, Projector,JDK,IDE,SQ Lite,Android application development emulators	28 T(10:00) P(18:00)
12		Security	<ul style="list-style-type: none"> <li>• Discuss best practices for application security</li> <li>• interpret the security checks and perform application security test</li> <li>• Discuss the security policies followed by the organisation during commissioning of the application</li> </ul>	TEL/N2302-PC6, PC8, KU4	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Laptop with software like MS Office and internet, Whiteboard, Marker, Projector,JDK,IDE,SQ Lite,Android application development emulators	16 T(4:00) P(12:00)
13		Networking and Publishing	<ul style="list-style-type: none"> <li>• organise the application for release on application store</li> <li>• prepare to public the application in google play store</li> <li>• deploy and publish the applications on android platform</li> <li>• fundamentals of networking</li> </ul>	TEL/N2302- PC9,PC11,PC12, KU8			16 T(4:00) P(12:00)
14		Support & Maintenance	<ul style="list-style-type: none"> <li>• Discuss how to resolve any issues/problems associated with the application, network and user interface after troubleshooting</li> <li>• Discuss various troubleshooting techniques</li> </ul>	TEL/N2302- PC7,KU5,			20 T(08:00) P(12:00)



15	TEL/N9101 Organise resources and work effectively and safely	Perform work as per quality standards	<ul style="list-style-type: none"> <li>•Employ appropriate ways to keep the workspace clean and tidy</li> <li>•Discuss how to perform individual roles and responsibilities as per the job role while taking accountability for the work</li> <li>•Show how to record/document tasks completed as per the requirements within specific timelines</li> <li>•Perform the steps to implement schedules to ensure the timely completion of tasks</li> <li>•Identify the cause of a problem related to your own work and validate it</li> <li>•Apply appropriate techniques to analyse problems accurately and communicate different possible solutions to the problem</li> </ul>	TEL/N9101 PC1, PC2, PC3, PC4, PC5, PC6	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Whiteboard/blackboard marker /chalk, Duster, Computer or Laptop attached to LCD projector, Personal Protection Equipment: Safety glasses, Head protection, Rubber gloves, Safety footwear, Warning signs and tapes, Fire extinguisher and First aid kit	6 T(2:00) P(4:00)
16		Maintain a safe, healthy and secure working environment (Part - 1)	<ul style="list-style-type: none"> <li>•Discuss how to comply with the organisation's current health, safety, security policies and procedures</li> <li>•Demonstrate the steps to check for water spills in and around the workspace and escalate these to the appropriate authority</li> <li>•Practice reporting any identified breaches in health, safety, and security policies and procedures to the designated person</li> <li>•Use safety materials such as goggles, gloves, earplugs, caps, ESD pins, covers, shoes, etc.</li> <li>•Apply required precautions to avoid damage of components due to negligence in ESD procedures or any other loss due to safety negligence</li> <li>•Identify hazards such as illness, accidents, fires or any other natural calamity safely, as per the organisation's emergency procedures, within the limits of the individual's authority</li> <li>•Explain the importance of regularly participating in fire drills or other safety-related workshops organised by the company</li> <li>•Discuss the significance of reporting any hazard outside the individual's authority to the relevant person in line with organisational procedures and warn others who may be affected</li> </ul>	TEL/N9101 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Whiteboard/blackboard marker /chalk, Duster, Computer or Laptop attached to LCD projector, Personal Protection Equipment: Safety glasses, Head protection, Rubber gloves, Safety footwear, Warning signs and tapes, Fire extinguisher and First aid kit	6 T(2:00) P(4:00)

17	Maintain a safe, healthy and secure working environment (Part - 2)	<ul style="list-style-type: none"> <li>•Explain how to maintain appropriate posture while sitting/standing for long hours</li> <li>•Employ appropriate techniques to handle heavy and hazardous materials with care while maintaining an appropriate posture</li> <li>•Discuss the importance of sanitising workstations and equipment regularly</li> <li>•Discuss how to avoid contact with anyone suffering from communicable diseases and take necessary precautions</li> <li>•Show how to clean hands with soap and alcohol-based sanitiser regularly</li> <li>•List the safety precautions to be taken while travelling, e.g., maintain a 1m distance from others, sanitise hands regularly, wear masks, etc.</li> <li>•Role-play a situation to report hygiene and sanitation issues to the appropriate authority</li> <li>•Discuss how to follow recommended personal hygiene and sanitation practices, for example, washing/sanitising hands, covering the face with a bent elbow while coughing/sneezing, using PPE, etc.</li> </ul>	TEL/N9101 PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC22	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Whiteboard/blackboard marker /chalk, Duster, Computer or Laptop attached to LCD projector, Personal Protection Equipment: Safety glasses, Head protection, Rubber gloves, Safety footwear, Warning signs and tapes, Fire extinguisher and First aid kit	6 T(2:00) P(4:00)
18	Conserve material / energy / electricity	<ul style="list-style-type: none"> <li>•Apply appropriate ways to optimise the usage of material, including water, in various tasks/activities/processes</li> <li>•Use resources such as water, electricity and others responsibly</li> <li>•Demonstrate the steps to carry out routine cleaning of tools, machines and equipment</li> <li>•Apply appropriate ways to optimise the use of electricity/energy in various tasks/activities/processes</li> <li>•Perform periodic checks of the functioning of the equipment/machine and rectify wherever required</li> <li>•Explain the significance of reporting malfunctioning and lapses in the maintenance of equipment</li> <li>•Use electrical equipment and appliances properly</li> </ul>	TEL/N9101 PC23, PC24, PC25, PC26, PC27, PC28, PC29			6 T(2:00) P(4:00)
19	Use effective waste management / recycling practices	<ul style="list-style-type: none"> <li>•Identify recyclable, non-recyclable and hazardous waste</li> <li>•Apply appropriate ways to deposit recyclable and reusable material at the identified location</li> <li>•Explain the process to dispose of non-recyclable and hazardous waste as per recommended processes</li> </ul>	TEL/N9101 PC30, PC31, PC32			6 T(2:00) P(4:00)

20	TEL/N9102 Communication and interpersonal skills	Interact effectively with superiors	<ul style="list-style-type: none"> <li>•Explain how to receive work requirements from superiors and customers and interpret them correctly</li> <li>•Role-play a situation to inform the supervisor and/or concerned person about any unforeseen disruptions or delays</li> <li>•Practice participating in decision-making by providing facts and figures, giving/accepting constructive suggestions</li> <li>•Practice rectifying errors as per feedback and ensure the errors are not repeated</li> </ul>	TEL/N9102 PC1, PC2, PC3, PC4	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Whiteboard and Markers, Chart paper and sketch pens, LCD Projector and Laptop for presentations, Sample of escalation matrix, organisation structure	6 T(2:00) P(4:00)
21		Interact effectively with colleagues and customers (Part - 1)	<ul style="list-style-type: none"> <li>•Discuss how to comply with the organisation's policies and procedures for working with team members</li> <li>•Apply appropriate modes of communication, such as face-to-face, telephonic and written, to communicate professionally</li> <li>•Show how to respond to queries and seek/provide clarifications if required</li> </ul>	TEL/N9102 PC5, PC6, PC7			6 T(2:00) P(4:00)
22		Interact effectively with colleagues and customers (Part - 2)	<ul style="list-style-type: none"> <li>•Illustrate the process to co-ordinate with the team to integrate work as per requirements</li> <li>•Discuss how to resolve conflicts within the team/with customers to achieve a smooth workflow</li> <li>•Discuss how to recognise emotions accurately in self and others to build good relationships</li> <li>•State how to prioritise team and organisation goals above personal goals</li> </ul>	TEL/N9102 PC8, PC9, PC10, PC11			6 T(2:00) P(4:00)
23		Gender sensitisation	<ul style="list-style-type: none"> <li>•Explain how to maintain a conducive environment for all genders in the workplace</li> <li>•Discuss ways to encourage appropriate behaviour and conduct with people across gender</li> <li>•Explain how to ensure equal participation of people across genders in discussions</li> </ul>	TEL/N9102 PC12, PC13, PC16			6 T(2:00) P(4:00)
24		PwD sensitisation	<ul style="list-style-type: none"> <li>•Identify ways to assist team members with a disability in overcoming any challenges faced at work</li> <li>•Practice appropriate verbal and non-verbal communication while interacting with People with Disability (PwD)</li> </ul>	TEL/N9102 PC14, PC15			6 T(2:00) P(4:00)
25	Employability Skills	DGT/VSQ/N0102 Employability Skills		DGT/VSQ/N0101			60 hrs
<p>Grand Total: 540 hrs                      Total Theory Duration: 150 hrs                      Total Practical Duration: 210 hrs                      OJT Duration: 120                      DGT Employability Skills: 60</p>							

## Annexure II Assessment Criteria

### CRITERIA FOR ASSESSMENT OF TRAINEES

Assessment Criteria for Telecom Terminal Equipment Application Developer(Android)	
Job Role	Telecom Terminal Equipment Application Developer (Android)
Qualification Pack	TEL/Q2300
Sector Skill Council	Telecom

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/training center.
4	To pass the Qualification Pack , every trainee should score a minimum of 40% in every NOS and overall 50% Pass percentage
5	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

## Assessment Criteria

Assessment Outcomes	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>TEL/N2300: Setup Android Application Development Environment with User Interface</b>	<i>Set up android application development environment</i>	8	14	-	2
	<b>PC1.</b> interpret key features for various versions of the android operating system used in devices	2	3	-	1
	<b>PC2.</b> list the various tools and software required for developing an Android Application	2	4	-	1
	<b>PC3.</b> perform installation of Java Development Kit (JDK) and Integrated Development Environment (IDE) like Eclipse IDE, Android Studio etc. and android Software Development Kit (SDK) Fileages	2	3	-	-
	<b>PC4.</b> configure android development tool and framework to create Android Virtual Devices (AVD)	2	4	-	-
	<i>Create android project</i>	6	8	-	2
	<b>PC5.</b> interpret the project details as well as requirements and create the android project	3	4	-	1
	<b>PC6.</b> identify the role of files and folders like source code files (.src), android directories, generations, assets, resources etc. in the project	3	4	-	1
	<i>Customise the design of the app using Extensible Markup Language (XML) and Cascading Style Sheets(CSS)</i>	21	33	-	6
	<b>PC7.</b> design the layout using the defined properties of the layout like width, height,background etc. in XML based on the requirements	3	4	-	-
	<b>PC8.</b> develop interlinked activities and intents	1	2	-	-
	<b>PC9.</b> create hierarchical code using concepts such as inheritance	1	3	-	-
<b>PC10.</b> develop various components of an android app such as screen, views and groups, images etc.	2	2	-	-	

## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	PC11. apply styles and themes to the user activities	1	3	-	1
	PC12. develop an interactive app using different types of menus	2	3	-	-
	PC13. create the code for various interactivities using User Interface (UI) elements/controls and for events	2	3	-	1
	<b>PC14.</b> link the code to XML layout file using an activity	2	3	-	1
	<b>PC15.</b> customise the app using specific user-defined/custom components, notifications, etc.	3	3	-	1
	<b>PC16.</b> perform steps to add multimedia to the application and program it to use the android camera and location	2	4	-	1
	<b>PC17.</b> perform testing of the functionality and UI of the app using different emulators	2	3	-	1
	<b>NOS Total</b>	<b>35</b>	<b>55</b>	<b>-</b>	<b>10</b>
<b>TEL/N2301: Develop Android Value Added Services (VAS) Application</b>	<i>Manage data</i>	<b>10</b>	<b>14</b>	<b>-</b>	<b>3</b>
	<b>PC1.</b> implement data persistence to prevent loss of data	2	3	-	1
	<b>PC2.</b> load and share the user preferences	2	3	-	-
	<b>PC3.</b> perform storage of data on cloud and on internal storage, external storage (SD Card) and static resources	-	2	-	1
	<b>PC4.</b> apply the Structured Query Language (SQL) commands to select, insert, update or delete data in the database	2	3	-	-
	<b>PC5.</b> execute steps to integrate the database with proper application	2	3	-	1
	<b>PC6.</b> instruct content providers and resolvers to provide an interface to the application data	2	-	-	-
	<i>Integrate messaging and networking activities</i>	<b>7</b>	<b>14</b>	<b>-</b>	<b>3</b>

## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	<b>PC7.</b> implement changes in layout, add Graphic User Interface (GUI) and create necessary code for sending and receiving Short Messaging Service (SMS)	2	3	-	1
	<b>PC8.</b> send SMS using intent and also setup SMS receiving	-	2	-	-
	<b>PC9.</b> implement changes in layout, add GUI and create necessary code for e-mail service	2	3	-	1
	<b>PC10.</b> integrate application with Bluetooth technology, text files, binary data and access web services, if required	2	3	-	1
	<b>PC11.</b> perform synchronous and asynchronous calls for integrated web services	1	3	-	-
	<i>Integrate location-based services</i>	<b>12</b>	<b>12</b>	-	<b>4</b>
	<b>PC12.</b> create a Google Maps project	-	3	-	1
	<b>PC13.</b> obtain the Google Maps Application Programming Interface (API) key and add to the application	3	3	-	1
	<b>PC14.</b> display the map after adding markers and synchronise it to location	3	-	-	-
	<b>PC15.</b> integrate geographical coding and reverse geocoding on map interface	3	3	-	1
	<b>PC16.</b> deploy and run the application	3	3	-	1
	<i>Develop the android services</i>	<b>6</b>	<b>10</b>	-	<b>5</b>
	<b>PC17.</b> interpret the application requirements to determine the type of service to be used	2	-	-	1
	<b>PC18.</b> create the required service and implement the methods	-	2	-	-
	<b>PC19.</b> execute various tasks such as long-running tasks, repeated tasks, asynchronous tasks on a separate thread repeatedly	-	2	-	1

## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	<b>PC20.</b> ensure to establish communication between an activity and a service and bind them	-	2	-	1
	<b>PC21.</b> implement efficient data transfer to minimise battery drain	2	2	-	1
	<b>PC22.</b> update User Interface (UI) from a runnable block	2	2	-	1
	<b>NOS Total</b>	<b>35</b>	<b>50</b>	<b>-</b>	<b>15</b>
<b>TEL/N2302: Test and Publish Android Application</b>	<i>Test and secure the android applications</i>	<b>23</b>	<b>34</b>	<b>-</b>	<b>8</b>
	<b>PC1.</b> understand, evaluate and decide upon the testing methodology	3	4	-	1
	<b>PC2.</b> create different cases and scenarios for the purpose of testing	2	3	-	1
	<b>PC3.</b> perform functional testing, compatibility and performance of the application with different mobile phones	3	3	-	1
	<b>PC4.</b> carry out network testing to check connectivity parameters	2	4	-	1
	<b>PC5.</b> perform User Interface (UI/UX) testing based on various parameters	2	4	-	1
	<b>PC6.</b> implement best practices for application security	3	4	-	1
	<b>PC7.</b> resolve any issues/problems associated with the application, network and user interface after troubleshooting	5	6	-	1
	<b>PC8.</b> interpret the security checks and perform application security test	3	6	-	1
	<i>Publish the android applications</i>	12	16	-	7
	<b>PC9.</b> organize the application for release on application store	3	5	-	2



## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	PC10. ensure availability of Google licensing for the application developed	3	3	-	1
	PC11. configure Google play store components for uploading the application in the play store console	3	4	-	3
	PC12. deploy and publish the applications on android platform	3	4	-	1
	<b>NOS Total</b>	<b>35</b>	<b>50</b>	<b>-</b>	<b>15</b>
<b>TEL/N9101: Organise Work and Resources as per Health and Safety Standards</b>	<i>Perform work as per quality standards</i>	<b>4</b>	<b>9</b>	<b>-</b>	<b>2</b>
	PC1. keep workspace clean and tidy	-	1	-	-
	PC2. perform individual role and responsibilities as per the job role while taking accountability for the work	1	1	-	1
	PC3. record/document tasks completed as per the requirements within specific timelines	-	1	-	1
	PC4. implement schedules to ensure timely completion of tasks	-	2	-	-
	PC5. identify the cause of a problem related to own work and validate it	2	2	-	-
	PC6. analyse problems accurately and communicate different possible solutions to the problem	1	2	-	-
	<i>Maintain safe, healthy and secure working environment</i>	<b>16</b>	<b>27</b>	<b>-</b>	<b>4</b>
	PC7. comply with organization's current health, safety, security policies and procedures	1	1	-	-
	PC8. check for water spills in and around the workspace and escalate these to the appropriate authority	1	2	-	1
PC9. report any identified breaches in health, safety, and security policies and procedures to the designated person	1	2	-	1	
PC10. use safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.	1	2	-	1	

Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	PC11. avoid damage of components due to negligence in ESD procedures or any other loss due to safety negligence	2	3	-	1
	PC12. identify hazards such as illness, accidents, fires or any other natural calamity safely, as per organisation's emergency procedures, within the limits of individual's authority	2	1	-	-
	PC13. participate regularly in fire drills or other safety related workshops organised by the company	1	3	-	-
	PC14. report any hazard outside the individual's authority to the relevant person in line with organisational procedures and warn others who may be affected	1	3	-	-
	PC15. maintain appropriate posture while sitting/standing for long hours	1	1	-	-
	PC16. handle heavy and hazardous materials with care, while maintaining appropriate posture	1	1	-	-
	PC17. sanitize workstation and equipment regularly	1	2	-	-
	PC18. clean hands with soap, alcohol- based sanitizer regularly	-	1	-	-
	PC19. avoid contact with anyone suffering from communicable diseases and take necessary precautions	-	1	-	-
	PC20. take safety precautions while travelling e.g. maintain 1m distance from others, sanitize hands regularly, wear masks, etc.	1	2	-	-
	PC21. report hygiene and sanitation issues to appropriate authority	1	1	-	-
	PC22. follow recommended personal hygiene and sanitation practices, for example, washing/sanitizing hands, covering face with a bent elbow while coughing/sneezing, using PPE, etc.	1	1	-	-
	<i>Conserve material/energy/electricity</i>	7	16	-	3
	PC23. optimize usage of material including water in various tasks/activities/processes	1	2	-	-
	PC24. use resources such as water, electricity and others responsibly	1	2	-	1
	PC25. carry out routine cleaning of tools, machine and equipment	1	2	-	-
	PC26. optimize use of electricity/energy in various tasks/activities/processes	1	3	-	1
	PC27. perform periodic checks of the functioning of the equipment/machine and rectify wherever required	1	3	-	1

## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	<b>PC28.</b> report malfunctioning and lapses in maintenance of equipment	1	2	-	-
	<b>PC29.</b> use electrical equipment and appliances properly	1	2	-	-
	<i>Use effective waste management/recycling practices</i>	<b>3</b>	<b>8</b>	-	<b>1</b>
	<b>PC30.</b> identify recyclable, non-recyclable and hazardous waste	1	2	-	1
	<b>PC31.</b> deposit recyclable and reusable material at identified location	1	3	-	-
	<b>PC32.</b> dispose non-recyclable and hazardous waste as per recommended processes	1	3	-	-
	<b>NOS Total</b>	<b>30</b>	<b>60</b>	-	<b>10</b>
<b>TEL/N9102: Interact Effectively with Team Members and Customers</b>	<i>Interact effectively with superiors</i>	<b>7</b>	<b>15</b>	-	<b>2</b>
	<b>PC1.</b> receive work requirements from superiors and customers and interpret them correctly	1	2	-	-
	<b>PC2.</b> inform the supervisor and/or concerned person about any unforeseen disruptions or delays	2	4	-	1
	<b>PC3.</b> participate in decision making by providing facts and figures, giving/accepting constructive suggestions	2	5	-	1
	<b>PC4.</b> rectify errors as per feedback and ensure the errors are not repeated	2	4	-	-
	<i>Interact effectively with colleagues and customers</i>	<b>7</b>	<b>26</b>	-	<b>4</b>

## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
	PC5. comply with organisation's policies and procedures for working with team members	1	2	-	-
	PC6. communicate professionally using appropriate mode of communication such as face-to-face, telephonic and written	2	4	-	1
	PC7. respond to queries and seek/provide clarifications if required	2	4	-	1
	PC8. co-ordinate with team to integrate work as per requirements	-	3	-	-
	PC9. resolve conflicts within the team/with customers to achieve smooth workflow	1	5	-	1
	PC10. recognize emotions accurately in self and others to build good relationships	1	4	-	-
	PC11. prioritize team and organization goals above personal goals	-	4	-	1
	<i>Respect differences of gender and ability</i>	<b>11</b>	<b>24</b>	-	<b>4</b>
	PC12. maintain a conducive environment for all the genders at the workplace	2	5	-	1
	PC13. encourage appropriate behavior and conduct with people across gender	2	5	-	1
	PC14. assist team members with disability in over-coming any challenges faced in work	3	4	-	1
	PC15. practice appropriate verbal and non- verbal communication while interacting with People with Disability (PwD)	2	4	-	1
	PC16. ensure equal participation of the people across genders in discussions	2	6	-	-
	<b>NOS Total</b>	<b>25</b>	<b>65</b>	<b>-</b>	<b>10</b>

## Assessment Criteria

Assessment Criteria	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>DGT/VSQ/N0102: Employability Skills (60 Hours)</b>	<i>Introduction to Employability Skills</i>	1	1	-	-
	<b>PC1.</b> identify employability skills required for jobs in various industries	-	-	-	-
	<b>PC2.</b> identify and explore learning and employability portals	-	-	-	-
	<i>Constitutional values – Citizenship</i>	1	1	-	-
	<b>PC3.</b> recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
	<b>PC4.</b> follow environmentally sustainable practices	-	-	-	-
	<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
	<b>PC5.</b> recognize the significance of 21st Century Skills for employment	-	-	-	-
	<b>PC6.</b> practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
	<i>Basic English Skills</i>	2	3	-	-
<b>PC7.</b> use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-	
<b>PC8.</b> read and understand routine information, notes, instructions, mails, letters etc.	-	-	-	-	

**Assessment Criteria**

	written in English				
	<b>PC9.</b> write short messages, notes, letters, e-mails etc. in English	-	-	-	-
	<i>Career Development &amp; Goal Setting</i>	<b>1</b>	<b>2</b>	-	-
	<b>PC10.</b> understand the difference between job and career	-	-	-	-
	<b>PC11.</b> prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
	<i>Communication Skills</i>	<b>2</b>	<b>2</b>	-	-
	<b>PC12.</b> follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
	<b>PC13.</b> work collaboratively with others in a team	-	-	-	-
	<i>Diversity &amp; Inclusion</i>	<b>1</b>	<b>2</b>	-	-
	<b>PC14.</b> communicate and behave appropriately with all genders and PwD	-	-	-	-
	<b>PC15.</b> escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
	<i>Financial and Legal Literacy</i>	<b>2</b>	<b>3</b>	-	-
	<b>PC16.</b> select financial institutions, products and services as per requirement	-	-	-	-
	<b>PC17.</b> carry out offline and online financial transactions, safely and securely	-	-	-	-
	<b>PC18.</b> identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
	<b>PC19.</b> identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
	<i>Essential Digital Skills</i>	<b>3</b>	<b>4</b>	-	-

## Assessment Criteria

	<b>PC20.</b> operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
	<b>PC21.</b> use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
	<b>PC22.</b> use basic features of word processor, spreadsheets, and presentations	-	-	-	-
	<i>Entrepreneurship</i>	<b>2</b>	<b>3</b>	-	-
	<b>PC23.</b> identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
	<b>PC24.</b> develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
	<b>PC25.</b> identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
	<i>Customer Service</i>	<b>1</b>	<b>2</b>	-	-
	<b>PC26.</b> identify different types of customers	-	-	-	-
	<b>PC27.</b> identify and respond to customer requests and needs in a professional manner.	-	-	-	-
	<b>PC28.</b> follow appropriate hygiene and grooming standards	-	-	-	-
	<i>Getting ready for apprenticeship &amp; Jobs</i>	<b>2</b>	<b>3</b>	-	-
	<b>PC29.</b> create a professional Curriculum vitae (Résumé)	-	-	-	-
	<b>PC30.</b> search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-



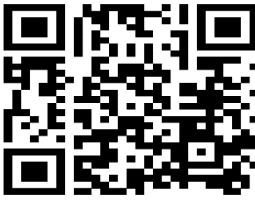

**Assessment Criteria**

	<b>PC31.</b> apply to identified job openings using offline /online methods as per requirement	-	-	-	-
	<b>PC32.</b> answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
	<b>PC33.</b> identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
	<b>NOS Total</b>	<b>20</b>	<b>30</b>	-	-











Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Provided in the above section	
<p><b>Means of assessment 1</b></p> <ol style="list-style-type: none"> <li>Criteria for assessment for each Qualification File will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.</li> <li>The assessment for the theory part will be based on knowledge bank of questions created by the SSC.</li> <li>Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below.)</li> <li>Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on these criteria.</li> </ol>	
<p><b>Means of assessment 2</b> Add boxes as required.</p>	
<p><b>Pass/Fail</b></p> <ol style="list-style-type: none"> <li>To pass the Qualification File, every trainee should score a minimum of 70% in every Qualification.</li> <li>In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification File.</li> </ol>	

## Annexure

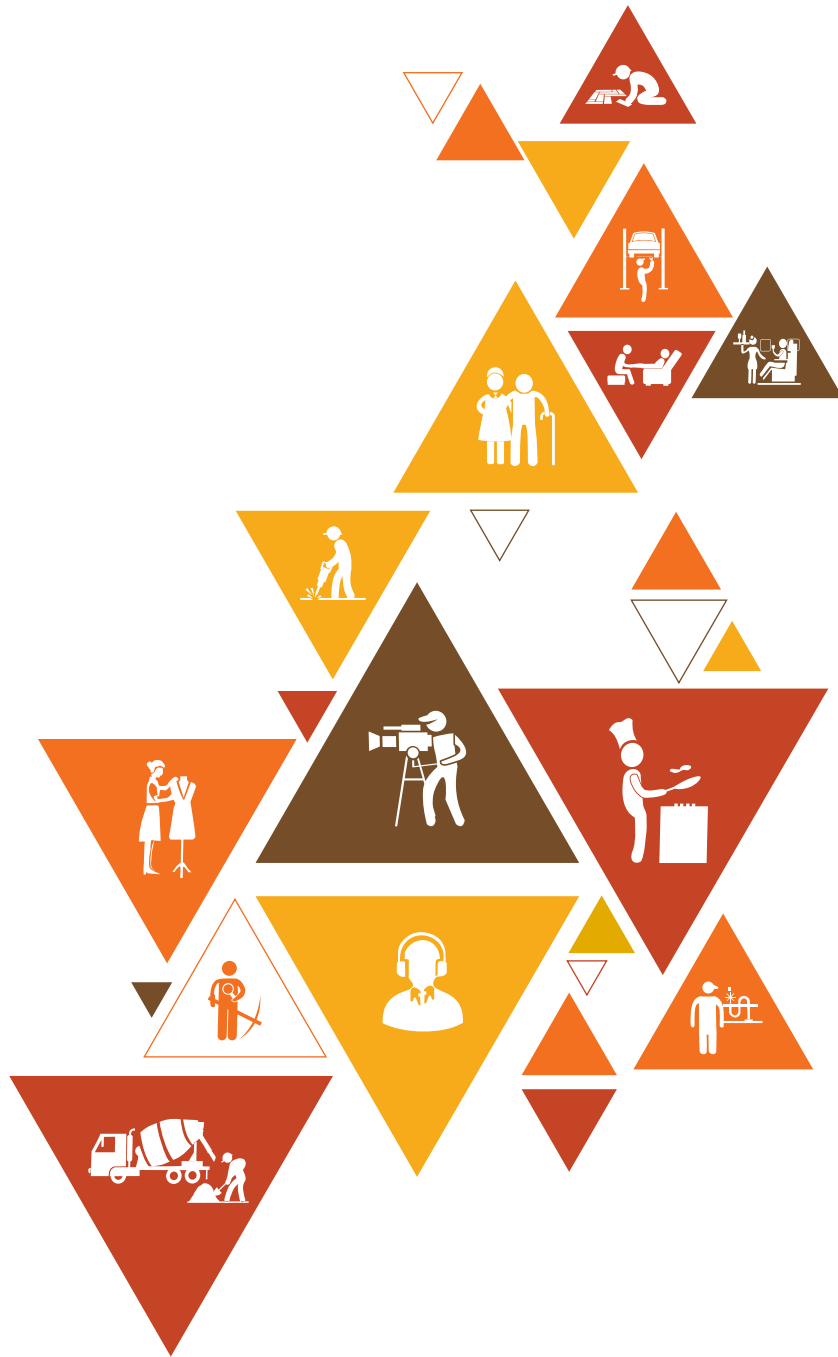
Chapter No	Unit No	Topic Name	Page No in PHB	QR Code
1	1.1	Introduction to the program	12	 <p>Click the QR code to view the video on tips to become a mobile app developer</p>
2	1.10	Android Studio Installation	59	 <p>Click the QR code to view the video on steps to download android studio</p>
3	3.1	Basic Layout,short messaging services and Networking	81	 <p>Click the QR code to view the video on how to learn android application development</p>
4	4.3	Networking and Publishing	150	 <p>Click the QR code to view the video on publish android app</p>

## Annexure

5	5.1	Importance of safe working practices-First Aid	161	 <p>Click/Scan this QR code to view the video First Aid at work place</p>
6	5.3	Importance of safe working practices-Hand Washing Techniques	170	 <p>Click/Scan this QR code to view the video on hand washing techniques</p>
7	5.3	Importance of safe working practices	176	 <p>Click/Scan this QR code to view the video on CPR Techniques</p>
8	5.5	Waste Management	183	 <p>Click/Scan this QR code to view the video on Waste Management</p>
9	6.1	Types of Communication	193	 <p>Click/Scan this QR code to view the video on Types of Communication</p>
10	6.1	Types of Communication-Communication with colleagues and customers	197	 <p>Click/Scan this QR code to view the video communication with customer and colleagues</p>
11	6.1	Types of Communication-Tips on Effective Telephone Communication	199	 <p>Click/Scan this QR code to view the video on Effective Telephone Communication</p>

Chapter No	Topic Name	QR Code
13	Employability Skills	 <p data-bbox="1007 539 1477 600">Click/Scan the QR code to access e-Book on Employability Skills</p>







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