Federal-TVET BUREAU

Basic Electronics Communication and Multimedia Equipment Servicing

Learning Guide #22

Level - II

Unit of Competence: Service and Repair mobile phones

Module Title: Servicing and repairing mobile phones

MO Code: EEL CMS2MO7 1019

TTLM Code: EEL CMS2 TTLM 10 19 V1

LO1: Prepare Unit and Workplace

Instruction Sheet	Prepare Unit and Workplace

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Prepare unit and workplace
- Diagnose faults of cellular phone unit
- Service/repair cellular phone unit
- Test repaired unit
- Install additional/ enhancement features

Install additional/ enhancement features This guide will also assist you to attain the learning outcome stated in the above. Specifically, upon completion of this Learning Guide, first learning outcome you will be able to –

- Workplace is set/arranged for repair job in line with the company requirements and standards
- Necessary tools, test instruments and personal protective equipment are made ready in line with job requirements
- Service manuals and service information required for repair/maintenance are acquired at commencement of activities
- Repair/maintenance history of the unit is properly verifie

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” in each information sheets.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

6. If you earned a satisfactory evaluation proceed to “Operation sheets and LAP Tests if any”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After you accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result;
8. Then proceed to the next Learning guide.

Information Sheet #1	set/arrange workplace for repair job in line with the company requirements and standard

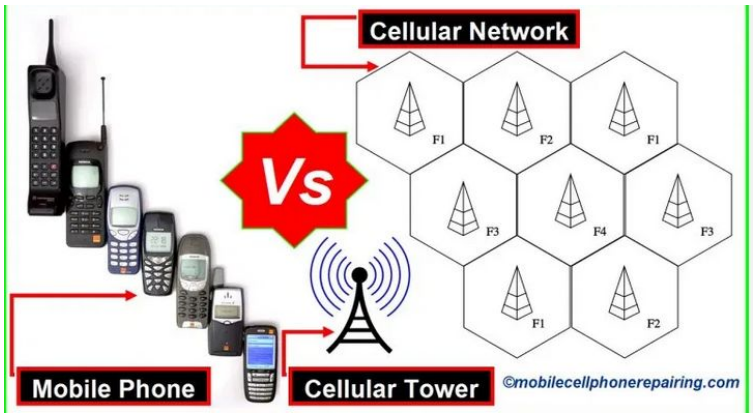
INTRODUCTION

1.1. Mobile Phones

1.1.1Types of mobile phone

a. Mobile Phone Vs Cell Phone – What is the Difference?

A cell phone can be a mobile phone but a mobile phone may not necessarily be a cell phone. For *e.g*. a satellite phone is a mobile phone but not a cell phone. Let us understand in detail.



Before we discuss the types of mobile phones, let us first look at the meaning of a mobile phone.

b. What is a mobile phone?

I. *A mobile phone* is a portable telephone to make and receive wireless phone calls. This can be done either by using radio frequency transmitting towers called base station or cell site. Phone calls over a mobile phone can also be done using satellite. These phones can be Mobile (*Portable*) or Fixed Site Satellite Phones.

II. *A mobile phone* is a handheld device that allows you to make and receive telephone calls while you move around a wide geographical area. A mobile phone also supports several other functions, such as text messaging, email and internet access, photography, money transfer, banking, and so on.

c. What is a Cell Phone?

A cell phone is a mobile phone (*not satellite mobile phone*) that works on radio frequency transmitted from one cell to another and is controlled by antenna systems on cell phone towers. It will be much clear when you read the below chapter on cellular network.

fig1.1

d.What is a Cellular Network?

A cellular network is a network of wireless links. An area on Earth is divided into cells. Shape of these cells can be hexagonal, square, rectangular, circular or any other shapes. But hexagonal shape is most preferred to create cells of a cellular network. Each of these cells has their own base transceiver stations. These base stations provide wireless network coverage to the cell. These wireless frequencies can be used for transmission of voice, data, FM radio content etc. Different set of frequencies are used by each cell to avoid conflict with the neighboring cells.

When a number of cells are joined together, they provide wireless radio frequency coverage to a large area. This is how wireless devices or transceivers (*Transmitter and Receiver*) like mobile phone, tablets, smartphones, modem etc work.

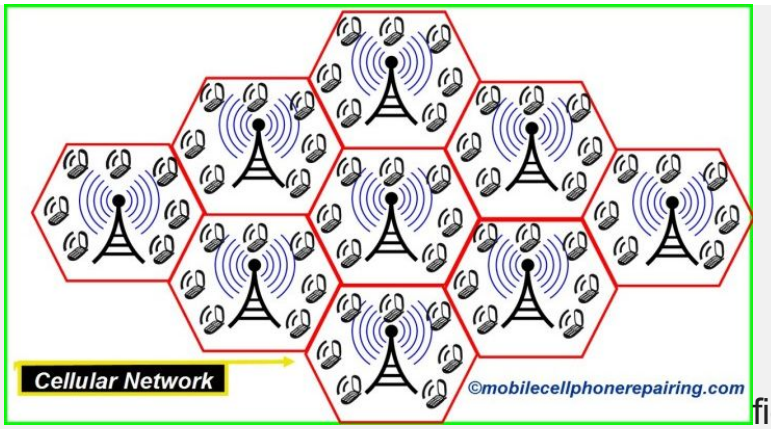


fig.1.2

Cellular Network

1.1.2Mobile Phone Vs Cell Phone – What is the Difference?

Well, the British people call it a Mobile Phone while the Americans call it a Cell Phone. I

named this site "*Mobile Cell Phone*". Look at the URL.
To avoid the conflict, now we have Smartphone. Mobile phone and cell phone are gone now, so no more conflict.

a. What is a Satellite Phone – Mobile Phone or Cell Phone?

A satellite phone can be either a portable mobile phone or a Fixed Site Satellite Phone. But it is not a cell phone because it does not work using any cellular network. It transmits and receives radio frequency directly from satellites orbiting around Earth.

fig1.3

1.1.3Types of Mobile Phones

There are many different types of mobile phones available in the market

Fig1.4

. Which ones do you know? Take 2 minutes to think about it and then complete the following activity.

➢ **What is a form factor?**

A **form factor** refers to the size, style, and shape of a mobile phone, as well as to the layout and position of the phone's major components. There are four major forms of mobile phones, namely:

- The bar phone,
- The touch screen phone
- The flip phone, and
- The slider phone.

Let us look at each form in further detail starting with the bar phone

b. The Bar Phone

A bar phone is also known as the slab, block, or slate phone. It takes the shape of a cuboid, usually with rounded corners and/or edges. The name is derived from the rough resemblance to a candy bar in size and shape, see Figure 1 below.

Figure 1: 5A bar phone

c. The Flip Phone

A flip or clamshell phone consists of two or more sections that are connected by hinges, as shown in figure 3. The hinges allow the phone to flip open and fold to close in order to become more compact. When flipped open, the phone's speaker and microphone are placed closer to the operator's ear and mouth, thereby improving usability.

Figure 1.6A flip phone

d. The Touch screen Phone

A touch screen, or slate phone is a subset of the bar form. Like the tablet computer, a touchscreen phone has minimal buttons and instead relies on an electronic visual display known as a touch screen. It also has an onscreen QWERTY keyboard.

Figure 1.7 Touch screen phone

1.2Parts of a Conventional Mobile Phone

A mobile phone has several parts or components. It is important for you to know the parts and understand their functions so that you can easily diagnose and solve problems. How many parts of a mobile phone do you know? Take a minute to think about it and then complete the following activity

Table 1.1: Parts of a mobile phone and their functions

Parts of a mobile cell phone	Functions
Keypad	Used for inputting or entering data into the phone. It is connected directly to the CPU
Ear piece	Converts the electric signal to a sound signal
Mouth piece	Transmits sound from one phone to another
Battery	Source of power supply to a mobile phone
Power switch	Switches the phone on and off
Power IC	It takes power from the battery and supplies to all other parts of a mobile phone
Oscillator	It creates frequency during outgoing calls
Screen or display	Displays data. It is connected to the CPU to receive following signals : LCD Data Signal, LCD Reset Signal, LCD WR Signal, LCD RD Signal, LCD FLM Signal, LCD HSYN Signal etc.
Flash IC	Stores the software and other programs

	installed in the mobile phone
Charging IC	Takes the current from the charger and charges the battery
CPU	Controls all sections of a mobile phone
Antenna	Receives and transmit radio frequencies and helps the phone to connect to the cellular network

Figure 5 below shows a printed circuit board (PCB) of a mobile phone showing the different internal parts. As you can see from this diagram the PCB is divided into two parts, the network section and the power section. The network section controls the incoming and outgoing phone calls, while the power section controls the memory and power related functions of the phone.

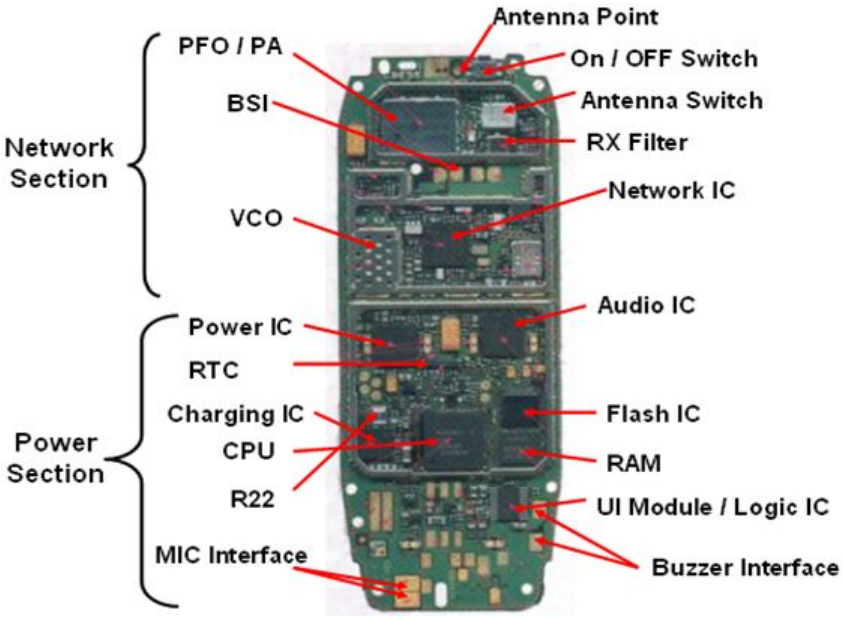


fig1.8

1.2.1Big Parts of a Mobile Cell Phone and Their Function

1. Antenna Switch

It is found in the Network Section of a mobile phone and is made up of metal and non-metal. In GSM sets it is found in white color and in CDMA sets it is found in golden metal.

fig1.9

Work / Function: It searches network and passes forward after tuning.
Faults: If the Antenna Switch is faulty then there will be no network in the mobile phone

2. P.F.O

It is found near the Antenna Switch in the Network Section of the PCB of Mobile Phone. It is also called P.A (Power Amplifier) and Band Pass Filter.

Fig 1.10

Work / Function: It filters and amplifies network frequency and selects the home network.

Faults: If the PFO is faulty then there will be no network in the mobile phone. If it gets short then the mobile phone will get dead.

3. RF IC / Hagar / Network IC

This electronic component found near the PFO in the Network Section of a Mobile Phone. It is also called RF signal processor.

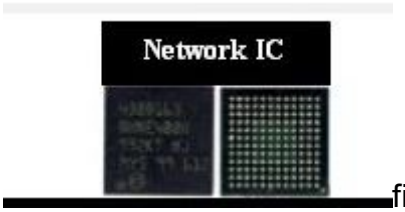


fig1.11

Work / Function: It works as transmitter and receiver of audio and radio waves according to the instruction from the CPU.

Faults: If the RF IC is faulty then there will be problem with network in the mobile phone. Sometime s the mobile phone can even get dead.

4. 26 MHz Crystal Oscillator

It is found near the PFO in the Network Section of a Mobile Phone. It is also called Network Crystal. It is made up of metal.

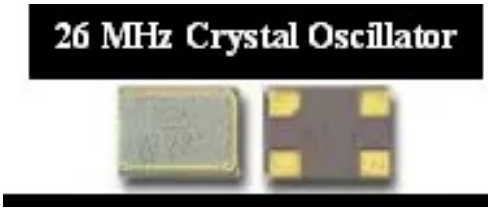


fig1.12

Work / Function: It creates frequency during outgoing calls.

Faults: If this crystal is faulty then there will be no outgoing call and no network in the mobile phone.

5. VCO

It is found near the Network IC in the Network Section of a Mobile Phone.

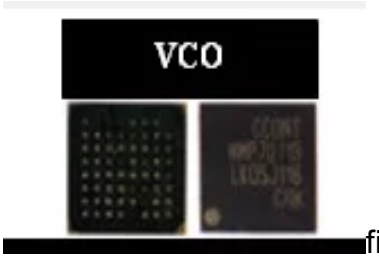


fig1.13

Work / Function: It sends time, date and voltage to the RF IC / Hager and the CPU. It also creates frequency after taking command from the CPU.

Faults: If it is faulty, then there will be no network in the mobile phone and it will display “Call End” or “Call Failed”.

6. RX Filter

It is found in the Network Section of a Mobile Phone.

fig1.14

Work / Function: It filters frequency during incoming calls.

Faults: If it is faulty then there will network problem during incoming calls.

7. TX Filter

It is found in the Network Section of a Mobile Phone.

fig1.15

Work / Function: It filters frequency during outgoing calls.

Faults: If it is faulty then there will network problem during outgoing calls.

8. ROM

It is found in the Power Section of a Mobile Phone.

fig1.16

Work / Function: It loads current operating program in a Mobile Phone.

Faults: If ROM is faulty then there will software problem in the mobile phone and the set will get dead.

9. RAM

It is found in the Power Section of a Mobile Phone.

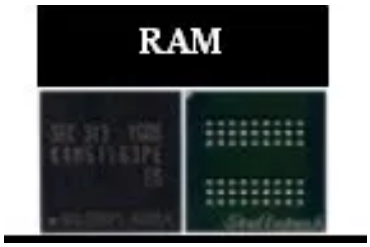


fig1.17

Work / Function: It sends and receives commands of the operating program in a mobile phone.

Faults: If RAM is faulty then there will be software problem in the mobile phone and it will get frequently get hanged and the set can even get dead.

10. Flash IC

It is found in the Power Section of a Mobile Phone. It is also called EEPROM IC, Memory IC, RAM IC and ROM IC.

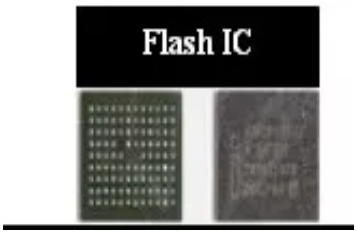


fig1.18

Work / Function: Software and IMEI Number of the mobile phone is installed in the Flash IC.

Faults: If Flash IC is faulty then the mobile phone will not work properly and it can even get dead.

11. Power IC

It is found in the Power Section of a Mobile Phone. There are many small components mainly SMD capacitor around this IC. RTC is near the Power IC.

fig1.19

Work / Function: It takes power from the battery and supplies to all other parts of a mobile phone.

Faults: If Power IC is faulty then the set will get dead.

12. Charging IC

It is found in the Power Section near R22.

fig1.20

Work / Function: It takes current from the charger and charges the battery.

Faults: If Charging IC is faulty then there will be battery not charging problem and the set will not get charged. If the Charging IC is short then the set will get dead.

13. RTC (Simple Silicon Crystal)

It is Real Time Clock and is found in the Power Section near Power IC. It is made up of either metal or non-metal. It is of long shape.

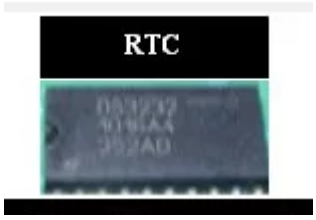


fig1.21

Work / Function: It helps to run the date and time in a mobile phone.

Faults: If RTC is faulty then there will be no date or time in the mobile phone and the set can even get dead.

14. CPU

It is Central Procession Unit of the Phone and is found in the Power Section. It is also called MAD IC, RAP IC and UPP. It is the largest IC on the PCB of a Mobile Phone and it looks different from all other ICs.

fig1.22

Work / Function: It controls all sections of a mobile phone.

Faults: If CPU is faulty then the mobile phone will get dead

15. Logic IC / UI IC

It is found in any section of a mobile phone. It has 20 pins or legs. It is also called UI IC and Interface IC.

fig1.23

Work / Function: It controls Ringer, Vibrator and LED of a mobile phone.

Faults: If Logic IC / UI IC is faulty then Ringer, Vibrator and LED of mobile phone will nor work properly.

16. Audio IC

It is found in Power Section of a mobile phone. It is also called Cobba IC and Melody IC.

fig1.24

Work / Function: It controls Speaker and Microphone of a mobile phone.

Faults: If Audio IC is faulty then Speaker and Microphone of a mobile phone will not work and the set can even get dead.

1.3 Identification of Small Part

a) **Diode**: Diodes are of 4 types:-

- Rectifier Diode: It is found in black color and converts AC Current to DC Current. Itpasses current in one direction. It does not pass current in reverse direction.
- LED: It is found in white or light yellow color and emits light.
- Zener Diode: It is found in charging section. It filters and minimize current and passes forward. It acts as voltage regulator. Zenor diode has fixed capacity like 4V, 6V, 8V etc.

Photo Diode: It is used for Infrared. It captures Infrared Rays.

B) Network Capacitor: It is found in any section of a mobile phone. It is made from 2 or more Non-Electrolytic Capacitors

C) Coil: It is found in any section of a mobile phone. It is found inmany shapes and sizes. Coils are found in 2 colours:

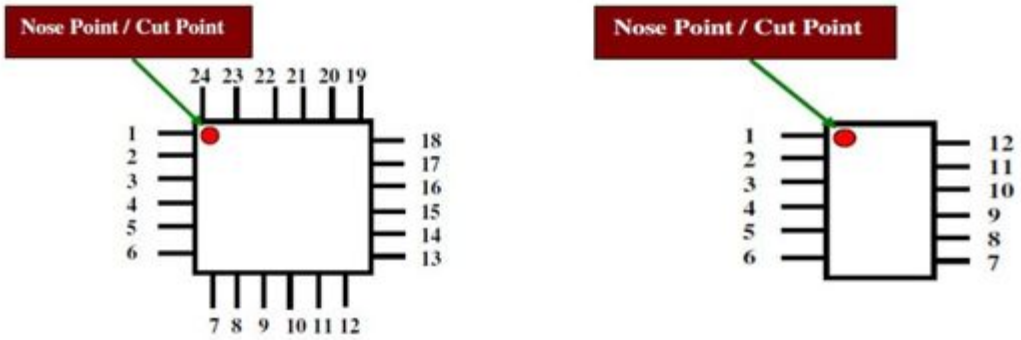
(i) Black and white; and
(ii) Blue and white.

It has binding of copper coil inside. It filters and decreases Current and Voltage.
Boost Coil: It's size is little bigger than coil. It is found in black colour and look like button. It increases current. If this coil gets damaged then it has to be changed

d) IC &Counting

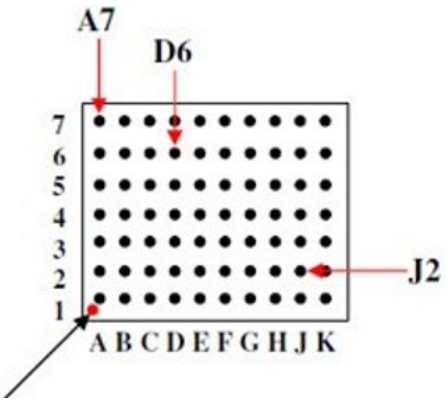
IC (Integrated Circuit): IC is an electronic component that is made up of many other small electronic components like resistance, capacitor, coil, diode, transistor etc. There are 2 types of ICs – (i) Leg-Type IC; and (ii) Ball- Type IC.

Counting: Leg-Type IC: Counting of leg-type IC starts in Numerical Digit in Anticlockwise Direction starting from the Nose Point or Cut Point



Counting: Ball-Type IC: Counting of Ball-type IC is done in Both Clockwise and Anti-Clockwise Direction. Rows are counted in Digit Numbers (1,2,3,4…) in Clockwise Direction. Columns are Counted in Alphabet (A,B,C,D…) in Anti-Clockwise Direction.

NOTE: When counting Columns, "I" and "O" are omitted because they look like "1" and "0".



1.4 What are the features of a mobile phone?

Feature of **mobile phones**. The main purpose of the **mobile phone** is to be able to make and receive **telephone** calls. In addition, text messaging is a basic function, officially called SMS (Short Message Service). All **phones**, even the cheapest ones are able to perform these basic functions.

- **What a cell phone is made of?**

Cell phones can be made up of **plastics**, rechargeable batteries, and **metals**. The types of **metals** found in cell phones can vary. **Metals** that have been recovered from cell phones in the recycling process have included **gold**, silver, **platinum**, palladium, **copper**, tin, and zinc!

- **What is a mobile handset?**

A cordless telephone uses a radio transceiver as its **handset**, and a radio transceiver, wired to the telephone line, as a base station. In a **mobile** telephone, the entire unit is usually a radio transceiver that communicates through an outdoor base station located at a cell site.

1.4.1 What is a code of practice in the workplace?

An approved **code of practice** is a practical guide to assist you in complying with your health and safety duties under the WHS Act and Regulations.

1.4.2 Is a code of practice a legal requirement?

A **Code of practice** can be a document that complements occupational health and safety laws and **regulations** to provide detailed practical guidance on how to comply with **legal** obligations, and should be followed unless another solution with the same or better health and safety standard is in place, or may be a document ..

1.4.3What does a code of practice include?

What a **code of conduct should include**. The most common sections to **include** in a **code of conduct** are: ethical principles - **includes** workplace behaviour and respect for all people. values - **includes** an honest, unbiased and unprejudiced work environment.

1.4.4 What is the purpose of the codes of practice?

By setting clear standards of professional **practice** and behaviour, the **Codes** are an important part of regulating and improving the quality of care for people who use services. The **Codes** let you know what you can expect from social service workers.

. 1.4.5What are workplace policies?

I. A **workplace** policy is a set of rules and principles that aims to guide managers and workers in how to behave in the **workplace**. You can have them in place for numerous different issues – bullying, harassment, internet use, health and safety, and social media are just a few.

II. What are the OHS policies and procedures?

The purpose of the Health and Safety **policies and procedures** is to guide and direct all employees to work safely and prevent injury, to themselves and others. All employees are encouraged to participate in developing, implementing, and enforcing Health and Safety **policies and procedures**.

iii.What should be included in a workplace health and safety policy?

It **must** include a statement regarding the responsibilities of the employer, supervisors and other workers. A **policy** states clearly what the employer intends to do about commitment and support for **health and safety** in the **workplace**. ... A**policy** commits the entire organization to maintaining a **safe workplace**.

1.5 occupational health and safety (OH&S) program

A health and safety program is a definite plan of action designed to prevent accidents and occupational diseases. Some form of a program is required under occupational health and safety legislation in most Country. A health and safety program must include the elements required by the health and safety legislation as a minimum.

Because organizations differ, a program developed for one organization cannot necessarily be expected to meet the needs of another. This document summarizes the general elements of a health and safety program. This approach should help smaller organizations to develop programs to deal with their specific needs.
An organization's occupational health and safety policy is a statement of principles and general rules that serve as guides for action. Senior management must be committed to ensuring that the policy is carried out with no exceptions. The health and safety policy should have the same importance as the other policies of the organization.

The policy statement can be brief, but it should mention:

- Management's commitment to protect the safety and health of employees.
- The objectives of the program.
- The organization's basic health and safety philosophy.
- Who is accountable for occupational health and safety programs.
- The general responsibilities of all employees.
- That health and safety shall not be sacrificed for expediency.
- That unacceptable performance of health and safety duties will not be tolerated.

1.5.1The policy should be:

- Stated in clear, unambiguous, and unequivocal terms.
- Signed by the incumbent Chief Executive Officer.
- Kept up-to-date.
- Communicated to each employee.

- Adhered to in all work activities.

1.program elements?

While organizations will have different needs and scope for specific elements required in their health and safety program, the following basic items should be considered in each case:

- Individual responsibility.
- Joint occupational health and safety committee.
- Health and safety rules.
- Correct work procedures.
- Employee orientation.

Training.

- Workplace inspections.
- Reporting and investigating accidents/incidents.
- Emergency procedures.
- Medical and first aid.
- Health and safety promotion.
- Workplace specific items.

2. Responsibilities of workers

Examples of responsibilities of workers include:

- Using personal protection and safety equipment as required by the employer.
- Following safe work procedures.
- Knowing and complying with all regulations.
- Reporting any injury or illness immediately.
- Reporting unsafe acts and unsafe conditions.
- Participating in joint health and safety committees or as the representative.

3.What are individual OH&S responsibilities

Health and safety is the joint responsibility of management and workers. Management is accountable for non-compliance to health and safety legislation.

Responsibility may be defined as an individual's obligation to carry out assigned duties. Authority implies the right to make decisions and the power to direct others. Responsibility and authority can be delegated to subordinates, giving them the right to act for superiors. It is important to note that, while some responsibilities can be delegated, the superior remains accountable for seeing that they are carried out.

Individual responsibilities apply to every employee in the workplace, including the Chief Executive Officer. All employees will then know exactly what is expected of each individual in health and safety terms.

To fulfill their individual responsibilities, the people must:

- Know what these responsibilities are (communication required).
- Have sufficient authority to carry them out (organizational issue).
- Have the required ability and competence (training or certification required).

Once all these criteria have been met, each individual's supervisor on an equal basis with other key job elements can assess safety performance. Health and safety is not just an extra part of an employee's job: it is an integral, full-time component of each individual's responsibilities.

4. Responsibilities of safety coordinators

Examples of responsibilities of safety coordinators include:

- Advising all employees on health and safety matters.
- Coordinating interdepartmental health and safety activities.
- Collecting and analyzing health and safety statistics.
- Providing health and safety training.
- Conducting research on special problems.

- Attending joint health and safety committee meetings as a resource person.

5. What are workplace inspections?

Workplace inspections help to identify existing hazards so that appropriate corrective action can be taken. Health and safety legislation requires workplace inspections as a proactive action to ensure workplace health and safety.

Supervisors and workers are responsible for reporting and taking action on unsafe conditions and acts as they are encountered. The frequency of planned formal inspections may be set out in legislation. Records of previous accidents and the potential for serious accidents and injuries are factors to be included when determining if more frequent inspections are needed.

Joint health and safety committee members are obvious choices of personnel to carry out formal inspections, especially if they have received training or certification. Other criteria for selecting the inspection team are:

- Knowledge of regulations and procedures.
- Knowledge of the hazards in the workplace.
- Experience with work processes involved.

Pre-planning any inspection is always worthwhile. Documents, such as previous inspections, accident investigations, maintenance reports, and committee minutes, should be consulted. If a checklist is to be used, it should be reviewed and changed to meet specific needs of the workplace.

Checklists are useful aids in that they help ensure that no items are overlooked in an inspection. One type of checklist is the "critical parts inventory". This inventory itemizes parts and items that may result in a serious accident if they fail. While many ready-made checklists are available in safety literature, it is best to adapt these to local conditions. The joint health and safety committee should participate in the preparation of these tailor-made checklists.

6.Sample Inspection List

Date: _____

Location/Department: _____

Yes = Satisfactory **No = Unsatisfactory, needs attention**					
Yes	**No**	**Safe Work Practices**	**Yes**	**No**	**Fire Protection**
		Use of machine guards Proper manual lifting Smoking only in safe, designated areas Proper use of air hoses No horseplay Other: _____			Fire extinguishers Proper type/location Storage of flammable materials Other: _____
		Use of Personal Protective Equipment			Tools and Machinery
		Eye/face protection Footwear Gloves Protective clothing Head protection Aprons Respirators Other: _____			Lawn mowers Power tools Hand tools Snow blowers Machine guarding Belts, pulleys, gears, shafts Oiling, cleaning, adjusting Maintenance, oil leakage Other: _____
		Housekeeping			First aid
		Proper storage areas Proper storage of flammable material			First aid kits in rooms/vehicles Trained first aid providers Emergency numbers posted

		(oily/greasy rags, etc.) Proper disposal of waste Floors (clean, dry, uncluttered) Maintenance of yards, parking lots Other: _____			All injuries reported Other: _____
		Electrical Safety			Other: _____
		Machines grounding/GFI Electrical cords Electrical outlets Other: _____			SDS/Labels Dust/vapour/fume control Safe use of ladders/scaffolds New processes or procedures carried out Other: _____

Table 1.2

Notes:

_____

_____

_____

During the actual inspection, both work conditions and procedures should be observed. If a hazard that poses an immediate threat is discovered, preventive action must be taken right away, not after the inspection. Notes are made, specifying details of the hazard, including its exact location. When completing the inspection report, it is a good idea to classify each hazard by degree of possible consequences (for example: A = major, B = serious, C = minor). In this way, priorities for remedial action are established.

7.Workplace Inspection Report

Location:_____

Department/Areas covered: _____

Date of Inspection: _____

Time of Inspection: _____

Item (Location)	Hazards Observed	Repeat item Yes/No	Priority	Recommended Action	Responsible Person	Action Taken	Date
Analysis and comments:							

Table 1.3

Priority Codes: A - do immediately; B - do within 3 days; C - do within 2 weeks; D - other

Inspections serve a useful purpose only if remedial action is taken to correct shortcomings. Causes, not symptoms alone, must be rectified. Corrective action should be taken immediately, with the emphasis on engineering controls, management failures, or need for worker education, whatever applies.

8.What are emergency procedures and how are they established?

Emergency procedures are plans for dealing with emergencies such as fires, explosions, major releases of hazardous materials, violent occurrences, or natural hazards. When such events occur, the urgent need for rapid decisions, shortage of time, lack of resources, and trained personnel can lead to chaos.

The objective of the plan is to prevent or minimize fatalities, injuries, and damage. The organization and procedures for handling these sudden and unexpected situations must be clearly defined.

The development of the plan follows a logical sequence.

- Compile a list of possible hazards or scenarios (for example: fires, explosions, floods).
- Identify the possible major consequences of each (for example: casualties, damage).
- Determine the required countermeasures (for example: evacuation, rescue, firefighting).
- Inventory the resources needed to carry out the planned actions (for example: medical supplies, rescue equipment, training personnel).
- Based on these considerations, establish the necessary emergency organization and procedures.

Communication, training, and periodic drills are required to ensure adequate performance when the plan must be implemented.

9.how do you establish medical aid and first aid programs?

First aid facilities and the provision of medical aid is generally prescribed under health and safety legislation or workers' compensation legislation. The OSH program must include the following information:

- Location of first aid stations and medical facilities.
- Identification of first aid attendants.
- Identification of other staff trained in first aid.

- Policy on pre-employment and follow-up medical examinations.
- Procedures for transporting injured employees to outside medical facilities.
- Provision of first aid training.
- Procedure for recording injuries and illnesses.

A policy on return to work after a lost-time accident might appropriately be included in this section of the program.

In general, if injured workers are offered alternative employment:

- The work should be suitable and productive.
- The worker's physician must agree that such employment will not harm the worker or slow down the recovery.
- The worker will pose no threat to other workers.
- The policy is applied to off-the-job injuries as well.

Under no circumstances should the reduction of severity ratings be a reason for initiating a "modified work" program.

10.Should workplace specific items be included in occupational health and safety programs

The elements of OH&S programs discussed so far apply to all basic health and safety programs. In addition, specific items may be needed to address workplace specific activities. Examples of such items are:

- Workplace Hazardous Materials Information System (WHMIS).
- Lock out procedures.
- Confined space procedures.
- Hot-work permits.
- Material handling rules.
- Plant maintenance.
- Fire safeguards.
- Vehicle safety rules.
- Off-the-job safety.

- Working alone guidelines.
- Personal protective equipment requirements.
- Engineering standards.
- Purchasing standards.
- Preventive maintenance.

1.5.2 how do you implement occupational health and safety programs?

A good health and safety program provides a clear set of guidelines for activities that, if followed rigorously, will reduce accidents and cases of occupational disease. The key to success is the manner in which the program is implemented and maintained.

Senior management must demonstrate commitment and support the program by:

- Providing resources such as time, money, and personnel.
- Ensuring that employees receive training or certification as required.
- Making all applicable health and safety information available to all employees.
- Including health and safety performance as part of employee performances appraisals at all levels.
- Attending health and safety meetings.

The program must be communicated to all employees. Special emphasis should be given to new workers, newly appointed supervisors, and new members of the joint health and safety committee. Revisions to policies and procedures should be publicized. The program should be available in a single written document. However, if separate manuals have been developed for various elements, such as accident/incident investigation procedures, their use should be referred to in the main document.

1.5.3How is the effectiveness of OH&S programs evaluated

Accident frequency and severity rates are not always the only measures to use for evaluating the effectiveness of a health and safety program. Cases of occupational disease are often under-reported in these statistics. The emphasis is usually on injury-

producing accidents, not all events. Since accidents/incidents are rare events, in small organizations the basis for comparison may be limited.

It is desirable to use an audit as a before-the-fact measure of the effectiveness of an OH&S program. An audit uses a checklist in which each element is subdivided into a series of questions. Each question is given a weighting factor depending on its importance. Records, observations, interviews, and questionnaires are used to evaluate performance for each sub-element.

A number of audit systems are available.

Annual audits appear to be more common, but reviewing critical elements in the program more frequently may be advisable. The audit team, which should include representation from the joint health and safety committee, must receive appropriate training in audit procedures.

The audit identifies weaknesses in the health and safety program. Little is achieved unless a procedure is established to ensure prompt follow-up on deficiencies. This procedure should include provision for target dates for remedial action and checks to confirm completion.

1.6 Occupational Health and Safety In Workplaces Duties of Workers

1.6.1Occupational Health and Safety and You

One of your most important responsibilities is to protect your Health and Safety as well as that of your co-workers. This booklet will discuss some of your duties under the occupational Health and Safety legislation and help you to make your workplace safer and healthier.

I. What the law requires

Workplaces under the jurisdiction are governed by your provincial legislation. The legislation places duties on owners, employers, workers, suppliers, the self-employed and contractors, to establish and maintain safe and healthy working conditions. The legislation is administered by your provincial legislation. Your officials are responsible for monitoring compliance.

.

II. Responsibilities of trainees

You must also comply with the legislation.

You have responsibilities to:

- protect your own Health and Safety and that of your co-workers;
- not initiate or participate in the harassment of another worker; and
- co-operate with your supervisor and anyone else with duties under the legislation

1.6.2Potential Hazards Associatedwith Mobile Phone Repair

Your physical wellbeing is important not only to yourself, but also to others.
Therefore, as you embark on mobile phone repair, you should be aware of all the Potential hazards and how to prevent them.

***What is a hazard*?**

A hazard is anything that has the potential to cause harm to yourself or those Around you. Before you learn the different types of hazards, let's start by definingSome of the terms associated with hazards.

Table 1.4

Hazard	Preventive Actions
Burns	Use of well insulated tools Use of gloves Keeping the soldering iron in the right place Unplugging equipment when not in use
Pricks by sharp objects	Appropriate storage of equipment Proper disposal of sharp objects Use of appropriate tools and equipment
Environmental pollution	Proper disposal of electronic wastes
Trailing electrical cables	Make sure electrical equipment is unplugged while not in use Safe storage of cables
Falls	Keep all tools, bins etc. in the right place

Self-check 1	choose

Name:

_____Date:_____

Time Start: _____

Time Finish_____

1._____help to identify existing hazard so that appropriate corrective action can be taken

A. work place b. safety

C. workplace inspection d .all

2._____portable telephone to make and receive call.

A. bell c. buzzer

B antenna d. mobile phone

3_____refers to the size, style and shape of mobile phone.

A. Bar phone c. touch screen

B. Form factor d. battery

4._____used for inputting or interring data to the phone

A .mic c. speaker

B .keypad D. battery

Answer **score**

1. _____
2. _____
3. _____
4. _____

Information sheet 2	Make necessary *tools*, *test instruments* and *personal protective equipment* are ready with job requirements

2.1 Mobile Phone Repairing Tools & Equipment Tools to Repair Mobile Cell Phone

When selecting tools and equipment for repairing mobile cell phones, it is important to select the best tools. Cheap or inexpensive tools and equipment may not be handy when repairing a mobile phone. On the other hand, best quality little expensive tools and equipment will help you to repair a mobile phone easily and comfortable. I am personally trained in mobile cell phone repairing and my personal experience says that we must always select and buy the best tools available in the market or online. These good quality tools may cost a little more but in the long term, you will be happy that you bought the best tools.

There are hundreds of tools for mobile phone repairing available in the market. It is important to select the best brand. Below all the tools and equipment needed for mobile cell phone repairing:

1. **Soldering Iron**:

Fig. 2.1 Shows Soldering Iron

It is used to solder small components like capacitor, resistor, diode, transistor, regulator, speaker, microphone, display etc. A 50 watt soldering iron is good enough for most mobile phone repairing job. When buying a soldering iron, select the one that is easy to hold and does not burn your hand. The soldering iron must

have option to choose and select different types and shapes of soldering tips or bits. These tips or bits must be replaceable. It must also be ESD-Safe (Antistatic) because most electronic components in a mobile phone are very sensitive and can get damaged due to static charge or static electricity. Hakko and Weller are two world renowned brands who manufacture, sell and export world class soldering irons and other soldering tools and equipments.

2. **Soldering Station**: A soldering station has 2 units – a station and an

Fig. 2.2 Shows Soldering Station equipments

Soldering Station Iron: It has option to control temperature depending on the heat requirement of the soldering job being done. The soldering iron is attached with the soldering station. It is better and more convenient than traditional soldering iron. It makes soldering work much easier and faster. When buying a soldering station for mobile phone repairing one must always select an ESD-Safe (Antistatic) model. Hakko and Weller are two world renowned brands who manufacture, sell and export world class soldering irons and other soldering tools and equipments.

3.**PCB Holder / PCB Stand**: A PCB (Printed Circuit Board) holder or PCB

Fig.2.3 Shows PCB holder

PCB Holder stand: is used to old the PCB of a mobile phone while soldering or repairing. It holds the PCB very strongly and doesn't allows it to move thus helping in repairing. Again, it is important and wise to select a good quality PCB holder rather than a cheaper and inexpensive one.

4 **Solder Wire**: Solder wire is used to solder electronic components, ICs

Fig. 2.4 Shows Solder wire or Jumper

Solder Wire or jumper: Composition of most solder wire is Tin / Lead in the ratio 60:40 or 63:37. Since the introduction of RoHS (Restriction of Hazardous Substances) from electronics, more and more companies are using lead-free solder. Lead-free solder wire is available in many compositions but the most common composition is Tin / Silver / Copper in the Ratio 96.5:3.0:0.5. Solder wire is available in different diameters such 2.0mm, 1.5mm, 1.0mm, 0.5mm, 0.2mm etc. For mobile phone repairing 0.5mm solder wire is best suitable. Kester is a world renowned manufacturer and supplier of solder wire and other soldering material.

5. **Thinner or PCB Cleaner:** Thinner or PCB cleaner is used to clean the PCB of a mobile phone. The most common PCB cleaner used in mobile phone repairing is IPA or Isopropyl Alcohol. It is important to buy only good quality PCB cleaner as poor quality PCB cleaners can damage the board.

Fig.2.5 Shows PCB Cleaner

6. **Jumper Wire:** This is a thin laminated or coated copper wire used to jumper from one point to another on the track of a mobile phone while repairing. Most people doing the work of mobile repairing do jumper to solve many problems.

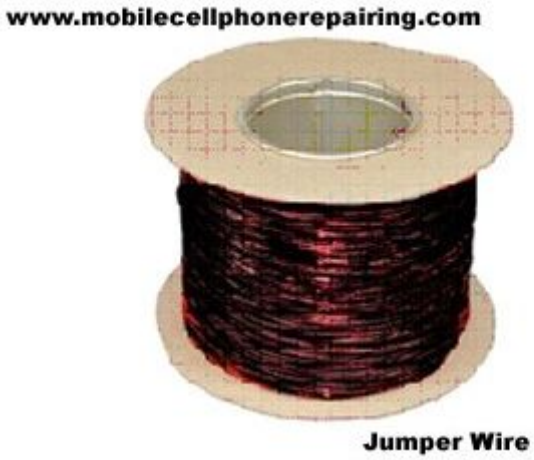


Fig.2.6 Shows Jumper Wire

7 **Blade Cutter**: This is used to remove lamination from jumper wire. It can also be used for several other purposes.

Fig.2.7 Shows Blade Cutter

8 **Point Cutter**: It is used for cutting.

Fig.2.8 Shows Point Cutter

9**Nose Cutter**: It is used for cutting.

Fig.2.9 Shows Nose Cutter

10. **Precision Screwdriver**: It is used to remove and tighten screws while assembling and dissembling a mobile phone. Precision screwdrivers of sizes T4, T5, T6 and forehead are good for most mobile repairing job.

Fig.2.10 Shows Screwdriver for Mobile Phone Repairing

11. **Tweezers**: These are needed to hold electronic components, ICs, jumper wire etc while soldering and Disordering.

Fig.2.11 Shows Tweezers

12.**Brush**: These are used for cleaning the PCB of a mobile phone while repairing. It is important to buy only ESD-Safe cleaning brushes.

Fig.2.12 Shows ESD-Safe Brush for Mobile Repairing

13. **Multi Meter**: Used to find faults, check track and components. Always buy a good quality reliable ESD-Safe digital Multi meter for mobile repairing works.

Fig..13 Shows Multi meter

14.**Hot Air Blower**: It is also called SMD (Surface Mount Device) rework system and SMD repair system. It has control to regulate or manage temperature and flow or hot air. Always buy a good quality ESD-Safe hot air blower.

Fig.2.14 Shows Hot Air Blower

15.**Battery Booster**: It is used to boost the power of battery of a mobile phone.

Fig.2.15 Shows Mobile Phone Battery Booster16. **Ultrasonic Cleaner**: Used to clean PCB of a mobile phone and electronic components.

Fig.2.16 Shows Ultrasonic Cleaner for Mobile Repairing

17.**BGA Kit**: Used to Re ball and repair ball-type ICs. BGA stands for Ball Grid Array.

Fig.2.17 Shows BGA Kit for Mobile Repairing

18. Magnifying Lamp: It is used to see the magnified view of the PCB of a mobile phone. Most magnifying lamps also have light. Magnifying lamps are available in different magnification such as 3x, 4x, 5x, 10x, 50x etc.

Fig.2.18 Shows Magnifying Lamp to Repair Mobile Phone

19. **Mobile Opener**: These are used to open the housing or body of a mobile phone.

Fig.2.19 Shows Mobile Phone Opener

20.**DC Power Supply**: Regulated DC (Direct Current) power supply is used to supply DC current to a mobile phone. Most repair person used DC power supply to switch ON a mobile phone without battery.

Fig.2.20 Shows DC Power Supply for Mobile Phone Repairing

21. **Liquid Flux**: It is used to clean PCB track and legs or pins of electronic components while soldering. Liquid flux improves quality of soldering. Kester flux is world renowned for good quality.

Fig.2.21 Shows Liquid Flux for Mobile Phone Repairing

22.**Paste Flux**: This is also used while soldering.

Fig..22 Shows Paste Flux

23. Solder Paste: This is solder in molted semi-solid form. It looks like paste. Solder paste is mainly used for Rebelling of ICs.

Fig.2.23 Shows Solder Paste

24.**Cleaning Sponge**: This is used to clean tip of soldering iron while soldering.

Fig.2.24 Shows Cleaning Sponge to Clean Tip of Soldering Iron

25. **Disordering Wire**: Disordering wire or De solder wire is used to remove excess solder from track of PCB. Chemtronics is world renowned manufacturer and supplier of De soldering wire.

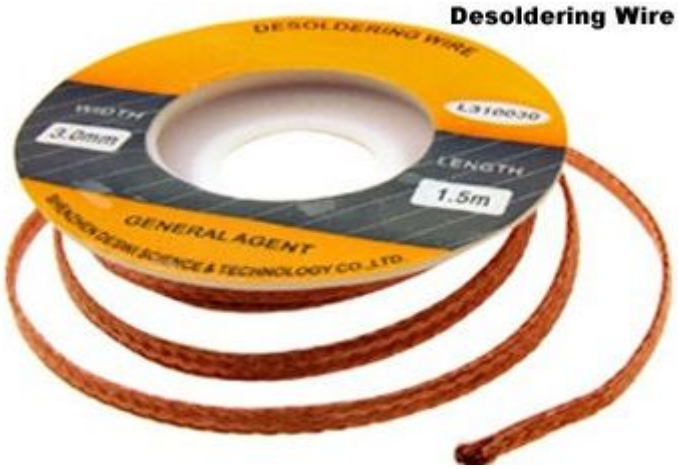


Fig.1.25 Shows De soldering Wire

26. **Screw driver Kit**: It has several screwdrivers of different shapes and sizes to dissemble and assemble a mobile phone. Tool is a world renowned manufacturer, exporter and supplier of all kinds of tools and tool kits.

Fig.2.26 Shows Screwdriver Kit

27.**IRDA or Infrared Workstation**: This machine is similar to hot air blower. Only difference is that it gives heat through infrared. It is very precise and give heat only where it is needed thus preventing any damage to nearby electronic components on a PCB.

Fig.2.27 Shows Infrared Workstation

28 **LCD Tester**: Used to check whether LCD screen of a mobile phone is faulty or not.

Fig.2.28 Shows LCD Tester

29. **Microscope**: It is used to see a magnified view of PCB or electronic components. These are available in different zoom options. Many microscopes can also be connected to a computer or a monitor.

Fig.2.29 Shows Microscope for Mobile Repairing

30. **Test JIG Box**: This device is used to diagnose and find fault or problem in a mobile phone. It helps the mobile phone to work and function normally outside its case. This helps to test and check voltage and other test points on the PCB. It simple words it helps a mobile phone to work without battery.

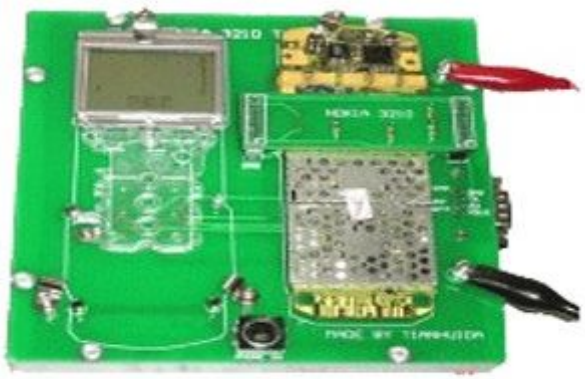


Fig.2.30 Shows Test JIG Box

31. **Wrist Strap**: It is work in the wrist of the person who is repairing a mobile phone. It helps to discharge or ground static charge thus preventing the PCB or electronic components from any damage.

Fig.2.31 Shows Wrist Strap

32**Antistatic Hand Gloves**: It is important to wear ESD-Safe hand gloves while repairing a mobile phone to prevent PCB and electronic components from static charge.

Fig.1.32 Shows Antistatic Hand Gloves

33. **Antistatic Mat**: It is laid or placed on the table or workbench where mobile repairing is done. The mat is grounded using a grounding cord or normal grounding wire. This also prevents damage from static electricity.

Fig.2.33 Shows Antistatic Mat

34. Antistatic Apron: It is a dress work by people who repair mobile phones. This also helps to discharge static electricity.

Fig.2.34 Shows Antistatic Apron

35. **Smoke Absorber**: This is like an exhaust fan that helps to filter smoke that comes out while soldering and de soldering.

Fig.2.35 Shows Smoke Absorber

36. **Battery Tester**: This device is used to test and analyze status or condition of battery of a mobile cell phone.

Fig.2.36 Shows Battery Tester

Self-Check 2	**matching**

Name: _____Date: _____

Time Start: _____Time Finish: _____

	**1**	Pcb holder
	**2**	Battery tester
	**3**	Hot Air Blower

	4	Soldering iron
	5	Wrist rap

Answer Sheet

1. _____
2. _____
3. _____
4. _____

5. _____

Operation sheet 1	Select appropriate tools and material for mobile maintenance

PURPOSE: - identify each component and knowing their function

PROCEDURE:-

- Follow safety procedure and rule
- Select the appropriate tool
- Identify the appropriate tools
- Write their function of each selected tools

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:-

Set each tools on safe areas

Information sheet 3	Service manuals and service information required for repair/maintenance are acquired at commencement of activities

3.1Service manuals and service information required for repair/maintenance are acquired at commencement of activities

3.1.1What is maintenance manual.

The **Maintenance Manual** provides maintenance personnel with the information necessary to maintain the system effectively. ... Appendices to document various maintenance procedures standards, or other essential information may he added to this document as needed.

3.1.2What is standard maintenance procedure.

A **Standard Maintenance Procedure**, or SMP, is a written set of instructions that specifies how a maintenance procedure is to be performed. .

3.1.3What is an O&M manual.

The operation and maintenance manual (O&M Manual) defines the requirements and procedures for the effective operation, maintenance, decommissioning and demolition of the building.

3.1.4What is repair manual.

Factory service manuals (FSM) are the manuals provided by manufacturers, which cover the servicing, maintenance and repair of their products. They were not originally offered to the public as they were developed for the dealerships so that their mechanics were able to fix their own products.

3.1.5What is the service manual.

Factory service manuals (FSM) are the manuals provided by manufacturers which cover the servicing, maintenance and repair of their products. They were not originally offered to the public as they were developed for the dealerships so that their mechanics were able to fix their own products.

Self-cheak3

Name:_____Date:_____

Time Start: _____Time Finish: _____

1. .What is service manual?.
2. What is repair manual?

Information sheet 4	**repair/maintenance history of the unit is properly verified**

4.1 Repair/maintenance history of the unit is properly verified

4.1.1 What is mobile maintenance?

Mobile technology is opening up a world of possibilities, and that includes new advances for the maintenance industry. One good example is mobile maintenance software which allows maintenance staff to enjoy the perks of a computerized maintenance management system (CMMS) anywhere via their mobile devices.

4.1.2 What is a mobile service?

A **mobile service** provider (MSP) is a company that offers transmission **services** to users of **wireless** devices (smartphones and tablet PCs) through radio frequency (RF) signals rather than through end-to-end wire communication.

Types of Mobile Services

- The Mobile Internet. Mobile phones today are equipped with Internet browsers and large colour screens. ...
- Mobile Instant Messaging Services. ...
- Mobile Chat Rooms. ...
- Premium Rate Mobile Content Services. ...
- Examples of mobile phone subscription services. ...
- Mobile Dating Services.

Step by Step Mobile Phone Repairing

Step-1: Take admission in a well-known and trusted mobile phone repairing training institute. You can never learn mobile phone repairing on your own. It may look simple and easy and you may also be able to do some easy repairing yourself by reading or watching online videos but you will never be perfect.

Try to do some bargaining and get some discount on the admission fee. Most such institutes provide offers for discount. Like most of them will ask you to bring few more students to their institute and you will get some discount per student on your own fee.

Step-2:

1. – Start from the basic. Try to learn some of the Most Common Terms Used in Telecommunication.
2. Next, learn about tools and equipment needed for mobile phone repairing.
3. Next, Learn how to disassemble and open a mobile phone and again assemble it back.
4. The PCB of a mobile phone is divided into different sections and contains different parts. Learn about different sections in a mobile phone and parts.
5. Next, Learn about Mobile Software Problem and Solution and then learn mobile phone hardware problem and solution.
6. Once you are done with learning how to repair basic mobile phone, you can move onto the second stage and learn how to repair modern smartphone, Apple iPhone and Android-Based smartphones.
7. Read Other Useful Articles on Mobile Phone Repairing.
8. Download for Free: Mobile Phone Repairing PDF Book
9. Learn Electronics Tutorial

- **We have to discuss in detail in next learnnring outcome**

Self-check 4	Choose

Name:_____Date:_____

Time Start: _____Time Finish: _____

1._____is opening up world of possibility and that include new advance for the maintenance industry

A. Mobile maintenance
B. Soldering /disoldering
C. Safety
D. Workplace policy

Answer

1._____

Operation sheet 2	Identify internal mobile parts

PROCEDURE:-

Step 1: Try to cheak your nsafety
Step2: Select the required cell phone
Step3: Selection is personal
Step 4: Select appropriate tools for did assembling
Step5: Use appropriate ESD material

PRECAUTIONS:-

You should not forget to wear your PPEs. You should take care of not to contact any bare part of your body whenever you assemble & disassemble cell phone. Use instruments properly according to manufacturer specification.

QUALITY CRITERIA:-

Perform safely and properly when assemble & disassemble cell phone, identified quickly, efficiently, economically and safely.

LAP TEST #1	Identify mobile tools

Name: _____Date:_____

Timestarted_____Timefinished:_____

Instructions: You are required to perform the following individually with the presence of your teacher

Task 1: identify tools and material

LAP TEST #2	Identify internal mobile phone part

Name_____Date: _____

Time started: _____ Time finished: _____

Instructions: You are required to perform the following individually with the presence of your teacher

Task: dis assemble mobile phone

Task: identify each mobile part

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