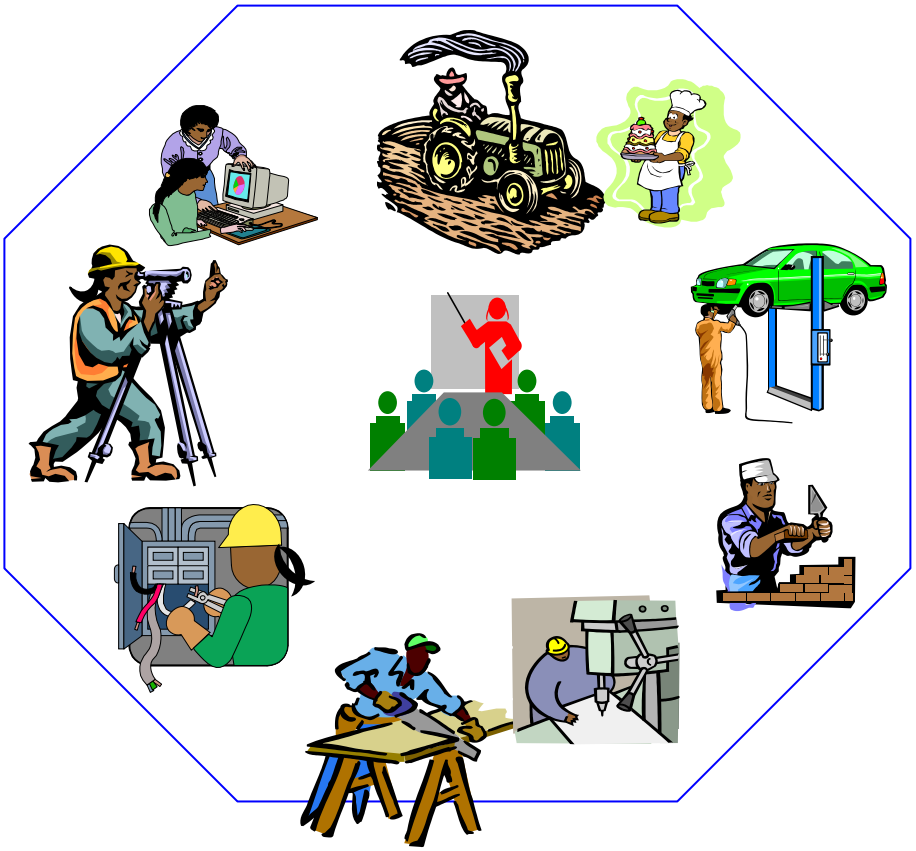
BIOMEDICAL EQUIPMENT SERVICING MANAGEMENT

Level-III

Based on Dec, 2011 Version OS and Feb, 2021 Version 1

Curriculum



Module Title: - Managing Biomedical Equipment

LG Code: EEL BES4 M03 0221 M03 LO (1-5) LG (09-13)

TTLM Code: EEL BES4 M03 TTLM 0221

February 2021

Contents

LG #09	LO1: Plan and prepare management of servicing operations.
Instruction Sheet	

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

- Plan and preparing management of servicing and maintenance of OHS policies and procedures
- Consulting and directing appropriate personnel.
- Checking programs to be managed for servicing and maintenance.
- Identifying materials necessary to complete the work.
- Identifying tools, equipment and testing devices.
- Formulating procurement management plan.

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:

- Plan and prepare management of servicing and maintenance of OHS policies and procedures
- Consulting and direct appropriate personnel.
- Check programs to be managed for servicing and maintenance.
- Identify materials necessary to complete the work.
- Identify tools, equipment and testing devices.
- Formulate procurement management plan.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 5 and Sheet 6”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3, Self-check 4, Self-check 5 and Self-check 6” **in page 6, 9, 11, 13, 15 and 20** respectively.

Information Sheet 1 -	Plan and preparing management of servicing and maintenance of OHS policies and procedures.

1.1. Preparing management

Maintenance management is the process of maintaining a company's assets and resources. The purpose is to ensure that production proceeds efficiently and that resources are used effectively.

The need of maintenance is based on the actual or imminent fail. Ideally, maintenance is carried out to keep equipment and systems running efficiently during at least its usual life cycle. As such, practical functioning of equipment is a function based on time. If you want to graphically represent the failure rate of a piece of equipment in relation to time, it is probable that the graphic takes the shape of a bathtub, such as the one shown in picture 1, where axis Y represents the failure rate and axis X represents time. This curve can be divided in three periods: premature dead, lifecycle and exhaustion period.

An effective maintenance control system improves equipment reliability and assists in the optimal utilization of resources. Maintenance control refers to the set of activities, tools and procedures utilized to coordinate and allocate maintenance resources to achieve the objectives of the maintenance system that are necessary for the following:

a) Work control
b) Quality and process control
c) Cost control; and
d) An effective reporting and feedback system.

1.2. OHS policies and procedures.

The Personal Protective Equipment (PPE) Selection Policy Guideline provides guidance in the identification of personal protective equipment and examples of personal protective equipment that may be available, selected and used.

The Work Health and Safety Act (SA) 2012, its regulation and associated codes of practice place a duty of care on all workers to take reasonable care to protect their own

health and safety while at work. This may include the need for using personal protective equipment (PPE) and clothing when undertaking a hazardous task.

1.3. Principles PPE

Personal Protective Equipment is any device or clothing worn by a worker to control the level of risk that cannot be controlled or eliminated by providing protection / shield between the hazard and the worker when exposed to:

- ✓ dangerous goods, hazardous chemicals, infectious substances including blood and bodily fluids(BBF)
- ✓ dust, fumes or particles
- ✓ radiation (ionizing and non-ionizing), ultraviolet or solar radiation
- ✓ noise
- ✓ moving objects such as vehicles, trolleys and forklifts
- ✓ flying objects when using machinery with moving parts
- ✓ Environmental factors , for example, high and low temperature

- PPE must be used for additional protection when other risk control measures do not provide sufficient exposure control.
- PPE is one of the least effective methods of controlling risk to work health and safety , as per the hierarchy of control, and must be used :
- When there are no other practical risk control measures available or when identified through a dynamic risk assessment, for example:
  - ✓ **Gloves** - for all contact with blood and or body fluids.
  - ✓ **Double glove** - application in operating theatres and procedural areas.
  - ✓ **Eye protection**- use of a face shield when undertaking any procedure where a splash of fluid may occur
  - ✓ **Gowns** - use when undertaking any procedure where a splash of blood or body fluid may occur
  - ✓ **Respiratory Masks:** A correctly fitted P2 (N95) respiratory mask must be used for all known or suspected ‘airborne’ respiratory diseases such as Tuberculosis,

Measles, Chicken Pox and during aerosol generating procedures such as bronchoscopy and pulmonary function testing.

- ✓ **Surgical Masks** must be worn for all patients exhibiting signs and symptoms of confirmed or suspected respiratory disease (droplet) such as: Influenza, Pertussis, Meningococcal infection and Respiratory Syncytial virus (RSV).
  (YIDNEKACHEW .R, .G, WONDIMU .Z, and .M, TARIKU .L 2019)

Self-Check 1 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Maintenance management? (2 point)
2. What is PPE? (2 point)

Note: **Satisfactory rating – 4 points** **Unsatisfactory - below 4 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

   _____

   _____

   _____

2. _____

   _____

   _____

   _____

Information Sheet 2 - Consulting and directing appropriate personnel.

2.1. Consulting

A personal consultant helps individuals understand their strengths and weaknesses and how to use their attributes to leverage new employment or life opportunities. As a personal consultant, your duties vary depending on what type of consulting you do. However, some of your general responsibilities include discussing your client's goals and ambitions, identifying possible changes in their personal or professional lives that might help them achieve these aspirations, and working with your clients to develop a plan to make their goals a reality. (Q: What Is a Personal Consultant? | ZipRecruiter n.d.)

2.2. Directing

Directing is the heart of management function. All other functions of management such as planning, organizing, and staffing have no importance without directing. Leadership, motivation, supervision, communication are various aspects of directing. Let us study the importance and principles of directing.

2.2.1. 4(four) Different Elements of Directing.

It has been made clear in the nature of leading that it is not a single activity but a group of functions. On the same basis, the following functions are included in its scope: (1) Supervision, (2) Communication, (3) Leadership, and (4) Motivation.

I. Supervision

It refers to monitor the progress of routine work of one's subordinates and guiding them properly. Supervision is an important element of the directing function of management. Supervision has an important feature that face-to-face contact between the supervisor and his subordinate is a must.

II. Communication:

It refers to an art of transferring facts, ideas, feeling, etc. from one person to another and making him understand them. A manager has to continuously tell his subordinates about what to do, how to do, and when to do various things.

Also, it is very essential to know their reactions. To do all this it becomes essential to develop effective telecommunication facilities. Communication by developing mutual understanding inculcates a sense of cooperation which builds an environment of coordination in the organisation.

III. Leadership:

It refers to influence others in a manner to do what the leader wants them to do. Leadership plays an important role in directing. Only through this quality, a manager can inculcate trust and zeal among his subordinates.

IV. Motivation:

It refers to that process which excites people to work for attainment of the desired objective. Among the various factors of production, it is only the human factor which is dynamic and provides mobility to other physical resources.

Self-Check 2 - Written Test

Direction: Write/List down the following. Use the answer sheet for your answer

1. What is Consulting? (3 point)
2. What is Directing? (3 point)
3. List down 4(four) Different Elements of Directing. (4 point)

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 10 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

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

Information Sheet 3 -	Checking programs to be managed for servicing and maintenance.

3.1. Maintenance program.

A large part of keeping a team running efficiently and profitably is ensuring that all the equipment is functioning optimally. To do so, routine preventive maintenance needs to be conducted. Unfortunately, regular equipment checks often go overlooked in certain areas of an organization's operations mainly because attention is usually directed toward more pressing issues.(What is Preventive Maintenance? n.d.)

3.2. Why do we need preventive maintenance checklists?

The benefits are related to standardization and speed. Preventive Maintenance checklists ensure that no matter who is doing the work, the work is getting done the same way. Instead of everyone having their own special way of doing things, there's an established standard that everyone follows. This also makes the work faster. No one is stuck trying to work out their own methods on the fly.

Instead, everyone has everything they need right there in front of them. Over time, as the older technicians retire, checklists help new members of the maintenance team learn workflows and process faster.

3.3. Maintenance program responsibilities include:

- Inspecting facilities periodically to determine problems and necessary maintenance
- Preparing weekly maintenance schedules and allocate work
- Recruiting, supervising and training maintenance technicians.

Self-Check 3 - Written Test

Direction: Write/List down the following. Use the answer sheet for your answer.

1. What is Maintenance program? (2 point)
2. Write the preventive maintenance checklists? (2 point)
3. Write down the Maintenance program responsibilities include? (2 point for each)

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 10 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____
   _____
   _____
   ____
2. _____
   _____
   _____
3. _____
   ____
   _____
   ____

Information Sheet 4 - Identifying materials necessary to complete the work.

4.1. Materials preparation

In general, hospitals with fewer than a hundred beds are more likely to save money and maintain quality by outsourcing equipment maintenance as opposed to having an in-house maintenance department. Most small health organizations simply cannot provide the needed resources, such as salaries for qualified technicians, to operate a good quality in-house workshop. However, larger hospitals may find it helpful to have their own workshop. The main benefits are:

- Better control over the maintenance budget
- Faster response speed
- Better understanding of user needs and organizational priorities.

You can find out whether an in-house equipment workshop will save costs: compare the money spent on maintenance performed by outside vendors to the anticipated initial investment and recurring expenses needed to establish and operate an in-house workshop. It is important to note that, even with an in-house workshop, there will always be a need for outsourced maintenance services, for example when the equipment is too complex for the in-house technicians or when repairs require special tools, test equipment, and service manuals. Most medium-sized health organisations will therefore have a mix of in-house and outsourced maintenance services.

In smaller hospitals, the role of medical equipment maintenance may be incorporated into the facilities maintenance department. Smaller hospitals that are part of a larger hospital system may also receive their medical equipment maintenance services from the medical equipment maintenance department of the central tertiary hospital of the system.(Powdrill, Cordero, and Srinivasan 2010)

Self-Check 4 - Written Test

Direction: Write/List down the following. Use the answer sheet for your answer.

1. What is Materials preparation? (3 point)
2. What are the main benefits of Materials preparation? (3 point)

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

   _____

   _____

2. _____

   _____

   _____

   _____

Information Sheet 5 - Identifying tools, equipment and testing devices.

5.1. Identifying tools, equipment and testing devices.

The workspace must be big enough to accommodate the equipment technicians and their physical resources. Maintenance work on eye equipment, in particular, requires a separate workspace that can be kept clean to avoid damage to lenses, etc. You will also need:

- Workbenches, stools, shelves and other furniture
- An office area with desks, filing cabinets, a notice board, telephone, etc.
- Work lights
- Repair tools
- Test and calibration equipment
- Safe storage for user and service manuals
- Sufficient number of electrical outlets
- Ventilation
- Running water and a sink
- Secure storerooms for spare parts and materials
- Secure outside storage areas for gas bottles, old or unrepairable equipment awaiting safe disposal, etc.
- Where possible, a computer for keeping your equipment inventory and repair records and accessing the internet to obtain technical information, source vendors and parts, and participate in equipment maintenance discussion groups to solve problems.

You should have enough spare parts in stock, which may need to be pre-ordered from the manufacturer or distributor. Useful spare parts to have include specialised light bulbs, gaskets, air filters, and other equipment-specific parts that wear out frequently.

Most of the other maintenance materials you need can be found in local markets, such as oil, grease, electric cables, washers, screws, fuses, generic light bulbs, cleaning

agents, disinfectant solutions, brushes, and cloths.(Powdrill, Cordero, and Srinivasan 2010)

Self-Check 5 - Written Test

Direction: fill in the blank. Use the answer sheet for your answer

1. The _____ must be big enough to accommodate the equipment technicians and their physical resources.? (3 point)
2. You should have enough _____ in stock, which may need to be pre-ordered from the manufacturer or distributor.? (3 point)

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____
2. _____

Information Sheet 6 - Formulating procurement management plan.

6.1. Procurement plan

The maintenance manager's responsibility is to clearly define the activity from the start and manage it going forward. This will ensure that everyone involved understands the steps necessary to take the job from its initial stages to completion. The manager's goal is to ensure the job stays streamlined and easy to manage, so those involved won't become overwhelmed. In order to accomplish this, it's necessary for all project team members to work together with the purchasing department and those responsible for approving and managing contracts.

This is a 10-step guide on how to make a procurement plan that will help any procurement professional optimize their processes.

Step 1: Define the Procurement Terms

The first step to start the procurement process is outlining what items will be procured in specific terms. Detail the items and sizes, along with the service it will provide, and the justification for it. For instance, is it a tool that this organization doesn't make? Is it required for the manufacturing of an item needed to complete the project? If there is any technical information pertinent to the procurement process, it should be listed here.

Next, specify the date the items are required by. Each item will have a different date, depending on where it is needed in the timeline for the project's completion. Finally, there is likely a list of people who are authorized to approve the purchase of each item. This ensures the approval process isn't hampered by misunderstandings.

Step 2: Determine Which Type of Agreement to Use

A contract is the agreement between a company and a vendor and specifies how costs will be handled. Fixed price and cost reimbursement (also known as cost-plus) contracts are two broad categories of contracts. There are also time and materials contracts,

which are based on fixed hourly billing rates, actual materials costs, and fixed add-on amounts.

In addition to the type of agreement, the specifics of the contract management details should be identified at this point. This generally includes the contract lifecycle management platform processes, including e-signature requirements, approvals, and post-signature management procedures.

Step 3: Identify the Risks

All projects carry risks that could threaten the project's completion or schedule, and it's the role of the project manager to identify the ones that pertain to the procurement process. These risks could include things like vendor conflicts, unrealistic schedules, idealistic cost expectations, potential shipping delays, and a vendor's inability to meet deadlines or perform up to standards.

Step 4: Mitigate the Risks

In order to ensure the success of the project, the plan should include a section to mitigate any of the identified risks. For example, if the specialized subcontractor fails to complete their portion of the project, a replacement contractor should be identified to call. There should also be a section naming who has the authority to approve issue resolution actions for any risks that come up and are not specifically outlined.

Step 5: Cost Determination

In this step, it's important to outline exactly how the costs associated with the project will be determined. For most procurements, a request for proposal (RFP) will be issued, outlining the needs and asking vendors to provide bids. In their responses, they will outline what products or services they will provide, how they will do the work, their experience in providing the types of goods or services, schedules, and a line-by-line outline of their costs. The initial RFP should be clear about the exact requirements, such as critical schedule dates or cost.

Step 6: Identify Which Forms are to be Used

Many procurement professionals prefer to use standardized forms to ensure the project is more easily managed. Identifying which forms, formats, and templates will be used for the project will ensure there is cohesion within the groups associated with the project, simplify the process, and make the ongoing management of the process easier. A contract lifecycle management platform should have the ability to create forms that people across the organization as well as third parties can use in the procurement process.

Step 7: State the Project Constraints

Identifying the constraints before the project begins will help ensure its successful completion. If limitations aren't recognized early on, they may hinder the successful completion of the project. Once outlined, these should be taken into consideration every step of the way until the project's completion. For instance, if the schedule is not negotiable, state it in this section and all personnel will understand that an on-time schedule should dictate their decisions during the process. Some other constraints in relation to the procurement process can be cost, scope, limited resources, and technical specification.

Step 8: Contract Approval Rules

This section outlines the process by which contracts will be approved. First include the steps that lead up to approval, such as a review of all bids and proposals, as well as a service and cost analysis. Then include the names, roles, and order in which decision makers will review and approve the contracts. Creating an approval workflow will ensure that each contract is reviewed and approved in an appropriate manner. A contract lifecycle management platform should offer workflow capabilities that streamline these approvals to make the agreements easier.

Step 9: Identify the Decision Criteria

In this step of the procurement management process, clearly outline the criteria the review board will use to decide which vendor to award the contract to. For example,

items like the vendor's ability to meet the schedule, cost, quality of the work or product offered, performance history of the vendor, and compliance of each vendor to the RFP will likely impact the final decision.

Step 10: Create a Vendor Management Plan

Part of the procurement management plan should be managing the vendors themselves. Draft an outline to ensure the required products or services are delivered on schedule and with the proper levels of quality. Include how often the project manager should meet with the purchasing department and vendors, how they will meet, the purpose of the meetings, and what each meeting should accomplish. These meetings will keep the project manager informed about the progress of the procured products or services.

Finally, establish performance metrics for each vendor involved with the project. Rate them on the quality of the product or service, their delivery as it pertains to the schedule, the final cost, and other metrics important for evaluating the vendor's performance on the project. These ratings will help identify areas that can be improved in the process, as well as provide critical data when considering the vendors for future projects.(Procurement Management Plan: 10 Steps | Concord n.d.)

Self-Check 6 - Written Test

Direction: Write/List down the following. Use the answer sheet for your answer.

1. What Is Procurement Plan?
2. List down The Stapes Guide to Make a Procurement Plan?

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6 points**

Score = _____

Rating: _____

1. _____
   ____
   _____
   ____
   _____
   ____
   _____
   ____

2. _____
   _____
   _____
   _____
   _____

_____

_____

_____

_____

_____

LG #10	LO2: Keep inventory of biomedical equipment
Instruction Sheet	

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

- Establishing inventory system.
- Using labels/tags.
- Conducting equipment inventory regularly.
- Completing and submit inventory records and reports properly.
- Categorizing and file manuals in an accessible manner.
- Establishing data base system.

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:

- Establish inventory system.
- Use labels/tags.
- Conduct equipment inventory regularly.
- Complete and submit inventory records and reports properly.
- Categorize and file manuals in an accessible manner.
- Establish data base system.

Learning Instructions:

5. Read the specific objectives of this Learning Guide.
6. Follow the instructions described below 3 to 4.

7. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
8. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -5, 10, 13 and 17** respectively.

Information Sheet 1 - Establishing inventory system.

1.4. Inventory System

A correct inventory of medical equipment is the first and most critical step in implementing management processes for monitoring and control of medical equipment. Inventory management is an attempt to have the right stock, in the right place, at the right time, and at the right cost. The goal is to minimize cost by helping facilities know when to purchase more inventory based on normal usage rates.

The way you define inventory depends on your industry. For a retail store, inventory is the products the store is trying to sell customers, like suits or dresses. When it comes to maintenance, inventory is the parts used to make assets function properly, like motors, bearings, fans or filters. The aim for maintenance teams is to have the right inventory on hand in the right amounts to repair or improve assets, while also considering the space available in their budgets and storerooms.(What is Maintenance Inventory Management? | Fiix n.d.)

1.5. The following are the key elements to a well-organized inventory tracking system.

- Create well designed location names and clearly label all locations where items may be stored.
- Use well organized, consistent, and unique descriptions of your items, starting with nouns.
- Keep item identifiers (e.g. part numbers) shortly, consistently formatted, unique, and avoid common pitfalls.
- Decide if you will need to use units of measure, and if so, make sure they are formatted consistently and used properly.
- Make sure you have a good starting count of all your items, their locations, and any other relevant inventory data
- Use an inventory tracking software like Clearly Inventory. Spreadsheets or written lists do not work well in the long term.

- Create solid inventory management policies and train your people to follow them.

Self-Check 1 – Multiple choice

Directions: choose the best answer from then following equation. Use the answer sheet for your answer.

1. _____ well designed location names and clearly label all locations where items may be stored.

   A. Keep *B.* Create *C.* Make *D.* Use

2. _____ well organized, consistent, and unique descriptions of your items, starting with nouns.

   A. Keep *B.* Create *C.* Make *D.* Use

3. _____ item identifiers (e.g. part numbers) shortly, consistently formatted, unique, and avoid common pitfalls.

   A. Keep *B.* Create *C.* Make *D.* Use

4. _____ sure you have a good starting count of all your items, their locations, and any other relevant inventory data

   A. Keep *B.* Create *C.* Make *D.* Use

5. _____ an inventory tracking software like Clearly Inventory. Spreadsheets or written lists do not work well in the long term.

   A. Keep *B.* Create *C.* Make *D.* Use

6. _____ solid inventory management policies and train your people to follow them

   A. Keep *B.* Create *C.* Make *D.* Use

Note: **Satisfactory rating – 7 points** **Unsatisfactory - below 7 points**

Score = _____

Name: _____ Date: ____/_____/_____ Rating: _____

Answer Sheet

1. _____ 2. _____ 3. _____

4. _____ 5. _____ 6. _____ 7. _____

Information Sheet 2 - Using labels/tags.

2.3. Inventory tag

An inventory tag is a barcode label or plate that is attached to a product or package for the purpose of tracking. These tags can be used for performing manual inventory counts or connected to a system of scanners and an Inventory Management System (IMS) for automated counting. The use of inventory tags is ideal since these labels can be customized to meet the needs of each company and provide adequate inventory control. (Guide to Inventory Tags: Uses, Types, Best Practices & More - Camcode n.d.)

2.4. Tips on Applying Labels:

- Before you apply your label, make sure that the surface is clean. If you have any doubts about whether or not the label will stick over the long-term, cover the label with clear packing tape.
- If you are trying to apply a label to a wire rack, use the duct tape on one side of the wire so that the sticky side of the label and the sticky side of the tape will stick together with the wires in between.
- If your label maker can't print arrows, or it's too difficult, print a sheet of arrows using a word processor and then cut and tape the arrows on either side of your labels.

1. Arrow points up, removing any doubt about which location the label is referring to
2. Zone abbreviation "S" for the storage zone

- If you're applying a lot of labels, use the roller we describe under "Labeling Supplies" above. It's great for firmly pressing labels and getting rid of air bubbles. If you do this with your fingers, they will get sore, and chances are that you'll go through more than a few labels when you try to smooth them out and deform them by mistake.

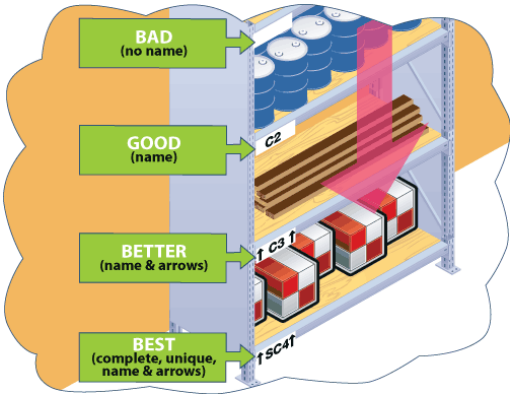


Figure 1:bad, good, better and best Labels

Self-Check 2 – Matching

Directions: Match from column A to B

A	*B*
1. C 3	A. _____ points up, removing any doubt about which location the label is referring to
2. S 2	B. Zone abbreviation "___" for the storage zone
3. 4 4	C. Section "_____"
4. ↑ 1	D. "Vertical" or "shelf" location number

Note: **Satisfactory rating – 4 points** **Unsatisfactory - below 4 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

1. _____

2. _____

3. _____

4. _____

Information Sheet 3 - Conducting equipment inventory regularly.

3.4. Conduct the Inventory

The records officer should work with the department heads to set up a schedule for inventorying each office and storage area. Make sure the schedule is flexible to accommodate the office needs/priorities. The inventory should include all your records. Non-records (or non-retention material) is included only as needed for staff informational purposes (such as common reference materials) or for initial inventories to locate and remove unnecessary materials.(How to Conduct a Records Inventory n.d.)

3.5. Records and Non-records Records.

"**Record**" means all documentary material (books, papers, photographs, maps or other documentation, including digital records such as email messages and attachments),

made or received and maintained by an agency in accordance with law or rule or in the transaction of its official business; because they serve as evidence of the agency's functions, policies, decision, procedures, operations and other activities; or because of their informational value.

Non-records (Non-retention material)

- Reference materials - magazines, catalogues, trade journals, books, pamphlets.
- Blank forms (until they are filled in, blank forms are supplies, not records).
- Copies of records retained elsewhere.
- Personal Communications.
- Employee non-work activities.
- Meetings in which you participate, but are not assigned recordkeeping responsibility: convenience copies.

The following information is commonly collected:

- Date prepared
- Office maintaining the files
- Person conducting the inventory
- Series location, title, dates
- Series description
- Record Format (medium)
- Arrangement (filing system)
- Volume (in cubic feet)
- Annual accumulation
- Reference activity (*how often are records referenced*) • Duplication (indicate copies in other formats)
- Finding aids
- Restrictions on access and use (confidentiality)
- Condition of permanent records (physical condition of records)
- Schedule (list schedule/series) or unscheduled

Self-Check 3 – list

1. List the comely collected information in record.

Note: **Satisfactory rating – 14 points** **Unsatisfactory - below 14 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____

Information Sheet 4 - Completing and submit inventory records and reports properly.

4.1. Submit Inventory Records And Reports

Knowing how much inventory stock you have at any given time is critical for a successful business. Inventory control reports will show how much inventory stock you have on hand. Efficiently controlling inventory stock makes sure your valuable capital is being used in the best way possible. You can use one of the following methods:

To measure inventory performance, you will need to compare previously collected data. Analyse different metrics such as:

- Item fill rate – the percentage of products from a customer's order your business shipped. The higher the item fill rate is, the better the inventory performance is.
- Inventory accuracy – regular inventory count cycles ensures all stock is accounted for and there is decreased discrepancies with what is recorded and what actually is there.
- Inventory turnover – the number of times inventory stock is replaced in a given period. The higher the rate, the less time inventory stock sits on the shelf.

4.2. Here are some suggestions on how to go about writing the stock report and ensuring it adds to the profitability of the business. (Stock taking: How to Write a Stock Report in 6 Easy Steps n.d.)

4.2.1. Create/Use a Template

Manually creating a new template for every stock take will not just waste time, but it will make comparing past figures more difficult. What should the template consist of?

- Item description
- Barcode
- State of quality
- Expiration date (if applicable)
- Cost and selling price. . . etc

4.2.2. List Items With Cost/Selling Prices

When the template is in place, the next step is all about listing the items. And once again, use an organized approach that makes it easy for staying on track and accurate. Properly categorize products and divide everything into manageable sections.

From there, get the items listed on the template along with the information mentioned earlier.

Do not forget to add the numbers for damaged, lost, or stolen stock.

In many cases, they are the reason why stock takes do not balance properly with the purchase orders and data captured from the receiving end.

4.2.3. Set up Dates for Stock Counts

For big companies, stock takes are usually scheduled on an annual basis. However, it is best to keep stock takes consistent and regular. For instance, prioritizing sections of the inventory for weekly or monthly stock takes makes it a lot easier to troubleshoot possible imbalances.

Otherwise, you have to wait for a whole year to pass. Tracking down missing stock gets more challenging the more time there is in between stock takes.

Small and consistent cycles, especially with high-risk and costly inventory, are crucial for maintaining healthy stock movement. Therefore, schedule these on a regular basis and use a basic template for easy referencing.

4.2.4. Calculate Projections/Loss/Profit

At this point in time, the stock report is already written. If the basic information mentioned above can be found on the report in an organized manner, the report can be used for several things.

For one, the stock report will show how much dead inventory sits in the warehouse.

It will also provide a specific amount in terms of how much inventory is worth in money, along with insight on which orders should increase/decrease. With this information, valuable calculations can be made that ultimately decide the fate of the business.

This is why stock reports need to be very accurate, meaning double and triple counts are recommended when the numbers do not balance.

4.2.5. Use Accurate Stocktaking Tactics

As a final thought, only use accurate systems and equipment to handle stock takes.

When the best solutions are used, the best results can be expected.

Self-Check 4 - Multiple choice

Directions: choose the best answer from then following equation. Use the answer sheet for your answer.

1. _____ – the percentage of products from a customer's order your business shipped. The higher the item fill rate is, the better the inventory performance is.

   A. Inventory turnover B. Inventory accuracy C. Item fill rate

2. _____ – regular inventory count cycles ensures all stock is accounted for and there is a decreased discrepancy with what is recorded and what actually is there.

   A. Inventory turnover B. Inventory accuracy C. Item fill rate

3. _____ – the number of times inventory stock is replaced in a given period. The higher the rate, the less time inventory stock sits on the shelf.

   A. Inventory turnover B. Inventory accuracy C. Item fill rate

***Note:* Satisfactory rating – 3 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

1. _____
2. _____
3. _____

Information Sheet 5 - Categorizing and file manuals in an accessible manner.

5.1. Manuals

Manuals are universal documents that can be understood by ordinary people. It explains certain operations and processes of different departments. With a Manual, company can have a standard for its operations.(Manual of Operations: Key for Knowledge Management – Founder's Guide n.d.)

Figure 2 good file keeping

5.2. Classifications of Manual

1. Product Manual: This is also called the "Instruction manual". It is a manual that instructs users how to use the product.

2. Installation Manual: This is a manual on how to set- up or install the product.

3. Troubleshoot Manual: A type of manual used to fix parts of the product.

4. User Manuals: A type of manual that focuses on different kinds of users- administrators, maintenance personnel, beginners, managers, or students

5. Operations Manual: This is the manual for operations of the company or businesses. It is a set of standards and procedures for operations, work standards, and policies of the company.

6. Crisis Management Manual: A manual on how to respond to crisis or tragedies such as earthquake, fire, storms, tsunami, or violence in the work premises.

7. Audit Manual: This type of manual is a guide on how to do or make finance reports in relations to accounting and auditing matters.

Self-Check 5 - Multiple choice

Directions: choose the best answer from then following equation. Use the answer sheet for your answer.

1. _____ This is also called the “Instruction manual”. It is a manual that instructs users how to use the product.may be stored.

   A. Troubleshoot Manual B. Installation Manual: C. User Manual: D. Product Manual:

2. _____: This is a manual on how to set- up or install the product. nouns.

   A. Troubleshoot Manual B. Installation Manual: C. User Manual: D. Product Manual:

3. _____: A type of manual used to fix parts of the product.

   A. Troubleshoot Manual B. Installation Manual: C. User Manual: D. Operations Manual:

4. _____: A type of manual that focuses on different kinds of users- administrators, maintenance personnel, beginners, managers, or students

   A. Troubleshoot Manual B. Installation Manual: C. User Manual: D. Operations Manual:

5. _____: This is the manual for operations of the company or businesses. It is a set of standards and procedures for operations, work standards, and policies of the company.not work well in the long term.

   A. Troubleshoot Manual B. Installation Manual: C. User Manual: D. Operations Manual:

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

1. _____ 2. _____ 3. _____

4. _____ 5. _____

Information Sheet 6 - Categorizing and file manuals in an accessible manner.

6.2. Data base system.

An inventory database is an important management tool for any retail business, large or small. The database holds details and quantities of the products you stock, together with information on product suppliers. By using a database, you can replace manual methods of inventory control and reduce the time, cost, and effort of inventory management.

An inventory database lets you keep track of *damaged*, *lost* or stolen product. Using printed inventory reports, you can manually count your stock to determine if what you have in your store or warehouse matches what you think you have, based on your paper reports. Knowing what's missing can help you come up with ways to address loss problems or replace low inventory supplies and prevent missed sales.(How to Make an Inventory Database on Access - Arkware n.d.)

6.3. How to Make an Inventory Database (DB) on Access.

Step1. Consider your business needs. *Think about what your database needs. E.g.* what items do you carry? Are there differences that need to be noted? What are the turnover times? This is the type of information that should be included in your DB.

Step2. Install Access on your computer. Decide where your database will be stored – on your personal computer, on an internal server or by a third party. It can then be downloaded and installed. Microsoft Access is part of Microsoft Office. You can freely and buy premium.

Step3. Build your database. Once installed, you can start building your inventory database. If you've used Microsoft Office before, Access will feel comfortable and familiar. However, building a high-quality database that is free from errors can be difficult to do at first.

Step4. Fine tune your database. Once you have your fields in – units ordered, units received, product information, etc. – you can fine tune the database according to your notes. Be sure to establish relationships between the fields.

Step5. Enter in the information. When your database is properly set up, you can start populating it with information. If you were using Excel, you can click "Excel" and import your spreadsheet this way.

Self-Check 6 – LIST

1. **Write The Stapes How To Make An Inventory Database (Db) On Access.**

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

1. _____

_____

_____

_____

2. _____

_____

3. _____

4. _____

5. _____

LG #11	LO3: Manage and monitor servicing operation
Instruction Sheet	

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

- Ascertaining and detail normal function of biomedical equipment.
- Using mechanisms to measure and record report progress of activities.
- Managing and monitoring servicing and maintenance system.
- Respond to unplanned events or conditions.
- Maintaining records and making documentation of servicing and maintenance activities.
- Monitoring results of routine maintenance activities.
- Acting shortfalls in quality outcomes.

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:

- Ascertain and detail normal function of biomedical equipment.
- Use mechanisms to measure and record report progress of activities.
- Manage and monitoring servicing and maintenance system.
- Respond to unplanned events or conditions.
- Maintain records and making documentation of servicing and maintenance activities.
- Monitor results of routine maintenance activities.
- Act shortfalls in quality outcomes.

Learning Instructions:

9. Read the specific objectives of this Learning Guide.
10. Follow the instructions described below 3 to 4.
11. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.

12. Accomplish the “Self-check 1-7, Self-check t 2, Self-check 3 and Self-check 4” **in page 37, 40, 42, 45, 48, 50, and 52** respectively.

Information Sheet 1 - Establishing inventory system.

1.6. Inventory System

A correct inventory of medical equipment is the first and most critical step in implementing management processes for monitoring and control of medical equipment. Inventory management is an attempt to have the right stock, in the right place, at the right time, and at the right cost. The goal is to minimize cost by helping facilities know when to purchase more inventory based on normal usage rates.

The way you define inventory depends on your industry. For a retail store, inventory is the products the store is trying to sell customers, like suits or dresses. When it comes to maintenance, inventory is the parts used to make assets function properly, like motors, bearings, fans or filters. The aim for maintenance teams is to have the right inventory on hand in the right amounts to repair or improve assets, while also considering the space available in their budgets and storerooms.(What is Maintenance Inventory Management? | Fiix n.d.)

1.7. The following are the key elements to a well-organized inventory tracking system.

- Create well designed location names and clearly label all locations where items may be stored.
- Use well organized, consistent, and unique descriptions of your items, starting with nouns.
- Keep item identifiers (e.g. part numbers) shortly, consistently formatted, unique, and avoid common pitfalls.
- Decide if you will need to use units of measure, and if so, make sure they are formatted consistently and used properly.
- Make sure you have a good starting count of all your items, their locations, and any other relevant inventory data
- Use an inventory tracking software like Clearly Inventory. Spreadsheets or written lists do not work well in the long term.

- ~~Create solid inventory management policies and train your people to follow them.~~

Self-Check 1 - Written Test

~~*Directions:* Answer all the questions listed below. Use the Answer sheet provided in the next page:~~

~~3. What is Maintenance management?~~

~~4. What is Maintenance planning?~~

~~5. Write some types of PPE?~~

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

3. _____

_____

_____

_____

4. _____

_____

_____

_____

5. _____

_____

_____

_____

Information Sheet 2 -	Using mechanisms to measure and record report progress of activities.

2.5. Progress of activities

One of the most important aspects of a Manage/monitor job is measuring progress on each task. It helps employees stay focused and meets goals, and it helps maintenance managers stay on top of what's happening in the workplace. The first step of effective leadership is helping others stay on task, keeping team members engaged and holding everyone accountable. Here are just a few effective ways of tracking activities progress as a manager.

2.5.1. Create a activities Outline

Working with team members to create a activities outline can be a great way of tracking activities progress. Each member of the team can give input for setting up realistic goals and learn what's expected of them individually and as part of a group. Taking the time to sit down with workers and hash out a comprehensive outline—including team goals, milestones, and key activities indicators (KAIs) is a great first step.

2.5.2. Establish Goals.

When considering how to track the progress of a task, it's good to consider a worker's specific skill set first. Measuring progress can look very different from person to person and task to task. The more familiar a manager is with each employee's skills and limitations, the better sense he or she will have of how to hold them accountable. Setting up tailored goals and milestones with each member of the team also goes a long way toward team satisfaction. It's important to stress each team member's role and how it will contribute to the success of the team as a whole. Keeping the big picture in mind is always important, even while implementing smaller goals and points of progress.

2.5.3. Check in Regularly

When considering how to track the progress of a task, never underestimate the importance of checking in. Having a quick, informal chat at the beginning of each work session can establish trust between managers and workers, and help to distinguish a

key difference between workers feeling cared about and checked in on versus feeling judged or checked up on. Communication is always key in making sure a activity runs smoothly. If a worker is having trouble reaching goals or performing time-sensitive tasks, it's best to check in and try to get to learn the reason why, rather than continuing to implement structures that aren't motivational or helpful.

2.5.4. Ask How You Can Help

There are many ways a manager can help workers feel less stressed or overwhelmed by tasks. For example, suggesting tools that are available to help workers with their organization skills is always a great option. Project/task management software can be a great way to show individual workers how to track the progress of a project and work collaboratively without getting caught up in a lot of confusing details.

2.5.5. Establish Clear Deadlines

Keeping the end goal in sight is always helpful for measuring progress. Being clear about deadlines can help workers stay on track and complete tasks without getting overly stressed or overwhelmed. Tracking activity progress becomes far easier once everyone knows what the tasks timeline is. Some managers prefer to work with one final deadline, while others like to establish a deadline per milestone or goal. Whatever the preferred method, so long as each deadline is clearly set and team members have a sense of what they're working towards, keeping track of each task should be a simple matter of sticking to the schedule.

Self-Check 2 - list

Direction : Write/List down the following. Use the answer sheet for your answer.

1. Write/List down effective ways of tracking activities progress as a manager**?**

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

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

6.

Information Sheet 3 -	Managing and monitoring servicing and maintenance system.

3.6. Servicing and maintenance system.

System maintenance is an ongoing activity, which covers a wide variety of activities, including removing program and design errors, updating documentation and test data and updating user support. For the purpose of convenience, maintenance may be categorized into three classes, namely:

- **Corrective Maintenance**: This type of maintenance implies removing errors in a program, which might have crept in the system due to faulty design or wrong assumptions. Thus, in corrective maintenance, processing or performance failures are repaired.
- **Adaptive Maintenance**: In adaptive maintenance, program functions are changed to enable the information system to satisfy the information needs of the user. This type of maintenance may become necessary because of organizational changes which may include:
  - ✓ Change in the organizational procedures,
  - ✓ Change in organizational objectives, goals, policies, etc.
  - ✓ Change in forms,
  - ✓ Change in information needs of managers.
  - ✓ Change in system controls and security needs, etc..
- **Perfective Maintenance**: Perfective maintenance means adding new programs or modifying the existing programs to enhance the performance of the information system. This type of maintenance undertaken to respond to user's additional needs which may be due to the changes within or outside of the organization. Outside changes are primarily environmental changes, which may in the absence of system maintenance, render the information system ineffective and inefficient. These environmental changes include:
  - ✓ Changes in governmental policies, laws, etc.,
  - ✓ Economic and competitive conditions, and
  - ✓ New technology.

(What is system maintenance? What are its different types - Computer Notes n.d.)

Self-Check 3 - Written Test

Direction : Write down the description of the following categorize of maintenance.

1. **Corrective Maintenance**
2. **Adaptive Maintenance**
3. **Perfective Maintenance**

Note: **Satisfactory rating – 3 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

Answer Sheet

1. _____

_____

_____

_____

_____

2. _____

_____

_____

_____

_____

3. _____

_____

_____

_____

_____

Information Sheet 4 - Respond to unplanned events or conditions.

4.3. Unplanned Events or Conditions.

Unplanned work could refer to anything from support escalations, to emergency outages, to feature requests coming in sideways, or stakeholder demands. This type of work can present several challenges to maintenance managers and their cross-functional teams.

- Unexpected Events or Conditions can impact the team's ability to deliver on planed activity.
- It can be difficult to communicate the impact of unplanned work to stakeholders.
- In some cases, unplanned work can lead to unsustainable work practices and an unhealthy culture.

What can product teams do about this? The short answer: don't just expect the unexpected, embrace it. First, get in the habit of thinking not all unplanned work is inherently bad. And rather than feeling as though you're at the beck and call of unplanned work, you can establish a structure for handling it. let we'll discuss a series of tried and true tactics for this.

I. Assess and Prioritize.

Before you figure out how you're getting the work done, it's wise to ask yourself why. Otherwise, you risk spending too much. In many situations, you can easily apply one of the commonly used plans to prioritize unplanned work. The caveat, however, is that these frameworks are only a starting point. At the end of the day, you need to tap into your maintenance manager's intuition when it comes time to make decisions about how to proceed.

II. Tactics for Tackling Unplanned Work

After you've assessed the importance of new work, you can decide how to actually get it done. There are a handful of different ways to handle unplanned.

- Squeeze it in to the current sprint.
- Throw it into the backlog.
- Carry it in to the next sprint.
- One item in, one item out.
- Tackle it in a pre-planned buffer
- Establish a dedicated team for reactive work.

Each of the methods above for dealing with unplanned work come with their own set of pros and cons. And there is no single "best" approach to tackling reactive work. Often, you can make these decisions on a case-by-case basis. However, establishing a pre-planned buffer within your development cycles is one smart way to keep unplanned work's impact on delivery of planned work at a minimum. Of course, there are some situations where unplanned work needs to be handled immediately, and in those cases, you'll need to do some shuffling to accommodate it.(4 Steps to Managing Unplanned Work - n.d.)

Self-Check 4 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Unplanned Events or Conditions?
2. What is **Assess and Prioritize?**
3. What is Tactics for Tackling Unplanned Work?

Note: **Satisfactory rating – 3 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

___

2. _____

_____

_____

_____

___

3. _____

_____

_____

_____

___

Information Sheet 5 -	Maintaining records and making documentation of servicing and maintenance activities.

5.3. Maintaining records

You know maintenance is an essential aspect of your organization, but do you know record-keeping is a vital aspect of maintenance? In this lesson, we'll discuss just how crucial proper documentation is for keeping track of equipment's maintenance history and for making future determinations based on that data. Maintenance alone is helpful, but without consistent record-keeping, maintenance activities may get needlessly repeated, forgotten or occur at random intervals.(Why Record-Keeping Should Be A Top Maintenance Priority n.d.)

As we will see, proper maintenance record-keeping can save your company time, money and headaches. The record for each device should include identifying data such as a brief description, manufacturer, model, serial number, and location It is helpful to also include data regarding the time and expense of providing scheduled and unscheduled maintenance services for the device.

These data are typically contained in work order records that provide documentation of every maintenance task performed on the device. (Medical equipment maintenance programme overview WHO Medical device technical series n.d.)

The equipment maintenance log is a simple document that shows all maintenance actions that have been performed on a specific asset. While the information it contains varies depending on the type of equipment/asset in question, a standard equipment maintenance log is often split into 2 distinct sections:

- General information used to identify the asset
- List of performed maintenance actions on the asset and who performed them

General information usually covers:

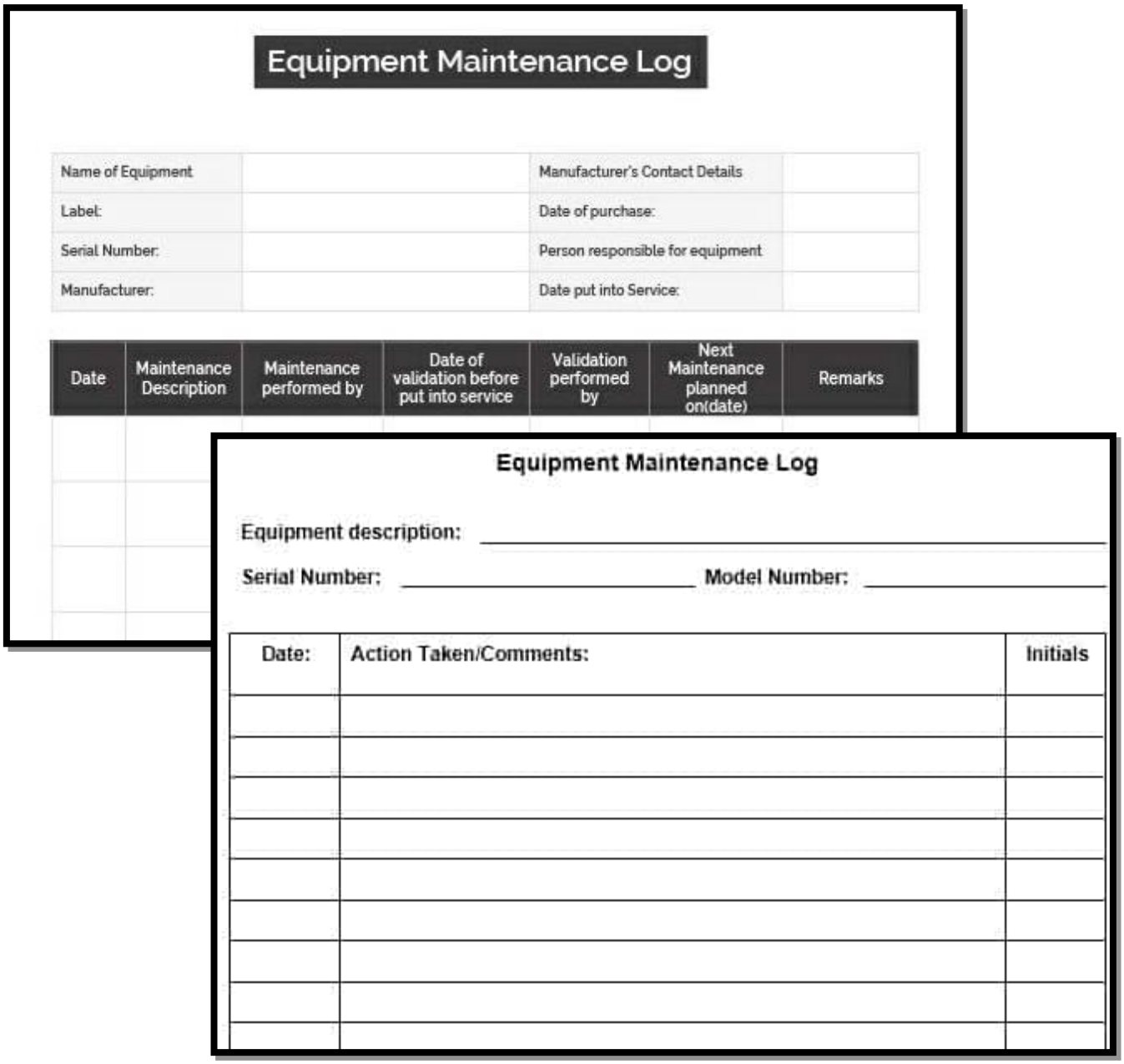
(Name of equipment, Model, Serial Number, Location) In some cases, the general info will also include Purchase date and Purchase price.

List of performed actions usually covers the following information:

- **Date** (when a certain action was performed)
- **Action description** (what was done)
- **Person performing said actions** (who performed it)

There are various free templates of equipment maintenance logs you can download if you are still using pen and paper to track your maintenance records.

Here are a couple of examples of such equipment maintenance log templates:



Equipment Maintenance Log

Name of Equipment		Manufacturer's Contact Details	
Label:		Date of purchase:	
Serial Number:		Person responsible for equipment	
Manufacturer:		Date put into Service:	

Date	Maintenance Description	Maintenance performed by	Date of validation before put into service	Validation performed by	Next Maintenance planned on(date)	Remarks

Equipment Maintenance Log

Equipment description: _____

Serial Number: _____ Model Number: _____

Date:	Action Taken/Comments:	Initials

Self-Check 5 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Maintaining records ?
2. What are General information usually cover?
3. List of performed actions usually covers the following information?

Note: **Satisfactory rating – 3 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____
   _____
   _____
   _____
2. _____
   _____
   ___
3. _____
   _____
   _____

Information Sheet 6 - Monitoring results of routine maintenance activities.

6.4. What is routine maintenance?

Routine maintenance refers to any maintenance task that is done on a planned and ongoing basis to identify and prevent problems before they result in equipment failure. Some common routine maintenance includes regular inspections or service work. These can be carried out on a time-based schedule or on a usage-based schedule. Typical examples of routine maintenance include:

- Lubricating, cleaning, or adjusting machinery
- Inspecting equipment to ensure proper operation and safety
- Replacing parts that show deterioration
- Checking, testing, and maintaining safety equipment, such as safety barriers, fire extinguishers, or alarm systems
- Checking for and replacing damaged signage or utilities, like light bulbs
- General workplace maintenance, such as cleaning floors, replacing HVAC filters, and washing windows, trash removal, and landscaping

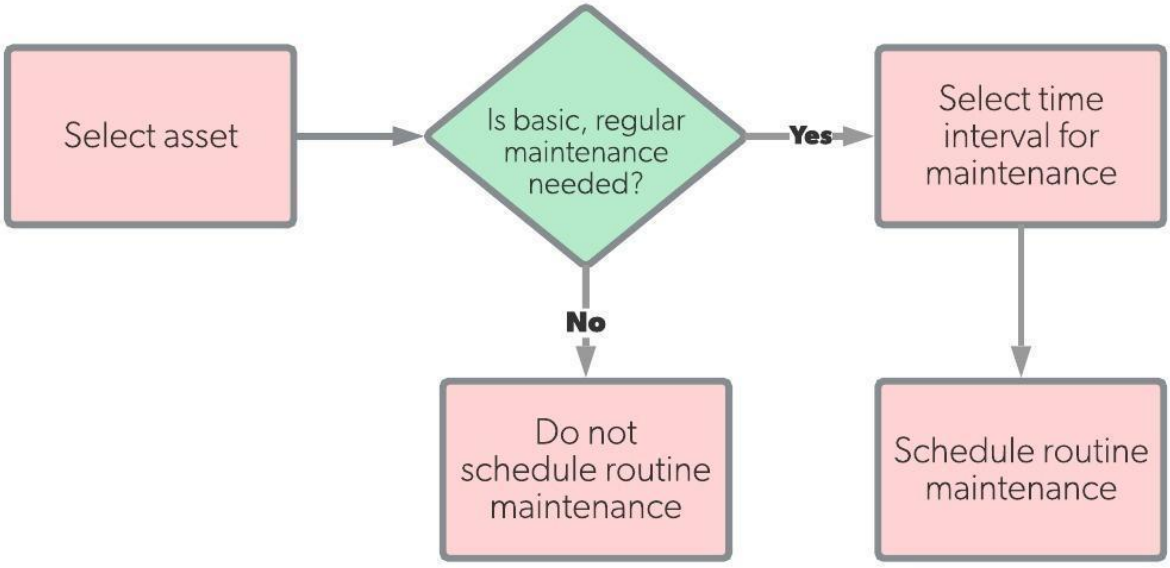


Figure 3: flow chart of routine maintenance?

Self-Check 6 - Written Tes/ Multiple choice

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is routine maintenance?
2. What are examples of routine maintenance include?
3. Draw flow chart of routine maintenance?

Note: **Satisfactory rating – 3 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

   _____

   _____

   _____

2. _____

   _____

   _____

   _____

   _____

   _____

3.

Information Sheet 7 - Acting shortfalls in quality outcomes.

Many maintenance departments today instead of approaching their problems systematically. Prevention is a far better goal than trying to solve problems as they arise. While this strategy may be a little costly at first, it is not nearly as expensive as allowing problems to occur.

Maintenance problem-solving is primarily concerned with four areas: maintaining critical systems, fixing the problem quickly and faster than the last time, determining what is causing the breakdown to happen so frequently, and identifying the 20 percent of breakdowns that are consuming 80 percent of your resources.

This information sheet focuses on the four common types of maintenance problems with the ultimate goal of helping you to prevent or at least minimize each type. The four common types of maintenance problems can be categorized as identification, cause/effect, means and ends. Let's discuss each of these in turn.

Identification

When you don't understand a natural phenomenon, a question or a method of doing things, your natural inclination is one of curiosity. Industrial maintenance is the same way. You must identify (understand) everything in your department or plant or have someone on staff who does. When a problem occurs, you need to identify where and when it happened as well as where and when it did not. More importantly, you need to identify why you do things a certain way while always on the hunt for a better approach.

Self-Check 7 - Written Test

LG #12	LO4: Evaluate and document servicing system
Instruction Sheet	

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

- Reporting quality management issues and responses.
- Reporting completion of servicing and maintenance

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**:

- Report quality management issues and responses.
- Report completion of servicing and maintenance

Learning Instructions:

13. Read the specific objectives of this Learning Guide.
14. Follow the instructions described below 3 to 4.
15. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
16. Accomplish the “Self-check 1 and Self-check t 2” **in page 56 and 59** respectively.

Information Sheet 1 - Report quality management issues and responses.

1.1. Report quality management

The purpose of these reports is to make your quality management process and quality control procedures concrete - and to make sure you are measuring - both quantitatively and qualitatively - the outputs of these processes so as to ensure that your project is maintaining the quality standards set out in official quality assurance and quality control guidelines, as well as the specifications set out by the client and/or costumer.

When you have problems, guessing the cause of the problem rarely works. A structured approach works much better. You want to not only resolve this particular problem, but you also want to understand the problem well enough to ensure that it doesn't occur again. Use the following general process to identify and resolve quality problems.(Quality report format: Here's the right format for your quality reports n.d.)

1.1.1. Identify the problem or symptom

You shouldn't assume that everyone knows the problem already. Take the time to document the problem in clear terms that everyone can understand. Make sure to also explain the impact of the quality problem to the respective. The first rule of problem resolution is that if you can't define the problem, you can't resolve it.

1.1.2. Identify the root cause

Try to identify the root cause of the problem and explain how the root cause ultimately results in the problem that has arisen. If you can't track the root cause to the perceived problem, you haven't taken your investigation far enough. There are a number of problem-solving techniques you can utilize, including root cause analysis and Fishbone Diagrams.

1.1.3. Determine alternatives and impacts

Once the cause is identified, you should look at the alternatives and the impact of each alternative. Although it's best to try to solve the root cause of the problem, sometimes it's not possible and sometimes it's not cost effective. In these instances, you might

need to look at alternatives that resolve the symptoms of the problem. Sometimes there's a very obvious solution that needs to be implemented. However, in many cases there are a number of potential alternatives. For each alternative, they should also address the impact to the project in terms of costs, benefits, and risks. It's worthwhile to make sure you look at the solutions as holistically as possible, so that you can make select the best alternative.

1.1.4. Select the best alternative

Depending on the severity of the problem, the project team may be able to choose the best alternative to the problem. If the problem is large enough, your sponsor and management stakeholders may need to be involved as well.

1.1.5. Execute

A mini-plan is put into place to address the quality problem and implement the chosen alternative. These activities should be moved into the project workplan to ensure that they are performed.

1.1.6. Monitor

The resolution plan needs to be monitored to ensure that the quality has improved as expected. If the quality has improved or is moving in that direction, you may allow the plan to continue. However, if the quality is not improving as expected, further corrective action may be required.

Self-Check 1 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what is Report quality management
2. write the general process to identify and resolve quality problems

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

2. _____

_____

_____

_____

_____

_____

Information Sheet 2 - Report completion of servicing and maintenance.

2.1. Maintenance report

A maintenance report is a written document that identifies clearly how to perform a maintenance procedure. It should be both detailed and specific enough so that any qualified technician who has never performed the job can do it successfully by just reading the document and following the contents. Here are the steps to consider when making this document:(Maintenance Report Forms n.d.)

I. Plan what you want to place in the form first

Before starting a large job, the maintenance planner should meet with all the personnel of the team the last time they performed the same job. The planner would then write down the steps how they remember them. This serves as a rough plan that forms the outline of the next project.

II. Include photographs

This step is very important for several reasons. Even very well-written plans can still get misunderstood or misread but adding photographs shows facts. If you have the personnel and equipment, recording the procedure on video will be even better.

III. Write things down

It should be the task of the maintenance planner to jot down the actions taken step-by-step starting with the equipment's safe lockout. For this, the planner should assume that he's writing the document for a person who doesn't know anything about the equipment.

The written procedure should have enough accuracy enough so that the "imaginary person" can complete the job successfully guided only by the maintenance report form. As the planner takes notes, he should also consider not just what is being currently done but also find ways to improve things.

This may include ways to do the job more smoothly and efficiently in the future. The planner should also take note of the man-hours associated with each of the steps from start to finish.

IV. Create a complete list of parts

Those who would read the report as a guide need a complete list of all the parts. The list should be as complete as possible, down to the grades and numbers of the bolts, nuts, washers and anything else needed.

V. Create complete lists for experts, supplies, and tools

If there is a need for special stands or jigs for the job, you should take note of these in your the maintenance report form, including where you store them. As for supplies, take note of any material shortages.

Self-Check 2 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Maintenance report?
2. Write the steps to consider when making this document?

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

2. _____

_____

_____

_____

_____

LG #13	LO5: Improve work process and staff.
Instruction Sheet	

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

- Making Documentation and discuss maintenance policy and procedures.
- Evaluating staff performance.
- Planning and implementing staff upgrading schemes
- Establishing team spirit and favorable working environment.
- Identifying and addressing critical issues.
- Recommending work improvement and processes.
- Accomplishing and submitting necessary documentation and reporting.

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:

- Make Documentation and discuss maintenance policy and procedures.
- Evaluate staff performance.
- Plan and implementing staff upgrading schemes
- Establish team spirit and favorable working environment.
- Identify and addressing critical issues.
- Recommend work improvement and processes.
- Accomplish and submit necessary documentation and reporting.

Learning Instructions:

17. Read the specific objectives of this Learning Guide.
18. Follow the instructions described below 3 to 4.
19. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.

Accomplish the “Self-check 1- 7” **in page 62, 66, 68 ,70, 72, 75, 77 and 77** respectively.

Information Sheet 1 -	Making Documentation and discuss maintenance policy and procedures

1.1. Policy and procedures

Maintenance procedures and other work-related documents should identify preconditions and precautions, provide clear instructions for work to be done, and be used to ensure that maintenance is performed in accordance with the maintenance strategy, policies and programs. The procedures should normally be prepared in cooperation with the designers, the suppliers of plant and equipment, and the personnel conducting activities for quality assurance, radiation protection and technical support. They should be technically accurate, properly verified, validated, authorized and periodically reviewed.

Maintenance instructions issued to craftsmen should be compiled in accordance with quality assurance requirements and should point out the risk impact of the work personnel safety and identify the countermeasures to be taken and specify the post-maintenance/modification testing required. The required level of skill and methods of procedure use should be stated. Routine activities involving skills that qualified personnel usually possess may not require detailed step-by-step instructions; they should nevertheless be subject to control by means of general administrative procedures.(Maintenance Procedure - an overview | ScienceDirect Topics n.d.)

1.2. Concept of Maintenance Policy:

The maintenance policy of a service system provides specific answer to problems concerned with the selection of specific components parts of a system for maintenance, decision regarding the specific forms of maintenance to be used, a choice between internal and external maintenance and a further choice between centralized and decentralized maintenance in case of internal maintenance.

Moreover not all items are influenced/controlled by preventive maintenance. For example, an item showing a time independent, i.e. a Negative Exponential failure behaviour, then the reason of failure is external to the item hence, any amount of

preventive replacement is not going to serve intended purpose.(Maintenance Policy: Concept and Procedure to Select It n.d.)

Self-Check 1 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Maintenance procedures?
2. What is Concept of Maintenance Policy?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

   _____

   _____

   _____

   _____

2. _____

   _____

   _____

   _____

   _____

Information Sheet 2 - Evaluating staff performance.

2.1. Evaluating staff performance.

An employee performance evaluation is a regular assessment and review of an employee's performance on the job. Typically, managers conduct a full performance evaluation annually, with regular check-ins throughout the year. Performance evaluations allow an employer to set clear expectations and measure the employee's success. The information gathered as part of a performance evaluation can help drive decisions about pay raises, promotions and layoffs.(How to Evaluate an Employee: A Performance Review Checklist n.d.)

2.2. How to Evaluate an Employee?

To evaluate an employee effectively, organizations need to have a standard evaluation framework in place and review each individual employee against those standard metrics. Here's a step-by-step guide to effectively evaluating employees:

2.2.1. SET PERFORMANCE STANDARDS

It's important that you set clear performance standards that outline what an employee in a specific role is expected to accomplish and how the work should be done. The same standards must apply to every employee who holds the same position. All performance standards should be achievable and they should relate directly to the person's job description.

2.2.2. SET SPECIFIC GOALS

You should also set goals that are specific to each employee, unlike performance standards, which can apply to multiple workers. Goals are particular to the strengths and weaknesses of the individual employee and can help them improve their skills or learn new ones. Work with each employee to set goals that are reasonable and relevant to their position.

2.2.3. TAKE NOTES THROUGHOUT THE YEAR

Track the performance of your employees throughout the year. Create a performance file for each worker. Keep records of notable accomplishments or incidents, whether they're positive or negative. Remember that you can give immediate feedback to employees when something stands out as well, you don't have to wait until the year-end review process to give praise or constructive criticism.

2.2.4. BE PREPARED

When it comes time to actually give an employee evaluation, it's best to prepare for the meeting ahead of time. Review your documentation for the employee before the meeting and make notes of what you want to discuss with the employee. The performance review should be mostly about the positive elements of the employee's performance, with some helpful advice on how to improve in the future. After all, if the worker's performance was mostly negative, they probably wouldn't still be working for you.

2.2.5. BE HONEST AND SPECIFIC WITH CRITICISM

When you do need to give criticism in an evaluation, be honest and straightforward about your feedback. Don't try to sugarcoat or downplay the situation, which can create confusion for the employee. Give clear examples and then provide helpful, specific advice on how the employee can grow and improve in the future.

2.2.6. DON'T COMPARE EMPLOYEES

The purpose of an employee evaluation is to review the performance of each staff member against a set of standard performance metrics. It's not helpful to compare the performance of one employee to another and doing so can lead to unhealthy competition and resentment. Always circle back to your evaluation framework, not the performance of other workers.

2.2.7. EVALUATE THE PERFORMANCE, NOT THE PERSONALITY

Your evaluation should focus on how well the employee performs their job, rather than their personality traits. When you make judgements about the employee's personality, they can feel attacked and the conversation can turn hostile. So, for example, rather than giving feedback about an employee being immature or emotional, it's more

productive to instead give specific examples of the employee's actions in the workplace that demonstrate those characteristics. Don't make criticism personal, always tie it back to the work.

2.2.8. HAVE A CONVERSATION

An employee evaluation shouldn't be a one-way street where the manager gives feedback and the employee listens to that feedback. Instead, a productive employee evaluation should be a conversation between the two of you. Listen to your employee's concerns and how they'd like their career to grow. Find out how you and the larger team can help the employee meet their career goals. You may also ask for an employee to provide a self-evaluation of how they think they performed at their job for the year. A performance review should allow the employee to review the workplace, their managers and themselves, as well as reflect on their own career growth.

2.2.9. ASK SPECIFIC QUESTIONS

To foster productive conversations with employees during the evaluation, it can help to enter the room with specific questions you'd like to discuss with the worker. Here are some questions you can ask employees to spark conversation and receive valuable feedback:

- What do you hope to achieve within the company this year?
- What resources or support do you need from the department to reach your goals?
- What will your biggest challenges be in working to meet your business goals this year?
- How often would you like to receive feedback?
- How can I be a better manager to you?
- What are your long-term career goals and how can the organization help you achieve them?
- What new skills would you like to develop this year? Is there training we can provide to help develop those skills?

2.2.10. GIVE ONGOING FEEDBACK

Ideally, employee evaluation is an ongoing process throughout the year, not a one-time task. Giving feedback throughout the year and touching base with an employee to see how they’re working toward their yearly goals can help improve worker morale and keep employees on track at work.

Self-Check 2 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How to Evaluate an Employee?
2. Write the step guide for effectively evaluating employees?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

_____

2.

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

Information Sheet 3 - Planning and implementing staff upgrading schemes.

3.7. Servicing and maintenance system.

Despite the fact that investing in employee development can help you attract and retain top talent, a lot of companies, and especially startups, push this initiative at the bottom of the to-do list. Yes, upgrading your workforce skills is difficult and time-consuming, but the reward is well worth it. So, let's look at five simple steps that you can take to keep your employees' skills fresh. (How to Upgrade Your Workforce Skill Level in 5 Easy Steps | Your Training Edge ® n.d.)

- Offer Professional Training
- Break Down the Barriers
- Cross-Train Employees.
- Offer Flexible Learning Options
- Develop Your Employees' Soft Skills Too

Self-Check 3 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Servicing and maintenance system.?
2. Write the five simple steps to keep your employees' skills fresh.?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

_____

2.

- _____
- _____
- _____
- _____
- _____

Information Sheet 4 - Establishing team spirit and favorable working environment.

4.4. Unplanned Events or Conditions.

Building a team is a two-way street. On one side, your employees agree to use their talents and experience to drive the organization forward. On the other, companies agree to compensate them for their work. Unexpected Events or Conditions can impact the team's ability to deliver on planed activity.

Here are a few ideas on how to build a strong team "spirit" in your organization

- Articulate and operate within a core set of values. Be impeccable about fairness, honesty, and respect for the individual.
- Provide clear direction and a sense of purpose. Money motivates; it doesn't inspire. The desire to be the best is driven from the inside, not the outside.
- Make trust-building a top priority. It is the foundation of high-performing teams. Trust is built by being reliable, open, straightforward, and accepting.
- Value the contribution of each player. Loyalty is earned by caring about not only the performance, but also the person.
- Build on strengths; manage weakness. Put people in positions where they play best and minimize where they are vulnerable.
- Listen to, acknowledge, and celebrate each player early and often.

Self-Check 4 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Unplanned Events or Conditions?
2. Write ideas on how to build a strong team “spirit”.?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

_____

2.

- _____

_____

_____

- _____

_____

_____

- _____

_____

_____

- _____
  _____
  _____
- _____
  _____
  _____
- _____
  _____
  _____

Information Sheet 5 - Identifying and addressing critical issues.

5.4. Critical Issues

For the purpose of this paper, "critical issues" are defined as topics that deal with resource problems and their need for solutions that relate to the safety of the visitor at the resource site or relate to resource protection and management issues that the public needs to be aware of. As examples, "critical issues"

- Coordinating service schedules for equipment
- Obtaining manufacturer support when problems arise
- Locating parts to repair failing equipment
- Segregating accessories for different equipment makes and models
- Convincing clinical staff and stakeholders that equipment should be replaced. (The Top 5 Challenges Facing Biomedical & Clinical Engineers Today | Attainia n.d.)

Self-Check 5 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Critical Issues ?
2. Write examples of "critical issues".?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

_____

2.

- _____

_____

_____

- _____

_____

_____

- _____

_____

_____

- _____

_____

- _____

_____

- _____

_____

Information Sheet 6 - Recommending work improvement and processes.

6.5. Improvement and processes

Maintenance planning and scheduling, arguably the most neglected functions of modern asset management, are at the heart of an effective maintenance management system. Maintenance planning covers the daily or weekly planning, scheduling and control activities to ensure that scheduled work is undertaken, and that available resource are being used optimally. Yet many organizations still struggle to make their maintenance planning and scheduling as effective as it should be.

Here are the six steps of the maintenance planning and control cycle as follows:

6.5.1. Identify the problem

The need for maintenance can be triggered by a failure, a noisy bearing or an oil leak. Once identified, the problem must be reported to the maintenance department. This is normally done through a work request so that planning and scheduling can take place.

6.5.2. Plan the maintenance task

'Planning' involves deciding on what exactly needs to be done, determining priority, and defining the sequence of activities and skills required. Ensure that all the resources, material, labor, contract services, specialist equipment, tools and information are available. There may even be a need for outside contractors, items to be purchased or work permits to be obtained, all of which must be arranged in advance.

A maintenance planning function is a critical tool for reducing downtime and maximising the value of preventive maintenance. The maintenance planner must therefore have the technical skills and equipment knowledge to do this planning.

6.5.3. Schedule the work

‘Scheduling’ involves deciding when to do the work. This will depend on the priority level of the task, and the availability of both the resources and the equipment to be repaired. Many organizations schedule maintenance for a specific period during the working week or month. Weekend maintenance is never desirable because, in many cases, suppliers are not available and personnel are expensive.

The legal requirements with regard to statutory inspections are generally quite rigid, so try and devise a 52-week maintenance plan at the beginning of each year. Review this plan periodically to improve the accuracy and quality of the information. Communicate the preventive and corrective maintenance requirements to production so that they fully understand the need for the maintenance window.

6.5.4. Allocate the task to specific people

Although this will depend on organizational arrangements, consider the following:

- Allocate your maintenance personnel to specific areas or pieces of equipment
- Ensure the allocated person has the skills to perform the task
- Be very clear about the type of work that will be allocated to outside contractors

Where necessary, undertake hazard analyses to identify risks and formulate action plans to control access to high-risk areas; your plans should include hot work permits, confined space permits and lockout procedures.

6.5.5. Ensure the work is executed properly

It is usually the responsibility of the maintenance supervisor to confirm that the maintenance work meets the required quality standards, usually through selected planned job observations. The planner (or, in some instances, a maintenance scheduler) should monitor outstanding schedules or work requests to ensure that the planned work was actually done.

6.5.6. Analyze the problem and decide how to prevent it from happening again

Analyze the root cause of major failures and take corrective action to prevent recurrence. Corrective action could include training, a change to the preventive

maintenance programme or equipment redesign. Breakdown or failure of the management process is often overlooked in a major failure. In those cases, corrective action may be a systems upgrade.

When all six of these foundational steps are implemented and combined correctly, maintenance planning can attain much greater levels of efficiency. This leads to important asset-related data and information being shared across the plant, and even across multiple plants. It’s not an overnight process though, so don’t give up if you think it might take too long. The benefits are well worth it.

Self-Check 6 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Improvement and processes?
2. Write the six steps of the maintenance planning and control cycle as follows?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

3. _____

_____

_____

_____

_____

4.

1. _____

___

2. _____

___

3. _____

___

4. _____

___

5. _____

___

6. _____

___

Information Sheet 7 -	Accomplishing and submitting necessary documentation and reporting.

7.1. Documentation and Reporting.

A work report is a formal document that discusses information about a specific topic related to an aspect of your job. Most work reports are addressed to a particular audience such as a manager. There are a variety of reports that may need to be written at work, including sales reports, daily reports, budget reports and business data analysis reports. Depending on the type, you may be given a report brief that outlines what you should include in your report. Most reports should be written in a structured format to clearly demonstrate what the report is trying to convey.

Writing effective work reports takes practice and requires good communication skills. The more reports you write, the more efficient you will be in composing them. The following are steps you can take to write a professional report in the workplace:(How to Write a Report for Work (With Examples) | Indeed.com n.d.)

1. Identify your audience.
2. Decide which information you will include.
3. Structure your report.
4. Use concise and professional language.
5. Proofread and edit your report.

Self-Check 7 - Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Documentation and Reporting.?
2. What are the steps to write a professional report in the workplace?

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: ____/_____/_____

1. _____

_____

_____

_____

_____

2.

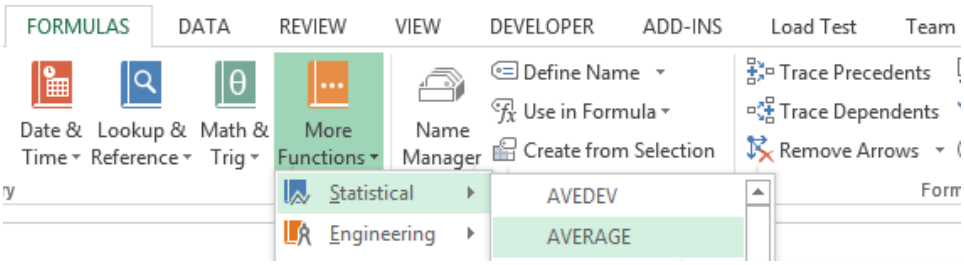
1. _____
2. _____
3. _____
4. _____
5. _____

Operation Sheet 1

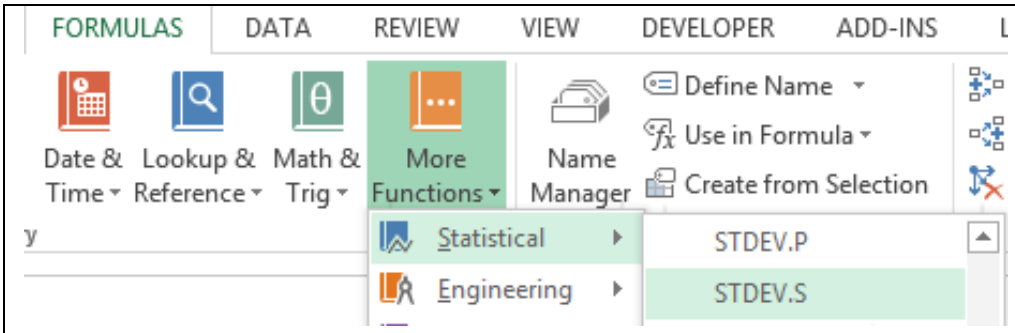
NB: before you start this operation sheet need to know BCO(basic computer operation)

OPERATION SHEET #01	
Operation title	Prepare Process Control Chart
Operation number	#01
Purpose	In This Operation Sheet You Will Learn How To Create Statistical Process Control Chart.
Equipment, tools and materials	• Personal computer • Excel (software) • Printer • Paper
Conditions or situations for the operations	Clean environment.
Procedures	

1. First we are going to find the mean and standard.
2. Deviation. To find the mean click on the Formula tab, click on More Function select Statistical and then Average from the dropdown menu. Select cells B2 to B20 and press okay.



Click on the Formula tab, click on More Function select Statistical and then STDEV.S from the dropdown menu. Select cells B2 to B20 and press okay.



3. Type the following on work sheet

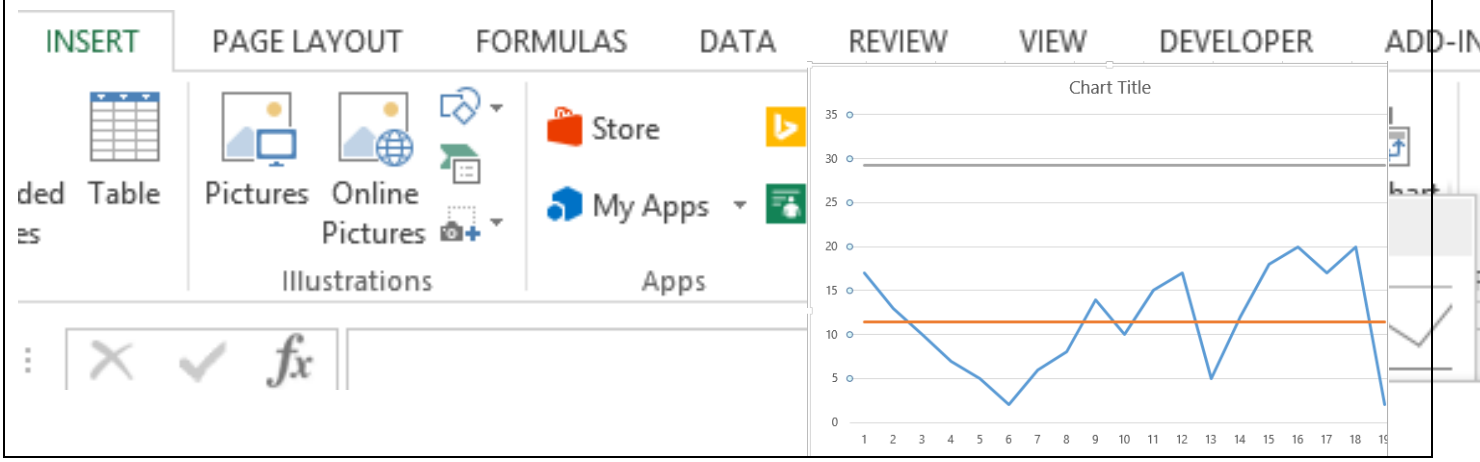
- Select cell C1 and type "Mean (CL)" in it. Select C2 and type "=I$1". Move your mouse to the bottom right of the cell until a black plus sign appear. Drag the plus sign all the way to cell C20 to copy the mean.
- Select cell D1 and type "UCL" in it. Select D2 and type "=I$1+ (I$2*3)". Move your mouse to the bottom right of the cell until a black plus sign appear. Drag the plus sign all the way to cell D20 to copy the mean.

B	C	D	E
Sample Measures	Mean(CL)	UCL	LCL
17	11.47368	29.2323	-6.28493
13	11.47368	29.2323	-6.28493
10	11.47368	29.2323	-6.28493
7	11.47368	29.2323	-6.28493
5	11.47368	29.2323	-6.28493
2	11.47368	29.2323	-6.28493
6	11.47368	29.2323	-6.28493
8	11.47368	29.2323	-6.28493
14	11.47368	29.2323	-6.28493

- Note: UCL= upper control limit and is mean+3 times the standard deviation

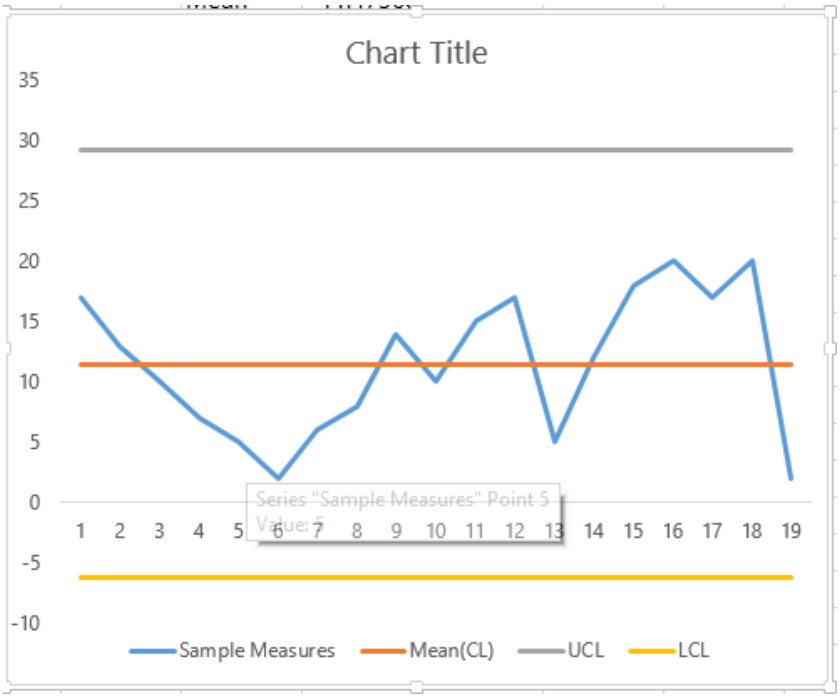
Select cell D1 and type "LCL" in it. Select E2 and type "=I$1+ (I$2*3)". Move your mouse to the bottom right

4. Click on Insert tab, click on Line Chart and then Click on Line.



- You have created your chart. Resize it. Remove the small black lines by double clicking on them and pressing Delete. That's it, you're done

5. This is what your final chart will look like.



Your Statistical process control chart is ready.

Precautions	● Save your file D:\"your Name" after each stapes
Quality criteria	The final chart same like in the graph.

LAP TEST 1

1. Create Statistical Process Control Chart?

Reference

“4 Steps to Managing Unplanned Work -.” https://www.productplan.com/4-steps-to-managing-unplanned-work/ (February 1, 2021).

“Guide to Inventory Tags: Uses, Types, Best Practices & More - Camcode.” https://www.camcode.com/asset-tags/guide-to-inventory-tags/ (January 30, 2021).

How to Conduct a Records Inventory. https://www.maine.gov/sos/arc/records/state/inventoryinfo.pdf (January 30, 2021).

“How to Evaluate an Employee: A Performance Review Checklist.” https://www.freshbooks.com/hub/leadership/evaluate-an-employee (February 1, 2021).

“How to Make an Inventory Database on Access - Arkware.” https://www.arkware.com/2019/10/24/how-to-make-an-inventory-database-on-access/ (January 31, 2021).

“How to Upgrade Your Workforce Skill Level in 5 Easy Steps | Your Training Edge ®.” https://www.yourtrainingedge.com/how-to-upgrade-your-workforce-skill-level-in-5-easy-steps/ (February 2, 2021).

“How to Write a Report for Work (With Examples) | Indeed.Com.” https://www.indeed.com/career-advice/career-development/how-to-write-a-report-for-work (February 2, 2021).

“Maintenance Policy: Concept and Procedure to Select It.” https://www.yourarticlelibrary.com/maintenance-management/maintenance-policy-concept-and-procedure-to-select-it/90687 (February 2, 2021).

“Maintenance Procedure - an Overview | ScienceDirect Topics.” https://www.sciencedirect.com/topics/engineering/maintenance-procedure (February 2, 2021).

“Maintenance Report Forms.” https://templatelab.com/maintenance-report/ (February 1, 2021).

“Manual of Operations: Key for Knowledge Management – Founder’s Guide.” https://foundersguide.com/manual-of-operations-helpful-tool-for-business/ (January 31, 2021).

Medical Equipment Maintenance Programme Overview WHO Medical Device Technical Series.

Powdrill, Sam, Ismael Cordero, and V Srinivasan. 2010. “Training for Equipment Maintenance and Repair.” *Community eye health* 23(73): 30–31. http://www.ncbi.nlm.nih.gov/pubmed/21119919 (February 2, 2021).

“Procurement Management Plan: 10 Steps | Concord.” https://www.concordnow.com/blog/10-steps-to-create-effective-procurement-management-plan/ (February 2, 2021).

“Q: What Is a Personal Consultant? | ZipRecruiter.” https://www.ziprecruiter.com/e/What-Is-a-Personal-Consultant (February 2, 2021).

“Quality Report Format: Here’s the Right Format for Your Quality Reports.” https://sitemate.com/us/resources/articles/quality/quality-report-format/ (February 1, 2021).

“Stock Taking: How to Write a Stock Report in 6 Easy Steps.” https://www.asp.com.au/how-write-stock-report-helpful-tips-advice/ (January 31, 2021).

“The Top 5 Challenges Facing Biomedical & Clinical Engineers Today | Attainia.” https://www.attainia.com/blog/the-top-5-challenges-facing-biomedical-clinical-engineers-today/ (February 2, 2021).

“What Is Maintenance Inventory Management? | Fiix.” https://www.fiixsoftware.com/blog/8-ways-to-control-inventory-related-costs-with-maintenance-assistant-cmms-2/ (January 29, 2021).

“What Is Preventive Maintenance?” https://hippocmms.iofficecorp.com/blog/what-is-preventive-maintenance (February 2, 2021).

“What Is System Maintenance? What Are Its Different Types - Computer Notes.” https://ecomputernotes.com/mis/implementation-and-evaluation/what-is-system-maintenance-what-are-its-different-types (February 1, 2021).

“Why Record-Keeping Should Be A Top Maintenance Priority.” https://gesrepair.com/record-keeping/ (February 1, 2021).

YIDNEKACHEW .R, GEMECHU, LISANEWORK .G, WONDIMU .Z, and BELAY .D .M, TARIKU .L. 2019. *Learning Guide-41 BME L2*.

Acknowledgement

The Ministry of Education wishes to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who donated their time and expertise to the development of this Model Curriculum for the TVET Program **ADVANCED BIOMEDICAL EQUIPMENT SERVICING** Level **IV**

This TTLM is developed from respective EOS by: ⬇⬇⬇

No	Name of trainer	Qualification	Region	E-mail
1	MELESE RORESA	Electronics and communication technology management lecturer **(M.Sc.)**	Ethio-Italy Poly Technic College	melese.r2003@gmail.com
2	WONDIMU ZEYEDE	Biomedical Engineering Instructor **(B.Sc.)**	Addis Ababa Tegbared Polytechnic College	wondimzeyu336@gmail.com
3	TEBEJE BEYENE	Biomedical Engineering Instructor **(B.Sc.)**	Addis Ababa Tegbared Polytechnic College	tebejebme@gmail.com
4	DECHASA AMDISA	Biomedical Engineering Instructor **(B.Sc.)**	Addis Ababa Tegbared Polytechnic College	amdissad@gmail.com

LG 09	Self-Check- 1

1. Maintenance management is the process of maintaining a company's assets and resources. The purpose is to ensure that production proceeds efficiently and that resources are used effectively.
2. Personal Protective Equipment is any device or clothing worn by a worker to control the level of risk that cannot be controlled or eliminated by providing protection / shield between the hazard and the worker when exposed to:

Self-Check- 2

1. A personal consultant helps individuals understand their strengths and weaknesses and how to use their attributes to leverage new employment or life opportunities. As a personal consultant, your duties vary depending on what type of consulting you do.
2. Directing is the heart of management function. All other functions of management such as planning, organizing, and staffing have no importance without directing. Leadership, motivation, supervision, communication are various aspects of directing. Let us study the importance and principles of directing.
3. (1) Supervision, (2) Communication, (3) Leadership, and (4) Motivation.

Self-Check- 3

1. A large part of keeping a team running efficiently and profitably is ensuring that all the equipment is functioning optimally. To do so, routine preventive maintenance needs to be conducted.
2. The benefits are related to standardization and speed. Preventive Maintenance checklists ensure that no matter who is doing the work, the work is getting done the same way.

3. **Maintenance program responsibilities include:**
   - Inspecting facilities periodically to determine problems and necessary maintenance
   - Preparing weekly maintenance schedules and allocate work
   - Recruiting, supervising and training maintenance technicians.

Self-Check- 4

1. In general, hospitals with fewer than a hundred beds are more likely to save money and maintain quality by outsourcing equipment maintenance as opposed to having an in-house maintenance department.

2. The main benefits are:

- Better control over the maintenance budget
- Faster response speed
- Better understanding of user needs and organizational priorities.

Self-Check- 5

1. workspace
2. spare parts

Self-Check- 6

1. The maintenance manager's responsibility is to clearly define the activity from the start and manage it going forward. This will ensure that everyone involved understands the steps necessary to take the job from its initial stages to completion. The manager's goal is to ensure the job stays streamlined and easy to manage, so those involved won't become overwhelmed.
2. Step 1: Define the Procurement Terms

   Step 2: Determine Which Type of Agreement to Use

   Step 3: Identify the Risks

   Step 4: Mitigate the Risks

   Step 5: Cost Determination

   Step 6: Identify Which Forms are to be Used

   Step 7: State the Project Constraints

   Step 8: Contract Approval Rules

   Step 9: Identify the Decision Criteria

   Step 10: Create a Vendor Management Plan

LG 10	**Self-Check-1**	**1 B 2 D 3 A 4 C 5 D 6 B**	
	Self-Check-2	**C B D A**	
	Self-Check-3	**• Date prepared** **• Office maintaining the files** **• Person conducting the inventory** **• Series location, title, dates** **• Series description** **• Record Format (medium)** **• Arrangement (filing system)** **• Volume (in cubic feet)** **• Annual accumulation**	**• Reference activity (how often are records referenced) • Duplication (indicate copies in other formats)** **• Finding aids** **• Restrictions on access and use (confidentiality)** **• Condition of permanent records (physical condition of records)** **• Schedule (list schedule/series) or unscheduled**
	Self-Check-4	**C B A**	
	Self-Check-5	**D B A C D**	
	Self-Check-6	**Step1. Consider your business needs.** **Step2. Install Access on your computer.** **Step3. Build your database.** **Step4. Fine tune your database.** **Step5. Enter in the information.**	

LG 11
~~Self-Check-1~~
Self-Check-2

1. **Create a activities Outline**
2. **Establish Goals.**
3. **Check in Regularly**
4. **Ask How You Can Help**
5. **Establish Clear Deadlines**

Self-Check-3

1. **Corrective Maintenance**: This type of maintenance implies removing errors in a program, which might have crept in the system due to faulty design or wrong assumptions. Thus, in corrective maintenance, processing or performance failures are repaired.
2. **Adaptive Maintenance**: In adaptive maintenance, program functions are changed to enable the information system to satisfy the information needs of the user. This type of maintenance may become necessary because of organizational changes which may include:
3. **Perfective Maintenance**: Perfective maintenance means adding new programs or modifying the existing programs to enhance the performance of the information system. This type of maintenance undertaken to respond to user's additional needs which may be due to the changes within or outside of the organization. Outside changes are primarily environmental changes, which may in the absence of system maintenance, render the information system ineffective and inefficient. These environmental changes include:

Self-Check-4

1. Unplanned work could refer to anything from support escalations, to emergency outages, to feature requests coming in sideways, or stakeholder demands. This type of work can present several challenges to maintenance managers and their cross-functional teams.
2. Before you figure out how you're getting the work done, it's wise to ask yourself why. Otherwise, you risk spending too much. In many situations, you can easily apply one of the commonly used plans to prioritize unplanned work. The caveat, however, is that these frameworks are only a starting point. At the end of the day, you need to tap into your maintenance manager's intuition when it comes time to make decisions about how to proceed.
3. After you've assessed the importance of new work, you can decide how to actually get it

done. There are a handful of different ways to handle unplanned.

1. Squeeze it in to the current sprint.
2. Throw it into the backlog.
3. Carry it in to the next sprint.
4. One item in, one item out.
5. Tackle it in a pre-planned buffer
6. Establish a dedicated team for reactive work.

Self-Check-5

1. You know maintenance is an essential aspect of your organization, but do you know record-keeping is a vital aspect of maintenance? In this lesson, we'll discuss just how crucial proper documentation is for keeping track of equipment's maintenance history and for making future determinations based on that data. Maintenance alone is helpful, but without consistent record-keeping, maintenance activities may get needlessly repeated, forgotten or occur at random intervals.
2. (Name of equipment, Model, Serial Number, Location) In some cases, the general info will also include Purchase date and Purchase price.
3. Date (when a certain action was performed)
   Action description (what was done)
   Person performing said actions (who performed it)

Self-Check-6

1. Routine maintenance refers to any maintenance task that is done on a planned and ongoing basis to identify and prevent problems before they result in equipment failure. Some common routine maintenance includes regular inspections or service work. These can be carried out on a time-based schedule or on a usage-based schedule.

2. - Lubricating, cleaning, or adjusting machinery

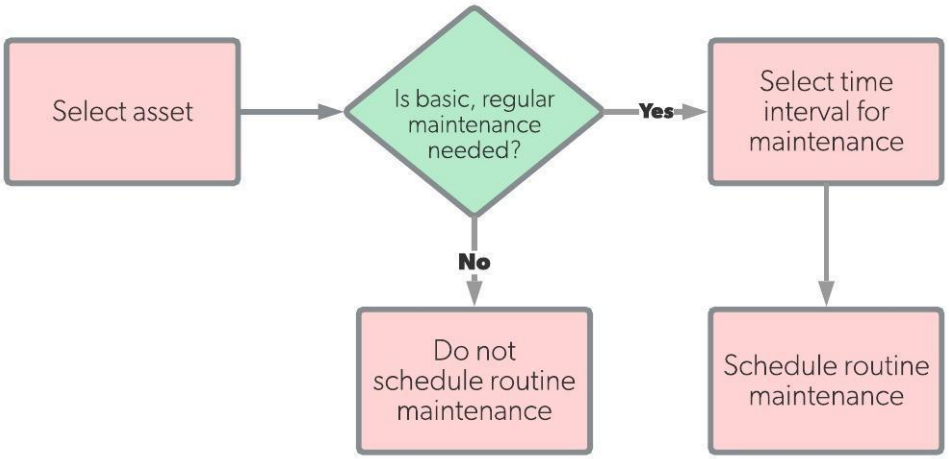
   - Inspecting equipment to ensure proper operation and safety

   - Replacing parts that show deterioration

   - Checking, testing, and maintaining safety equipment, such as safety barriers, fire extinguishers, or alarm systems

   - Checking for and replacing damaged signage or utilities, like light bulbs

   - General workplace maintenance, such as cleaning floors, replacing HVAC filters, and washing windows, trash removal, and landscaping



~~Self-Check-7~~

LG 12

Self-Check-1

1. The purpose of these reports is to make your quality management process and quality control procedures concrete - and to make sure you are measuring - both quantitatively and qualitatively - the outputs of these processes so as to ensure that your project is maintaining the quality standards set out in official quality assurance and quality control guidelines, as well as the specifications set out by the client and/or costumer.
2.
   i. **Identify the problem or symptom**
   ii. **Identify the root cause**
   iii. **Select the best alternative**
   iv. **Determine alternatives and impacts**
   v. **Execute**
   vi. **Monitor**

Self-Check-2

1. A maintenance report is a written document that identifies clearly how to perform a maintenance procedure. It should be both detailed and specific enough so that any

qualified technician who has never performed the job can do it successfully by just reading the document and following the contents. **Here are the steps to consider when making this document:**

2.

i. **Create complete lists for experts, supplies, and tools**
ii. **Create a complete list of parts**
iii. **Write things down**
iv. **Include photographs**
v. **Plan what you want to place in the form first**

LG.13

Self-Check-1

1. Maintenance procedures and other work-related documents should identify preconditions and precautions, provide clear instructions for work to be done, and be used to ensure that maintenance is performed in accordance with the maintenance strategy, policies and programs. The procedures should normally be prepared in cooperation with the designers, the suppliers of plant and equipment, and the personnel conducting activities for quality assurance, radiation protection and technical support. They should be technically accurate, properly verified, validated, authorized and periodically reviewed.
2. The maintenance policy of a service system provides specific answer to problems concerned with the selection of specific components parts of a system for maintenance, decision regarding the specific forms of maintenance to be used, a choice between internal and external maintenance and a further choice between centralized and decentralized maintenance in case of internal maintenance.

Self-Check-2

3. An employee performance evaluation is a regular assessment and review of an employee's performance on the job. Typically, managers conduct a full performance evaluation annually, with regular check-ins throughout the year. Performance evaluations allow an employer to set clear expectations and measure the employee's success. The information gathered as part of a performance evaluation can help drive decisions about pay raises, promotions and layoffs.

4. How to Evaluate an Employee?

4.1.1. SET PERFORMANCE STANDARDS

4.1.2. SET SPECIFIC GOALS

4.1.3. TAKE NOTES THROUGHOUT THE YEAR

4.1.4. BE PREPARED

4.1.5. DON'T COMPARE EMPLOYEES

4.1.6. BE HONEST AND SPECIFIC WITH CRITICISM

4.1.7. EVALUATE THE PERFORMANCE, NOT THE PERSONALITY

4.1.8. HAVE A CONVERSATION

4.1.9. ASK SPECIFIC QUESTIONS

4.1.10. GIVE ONGOING FEEDBACK

Self-Check-3

1. Despite the fact that investing in employee development can help you attract and retain top talent, a lot of companies, and especially startups, push this initiative at the bottom of the to-do list. Yes, upgrading your workforce skills is difficult and time-consuming, but the reward is well worth it. So, let's look at five simple steps that you can take to keep your employees' skills fresh.
2.
   - Offer Professional Training
   - **Break Down the Barriers**
   - **Cross-Train Employees.**
   - **Offer Flexible Learning Options**
   - **Develop Your Employees' Soft Skills Too**

Self-Check-4

4.5. Unplanned Events or Conditions.

Building a team is a two-way street. On one side, your employees agree to use their talents and experience to drive the organization forward. On the other, companies agree to compensate them for their work. Unexpected Events or Conditions can impact the team's ability to deliver on planed activity.

Here are a few ideas on how to build a strong team "spirit" in your organization

- Articulate and operate within a core set of values. Be impeccable about fairness, honesty, and respect for the individual.
- Provide clear direction and a sense of purpose. Money motivates; it doesn't inspire. The desire to be the best is driven from the inside, not the outside.
- Make trust-building a top priority. It is the foundation of high-performing teams. Trust is built by being reliable, open, straightforward, and accepting.
- Value the contribution of each player. Loyalty is earned by caring about not only the performance, but also the person.
- Build on strengths; manage weakness. Put people in positions where they play best and minimize where they are vulnerable.
- Listen to, acknowledge, and celebrate each player early and often.

Self-Check-5

1. For the purpose of this paper, "critical issues" are defined as topics that deal with resource problems and their need for solutions that relate to the safety of the visitor at the resource site or relate to resource protection and management issues that the public needs to be aware of. As examples, "critical issues"
2.

- Coordinating service schedules for equipment
- Obtaining manufacturer support when problems arise
- Locating parts to repair failing equipment
- Segregating accessories for different equipment makes and models

Self-Check-6

1. Maintenance planning and scheduling, arguably the most neglected functions of modern asset management, are at the heart of an effective maintenance management system. Maintenance planning covers the daily or weekly planning, scheduling and control activities to ensure that scheduled work is undertaken, and that available resource are being used optimally. Yet many organizations still struggle to make their maintenance planning and scheduling as effective as it should be.
2.

6.5.7. Identify the problem

6.5.8. Plan the maintenance task

6.5.9. Schedule the work

6.5.10. Allocate the task to specific people

6.5.11. Ensure the work is executed properly

6.5.12. Analyze the problem and decide how to prevent it from happening again

Self-Check-7

6. A work report is a formal document that discusses information about a specific topic related to an aspect of your job. Most work reports are addressed to a particular audience such as a manager. There are a variety of reports that may need to be written at work, including sales reports, daily reports, budget reports and business data analysis reports. Depending on the type, you may be given a report brief that outlines what you should include in your report. Most reports should be written in a structured format to clearly demonstrate what the report is trying to convey.
7. Identify your audience.

   Decide which information you will include.

   Structure your report.

   Use concise and professional language.

   Proofread and edit your report.