IT SUPPORT SERVICE LEVEL II

Learning Guide #38

Unit of Competence	:	Maintain Equipment and Consumables
Module Title	:	Maintaining Equipment and Consumables
LG Code	:	EIS ITS2 M10 1019 L03
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LO3: Maintain equipment

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

- Clean equipment
- Replace and maintain consumables and supplies
- Maintain equipment

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:

- Identify equipment which requires maintenance
- Maintain equipment as required by organizational guidelines and manufacturer specifications.
- Document maintenance procedures as required by organizational guidelines.
- Exercise care to prevent interruption of business activities during maintenance procedures
- Store unused equipment devices in line with manufacturer specifications and organizational guidelines

Learning Activities

1. Read the specific objectives of this Learning Guide.
2. Read the information written in the "Information Sheets 1" in page 3.
3. Accomplish the "Self-check 1" in page 4.
4. Read the information written in the "Information Sheets 2" in pages 5-6.
5. Accomplish the "Self-check 2" in page 7.
6. Read the information written in the "Information Sheets 3" in page 8.
7. Accomplish the "Self-check 3" in pages 9.
8. Read the information written in the "Information Sheets 4" in pages 10-11.
9. Accomplish the "Self-check 4" in pages 12.
10. Read the information written in the "Information Sheets 5" in pages 13-15.
11. Accomplish the "Self-check 5" in pages 16.

- Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to the next topic.

Information Sheet 1	Identifying Equipment which requires maintenance

1.1.   Identifying Equipments

A properly run organization will have a maintenance schedule for all of its equipment. This schedule would have key information that would allow you to readily identify those pieces of equipment that require servicing at a particular time. You will find that not all equipment will be serviced at the same time primarily because some are newer than others. Your best choice then, is to refer to the maintenance schedule.

Sample Schedule Form

Computer Maintenance Schedule

Things to Check and Maintain	Daily	Weekly	Monthly	Annually

Note:

With proper maintenance you can avoid trouble and keep your computer running at peak efficiency. The basic steps are:

1. Keep your operating system up-to-date with all the latest security releases.

2. Run an anti-virus program regularly to keep your computer bug free.

3. Run system utilities regularly to make sure your hardware is operating correctly.

Signature: _____

Self-Check 1	**Written Test**

Name: _____   Date: _____

Instruction*:* Answer all the questions listed below, if you have some clarifications- feel free to your teacher.

Please ask your trainer for the questionnaire for this Self-Check.

Identification: list and Identify Equipments requiring maintenance.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Information Sheet 2	**Equipment Maintenance**

2.1. Maintenance Definition

Maintenance is a set of organized activities that are carried out in order to keep an item in its best operational condition with minimum cost acquired.

2.2. Types of Maintenance

- Preventive Maintenance (PM)
- Corrective Maintenance (CM)
- Improvement Maintenance (IM)
- Predictive Maintenance (PDM)
- Run to Failure Maintenance (RTF)

✓ **Preventive Maintenance (PM)**

The advantage of applying preventive maintenance activities is to satisfy most of maintenance objectives. It is good for those machines and facilities which their failure would cause serious production losses.

Its aim is to maintain machines and facilities in such a condition that breakdowns and emergency repairs are minimized.

Its activities include replacements, adjustments, major overhauls, inspections and lubrications.

✓ **Corrective Maintenance (CM)**

In this type, actions such as repair, replacement, or restore will be carried out after the occurrence of a failure in order to eliminate the source of this failure or reduce the frequency of its occurrence.

✓ **Improvement Maintenance (IM)**

It aims at reducing or eliminating entirely the need for maintenance.

✓ **Predictive Maintenance (PDM)**

Predictive maintenance is a set of activities that detect changes in the physical condition of equipment (signs of failure) in order to carry out the appropriate maintenance work for maximizing the service life of equipment without increasing the risk of failure.

✓ **Run to Failure Maintenance (RTF)**

This type of maintenance is useful in the following situations:

- The failure of a component in a system is unpredictable.
- The cost of performing run to failure maintenance activities is lower than performing other activities of other types of maintenance.
- The equipment failure priority is too low in order to include the activities of preventing it within the planned maintenance budget.

2.3. Maintenance procedure and techniques

- Maintenance work order:

    1. Identify the Nature problem
    2. Identify cause of problem
    3. Action code

- Maintenance safety rules:

Maintenance safety rules are safe guard of people and Pc components. It prevents people from injury, equipment from damage.

    A. Laboratory procedures

    ✓ The work place or laboratory should have safety guidelines.

    B. Safe working conditions

    ✓ The work place should be cleaned and organized

    ✓ Think before some action

- General Safety Rules:

The following general safety rules have been developed to provide a safe and healthy working environment for all employees and students. These apply to all work activities.

    ✓ Report to work well rested and physically fit to be able to give full attention to your job.

    ✓ Persons with physical or mental impairment shall not be assigned to tasks where their impairment has a potential to endanger themselves or others.

    ✓ No person shall be permitted to remain on the premises while their ability to work is so affected by alcohol, drugs (prescription or non-prescription) or other substance, so as to endanger their health or safety or that of any other person.

    ✓ Persons working alone shall be required to check-in regularly with security or a supervisor to ensure that their well being is maintained.

    ✓ Inappropriate behavior, such as horseplay, fighting and practical jokes are extremely dangerous and will not be tolerated.

    ✓ Any unsafe conditions which are encountered shall be corrected or reported to your Supervisor and/or the Occupational Health and Safety Department.

    ✓ Do not operate any machinery or equipment if it is known to be in an unsafe condition.

    ✓ Machinery and equipment are only to be operated by qualified persons and then only when adequately trained in the use of the equipment and authorized to operate it.

    ✓ Unsafe Acts shall be reported to your Supervisor and/or the Occupational Health and Safety Department.

Self-Check 2	Written Test

Name: _____   Date: _____

Instruction*:* Answer all the questions listed below, if you have some clarifications- feel free to your teacher.

Please ask your trainer for the questionnaire for this Self-Check.

Choice: Choose the correct answer

1. The aim of _____ is to maintain machines and facilities in such a condition that breakdowns and emergency repairs are minimized.
   A. Preventive Maintenance
   B. Corrective Maintenance
   C. Improvement Maintenance
   D. Predictive Maintenance

2. In _____ type of maintenance, actions such as repair, replacement, or restore will be carried out after the occurrence of a failure in order to eliminate the source of this failure or reduce the frequency of its occurrence.
   A. Preventive Maintenance
   B. Corrective Maintenance
   C. Improvement Maintenance
   D. Predictive Maintenance

3. Which type of maintenance includes a set of activities that detect changes in the physical condition of equipment (signs of failure)?
   A. Preventive Maintenance
   B. Corrective Maintenance
   C. Improvement Maintenance
   D. Predictive Maintenance

4. In which of the following situation Run to Failure Maintenance (RTF) is useful?
   A. The failure of a component in a system is unpredictable.
   B. The cost of performing run to failure maintenance activities is lower than performing other activities of other types of maintenance.
   C. The equipment failure priority is too low in order to include the activities of preventing it within the planned maintenance budget.
   D. All

5. Choose the correct maintenance work order.
   A. Identify the Nature problem → Identify cause of problem → Action code
   B. Identify the Nature problem → Action code → Identify cause of problem
   C. Identify cause of problem → Identify the Nature problem → Action code
   D. Identify cause of problem → Action code → Identify the Nature problem

Information Sheet 3	Documenting and reporting Maintenance procedures

3.1.   Equipment documentation

Each item of IT equipment should be accompanied by documentation. This may be provided in hard copy, as a manual, on CD, or on a support website. If original documentation provided as hard copy is missing, it can usually also be downloaded from the manufacturer's website. IT Support staff need to be able to read and interpret all such technical documentation.

Documentation for a system should outline the manufacturer's recommended maintenance procedures for the unit. The procedures should state:

- **How often** maintenance procedures should be done
- Any **equipment/material/consumables** that are required
- The actual **steps** to complete the maintenance task, including all relevant safety precautions for the task.

The system's documentation should also identify any components of a system that should *not* have any preventative maintenance applied to it for safety reasons. Generally speaking, hardware manufacturers will include instructions for:

- Cleaning
- Care
- Consumables — handling, installing and disposing
- Making adjustments
- Troubleshooting

Apart from documentation, the supplier's website will supply software patches and driver updates as they become available.

3.2.   Reporting Maintenance procedures

Since your external suppliers and internal clients involve different service level agreements, procedures for handling them are usually different, but one may depend on the other. Some of these procedures detail:

- The way service requests are reported
- How fast you can respond to requests — how fast you respond to an internal client will depend on the agreed response time with an external supplier. For example, let's say a workstation monitor needs replacing. If your external supplier says it will be done within two days, then you can't do it any faster for your client!
- How requests are escalated — an external supplier will have specific, agreed escalation procedures, and these may be different from your own internal ones.

Self-Check 3	**Written Test**	- 9 -

Name: _____   Date: _____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to your teacher.

Please ask your trainer for the questionnaire for this Self-Check.

True/False: Write True or false.

_____ 1. It is necessary to include any equipment/material or consumables that are required for the maintenance process in the documentation.

_____ 2. Apart from documentation, the supplier's website will supply software patches and driver updates as they become available.

_____ 3. How fast you respond to an internal client will NOT depend on the agreed response time with an external supplier.

Information Sheet 4	**Exercising care to prevent interruption of business activities**

4.1. Minimizing downtime

It is important that preventative maintenance focuses on items that may cause significant downtime and cost to the business if they were to fail. Such items may include hard disk drives (HDD) of servers. Should they fail, emergency downtime may occur at a significant cost to the business. As a result, such devices should be considered high priority in a maintenance schedule.

Preventative maintenance must be practical within the working of a business. If the process of preventative maintenance causes a major interruption to the daily working of a business, the maintenance program will fail. Always try to consider the impact on the users of the computers when considering a preventative maintenance program.

4.2. Meet business needs

Any maintenance program must meet the needs of the business if it is going to be successful. While this should have been considered when an SLA was written, the maintenance work must be carried out within the organisation's guidelines and requirements.

When should tasks be scheduled?

Scheduled maintenance should obviously impact as little as possible on normal business operations, and should therefore be carried out at periods of low activity, such as during the night, at weekends or holiday periods. It is possible to carry out many tasks with very little client awareness or involvement.

If client involvement is required, they should be informed in advance of when they will be affected, for how long and how it will impact them. You may need to give them instructions, such as logging out of their PC, leaving it on, rebooting, and so on.

There are some useful operating systems or third-party tools which allow maintenance tasks to be automatically scheduled. This is the case with later versions of Windows.

How often should tasks be scheduled?

To determine how frequently maintenance tasks should be done, you should first refer to the types of documentation mentioned earlier in this topic. The preventative maintenance strategies in place would also help determine the frequency of tasks. You should also bear in mind the principles listed above. However, if your organisation is small and you are in the process of developing your own schedule, you'll need carry out research and then make these decisions yourself.

For example, how often should a hard disk be defragmented? You'll find opinion divided on this one, as it depends on a number of different factors such as hard disk size, how much space is on the disk, and how much disk and file activity there is. Suggestions range from daily, to three monthly! If it can

be scheduled to run automatically during a period of non-activity, a more frequent schedule can do no harm.

Similar decisions need to be made with respect to the scheduling of backups.

What should be recorded?

Scheduling can be a formal process, where preventative maintenance is carefully scheduled for various business units within the organisation and formally documented and signed off. It can also be an informal process.

The following should be documented in a preventative maintenance schedule:

- Dates for maintenance to occur
- Business unit/floor/building/computer facilities where the maintenance will occur
- The it staff member responsible for completing the maintenance
- Dates for completion
- Notification that maintenance has been completed
- Comments or notes where problems are detected.

Reporting problems

Your preventative maintenance schedule will occasionally alert you to potential problems. When this happens, you should be aware of the appropriate person to inform. Your organisational guidelines and/or service level agreements should indicate who this is. It may be your supervisor, authorised business representative, external supplier, or client.

Self-Check 4	Written Test

Name: _____   Date: _____

Instruction*:* Answer all the questions listed below, if you have some clarifications- feel free to your teacher.

Please ask your trainer for the questionnaire for this Self-Check.

True/False: Write True or False.

_____ 1. If the process of preventative maintenance causes a major interruption to the daily working of a business, the maintenance program will fail.

_____ 2. Your preventative maintenance schedule will occasionally alert you to potential problems.

Short Answer: Write a short answer for the following Questions.

1. Write the points that should be documented in a preventative maintenance schedule.

   ✓ _____

   ✓ _____

   ✓ _____

   ✓ _____

   ✓ _____

   ✓ _____

1.1. Storage basics

Equipment not being used should be stored. It may be new hardware and software in boxes, or loose parts, or sensitive materials that need to be stored securely until installed or needed. Valuable items such as memory chips or original software copies may need to be locked in a safe.

An IT store can hold new hardware, spare parts, repaired equipment, extra copies of software, daily and weekly backup copies of files as well as memory chips. It can also hold redundant devices such as printers, modems, cables and tools. While the IT department may also keep contracts, licences and other documents, some companies prefer to keep such documentation in their Legal department (if there is one).

IT equipment is often delicate and expensive. The environment for IT hardware and software storage should be:

- Lockable
- Dust-free
- Static-resistant
- Safe from water and humidity
- Well ventilated and lit
- At a constant temperature
- Separated from other perishable stores

Guidance from technical manuals

Most IT equipment is fragile and should be handled with care — it can be damaged if not packed correctly in storage. The technical manual that companies equipment will often advise on packing and storage.

It is also advisable to access the website of the manufacturer. Often they update information about equipment on their website, or add additional information on packing and disposing of computer consumables and equipment.

Information from technical manuals needs to be recorded in the inventory for all stock (in storage or being used) such as the expected lifetime of the product. Printer manuals, for instance, will state how many pages can be printed before the toner cartridge or developer needs replacing. Packed and unopened toner cartridges can be kept for quite some time, but developer has a more limited shelf life.

1.2. Storing components, software originals and documentation

All information about storing components can also usually be found in technical manuals. Generally, sensitive components will be stored as follows.

- **Memory chips**

  Each memory chip should be placed in a foam-protected, anti-static bag. Each bag is then placed in an individual box or in a larger box that will have separate slots for each chip. Memory was once very expensive and always stored in a safe — however, as the cost of memory has fallen, memory is often stored alongside other components.

- **Expansion cards, motherboards and other spares**

  Expansion cards also must be placed in anti-static bags and each bag then placed in an individual box or in a larger box that will have separate slots for each card. This box is then stored in the storeroom, with care taken, if the box is cardboard, not to place other equipment on top of it. Motherboards and other spares should be kept in boxing so that they are not stacked on one another and also to avoid dust building up.

- **CD-ROM drives and hard disks**

  CD-ROM drives are stored in stacks on a shelf in the storeroom. An obvious caution to take is that the stack is not too high, as it may topple over. Hard disks should be placed in foam-protected anti-static bags. Each hard disk needs to be stored in an individual box. The boxes can be placed on top of each other in stacks (again, not too high).

- **Software originals**

  When an organisation purchases software, copies need to be made of all disks. Installation of the software should be carried out with the copied disks and *not* the original. This ensures the security of the original disks, and if there are any problems with the copied disks another copy can be made. The original disks need to be stored in a secure place such as a safe and preferably off-site — as a form of assurance against any problems within the building, such as flooding from heavy rain or fire damage.

- **Documentation**

  Documentation, including manuals that come with hardware and software, needs to be stored correctly. Some manuals may need to be kept with the relevant computers if they are used regularly. Generally, manuals are kept in a storeroom or IT library (which may be in the same place). They are only used at times of installation and later on for troubleshooting. They should be indexed in the inventory and labelled clearly on shelves or in cabinets.

Documentation such as licensing should be recorded and stored in a safe area, such as a locked filing cabinet. As mentioned, in some larger companies, it may be kept the legal department or in a safe.

1.3. Skills for handling IT equipment

- **Occupational health and safety**

By law, organisations must have an OH&S committee or an OH&S representative in the workplace. Most large organisations employ a staff member who is fully responsible for OH&S and also convenes a committee. Smaller organisations may have a member of staff who is trained in OH&S and is responsible for it as part of their job. Employers must make OH&S guidelines and procedures available in the workplace. Generally, all employees contribute to the maintenance of OH&S by following those procedures and reporting situations where accidents and injuries occur. Occupational health and safety guidelines must always be practiced when handling computers, peripherals and components.

- **Fragile components**

Fragile components such as memory and expansion cards need to be held on the outer edges. These components are made up of chips, transistors and wires that hold memory and transport information. You should not grasp them in the middle of the component. Your body can hold a large amount of static electricity and this can damage the circuitry, making the component unworkable.

- **Heavy equipment**

Heavy equipment, such as system units and monitors, should be placed correctly onto a trolley with wheels, so they can be moved with ease. If you need to bend down to pick up a heavy object, you should never bend over at the waist or shoulders. You should always keep a straight back and bend at the knees so that objects are lifted with the legs and not the spine, and serious back problems are avoided. Heavy objects must also be carried in the correct position to avoid dropping them.

Self-Check 1	**Written Test**

Name: _____   Date: _____

Instruction*:* Answer all the questions listed below, if you have some clarifications- feel free to your teacher.

Please ask your trainer for the questionnaire for this Self-Check.

Choice: Choose the correct answer.

1. Only new equipments need to be stored; the old once should be thrown in a trash.

    A. True   B. False

2.   Which one of the followings is NOT correct about the environment for IT hardware and software storage?

    A. Should be Lockable   C. Should be Dust-free

    B. Should be Static-resistant   D. None

3. An IT equipment called _____ should be placed in a foam-protected, anti-static bag.

    A. Memory Cheap   B. CD/DVD   C. Original Software   D. Documentation

4. _____ such as memory and expansion cards need to be held on the outer edges.

    A. Memory Cheap   B. CD/DVD   C. Original Software   D. All

Self Check Answer Sheet

Self-Check 1	• Any equipments and peripherals may require to be maintained

Self-Check 2	1. A 2. B 3. C 4. D 5. A

Self-Check 3	1. True 2. True 3. False

Self-Check 4	1. True
	2. True
	3. Points included in the Schedule:
	   ✓ Dates for maintenance to occur
	   ✓ Business unit/floor/building/computer facilities where the maintenance will occur
	   ✓ The it staff member responsible for completing the maintenance
	   ✓ Dates for completion
	   ✓ Notification that maintenance has been completed
	   ✓ Comments or notes where problems are detected.

Self-Check 5	1. B 2. D 3. A 4. D