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Participant Handbook

Sector
Green Jobs

Sub-Sector
Waste Management

Occuaption
Operation & Maintenance

Reference Id: **SGJ/Q6404, Version 1.0**
NSQF Level 4

Faecal Sludge Treatment Plant Operation & Maintenance Technician

Published by

RACHNA SAGAR PVT. LTD.
4583/15, Daryaganj, New Delhi – 110 002, PO Box 7226
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First Edition, July 2019
ISBN:
Printed in India

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CURRICULUM COMPLIANCE TO QUALIFICATION PACK - NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

SKILL COUNCIL FOR GREEN JOBS

for the

Skilling Content : Faecal Sludge Treatment Plant O&M Technician

Complying to National Occupational Standards of

Job Role/Qualification Pack : **'Faecal Sludge Treatment Plant O&M Technician'**
QP No : **'SGJ/Q6404 Level 4'**

Date of Issuance : August 22nd, 2019
Valid up to* : November 29th, 2022
*Valid up to the next review date of the Qualification Pack

Authorised Signatory
(Skill Council For Green Jobs)

Acknowledgements

The Urban Management Centre (UMC), Ahmedabad, would like to thank all the individuals and organizations who have contributed to the preparation of this Participant Handbook for Faecal Sludge Treatment Plant Operation & Maintenance Technician.

The preparation of this manual would not be possible without the support and feedback of the Sector Council for Green Jobs (SCGJ) and the National Faecal Sludge and Septage Management Alliance (NFSSM Alliance) members.

This "Participant Handbook for Faecal Sludge Treatment Plant Operation & Maintenance Technician" is dedicated to all aspiring youth who desire to gain special skills and gain a meaningful and dignified livelihood in the FSSM sector.

A special thanks to the "Bill and Melinda Gates Foundation" (BMGF) for supporting the study and in the preparation of this training manual.

About this Book

Why faecal sludge management?

In most of the urbanized areas in developing countries excreta are disposed of in facilities located on the housing plot itself. Whether these facilities are septic tanks, dry latrines, bucket latrines, communal toilets, or other types, they all accumulate faecal sludge, which needs to be removed periodically. If this sludge is not adequately managed, there are negative impacts on the urban environment and public health may result in:

- Environmental pollution is caused by effluents of not regularly de-sludged septic tanks or community toilets;
- Large amounts of faecal sludge removed from sanitation facilities are dumped indiscriminately into the environment due to lack of disposal facilities;
- Faecal sludge is used in an unhygienic way in agriculture because no sludge treatment is available.

All these problems can be avoided by proper management of faecal sludge, which may include adequate de-sludging of sanitation facilities, safe handling, and transport of sludge, treatment of sludge, and its safe disposal or reuse. Faecal sludge treatment plants are dedicated treatment plants for treating faecal sludge and septage from on-site sanitation systems which are conveyed usually through desludging vehicles (such as suction trucks, tractors etc.). Operating and maintaining the faecal sludge treatment plants (FSTPs) is an essential requirement for managing faecal sludge.

Faecal sludge treatment plants (FSTPs) require ongoing and appropriate operation and maintenance (O&M) activities in order to ensure long-term and efficient functioning. O&M activities are at the interface of the technical, administrative, and institutional frameworks that enable sustained FSTP function. “Operation” refers to all the activities that are required to ensure that an FSTP delivers treatment services as designed, and “maintenance” refers to all the activities that ensure long-term operation of equipment and infrastructure.

Background to preparation of the handbook

The Urban Management Centre (UMC) is the Technical Support Unit to support the convergence between Deendayal Antyodaya Yojana, National Urban Livelihood Mission and Swachh Bharat Mission-Urban of the Ministry of Housing and Urban Affairs (MoHUA). UMC is supporting preparation of Qualification Packs (QP) and National Occupational Standards (NOS) for work-force under the Faecal Sludge and Septage Management (FSSM) Sector. One of the QPs is on FSTP operation and maintenance technician. The training for this QP will be done through a network of skill training providers. For this purpose, there is a need to prepare a training module for training organisations and a participants’ handbook.

In the preparation of this handbook and trainers’ manual UMC has been supported by the Consortium for DEWATS Dissemination Society (CDD Society). CDD Society is one of the leading organisations in the FSSM Sector. It has been instrumental in setting up India’s first stand-alone faecal sludge treatment plant (FSTP) in Devanahalli, Karnataka in November 2015. This has been one of the key milestones in FSSM Sector as it set an example for dedicated faecal sludge treatment plants in many towns of the country.

What is the scope of this handbook?

This handbook is a step to step guidebook for the operation and maintenance technicians of faecal sludge treatment plant. This handbook will help to understand the importance and role of operations and maintenance for faecal sludge treatment plants. It will provide the details of critical activities and support factors to include starting with the design and planning phases. This handbook will act as a guidebook for effective monitoring and operations and maintenance plan to ensure treatment performance.

Who is this handbook for?

This manual intends to provide practical guidance to the operation and maintenance technicians responsible for the faecal sludge treatment plant.

How to use this handbook?

The handbook has elaborative guidelines on undertaking certain procedures common to all FSTPs irrespective of technology used. The handbook starts with explaining the concept of faecal sludge management with approaches for treatment. In this handbook, step by step operation and maintenance processes are described, and the possible actions are defined. It is meant to be a checklist for all the activities that are necessary to be conducted irrespective of the technology used in the treatment plant. Each chapter is followed by an exercise to enable self-learning for the users.

Symbols Used


Key Learning Outcomes


Steps


Role Play


Tips


Notes


Unit Objectives


Activity


Practical

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1. Introduction

Unit 1.1 - Who is a FSTP operation and maintenance technician?

Unit 1.2 - Job description of FSTP operation & maintenance technician

Unit 1.3 - Skill requirement for operation and maintenance technicians

Key Learning Outcomes

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

1. Define a FSTP operation and maintenance technician.
2. List the role and responsibilities of a FSTP operation and maintenance technician.
3. Identify the required skills to be an operation and maintenance technician.

UNIT 1.1: Who is an FSTP Operation and Maintenance Technician?

Unit Objectives

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

1. Define a FSTP operation and maintenance technician.

According to the Qualification Pack (QP) of National Skill Development Council (NSDC), FSTP operation & maintenance technician is responsible for carrying out the day-to-day operations of a faecal sludge treatment plant (FSTP), which is a special type of treatment plant where the faecal waste coming out of toilet containment units like septic tank and pits is being treated. The technician is also responsible for routine maintenance of pumps, engines, motors, filters, bar screens, valves, pipes and any other equipment used in FSTP.

"Operation" refers to all the activities that are required to ensure that an FSTP delivers treatment services as designed. On the other hand, "maintenance" refers to all the activities that ensure long- term operation of equipment and infrastructure (Basan & Robbins, 2014). Irrespective of the size and technology of the treatment plant, a number of crucial tasks need to be carried out as a part of the O&M (Operation and Maintenance).

UNIT 1.2: Job Description of FSTP Operation & Maintenance Technician

Unit Objectives

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

1. List the role and responsibilities of a FSTP operation and maintenance technician.

The following is the job description of operation & maintenance technician as mentioned in the Qualification Pack for "FSTP Operation and Maintenance Technician".

Refer to Annex 1: Qualification Pack on FSTP O&M Technician

Job Role FSTP Operation and Maintenance Technician		NSQF[2] Level 4
Minimum Educational Qualifications **ITI or equivalent**	Maximum Educational Qualifications **Not Applicable**	Prerequisite License or Training **N/A**
Minimum Job Entry Age **18 years**	Experience **Nil**	Applicable National Occupational **Compulsory**
Standards (NOS) **SGJ/N6606: Carry out operation of FSTP** **SGJ/N6607: Carry out routine maintenance of FSTP** **SGJ/N6411: Maintain personal health & safety while operating FSTP** **SGJ/N0120: Work effectively with co-workers**		Performance Criteria **As described in the relevant Occupational Standards (OS) units**

Role Description

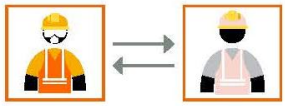
The Faecal Sludge Treatment Plant (FSTP) operation and maintenance technician is responsible for carrying out the day-to-day l operations of the FSTP. He /She is also responsible for repair and maintenance of pumps, engines, motors, filters, bar screens, valves, pipes, and any other equipment used in FSTP.

1https://www.nsdcindia.org/sites/default/files/SGJQ6404_Faecal_%20Sludge_Treatment_Plant%20_O%26M_Technician_v1_06_12_2018.pdf

2National Skill Qualification Framework

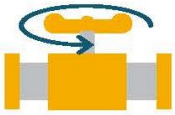
Job Role	Nature of Work	Qualifications
Faecal Sludge Treatment Plant Operator	Full time	Essential ITI; but candidate with Diploma qualification in civil/Mechanical engineering will have an advantage.

Roles

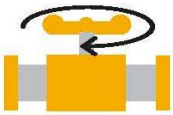


The FSTP operator is for responsible for coordinating with the Cesspool vehicle and all activities related to receiving load at the plant.

Operator should ensure that vehicle is parked properly in the ramp and assist the truck operator to clamp the truck outlet to the feeding tank inlet.



Once the safe connection is ensured; operator must instruct the truck operator to open the valve to half position to maintain smooth flow, which aids in collecting sample as well as to prevent the solid waste from escaping the screen.



Operator should instruct the truck operator to stop the valve if any splashing or blockages in the screen occur.

Note and record the required parameters of faecal sludge arriving as prescribed by the Engineer.

Removal of rags, napkins from modules at regular interval.

Operator is responsible securing and safely storing the harvested dried sludge in the allotted storage area.

Trimming of the plants in the treatment plant (which are part of treatment modules, if applicable) and also carry out the landscaping activities in the plant on timely basis.

Carry out Module Specific activities as specified in the protocol.

Table 1.2.1: Sample Job Description

The above job description can include additional responsibilities such as:

1. Carry out the day to day operations of the FSTP (apart from those already mentioned in the job description)
2. Carry out on-site repair and maintenance work of the FSTP.
3. Maintain personnel health and safety while working in the plant (including oneself) and that of the treatment plant
4. Working effectively with the co-workers
5. Arrange for the visits made by authorised visitors to the plant.

UNIT 1.3: Skill Requirement for Operation and Maintenance Technicians

Unit Objectives

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

1. Identify the required skills to be an operation and maintenance technician.

The following are the core, generic and professional skills required for FSTP operation & maintenance technician as mentioned in the Qualification Pack (QP)for "FSTP Operation and Maintenance Technician".

Core Skills / Generic Skills	
Writing Skills 	The individual on the job needs to know and understand how to: • Fill up relevant documents • Prepare and write detailed document and reports • Record readings of various parameters in the prescribed format
Organising Skills	The individual on the job needs to know and understand how to: • Keep all the tools in an organised manner so as to avoid accidents • Keep all the work environment safe and clean
Reading Skills 	The individual on the job needs to know and understand how to: • Read relevant reports and publications • Read and understand relevant policies • Read from different sources: books, screens in machines and signage. • Read and understand financial documents • Read and understand FSTP operational manual /guidelines • Read internal information documents sent by internal teams

Core Skills / Generic Skills	
Oral Communication Skills (Listening & Speaking)	The individual on the job needs to know and understand how to: • Express statements or information clearly so that team members can understand • Participate in and understand main points of simple discussions • Respond appropriately to queries • Communicate with industries and customers to understand and analyse various strategies, demand and limitation in the market • Communicate effectively with supervisor, peers and subordinates
Professional Skills	
Decision making	The user/individual on the job needs to know and understand how to: • Follow organization rule-based decision-making process • Take decisions with systematic course of actions and/or response • Report potential sources of danger and emergency • Wear appropriate safety gear to avoid an accident • Analyse critical points in day to day tasks and identify control measures to solve the issue. • Handle issues in case the superior is not available (as per the authority matrix defined by the organization).
Plan and Organize	The user/individual on the job needs to know and understand how to: • Complete tasks efficiently and accurately within stipulated time • Work constructively and collaboratively with others • Coordinate with multidisciplinary stakeholders • Plan health & safety schedule • Maintain health

Professional Skills	
Customer Centricity	The user/individual on the job needs to know and understand how to: • Understand limitations of the customers/client • Identify the spending trends of customers/client • Communicate courteously with others in a polite manner • Follow organization code of conduct. • Manage relationships with public with intent of satisfying its requirements for service delivery.
Problem solving	The user/individual on the job needs to know and understand how to: • Recognize problems and search for solutions • Choose best methods to complete assigned tasks • Approach relevant authority when required • Approach local authorities, in case of emergency (police, doctor etc.)
Analytical Thinking	The user/individual on the job needs to know and understand how to: • Apply domain knowledge / observations and data to select course of action to perform tasks related to formulation of the business plan • Analyze day to day experience to correct future course of action • Apply domain knowledge, observations and data to select course of action to perform tasks
Critical Thinking	The user/individual on the job needs to know and understand how to: • Critically evaluate the information obtained from other departments and stakeholders • Ask questions for better understanding
Reflective Thinking	The user/individual on the job needs to know and understand how to: • Learn from past mistake regarding use of hazardous tools and equipment

Table 1.3.1: Skills required by an operation and maintenance technician

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2. Introduction to Faecal Sludge Treatment Plant Operation

Unit 2.1 - Define faecal sludge, septage and sewage

Unit 2.2 - Define Faecal Sludge Treatment Plant (FSTP) and its components

Unit 2.3 - Types of faecal sludge treatment approaches

Key Learning Outcomes

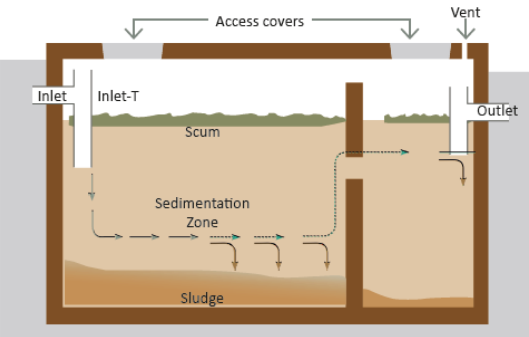
At the end of this module, you will be able to:

1. Recognize various component of Faecal Sludge Treatment Plant(FSTP)
2. Identify the role of administrative management in FSTP operation
3. Demonstrate the working knowledge of handling repair and maintenance tools
4. Identify personal protective equipment

Effective sanitation solutions are critical in preventing environmental pollution. Constructing toilets is the first step towards it. However, without effective management of the liquid waste coming out of the toilet, the objective of preventing environmental pollution cannot be met. Hence, the toilets need to be connected to a proper containment/ conveyance and treatment system. Given the high cost of underground sewerage systems, **on-site sanitation systems (OSS)** like septic tanks and pits are used to contain the faecal waste from the toilets.

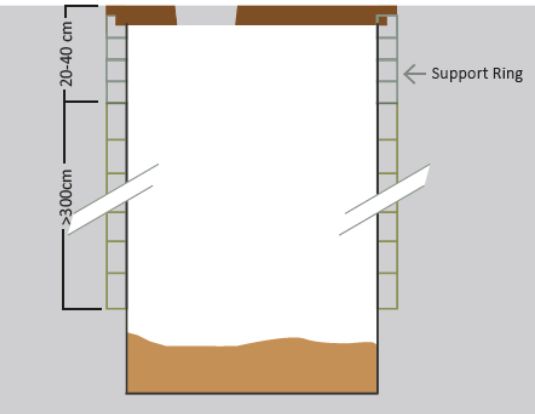
On-site sanitation is a system of sanitation where storage facilities are contained within the plot occupied by a dwelling and its immediate surrounding. For some systems (e.g., twin-pit latrines), faecal matter is treated on site by extended in-pit consolidation and storage. With other systems (e.g., septic tanks and single-pit), the sludge has to be collected and treated off-site.

Common types of on-site sanitation systems in India and their description



Septic tank

A septic tank is a watertight chamber made of concrete, fibreglass, PVC or plastic, through which blackwater and greywater (*refer footnote*) flows for primary treatment. Settling and anaerobic processes reduce solids and organics, but the treatment is only moderate.



Single Pit

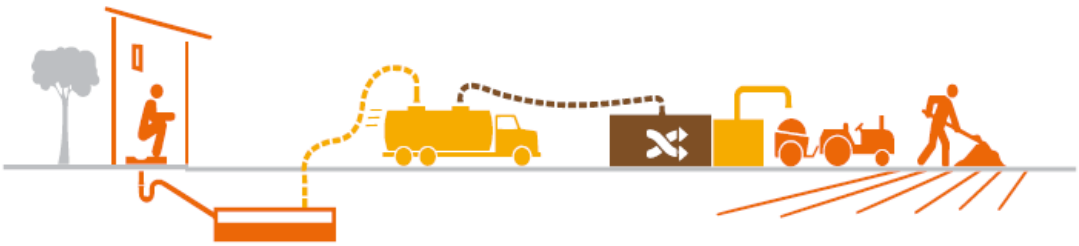
The single pit is one of the most widely used sanitation technologies. In this, excreta, along with anal cleansing materials (water or solids) are deposited into a pit. Lining the pit prevents it from collapsing and provides support to the superstructure. As the single pit fills, two processes limit the rate of accumulation: leaching and degradation, urine and water percolate into the soil through the bottom of the pit and wall, while microbes degrades part of the organic fraction. Hence, as the single pit is used, rate of accumulation is low.

Source: Compendium of Sanitation Systems and Technologies, (Compendium of Sanitation Systems and Technologies, 2014)

Blackwater *is the wastewater coming from toilets*
Greywater *is the wastewater coming from all the household sources apart from toilets. It includes water from wash basins, bathing, cleaning, kitchen etc.*

The faecal waste accumulated in the OSS is called **faecal sludge (FS)**. Faecal sludge comprises all liquid and semi-liquid contents accumulating in these systems. These liquids are generally several times more concentrated in suspended and dissolved solids than wastewater. It needs to be periodically emptied and treated at a specialized treatment plant called faecal sludge treatment plant (FSTP). FS may be treated in such special treatment plants (called FSTPs) or co-treated with sludges produced in sewage treatment plant. The person involved in carrying out the day to day operation & maintenance technician of FSTP is called **FSTP operation & maintenance technician**.

Faecal sludge management refers to safe management of faecal waste infrastructure from containment to end use or disposal of faecal sludge from on-site sanitation systems (OSS). This includes the safe storage, collection, transport, treatment and end-use or disposal of faecal sludge. This can be better described through the graphic below:



Containment	Emptying	Transport	Treatment	Reuse/Disposal
Human waste is contained in an on-site system, possibly together with grey water. Waste is partially treated due to the time and is known as faecal sludge or septage depending on the system used.	The system is emptied typically by a desludging truck with a vacuum mechanism.	Faecal sludge or septage is transported safely in a closed truck.	Faecal sludge or septage can be treated either at a Faecal Sludge Treatment Plant (FSTP), or co-treated with sewage at a Sewage Treatment Plant (STP).	The treated waste can now be safely reused or disposed.

Fig. 2.1: Santion Value Chain

Source: Water, Sanitation and Hygiene, BMGF, 2010.

UNIT 2.1: Definition of Faecal Sludge, Septage and Sewage

Unit Objectives

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

1. Define the concepts like faecal sludge, septage and sewage

Faecal sludge is raw, partially digested combinations of excreta and blackwater[3], in a slurry or semi- solid form, with or without greywater[4]. It is the solid or settled contents of OSS. Generally, faecal sludge has 3 main components as below:

- **Scum:** floats on top and is generally where the living bacteria treat the waste
- **Effluent:** the semi-treated liquid that comprises the majority of the material in the septic tank
- **Sludge:** solids which collect at the bottom of the tank

The physio-chemical characteristics of the faecal sludge will vary depending on the size and type of on-site sanitation system, design, (emptying) interval and the local climatic conditions of the place where the tank is located, the quantity and quality of water supplied and the type of wastewater originating from the household (which is user specific).

"Septage" is the liquid and solid material that is pumped from a septic tank, cesspool, or such on-site treatment facility after it has accumulated over a period of time. Usually, septic tank retains 60% - 70% of the solids, oil, and grease that enter it. The scum accumulates on the top and the sludge settles to the bottom comprising 20% - 50% of the total septic tank volume when pumped. In this sense, septage is a subset of faecal sludge.

Sewage on the other hand is the liquid waste matter that is transported through the sewers underground drainage system. Normally, this is a combination of blackwater and greywater. Thus, sewage is domestic (household) wastewater in totality.

Difference between sewage and faecal sludge & septage

Due to combination of blackwater and greywater and the fact that sewage is transported over considerable distance through sewers, it is characteristically different from faecal sludge and septage. Faecal sludge and septage, on the other hand, deals only with excreta and blackwater originating from toilets and contained in on-site sanitation systems. Due to this stage of containment over a period of time, the faecal sludge and septage can usually be partially digested.

[3] Blackwater: The mixture of urine, faeces and flushwater along with toilet paper and anal cleansing water

[4] Greywater: Water from the kitchen, laundry and bathing (but not toilets)

UNIT 2.2: Define Faecal Sludge Treatment Plant (FSTP) and its Components

Unit Objectives

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

1. List the components of Faecal Sludge Treatment Plant(FSTP).

Faecal sludge treatment plants are dedicated treatment plants for treating faecal sludge and septage from on-site sanitation systems which are conveyed through desludging trucks.

Any FSTP, irrespective of technology has the following stages:

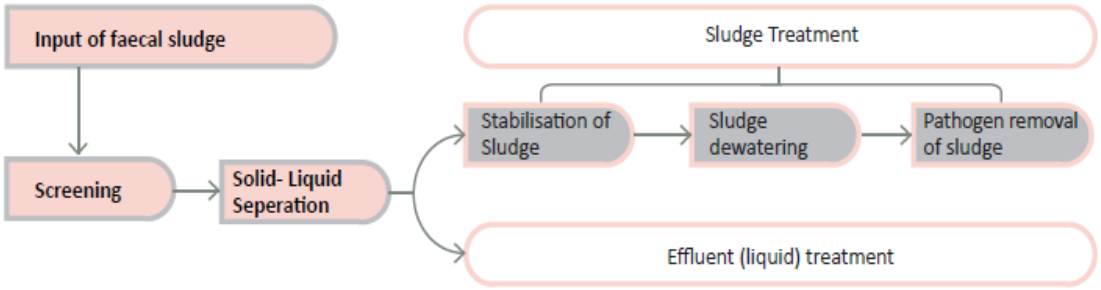


Fig. 2.2.1: Process flow of faecal sludge treatment

Screening	It is the first stage of FS treatment where impurities are removed by means of physical separation. At this stage, large solid objects such as municipal solid waste and grit are removed. The oil and grease traps are installed at this stage if the incoming faecal sludge is expected to have a lot of oil and grease in it. This may be the case if the containment systems in the area also hold greywater (specially kitchen water) along with faecal sludge.
Solid-liquid separation	This process may be needed if the faecal sludge has very high-water content. At this stage the solids are separated from the liquid portion by settling them down. The solids coming out of this unit may still have a lot of water content (around 80-85% moisture content) in it and will need further dewatering.

Sludge treatment	• **Stabilisation:** Stabilisation is the process in which the bio-degradrable part the faecal sludge is bio-degraded. • **Dewatering:** Dewatering is the process in which the sludge is dewatered or dryed. • **Pathogen removal:** This is the stage at which pathogens (such as bacteria, virus, parasites etc.) are inactivated and/or destroyed.
Effluent treatment	The effluent or liquid coming out from various treatment processes are collected and treated at this stage

The treatment technologies for different stages of treatment are shown below:

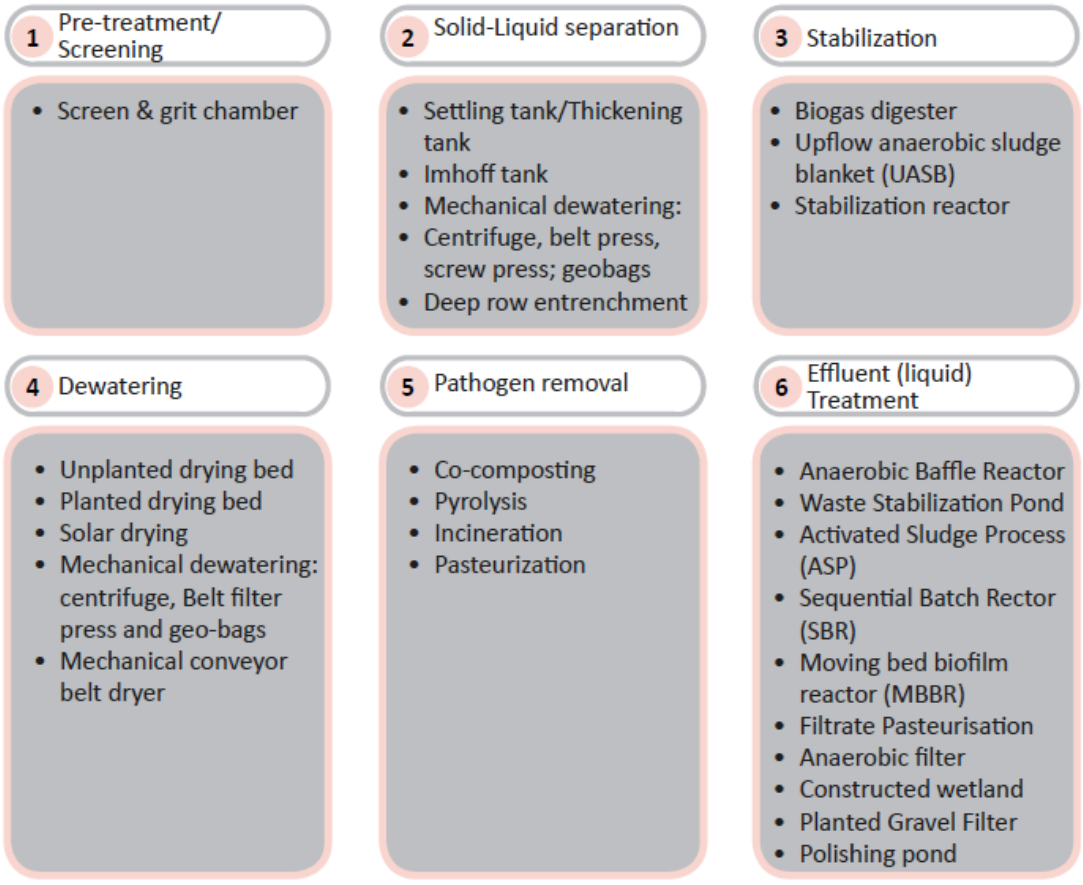


Fig. 2.2.2: Treatment technologies for different stages of treatment

Some of the above technologies perform multiple functions. For example: Centrifuge, belt press, screw press and geo-bags can be used for both solid-liquid separation and dewatering.

Stages such as solid-liquid separation and stabilisation can be bypassed if the incoming sludge has less water content and is already stabilised. These treatment technologies or plant machineries are discussed in detail in Types and Description of treatment units/ technologies.

UNIT 2.3: Types of Faecal Sludge Treatment Approaches

Unit Objectives

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

1. Distinguish between Nature-based and mechanised treatment approaches of faecal sludge.

2.3.1 Nature-Based Treatment Approach

This treatment approach relies primarily on natural processes like gravity, biological digestion, sun-rays (for drying and UV treatment) and composting for treatment. In such treatment plants, there is little to no use of electricity, pumps, motorised equipments and chemicals for treatment of faecal sludge.

However, this type of treatment approach usually requires a larger land area. The following are two examples of nature-based treatment approaches used in faecal sludge treatment plants:

1. Faecal sludge treatment plant at Leh, Jammu & Kashmir

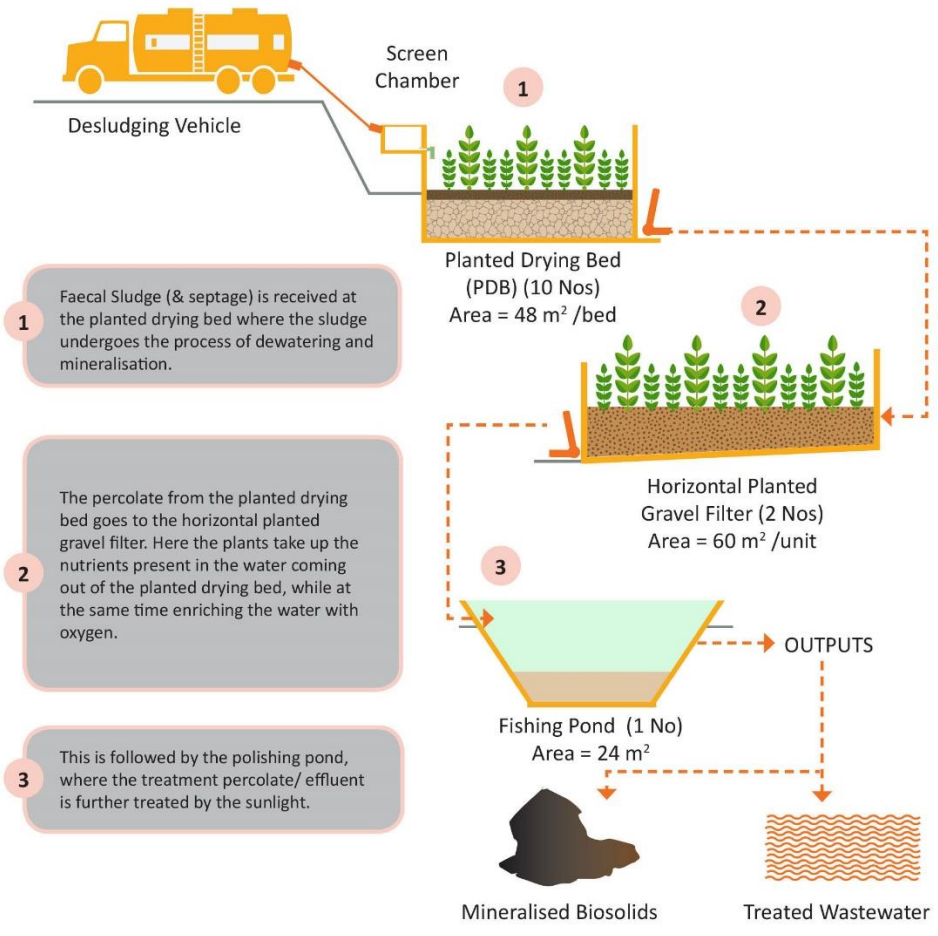


Fig. 2.3.1: Leh FSTP Treatment plant description

2. Faecal sludge treatment plant at Devanahalli, Karnataka

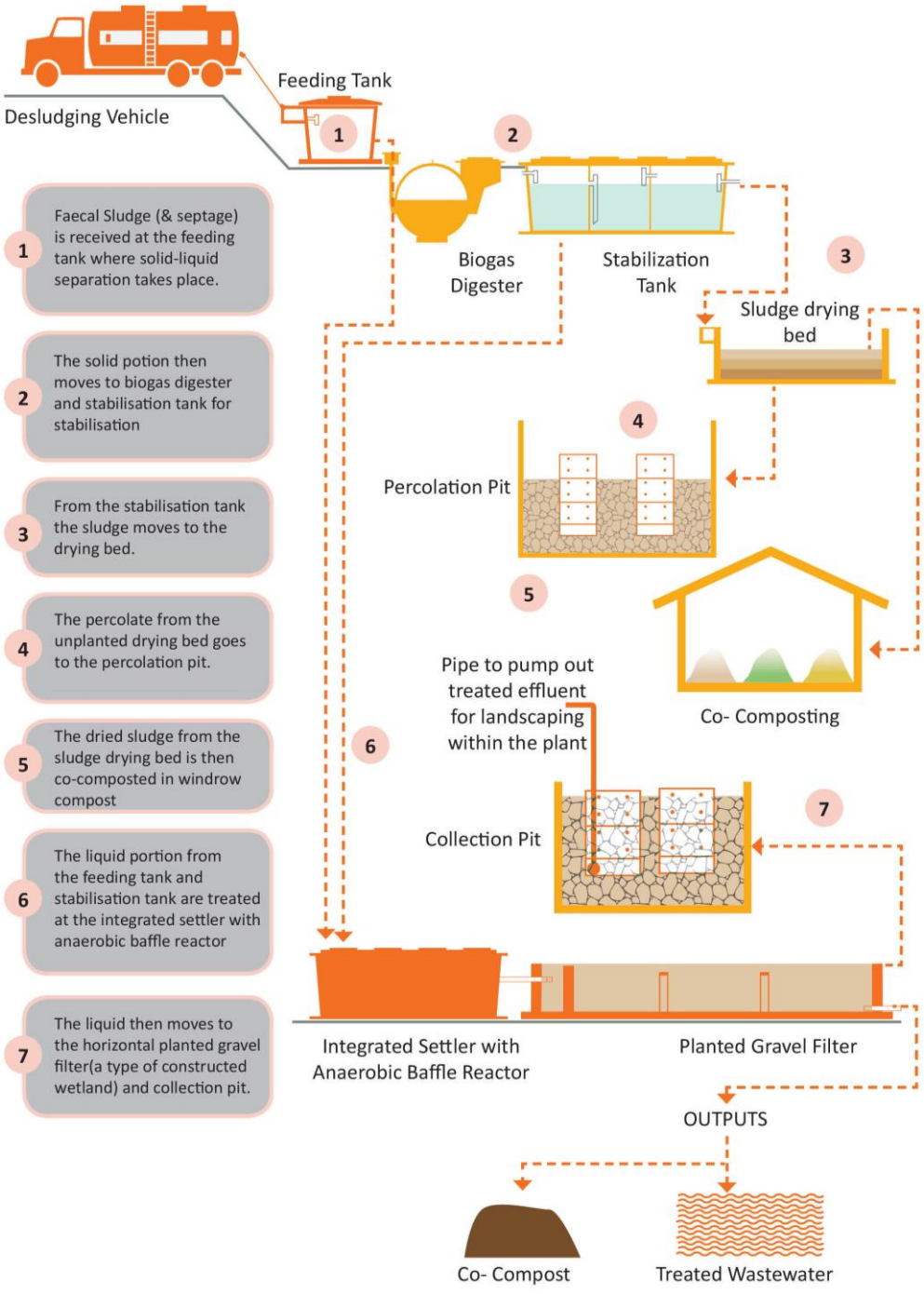


Fig. 2.3.2: Devanahalli FSTP description

2.3.2 Mechanised Treatment Approach

This treatment approach relies primarily on mechanised equipments for treatment. These treatment plants run on power/energy. They use chemicals like polymers and use equipments like pumps, motors, dryers, sludge press etc. The treatment plants are usually controlled by sophisticated control mechanisms. This treatment approach usually needs relatively smaller land area and can handle huge quantities. The following is a type of a treatment plant using mechanised treatment approach:

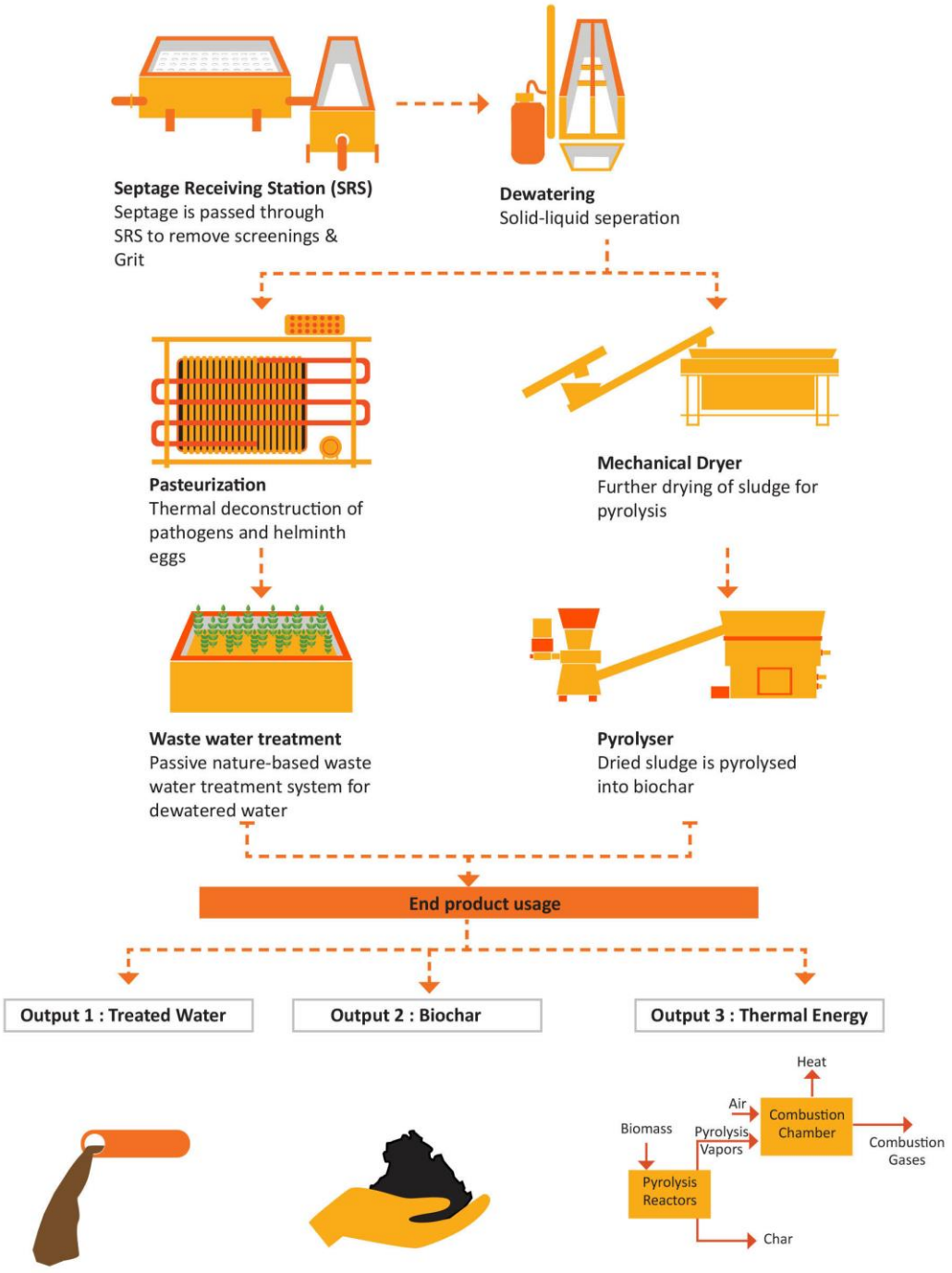


Fig. 2.3.3: Mechanised treatment approach of faecal sludge

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3. Operation of Fecal Sludge and Treatment Plant

Unit 3.1 - Operation of septage receiving station

Unit 3.2 - Commonly used treatment units / technologies and equipments

Unit 3.3 - Sample testing of septage at FSTP

Unit 3.4 - Maintain the test record

Unit 3.5 - Monitoring the working of FSTP

Unit 3.6 - Daily activities & log sheet for reporting

Unit 3.7 - Preparing the relevant reports, and provide recommendations for optimizing the FSTP

Unit 3.8 - Housekeeping of FSTP

Unit 3.9 - Inspection

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Key Learning Outcomes

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

1. Collect sludge sample from sludge vacuum tank and deliver to laboratory for testing
2. Carry out visual inspection of equipment and septage receiving station at FSTP
3. Facilitate calibration of process control and instrumentation system at FSTP
4. Operate septage receiving station
5. Monitor overall working of FSTP
6. Prepare daily log sheet and other relevant reports/records
7. Clean sludge receiving station and equipment in use

Once the FSTP is constructed, the treatment process and the plant design is fixed but it is the responsibility of the O&M technician to effectively operate the plant in order to produce desired results. Day to day operations can be defined as simple tasks that enable smooth functioning and upkeep of the treatment plant. Fulfilment of these tasks promptly a by skilled O&M technician i.e. you, ensures that the plant functions efficiently for a long time.

This set of day to day operations describes how the treatment facility and equipment should be used, and the standard procedure outlines the step-by-step tasks that you need to perform.

The tasks which are common to all FSTP models include:

A At septage receiving station

- Receiving septage
- Maintaining logbook
- Cleaning of screen chamber and grit chamber

B Operating plant machineries and equipment so that they function as designed

C Sample testing

- Collection of samples
- Analysis of sample
- Record keeping

D Monitoring tasks

- Periodic checking of blockages in pipes
- Periodic checking of sludge height level
- Ensure free flow

E Reporting activities for the FSTP O&M and management of treatment end-products

F Maintaining cleanliness of the exterior and interior of FSTP

G Inspection work

UNIT 3.1: Operation of Septage Receiving Station

Unit Objectives

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

1. Operate at septage receiving station.
2. List the steps to be followed for discharging faecal sludge.

This chapter covers the description of septage (& faecal sludge) receiving station, steps to be followed for discharging faecal sludge (& septage) at FSTP and a set of guiding principles to protect your health and safety and maintain the performance of treatment units.

3.1.1 Septage Receiving Station

A septage receiving station is an interface between desludging trucks and the treatment plant for receiving the sludge safely into the treatment plant. They usually have the following features:

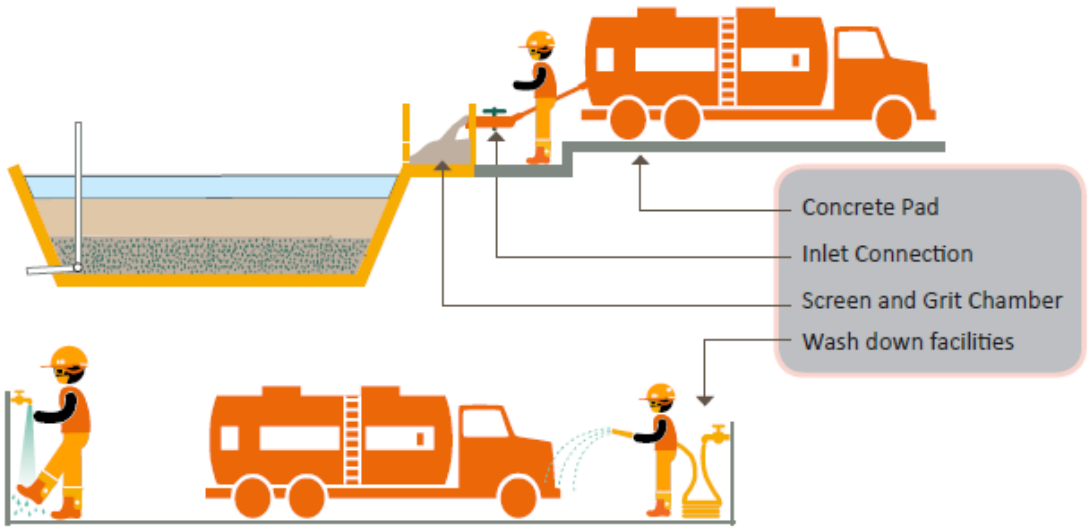


Fig. 3.1.1: Working at septage receiving station

Every FSTP has a unit which acts like a receiving station into the FSTP. This can be one of the treatment modules (such as the screen and grit chamber) or can be a tank solely for the purpose receiving the sludge.

The septage receiving station should be operated on only during the operational hours of the treatment plant. The septage receiving station typical consists of a concrete pad for the truck to park, an inlet connection for the truck to connect, a screen and grit chamber for removing solid waste and grit and wash down facilities for the personnel (O&M technician, truck operator and any other person involved), equipment, truck and clean any spillage, if any.

3.1.2 Checklist for Things to be Done

The following checklist provides a list of all the required steps/tasks to ensure routine operations and maintenance of septage receiving station. This simple tool can help you get organized by knowing what needs to be done in the receiving station.

STEPS

1. Collect information from desludging truck operator and record in manifest form (refer to **Sample Manifest form, Pg 138)**

2. Connect the truck outlet with the inlet of septage receiving station with the help of a hose pipe

3. Instruct the truck operator to open the valve of the outlet of the truck in half open position

4. Open the valve of the septage receiving station in half open position.

5. Collect a small sample of faecal sludge in a beaker for testing for the following: pH, colour, smell & temperature.

6. Instruct the truck operator to close the outlet valve of the truck

7. Visually inspect the incoming faecal sludge and septage in terms of odor and appearance. The usual colour of FS is pale brown to black. In case the sludge has a colour different than this, direct the desludging truck operator to dispose at a site designated by the urban local body for disposal of the sludge rejected from the FSTP.

8. Check for odour. It should pungent smell of rotten eggs/ smell from septic tanks, pits or sewers due to the hydrogen sulphide gas in it.

9. In the sample collected in the beaker test pH using a pH meter or PH strip. The detailed method of collecting samples is given in **Testing for deciding whether to accept or reject the sludge, pg 34-35.** If the pH is in the range of 6-9 follow the below steps or else reject the sludge. (Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014). In cases when the sludge is outside this range, direct the desludging truck operator to dispose at a site designated by the urban local body for disposal of the sludge rejected from the FSTP.

10 Check for temperature: it usually ranges from 25 to 38oC. Do not accept the sludge if it ranges beyond 400C. It is because anything above 400C is in all likelihood has constituents of industrial wastewater such as chemicals, oil etc., and therefore, cannot be considered faecal sludge and be treated at the site.

11 If sludge can be accepted in the FSTP, instruct the desludging truck operator to open the outlet valve of the truck.

Accept the sludge if the pH, temperature, colour and smell are within the specific parameters. Else, direct the truck to a site designated by the urban local body for discharge of rejects

12 Collect FS samples in a 1L beaker while discharging into the septage receiving station. Check on-site parameters (pH, electric conductivity, temperature and Settable solids) by transferring the contents into an Imhoff cone of 1 Litre. The Imhoff cone is needed primarily to measure the volume of settleable solids. Then transfer the sample into a 1 Litre bottle with the date and serial number pre-written on it. This bottle will be sent for laboratory testing. For step by step procedure for collecting sample, go to Methods of sample testing

13 Once the contents of the truck are emptied into the FSTP, instruct the desludging truck operator to close the valve of the outlet of the truck. Ensure that the contents in the hose pipe are also emptied.

14 Wash down using water hose in case of spillage

15 Clean the screens using a rake

16 Weigh the solid waste coming along with the truck and document it.

17 Collect and discard the trash in a waste collection bucket

3.1.3 Do's and Don'ts

Do's

1 Do wear personal protective equipment before handling faecal sludge & septage

2 Do wash your hands or use hand sanitizer after discharging faecal sludge & septage into the receiving station

3 Do test the sludge content in desludging truck prior to discharge

3

Do wash away any spillage during discharge with water hose

4

Do be careful and attentive at all times while working at the FSTP

Don'ts

1

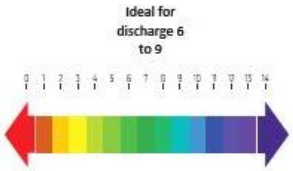
Do not smoke while working at the FSTP.

2

Do not allow unauthorized person to enter the FSTP

3

Do not allow discharge of faecal sludge if it the pH range deviates from 6 to 9. In such cases the sludge should be disposed at a site designated by the urban local body for disposal of the sludge rejected from the FSTP.



4

Do not allow discharge of faecal sludge if it has an unusual colour. The colour should vary from deep brown to black. In such cases when the sludge is outside the above colour range, direct the desludging truck operator to dispose at a site designated by the urban local body for disposal of the sludge rejected from the FSTP.

5

Do not let animals ransack the waste collection bucket

6

Do not delay disposing solid waste collected in FSTP. Give it daily to the authorised waste collector.

UNIT 3.2: Commonly used Treatment Units/Technologies and Equipments

Unit Objectives

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

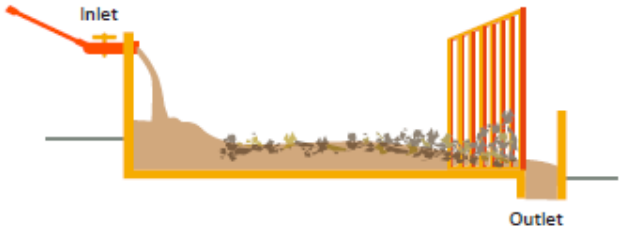
1. Description of treatment units/ technologies and equipment's
2. Rules for safe handling as Do's and Don'ts

The objective of treatment units/ technologies is to treat the sludge, eliminate the smell and colour, stabilize the sludge and make it fit for disposal or reuse. The objective of the plant equipment is to aid in the daily operations of the treatment plant.

3.2.1 Types and Description of Treatment Units/Technologies

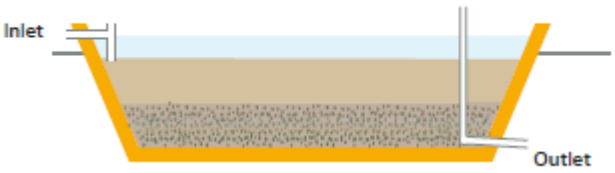
Screening is typically the first step of primary filtration of any wastewater or faecal sludge treatment facility. Screen & grit chamber removes waste and large solid objects from the wastewater/ faecal sludge, thereby preventing clogging.

Screen & grit chamber



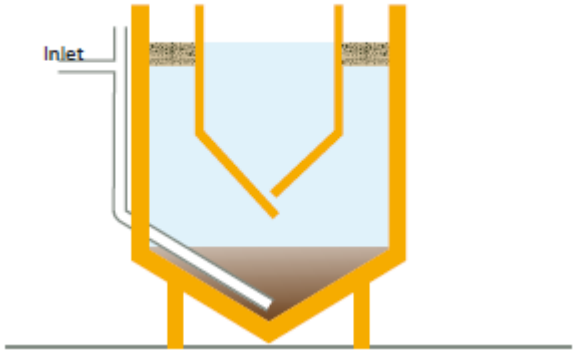
This unit helps in solid-liquid separation at the FSTP Inlet. Settling-thickening tanks for FS treatment are rectangular tanks, where FS is discharged into an inlet at the top of one side and the supernatant exits through an outlet situated at the opposite side, while settled solids are retained at the bottom of the tank, and scum floats on the surface.

Settling and thickening tank

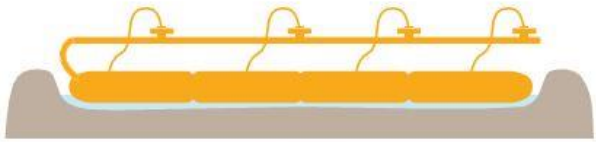


This unit helps in solid-liquid separation using gravity thickening at the FSTP. This is a high-rised tank where sludge settles at the bottom during the period of retention. The biogas produced during the anaerobic digestion process rises to the top. The tank has inclined walls and a slot at the bottom, which allows the sludge to slide down to the centre into the digestion compartment. The gas transports sludge particles to the water surface, creating a scum layer. T-shaped pipes or baffles are used at the inlet and the outlet to reduce velocity and prevent scum from leaving the system.

Imhoff tank



This unit helps in dewatering at the FSTP. It is a mechanical process in which FS is put into the geobag and water squeezed out from it



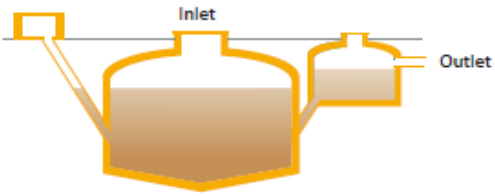
Geobags

In this method, faecal sludge is disposed in deep trenches and covering them with soil. Trees are then planted on top, which benefit from the organic matter and nutrients that are slowly released from the FS.

Deep-row entrenchment

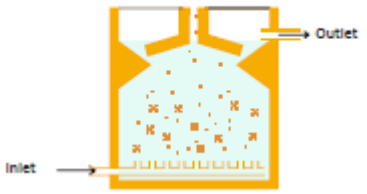
This unit helps in stabilisation or digestion of the faecal sludge. Biogas digesters create anaerobic conditions ie. conditions characterised by the lack of oxygen. The organics in the FS degrade due to the presence of anaerobic microbes. This process of digestion/ degradation by the microbes results in the production of biogas that can be used for energy generation.

Biogas digestor



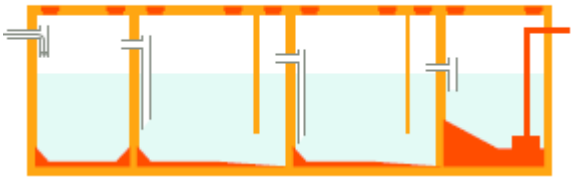
This unit helps in stabilisation or digestion of the faecal sludge (FS). FS enters the UASB from the bottom, and flows upward. A suspended sludge blanket filters and treats the FS as the sludge flow through it.

Upflow Anaerobic Sludge Blanket (UASB)



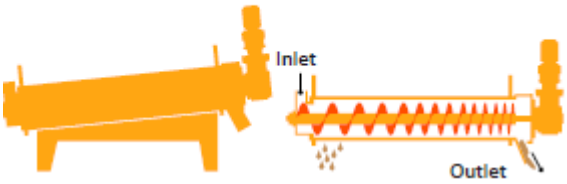
This unit helps in solid-liquid separation and stabilization of faecal sludge. It is a tank with baffles which retains the sludge for a specific duration of time, depending on the characteristics of the faecal sludge in the area, to allow digestion of the easily biodegradable component in the sludge.

Stabilization reactor



This unit helps in dewatering of faecal sludge. Sludge is placed inside the centrifuge while it rotates at a high speed. This centrifugal forces accelerates the sedimentation process, thereby, allowing the solids to settle out at the centrifuge walls, after which it is pressed and concentrated. Thereafter, the liquid and solid fractions come out of the unit separately.

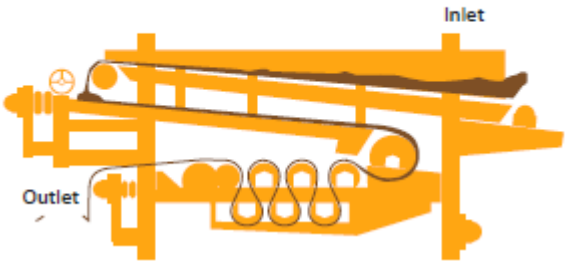
Centrifuge



This unit helps in dewatering of faecal sludge. The water is squeezed out of the sludge as it is compressed between two belts. The system consists of:

- a gravity drainage zone where the sludge is deposited and conveyed on a porous and mobile belt;
- a compression zone where a second belt is applied on the upper layer of the sludge,
- a zone where the belts are separated and the dewatered sludge is released.

Belt filter press

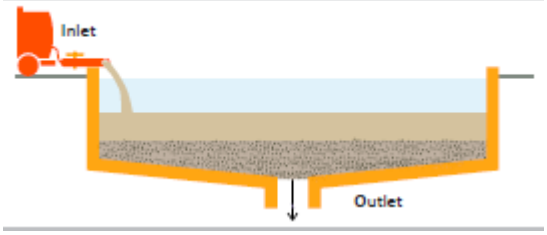


This unit helps in dewatering of faecal sludge. A screw press consists of a rotational screw placed in a perforated cylinder. The sludge is loaded at one end, it gets pressurised due to a diminishing distance between the screw and the cylinder, and the water that is squeezed out through the pores in the cylinder. The dewatered sludge is comes out at the other end.

Screw Press

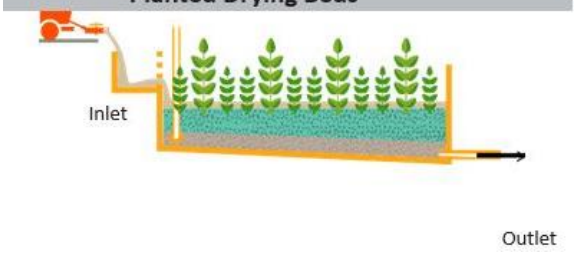
This unit helps in dewatering the faecal sludge. An unplanted drying bed is a simple, permeable bed made of layers of sand and gravel. This drying bed when loaded with sludge, collects percolated leachate and allows the sludge to dry by evaporation.

Unplanted Drying Beds



This unit helps in dewatering and mineralizing the faecal sludge as well as stabilization of solids. Planted drying beds are similar to unplanted drying beds but they have plants growing out of them. This provides the added benefit of transpiration and enhanced sludge treatment due to the plants. The key improvement of the planted bed over the unplanted bed is that the filters do not need to be desludged after each feeding/drying cycle. Fresh sludge can be directly applied onto the previous layer; the plants and their root systems maintain the porosity of the filter

Planted Drying Beds



In this method, a greenhouse roof is created over an unplanted drying bed. The "Greenhouse Effect" is achieved by trapping the moisture released from the sludge for certain period which allows the incoming solar radiation from the atmosphere to warm up the air. The resultant temperature inside the greenhouse is above what it would be outside. The unit also has an air circulation and ventilation mechanism to remove the excess moisture laden air in the greenhouse. The increase in temperature and removal of excess moisture reduces the time required for drying.

Greenhouse solar drier

This system is used mainly for inactivation of pathogens present in the faecal sludge. Faecal sludge is co- composted with municipal solid waste at specific condition to get compost

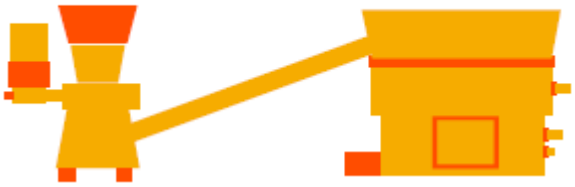
Co-composting

The main purpose of the mechanical dryer is to further dry the dewatered sludge and reduce moisture. The Dryer operates at a temperature of about 60-70 degree Celsius. The moisture content in sludge after dryer reduces to 35 - 40%.

Mechanical conveyor belt dryer

This technology decomposes dried sludge into gas and biochar in 10-15 minutes by heating it at 8500C

Pyrolysis



Incineration of faecal sludge is a form of disposal which involves the burning of faecal sludge at temperatures between 850-900°C.

Incineration

This unit helps in reducing organic load from the effluent. It can also be used in cases of highly diluted (low strength) faecal sludge for stabilization

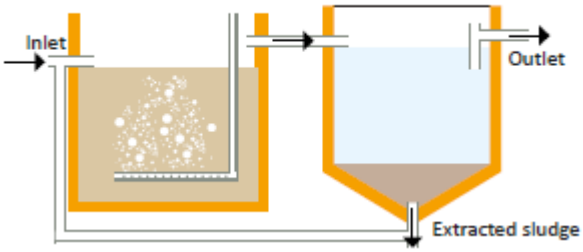
Anaerobic Baffle Reactor

This is a method of treatment of the effluent (liquid) coming out of the faecal sludge using a series of ponds.

Waste Stabilisation pond

This is a method of treatment of the effluent (liquid) using aeration and a combination of bacteria and protozoa. This unit is usually used when there is an existing STP treating wastewater and sludge is added to it. ASP systems comprises of multiple tanks where the effluent is treated by means of different processes.

Activated Sludge Process

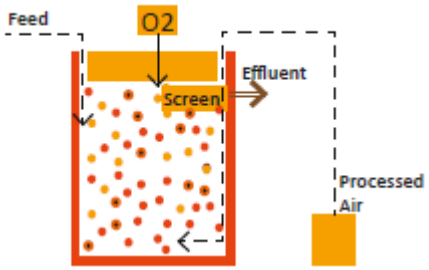


This is a method of treatment of the effluent (liquid) using a type of activated sludge process called sequential batch reactor (SBR). Unlike other ASP systems, in SBR all the processes for treating the effluent take place in one tank.

Sequential Batch Reactor

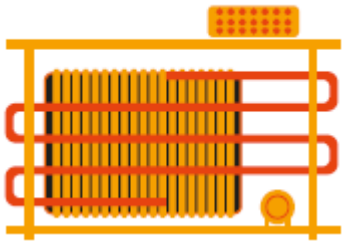
This method of effluent (liquid) treatment uses aeration and biofilms (collective of one or more types of microorganisms) to treat the effluent. MBBR system consists of an aeration tank (similar to an activated sludge tank) with special plastic carriers that provide a surface where a biofilm can grow.

Moving bed biofilm reactor (MBBR)



In this system, the filtrate or percolate is heated to 85 degree Celsius for 30 sec for pathogen kill (including helminths eggs).

Pasteurisation

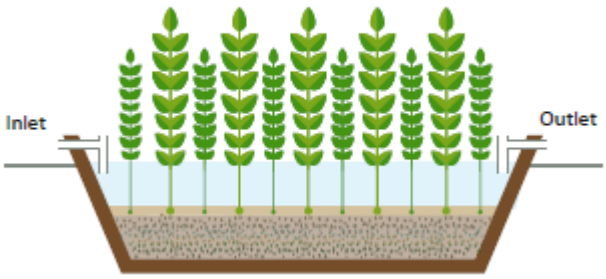


This method treats the effluent (liquid) using anaerobic filtration As the effluent flows through the filter, particles are trapped and organic matter is degraded by the active biomass that is attached to the surface of the filter material.

Anaerobic Filter

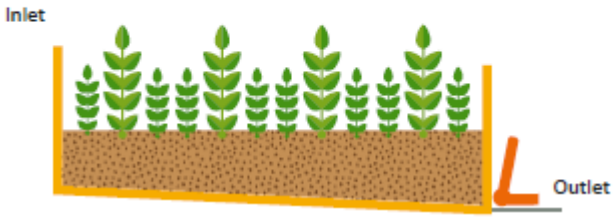
It is an artificial wetland created to treat the effluent (liquid component). It uses certain species of plants to absorb and treat the effluent.

Constructed Wetland



It is a type of a constructed wetland in which in the effluent coming from various treatment units are treated. The effluent flows horizontally below the surface of the filter bed, through the root zone of the plants. Oxygen reaches the filter through the natural surface gas exchange and through the roots of the plants. In exchange plants take up the nutrients present in the effluent.

Horizontal planted gravel filter



Polishing pond is a shallow aerobic pond. This pond is mainly used for enriching the oxygen in the wastewater and elimination of pathogens by exposing water to UV radiation of sun rather than removal of organic pollution like BOD

Polishing Pond

3.2.2 Types and Description of Equipment to be Used

Rake and Broom

Used for cleaning the bars of screen chambers and other areas of the FSTP

Trowel

Used for removing the trash from screens and bars and putting into waste collection bucket

Bucket

Used for collecting trash

Gum boots

Used as protective gear while operating on sludge drying beds and disposing the sludge at the sludge disposal point.

Wheel barrow

For transferring dried sludge from drying beds to storage house

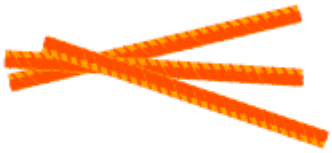
L- Shovel, straight shovel

Used for moving and cleaning filter materials and removing the dried sludge from the drying bed

Plastic sheet

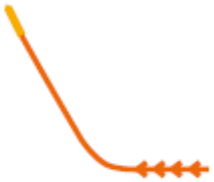
Used for moving and cleaning filter materials and removing the dried sludge from the drying bed

Steel wire/ rod



Used for removing any obstructions in the pipe

Long steel sieve



Used for removing any obstructions in the pipe

Water pipe/hose

Used for flushing any area with pressurized water

Measuring tape

Used for checking any levels

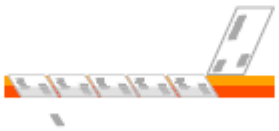
Garden scissors, Sickle

Used for trimming, harvesting and removing weeds from drying beds, landscaping etc.

L- Brush

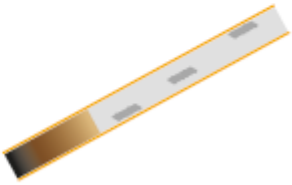
Used for trimming, harvesting and removing weeds from drying beds, landscaping etc. Used for checking any blockages in pipes (vent pipes)

Long stick wrapped white cloth



Used for checking sludge level in septic tank and treatment modules

Glass tube sludge sampler



Used for checking sludge level in septic tank and treatment modules Used for measuring sludge levels in treatment modules

Desludging pump

Used for desludging solidified sludge from the bottom of treatment modules

Screw driver

Used for unscrewing the screens from screening chamber at the time of replacement

Sample collection equipment

Icebox - Used for collecting FS sample for laboratory tests

Personal protective Equipments (masks, gloves etc.)

Should be used during operating and monitoring activities at the FSTP

First aid

Fully stocked first aid kit should be available all the time at the FSTP

Wheel chocks

Used for stopping the vehicle from moving when parked

Pumps

Pumps are used in an FSTP for various purpose. They can help in transfering the sludge in between units in case of a level difference, adding chemicals in a controlled way to the plant etc.

Hammers

Hammers will be useful in various maintenance and house-keeping activities

Generators

Generator are used as a source of in-situ power supply to meet part or entire energy requirement of the treatment plant. The hours of operation is on need basis. These are to be operated as instructed in the User Manual provided by the manufacturers.

Blowers

Blowers are part of the aerobic (oxygen using) treatment units for effluent. These are a typical feature in activated sludge process. Blowers are used to increase the supply of oxygen for the microorganisms present in it. These are to be operated as instructed in the operation and maintenance manual for the particular FSTP you are working in.

Compressors

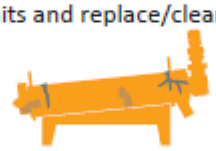
Air compressors are used for agitation in the effluent to keep the solids in suspension and to supply oxygen support to the processing bacteria. These are to be operated as instructed in the operation and maintenance manual for the particular FSTP you are working in.

3.2.3 Do's and Don'ts

Do's for plant machineries

1. Do keep all maintainance holes covered when not in operation

2. Do check for rust and damage of treatment units and replace/clean it



3. Do clean clogged inlet and outlet valves when there is less or no flow

4. Do collect samples at inlet and outlet of each treatment unit for tests

5. Do check sludge height for desludging of treatment units

6. Do call for desludging services when sludge height from bottom of plants is more than 50cm.

7. Do operate the pump as instructed by the vendor or service provider

8. Switch off mechanical units such as pumps and dewatering units while cleaning

9. Wear gloves while cleaning machines

Dont's for plant machineries

1. Don't leave open chambers unattended

2. Don't clean machines using bare hands

Do's for equipment

1. Do clean equipment and tool after each use

2. Do check first aid kits every 3 month to replace supplies that have expired

3. Do check for wear and tear in personal protective equipments

Do's for equipment

4

Do keep water hose at its designated place after use to avoid tripping or slipping hazards

5

Read the instructions in the User Manual provided by the manufacture before operating any equipment.

Dont's for equipment

1

Do not work/ insert hand into moving parts of an equipment while in operation

Dont's for equipment

2

Do not keep the hose pipes scattered

3

Don't use defective personal protective equipments

4

Don't leave sharp tools or equipment unattended to avoid injury

UNIT 3.3: Sample Testing of Septage at FSTP

Unit Objectives

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

1. Test the samples of faecal sludge as per standards.
2. List the parameters essential for testing faecal sludge.

Sampling and analysis of sludge is very important to monitor the treatment process and also to check whether the final effluent adheres to standards. Your role as O&M technician is to collect faecal sludge samples to:

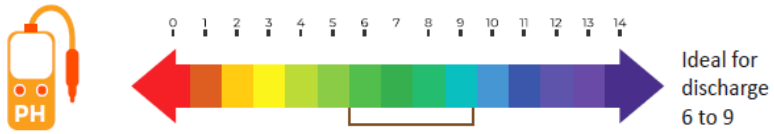
- Approve or reject faecal sludge (& septage) arriving into FSTP
- Facilitate monitoring

This session will assist you in:

- Collection and analysis of faecal sludge samples as per standards
- Reporting and record keeping of results

3.3.1 Parameters to be Tested on-site

Following are the list of parameters that can be tested on-site: (Scoping paper: Development and validation of protocol for testing faecal sludge and decentralised wastewater technologies Centre for Science and Environment, 2017)

Sr. no.	Test parameter	Unit
1	pH: pH (potential hydrogen) is a measure of the acidity (< 7) or alkalinity (> 7) of sludge. The pH is measured with a probe immediately at the sampling point (faecal sludge and septage receiving station) to determines whether to accept or reject the sludge from discharging into FSTP. As mentioned in unit 3.1 the acceptable pH range is 6 -9. 	

Sr. no.	Test parameter	Unit
2	Conductivity: EC (electrical conductivity) is one way to measure inorganic materials, including calcium, bicarbonate, nitrogen, phosphorus, iron, sulphur and other ions, present in sludge. It is measured by placing a conductivity probe in the sample and measuring the flow of electricity between the electrodes. 	°s/mc
3	Temperature: Temperature is an important parameter in understanding and predicting rates of biological activity, treatment processes and pathogen die-off. Temperature is measured with a probe immediately after sampling. 	Degree °C
4	Settable solids: This is useful to derive the sludge volume index, an indicator for the tendency of activated sludge to thicken or to become concentrated during sedimentation/ thickening process[9]. 	ml/g

Table 3.3.1: Testing parameters

[9] Source: http://www.owp.csus.edu/glossary/sludge-volume-index.php

3.3.2 Parameters to be Tested at Accredited Laboratory

Following are the list of parameters that will be sent for laboratory analysis:

Sr.no.	Test parameter	Unit of measurement
1	Solids (dissolved)	mg/l
2	Solids (fixed)	mg/l
3	Solids (volatile)	mg/l
4	Suspended solids	mg/l
5	Total solids	mg/l
6	Ammoniacal nitrogen	mg/l
7	Biochemical Oxygen Demand	mg/l
8	Chemical Oxygen Demand	mg/l
9	Phosphate (Total)	mg/l
10	E-coli	MPN
11	Helminths egg	MPN
12	Nitrates	mg/l
13	Settleable Sulphates	mg/l

Table 3.3.2: Testing parameters in laboratory

3.3.3 Methods of Sample Testing

As O&M technician, you need to be thoroughly trained for sampling as handling faecal sludge (& septage) involves health risks. You must adhere to the following steps mentioned below for collecting samples.

The samples are to be collected for three purposes: allowing discharge into the FSTP, testing on-site parameters and laboratory analysis for monitoring the treatment efficacy of the FSTP.

For allowing sludge discharge into the FSTP Testing for on-site parameters		At receiving station	Frequency of collection: Every load
For laboratory analysis		At inlet of receiving station and outlet of each treatment module or stage	Frequency of collection: Twice a week

Testing the safety of the incoming sludge for the FSTP

Faecal sludge originates from on-site sanitation systems (OSS) such as pits and septic tanks. Ideally, these systems should be connected to only toilets. However, there are instances in which wastewater from other parts of the household or the institution (such as hospitals, laboratories, educational institutes) are also connected to OSS. This can potentially change the characteristics of the faecal sludge making it untreatable at the faecal sludge treatment plant. Similarly, in places where there is excessive use of chemical agents (such as acid) to clean toilets, there is a chance that the characteristics of faecal sludge has changed and cannot be treated at the FSTP. Hence, testing incoming faecal sludge is essential before accepting it into the treatment plant. The main parameter tested at is pH and colour.

1. Wear personal protective equipment, especially uniform, gloves and boots

2. Take a 1 Litre beaker

3. Connect the outlet of truck with the inlet of septage (& faecal sludge) receiving station

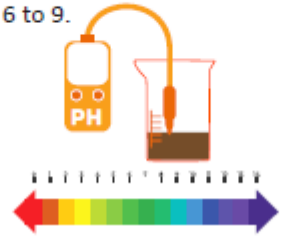
4. Instruct the desludging truck driver to open the valve of the outlet in half open position to allow discharge of sludge into FSTP

5. Half open the valve of the inlet of the receiving station to obtain laminar flow of discharge. It will help in collection of sample without any spillage

6. Collect a small sample of faecal sludge in the beaker

7. Instruct the truck operator to close the valve of the truck

8. Test to check the pH using a pH meter. The pH value should be in the range of 6 to 9.



9. Check temperature. It should not be above 40°C i.e. the temperature at which the biological activity starts to reduce.

10

Visually inspect the colour: it should range from dark brown to black.

11

Inspect the odour: it should smell of like rotten eggs and/ or like smell from septic tanks and pits

12

Accept the sludge if the pH, temperature, colour and smell all are within the specified parameters. Else, direct the truck to a site designated by the urban local body for discharge of rejects.

13

If the faecal sludge can be accepted into the treatment plant, then pour the faecal sludge into the receiving station

14

Proceed to testing on-site parameters of the sludge as given in Sampling for **on-site parameters and laboratory testing of incoming sludge**

Sampling for on-site parameters and laboratory testing of incoming sludge

This step has to be conducted only for the sludge that is determined to be suitable for discharge at the FSTP.

On-site parameters such as pH, electric conductivity, temperature and sludge volume index are crucial in improving the understanding the characteristics of incoming sludge. This can help in feeding into improving the treatment efficiency of the plant.

1

Take a fresh and clean 1 Litre beaker and a 1 Litre Imhoff Cone

2

Wear personal protective equipment, especially uniform, gloves and boots.

3

Check the safety of the sludge for disposal at the faecal sludge treatment plant as referred to in **Refer to Table 6 Testing safety of the incoming sludge for the FSTP. Pg 34,35**

4

Instruct the desludging truck operator to open the valve.

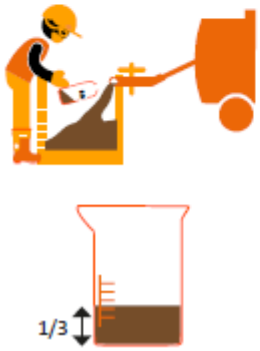
While the septage is being discharged, collect the sample from the inlet of septage (& faecal sludge) receiving station directly in a sample bottle at three intervals (immediate, middle, end).

5

Hold the sample bottle in front of the inlet of Septage (& faecal sludge) receiving station

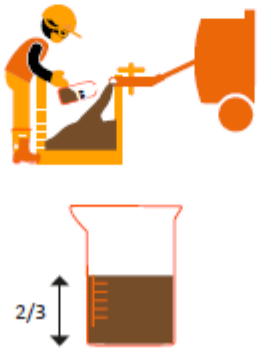
6

Fill only 1/3 of the volume of the beaker while emptying the first 1/3 of the FS present in the desludging truck. Then withdraw the sample beaker. Keep checking the watch glass of the truck to start again while the another 1/3rd is being emptied.



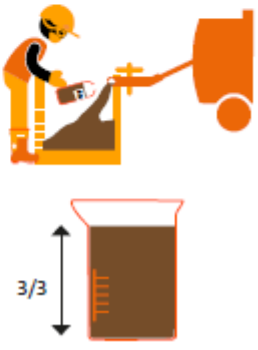
7

Fill another 1/3 of the volume of beaker in the while emptying the 2nd 1/3rd of the FS present in the desludging truck. Now you have 2/3 of the volume of the beaker filled. Then withdraw the sample beaker. Keep checking the watch glass of the truck to start again while the another 1/3rd is being emptied.



8

Fill the remaining 1/3 volume of beaker while the last 1/3rd of the FS present in the desludging truck is being emptied.



9

Pour the contents into an Imhoff cone and test the on-site parameters.

Skip to point 14 if laboratory analysis is not to be done for the existing sample

10

1. Test for on-site parameters i.e. pH using a pH meter, Electric conductivity using EC meter, Sludge volume index using an Imhoff cone, Temperature using a thermos meter. While pH, electric conductivity and temperature can be measured right away, wait for an hour to calculate the settleable solids which will be used to calculate volume index. Procedure for measuring settleable solids
2. Fill an Imhoff cone to the one-litre mark with a well-mixed sample.
3. Allow sample to settle in the Imhoff cone for 45 minutes.
4. Gently stir the sample with a glass rod to release the suspended matter clinging to the sides of the Imhoff cone.
5. Let sample settle for an additional 15 minutes.
6. At this point, one hour has passed. Record the volume of settleable solids (in millilitres) in the Imhoff cone.

Note: Do not include any floating solids or any voids in the settled solids as settleable matter (Standard Method for Settleable Solids)

11

Once the sample is taken and on-site parameters are analysed, put the samples into a fresh and clean 1 Litre sample bottle with pre-written the sample ID. Sample ID should be in the following format:
Receiving station/ DD-MM-YYYY/ Load Number/ Time of sample collection

12a

Close the lid of the bottle tightly

13a

Keep the sample bottle in an ice box for transportation to the laboratory.

12-13 b

If laboratory testing is not needed, then pour the sample back into the receiving station.

14

Wash and clean all the devices and equipment, and store in a clean and dry place

15

Wash the sampling area with clean water and make sure to leave a clean environment around the sampling site before leaving.

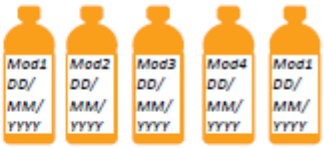
Sampling for sending for laboratory analysis

Regular laboratory analysis of the following forms an essential part of the monitoring of the performance of the FSTP:

- incoming sludge
- the outlet of each treatment module
- outlet of the FSTP

1

Take as many clean 1 Litre sample bottles as the number of outlets from which sample needs to be collected. This is assuming that for incoming sludge sample has been already taken as a part of composite sampling of the incoming sludge as referred to in the previous section. Else, take the composite sample of the incoming sludge as described in the previous section.**Label all the bottles with the sample ID in the following format: Treatment module /DD-MM-YYYY**

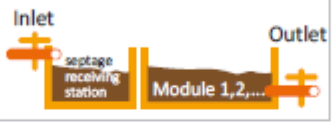


2

Wear personal protective equipment

3

Take samples from the inlet of the septage receiving station and the outlets of all the subsequent modules.



4

Once it is done, seal/close it properly and label the sample bottle with the following information

1. Sample Identification (ID) number (module name and date of arrival)
2. Collection time and date
3. Sample location (example: Outlet of PGF)

5

Keep the sample bottles in an ice box for transportation to the laboratory.

6

Maximum transport time to the laboratory is 6 hours and samples should be processed within 2 hours of receipt at the laboratory

7

Wash and clean all the devices and equipment, and store in a clean and dry place

8

Wash the sampling area with clean water and make sure to leave a clean environment around the sampling site before leaving.

3.3.4 Do's and Don'ts

Do's

1. Wear personal protective equipment

2. Handle samples with care to avoid spillage

3. Perform hand hygiene in case of contact with the faecal sludge, Refer Pg 72

4. Clean up the sampling area after use

5. Store samples in ice box and transport to the laboratory in the ice box itself

6. Clean equipments after use

Dont's

1. Do not touch with bare hands and foot

UNIT 3.4: Maintain the Test Record

Unit Objectives

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

1. Maintain the records of testing sample.

Maintaining the test record can help to understand the treatment efficiency at each stage of treatment and identify areas of malfunction. A test record should include the following information:

General information:

- Date and time of sample collection
- location
- Method of sampling
- Name of technician
- Name of analyst

Characteristics: On-site, given in section 3.3.1 above

Sample ID	Sampling Date	Parameter	Value	Unit
		Color		
		Odor		
		pH		
		EC		mS/cm
		Temperature		0C
		TDS		Ppt

Table 3.4.1: On-site record maintenance sheet

Fig. 3.4.1: Sample test record sheet

Characteristics: Lab, given in section 3.3.2 above

Sample ID	Sampling Date	Parameter	Value	Unit
		Solids (dissolved)		mg/l
		Solids (fixed)		mg/l
		Solids (volatile)		mg/l
		Suspended solids		mg/l
		Total solids		mg/l
		Ammoniacal nitrogen		mg/l
		Biochemical Oxygen Demand		mg/l
		Chemical Oxygen Demand		mg/l
		Phosphate (Total)		mg/l
		E-coli		MPN
		Helminths egg		MPN
		Nitrates		mg/l
		Settleable Sulphates		mg/l

Table 3.4.2: Testing parameters and their units

UNIT 3.5: Monitoring the Working of FSTP

Unit Objectives

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

1. Operate the working process of FSTP.

Monitoring the working of an FSTP involves supervision of the ongoing activities to ensure that they are on-course and are meeting the plant objectives and goals. It is a long-term process of gathering information with regards to the plant performance, use of resources, employees, finance and make any needed corrections accordingly. As the FSTP O&M technician, you will use this information for internal communication to optimize the working of FSTP.

3.5.1 Checklist for Things to be Monitored by FSTP O&M Technician

Key elements	Description	Source of data
Monitoring of physical-chemical and microbiological parameters	If lab analysis reveals that standards are not met, then operational decisions can be taken to identify the issues and rectify them. **Method of procuring data** is given in section 3.3	Lab analysis reports
Reporting and Record keeping	It includes information on the operation and maintenance of the FSTP like daily operating records, the operators log book, manifest reports; disaster response and emergency recovery records; preventative and corrective maintenance records including the equipment-maintenance log books and store room supply reports; compliance reports including field and analytical data, correspondence from regulatory officials; and employee records, such as employee schedules, time sheets and injury reports. Details are given in the next section **3.6**	Logbook
Reception monitoring report	Reception reports track the total number of loads delivered, the time, date and driver's name and other records related to FS deliveries to the plant Refer to **Sample Manifest Form,** given in the Annexure	Logbook

Key elements	Description	Source of data
Treatment unit operation sheet	Treatment unit operation sheets are used to record the quantity of FS loaded and the operational activities performed in each treatment unit. Refer to **Sample format for Operation & Maintenance report,** given in the annexure	Manifest form and logbook
Plant security and safety[10]	Protect the FSTP from unauthorized entry, maintain the safety of FSTP workers and ensure safe operations of plant machineries and equipments	Plant security policy, Guidelines on health and safety, record of personal protective equipment, emergency report form
Monitoring of finance plan	It monitors the operating cost of the plant and revenue generation from sale of end products, methods to procure tools and equipment, funds for repairs and breakdown etc.	Logbook

Table 3.5.1: Checklist to be followed during monitoring

Source: (Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014)

UNIT 3.6: Daily Activities & Log Sheet for Reporting

Unit Objectives

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

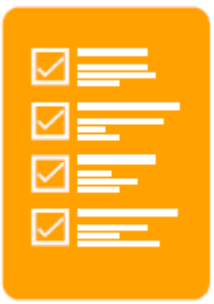
1. List the activities to be reported in a log sheet.

The effective operation and maintenance of an FSTP requires a detailed and structured monitoring plan. As the O&M technician of the plant, you have to provide adequate information to continuously optimize the plant performance. You must keep accurate record of all daily activities and, monitor the occurence of malfunctions. This will help you in identifying fluctuations in the operation of the facility and operational problems that may occur periodically, review the effectiveness of mitigation measures that may have been used to correct past operating problems, and to optimise the O&M procedures. (Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014)

3.6.1 List of Things to be Recorded

Following is the list of things that should be recorded, Refer to section 3.6.2 and Annexure for the forms:

- Overview of FSTP
  - Total no. of operating days since the commissioning of plant
  - Total volume of FS arrived till date (m3)
  - Total number of loads or trips made to FSTP
  - Plant utilization or under-utilization details in percentage (Current capacity utilisation of plant/ capacity of the plant * 100).
- Manifest form Refer **Sample Manifest form**
- Employee records such as employee schedule, time sheet and injury report
- Log book Refer **Components of logbook**, in next section
- Measurement of quantity and type of screens collected in screening chamber
- Preventive and corrective measures taken for plant machineries and equipment
- Store room supply reports
- Sampling analysis at inlet and outlet of treatment units



Apart from the above-mentioned points, you also need to record weather conditions, any equipment malfunctions, operating problems, important phone messages, security information and actions taken in response to unusual circumstances. (Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014)

3.6.2 Components of Logbook

The Log book is the most important record for an FSTP. This log book provides a written record of management and operation of the plant. Components of logbook can be divided into following elements:

Day	Months	No. of loads	Volume of sludge in litres	Type of desludging truck		Dry sludge generated in kgs	End product generated
				Private	Government		
	January						
	February						
	March						
	April						
	May						
	June						
	July						
	August						
	September						
	October						
	November						
	December						

Table 3.6.1: Components of logbook

- Manifest details, for format go to **Sample Manifest Form** in the annexure
  - Date and time of arrival
  - Type of agency (private or government)
  - Name of agency
  - Source of faecal sludge (& septage)
  - House owner name and contact details
  - Type of containment system at source (pits/septic tanks)
  - Specifications of structure (rings/stone masonry)
  - Date of desludging at source
  - Quantity of FS discharged
  - Age of FS
  - Time required to discharge
  - pH of sample

Operator Name	Vehicle details			Driver details			Desludging truck operator locality
	Type	Capacity	Vehicle Registration number	Name	Contact no.	License no.	

Rows to be added as per number of loads received.

Table 3.6.2: Sample format for recording details of desludging vehicle

Sr. No.	Date	No. of loads rejected	Type of agency	Reason for rejection

Table 3.6.3: Sample format for recording details of rejected loads

Sample ID	Color	Odor	pH	TDS	Conductivity	Settleable solids, ml	Presence of Oil/Grease Yes/No	Presence of Silt/Sand Yes/No

Table 3.6.4: Sample format for recording on-site parameters of the sludge

- Weather conditions
  - Temperature
  - Humidity
  - Precipitation

Date	Temperature, oC		Humidity		Precipitation, ml
	6 am	2 pm	6 am	2 pm	

Table 3.6.5: Sample format for recording weather conditions

Treatment Unit	Date of valve operation	State of valve (half open/full open)	Time taken to flow to next unit	Volume of liquid dis-charged	Rate of flow

Table 3.6.6: Sample format for recording flow of liquid from one treatment unit to next treatment unit

Treatment unit	Time of de-sludging	Time taken to de-sludge	Volume of sludge de-sludged	Sludge type

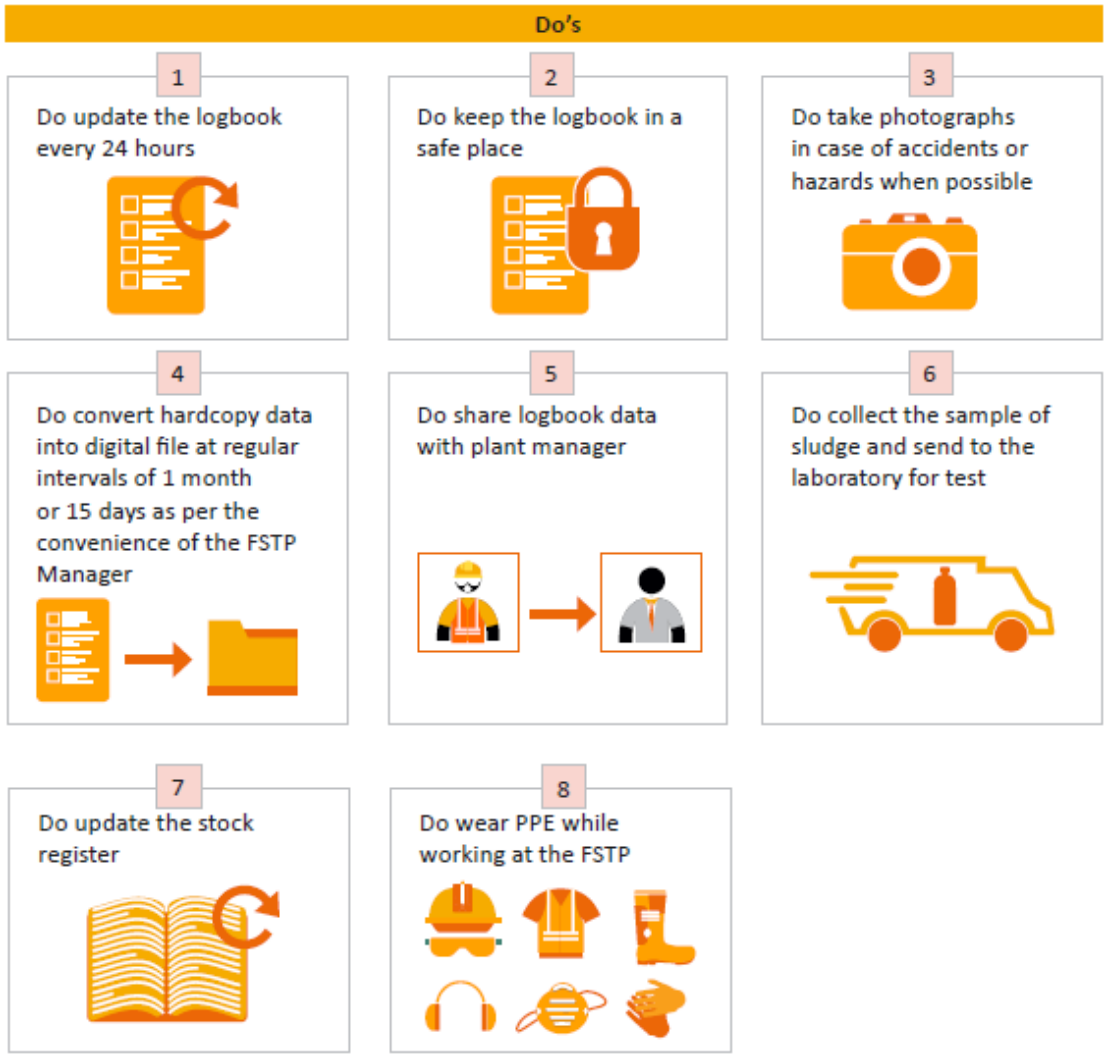
Table 3.6.7: Sample format for recording desludging treatment units

- Revenue generation details
  - Total quantity of end product (compost/bio solid/treated water) sold
  - Revenue from sale of end products

Sr. No.	Date	Name of the buyer	Product category	Pur-pose	Quantity sold	Cost per unit	Total amount collected	Amount collected by	Re-marks

Table 3.6.8: Sample format for recording revenue from sale of end products

3.6.3 Do's and Don'ts



Dont's

1

Don't misrepresent the data in logbook

UNIT 3.7: Preparing the Relevant Reports, and Provide Recommendations for Optimizing the FSTP

Unit Objectives

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

1. Prepare the relevant reports, and recommend to optimize the results at FSTP.

The operation and maintenance of an FSTP involves a detailed understanding of treatment processes and the requirements of each treatment unit. This understanding along with relevant theoretical information in the form of reports can help in optimising the plant performance and monitor the effluent quality. These structured reports give comprehensive information about the plant infrastructure, operations, employees and finance.

3.7.1 Type of Reports which need to be Prepared

You need to prepare reports on the following:

Quality of Treatment

Quality report is prepared to check whether the final treated water meets the standards specified by the state and central government. It basically comprises of lab reports and on-site FS analysis. Refer **Sample format for Quality testing report**.

Operational Expenditure and Revenue Generation

This report gives the ongoing cost of running the FSTP. It includes the cost of regular operating and inspection activities, water and electricity cost, incidental maintenance activities (plumbing charges, replacement of tools and equipments) and salaries and wages of FSTP workers. This report can also help you keep a track on the sale of end products. Refer **Sample format for Operational expenditure and revenue report**.

O&M Activities

This is a detailed document used to record the quantity of FS loaded into each treatment unit, the operational activities performed (e.g. load of FS or extraction of end products), the operational variable applied (e.g. mixing ratio of fresh to stabilised sludge, the addition of lime), the quantity of end products and wastes extracted, and the consumables required. Refer **Sample format for of Operation & Maintenance report**.

UNIT 3.8: Housekeeping of FSTP

Unit Objectives

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

1. Maintain the cleanliness and housekeeping practices at FSTP.

Housekeeping in an FSTP is important to control or eliminate workplace hazard and ensures efficient operation and maintenance of the treatment plant site. An unkept, messy and dirty FSTP can make the FSTP look neglected; these conditions may lead to incidents such as:

1. tripping over loose objects lying on floors
2. slipping on greasy sufraces
3. wet or dirty surfaces
4. hurting yourself with sharp tools
5. falling of poorly stacked items or misplaced material

To avoid these hazards, you must maintain a schedule of housekeeping activities which are to be carried out regularly (daily/weekly/monthly). You must ensure that every worker follows this schedule and performs his duty along with cleaning his workspace before the end of his shift.

3.8.1 Checklist for Cleanliness and Frequency

Description		Frequency
Dust and dirt removal 1. Sweeping floors 2. Manual cleaning of shelves, lockers, Cupboards		Daily
Cleaning of toilet 1. Washing the floors and walls of the toilet 2. Maintaining sanitary ware 3. Maintaining supply of hand wash, soap, towels disinfectants etc.		Daily
Weed removal and trimming of plants 1. Remove dead leaf litter or weed growth manually or using appropriate tool (scissors, sickle) 2. Trim excess growth of plants using appropriate tool (scissors, sickle)		Once in a month or whenever is needed

Description		Frequency
Cleaning of polishing pond 1. Empty the treated water present in the polishing pond 2. Use a brush to clean the interior walls and floor of the pond 3. Remove all the weeding and litter manually using the knife, trowel, shovel and bucket		Once in a month or whenever it needed
Tools and equipment 1. Clean tools and equipment after each use 2. Return and store the tools and equipment at its designated place		After every use
Routine desludging of treatment unit: desludging is required when the sludge height level reaches 50 cm		As and when required
Solid waste: Collect solid waste generated in a dustbin and dispose it regularly		Daily or weekly as per the municipal arrangement
Lighting 1. Replace fused or malfunctioning lights 2. Light sourced to be cleaned		whenever necessary
Mosquito repellent spray has to spread to control mosquito		Once in 2 days

Table 3.8.1: Housekeeping practices

3.8.2 Do's and Don'ts

Do's

1. Wear personal protective equipment

2. Do keep the cleaning tools and detergents at a designated, clean and dry place

3. Do wash your hands thoroughly after any cleaning activity

4. Do update the daily, weekly and monthly logbook

5. Do follow the report structure for reporting

Dont's

1. Do not spray DEET (mosquito repellent spray) in enclosed areas

2. Do not mishandle harmful chemicals

UNIT 3.9: Inspection

Unit Objectives

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

1. Inspect the required activities at a FSTP.

Inspection and examination are required for the following purpose:

- To prevent any problems for occurring in the plant
- To identify existing or potential problems in the treatment unit
- To locate the position of problems
- To provide clear, concise and meaningful reports to supervisor regarding the problem

These activities often minimise reactive interventions to emergency situations, which tend to be more complex and expensive.

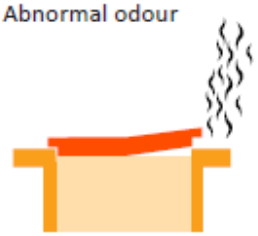
3.9.1 Define Inspection Activities of FSTP

Inspection activities include checking for any abnormalities in the operation of treatment units, deformation or damage to facilities, defects in piping system etc. You should inspect the relevant locations for the following:

Corrosion, wear, damage or crack in the facility

Damage in covers, deformation of maintenance hole, buried maintenance hole

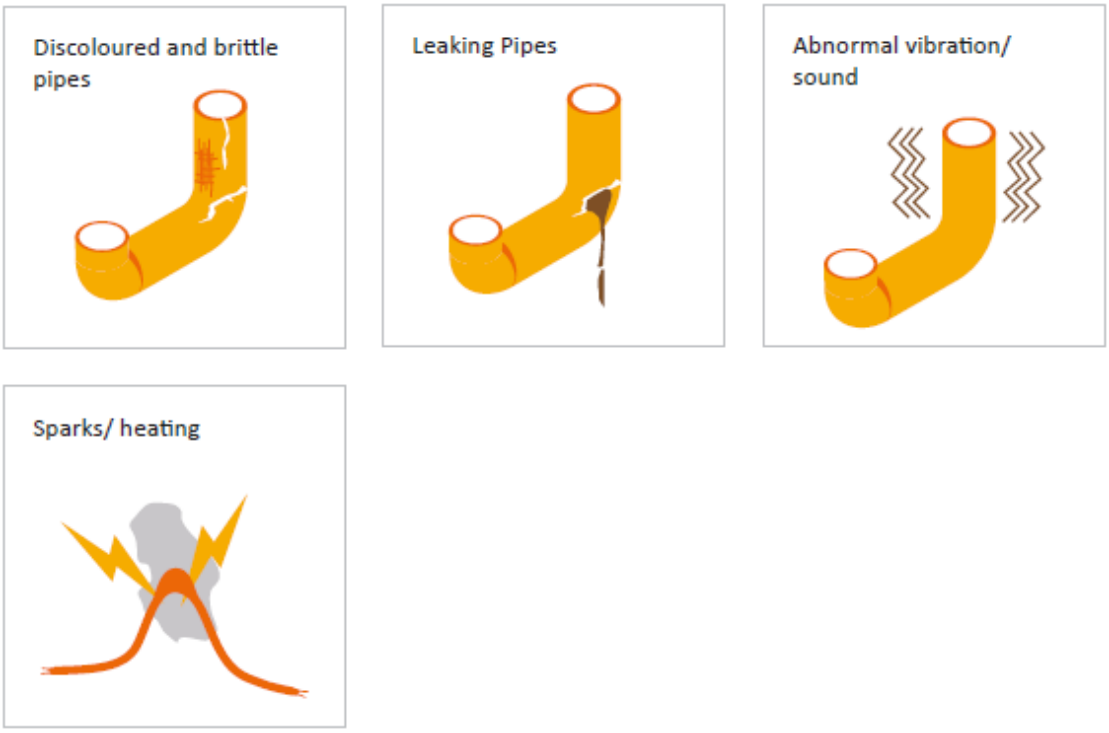
Abnormal odour



Clogging and overflowing

Cracked wireds

Cracks in concrete



3.9.2 Checklist of Operation Related Inspection Activities

The following checklist list downs activities that need to be carried out for inspection work:

Task	Frequency	Date	In charge
Ensure proper cleaning of screen chamber	Every day		
Repaint/replacement of screen	Once in 3-4 years		
Ensure free flow of water from each treatment unit	Once in a month or whenever it is needed		
Removal of dried sludge	As per design period		
Cleaning of filter material	Once in 5-6 years or whenever it is needed		
Ensure functionality of vent pipes	Once in a month or whenever it is needed		
Checking sludge level	Every day		
Check accumulation of scum	Every day		
Check growth of weeds in and around treatment units	Once in a week		

Table 3.9.1: Checklist of inspection activities

Exercise

1. Name the tool used for measuring sludge height in treatment units

_____

_____

_____

2. Name the tool used for trimming plants in PGF and PDB

_____

_____

_____

2. Name two on-site parameters that needs to be checked by O&M technician

_____

_____

_____

4. Name two major components of log book

_____

_____

_____

True or False

	T/F
1. Allow discharge of faecal sludge if pH is 10	
2. Screen chamber is the last stage of FS treatment	
3. Report to plant manager if there is a crack in the settling tank	
4. Smoking while inspection work is allowed	
5. Update the logbook every week	
6. Desludging is required when sludge height reaches 50 cm	
7. Plastic sheet is used for cleaning clogged pipes	
8. Electrical conductivity is a part of on-site parameters	
9. Mosquito repellent is used for inspection work	

Summary

This chapter gives you information on the following list:

- Standard procedure for receiving of faecal sludge (& septage) at the FSTP
- List of tools and equipment used in various types of FSTP
- Standard procedure for sample testing of faecal sludge
- Importance of operation and monitoring of various types of FSTP
- Things to be recorded
- Types of reports to be prepared for proper operation and maintenance of FSTP
- Cleanliness procedure in various types of FSTP
- Inspection of various types of FSTP

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4. Carry Out Routine Maintenance of FSTP

Unit 4.1 - Plant equipment for which routine repair and maintenance is needed

Unit 4.2 - Inspection of the equipment at FSTP

Unit 4.3 - Replacement of the damaged equipment

Unit 4.4 - Preparing a report on repair and maintenance activities

Unit 4.5 - Ensuring the cleanliness of the equipment

Unit 4.6 - Handling the repair and maintenance (R&M) tools

SGJ/N6416

Key Learning Outcomes

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

1. Inspect equipment at FSTP for any damage i.e hose pipe, bucket, glass tube, plastic sheet, shovel, rake, etc.
2. Carry out replacement of damaged equipment
3. Monitor facility and equipment in order to identify leak
4. Repair equipment if leak is identified
5. Monitor malfunctioning of FSTP by testing inlet and outlet sample of sludge
6. Perform routine maintenance activities for motor bearing, flanges used at FSTP
7. Perform greasing of moving parts
8. Change oil in generator, machines and equipment
9. Prepare routine maintenance record of major and minor activities
10. Perform routine cleaning of work area and equipment used at the FSTP

UNIT 4.1: Plant Equipment for which Routine Repair and Maintenance is Needed

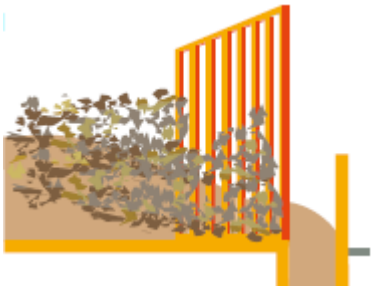
Unit Objectives

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

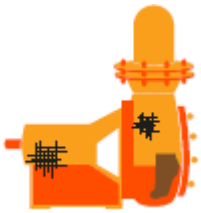
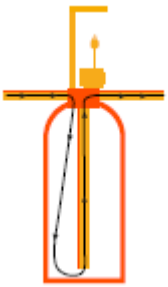
1. Arrange the tools and equipment required at a FSTP.
2. List the corrective measures need to be taken while facing different issues.

Plant machineries and equipments require constant maintenance to keep it in good working condition. Conversely, poorly maintained machineries and equipments run inefficiently and results in breakdowns which are costly to repair or replace. Following section lists down the plant equipment which require regular repair and maintenance work. It specifies the issues faced and the steps to be followed for solving the issues.

4.1.1 List of the Equipment, Issues Faced and Corrective Measures

Plant Machinery/ Equipment	Issues Faced	Corrective Measures
Screening mesh: It requires very less maintenance, however regular removal of solids from the chamber needs to be ensured in order to avoid clogging and overflow from the chamber.	Clogging and over flowing 	Cleaning of screen chamber: 1. Open the maintenance hole covers of Screen chamber. 2. Collect the solids accumulated at screens using the trowel and put them in a bucket. 3. Clean the bars using water and rake 4. Close the maintenance holes with covers Replacement of screen chamber: 1. Unscrew the screens 2. Wash the screen using fresh water 3. Paint the screens with anticorrosive paints/Replace with new ones as per drawings 4. Fix back the screens in the same position

Plant Machinery/ Equipment	Issues Faced	Corrective Measures
		5. Close the maintenance holes with cover 6. If screen plate is highly corroded, replace is entire plate with new one
Filter media in treatment units: Filter material need to be cleaned to avoid clogging of wastewater through the treatment system		Cleaning of filter material in treatment unit (Anaerobic filter) 1. Open the maintenance holes covers of the unit 2. Force water above the filter materials using a pump. 3. Meanwhile, use a sludge pump to dewater the filter chamber through the desludging pipe 4. Repeat the steps 3 or 4 times till you pump out clear water. 5. Place the maintenance holes cover back over the maintenance holes.
Wastewater pipes: maintenance activities include checking and replacement of broken pipes. All the pipes of treatment modules need to be checked once a month. Vent Pipes: Vent pipes must be check for any blockage or choking.	Odor, gas and liquid leakage and clogging 	1. Check for any leakages or smell coming out of pipes. This indicates damaged or broken pipe 2. If there are any pipes broken inform the supervisor or whoever in charge. 3. Replace the damaged pipe with new pipe of same diameter and specification. 4. Follow the drawings in fixing important pipes.

Plant Machinery/ Equipment	Issues Faced	Corrective Measures
Pumps: to keep pumps running properly, a regular maintenance schedule should be implemented and followed. It will also increase the lifespan of the pumping system	Corrosion, debris accumulation 	1. Remove all wiring and clean the pump 2. Check pump volute for any damage 3. Check for any clogged debris and clean as required 4. Follow the guidelines provided by the vendor for operating the pump
Sand and Carbon filter		1. Backwashing is required twice in a day, in this process treated water is pumped back into the filter system which cleans the filter media by removing accumulated particles. 2. Refilling of sand and filter media is required whenever there is a drastic reduction in flow rate from the outlet of the filter. Follow the guidelines provided by the vendor to replace the sand and carbon (charcoal) filled in the treatment unit.
Maintenance tools used for cleaning such as rake, trowel, brooms, shovel, sieve, steel rod and garden scissors	Wear and tear, broken or damaged 	1. Clean all the tools directly with clean water, do not use any chemicals 2. After that apply a light film of oil to prevent rust on tools.
Equipment for taking samples	Broken utensils, trouble in calibration of pH meter, electrical conductivity probe, thermometer etc. 	1. If there are any broken items report to supervisor or whoever in charge. 2. Replace the damaged item with a new one of same specification.

Plant Machinery/ Equipment	Issues Faced	Corrective Measures
Personal Protective Equipment	Wear and tear, broken or damaged goggles and masks, torn uniform etc. 	1. If there are any broken items report to supervisor or whoever in charge. 2. Replace the damaged item with a new one of same specification.
Wheel chocks to prevent vehicles from moving when parked	Wear and tear, damage 	Replacement
Disinfectants, barriers and bags for cleaning up activity	Broken or damaged 	Replacement
Control panels	Burned out, defective buttons, requirement of upgrades 	Service repair and replacement (if required)
Treatment units	Unhygienic environment leads to breeding of mosquitos and bad odor 	1. Remove unwanted growth of weeds/grass 2. remove accumulation of scum in treatment units 3. Spray mosquito repellent to avoid mosquito nuisance 4. Follow housekeeping rules mentioned in Unit
Plant Machinery/ Equipment: Machines and moving part	Friction 	1. Check of the level of grease and lubricants in the machine. Switch off the machine and apply grease and lubricants 2. Change the oil periodically in machines as directed by the manufacturer

Table 4.1.1: Issues with machineries and their corrective measures

4.1.2 Do's and Don'ts

Do's

1. Before performing the maintenance work on a mechanical equipment, switch it off, unless stated otherwise by the manufacturer.

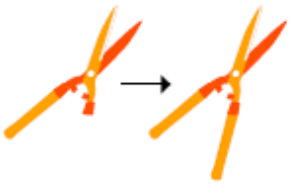
2. Read the maintenance/ cleaning/ repair instructions in the User Manual provided by the manufacture before performing the maintenance work on any equipment.

3. Do oversee the correct operation of the equipment.

4. Do use good lubricants to reduce friction around any moving part.

5. Do check for signs of wear and tear such as vibration, high temperature, cracks, loose bolts etc.

6. Do quickly perform replacement of any broken equipment.



7. Do keep machineries clean

8. Do maintain clean environment

9. Do conduct regular inspection

Dont's

1. Do not carry out maintenance activity when the pumps are in operation

2. Do not use damaged tools

3. Do not carry out work without the knowledge/ permission of the plant manager

UNIT 4.2: Inspection of the Equipment at FSTP

Unit Objectives

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

1. Inspect and maintain the record of inspected activities.

During inspection of the FSTP, you will verify that all plant machineries and equipment are in correct working order.

Inspection activities are generally a type of preventive maintenance with the aim of minimizing or preventing cases of breakdowns in plant machineries and equipments. The aim is to detect any potential failures and carry out minor repairs works to avoid major operating failures.

Following is a list of inspection activity:

- Inspect inlet and outlets of treatment modules
- Inspect free flow of water in distribution pipes, percolation collection pipes and vent pipes
- Inspect the condition of tools and equipment
- Inspect the condition of safety equipment and repair and replace as needed
- Inspect the cleanliness of the plant
- check if there is growth of grass/weed in and around treatment units
- check if garbage bins are routinely emptied
- check cleanliness of toilets and wash areas
- Inspect if there is accumulation of scum in treatment unit
- Inspect the treatment efficiency by checking sample reports weekly.
- Inspect all the light fixtures in FSTP: lighting in operator's room, FSTP premises lighting etc.

4.2.1 Things to be Recorded

Your work is to examine each equipment and plant machinery of the FSTP and record its status in the Inspection report. The inspection report shall include

- Time, date, subject of inspection
- Description of breaks, breakdowns, problems, bypasses, pump failures, occurrences, emergencies, complaints and/or intervening factors
- Record of the remedial action or follow up action taken to correct all of the above issues
- Name of the inspector or technician who is entering the details in the report

(Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014)

Daily Inspection Report					
Technician Name					
Date of inspection					
Time of inspection					
Name of equipment	Status	Problem description	Repair activity performed	Status after repair	Expenses (if any)

Table 4.2.1: Sample format for recording daily inspection report

UNIT 4.3: Replacement of the Damaged Equipment

Unit Objectives

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

1. Arrange the replacements of damaged equipment.
2. Maintain the checklist of replaced equipment.

There are a number of factors that need to be checked before deciding whether to replace or repair an equipment or tool. For example, when only a part of the equipment is damaged which can be repaired at negligible costs, you may decide to go for repair works only. Two parameters are generally taken into consideration:

Cost of repair:

- Includes removal and disposal of damaged part, replacement cost of damaged part with installation and testing, manpower cost

Cost of replacement:

- Includes disposal cost, salvage value(i.e. estimated resale value of an asset at the end of its useful life), capital cost of equipment, installation and testing charge, training of staff prior to operation

4.3.1 What are Replacement Activities?

The activities which needs to be done for procuring a replacement of an equipment for reasons such as the equipment is completely damaged, the equipment has reached the end of its useful life etc. are called as replacement activities.

4.3.2 Whom to Request?

The plant manager or the in-charge should be requested to make necessary arrangement for the supply of new equipment or machinery.

4.3.3 Checklist for Replacement of Equipments

Steps	Checklist
First step: Inspection of the equipment	☐
Second step: Evaluation of the damaged or malfunctioning equipment	☐
Third step: Create a notification of malfunction by recording it in inspection report.	☐
Fourth step: Inform supervisor and receive confirmation for repair or replacement	☐
Fifth step: Check warranty of the equipment, check availability of equipment in stock, carry out discussion with plant manager for replacement or repair of equipment	☐
Sixth step: Release an order notice with permission of plant manager or in charge person.	☐
Seventh step: once the equipment is replaced, document the relevant details.	☐

4.3.4 Do's and Don'ts

UNIT 4.4: Preparing a Report on Repair and Maintenance Activities

Unit Objectives

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

1. Prepare a report of repair and maintenance activities.

You must ensure that all required repair and maintenance work is documented using the form given below. This form will be used to detail out the repair and maintenance activity carried out for a particular equipment. The completed form must be given to plant manager or in charge and kept in safety. Through these reports the repair and maintenance procedures done on equipment can be monitored.

Repair and maintenance Report		
FSTP Technician name:	Maintenance date:	
Equipment type:	Location:	
Type of maintenance activity	Status:	Problems identified
Routine ☐		Noise ☐
Breakdown ☐		Odor ☐
Service ☐		Vibration ☐
Last maintenanc date:		Leakage ☐
Problem description:		Blockage ☐
		Crack ☐
		Others ☐
Routine maintenance activity description:		
Breakdown maintenance activity description:		
Service maintenance activity description:		
Status after repair and maintenance:		
Name of plant manager:		
Signature of plant manager:		
Date:		

Fig 4.4.1: Sample Repair and maintenance Report

UNIT 4.5: Ensuring the Cleanliness of the Equipment

Unit Objectives

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

1. Ensure and maintain the cleanliness of equipment and FSTP.

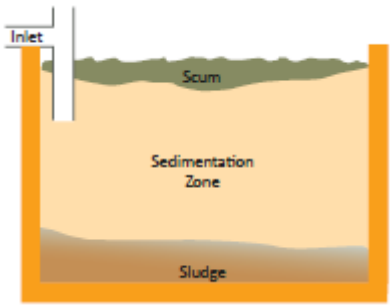
Cleaning the equipment is important because if your equipment is in dirty condition, it might eventually lead to damage and malfunction in the plant. Following a regular maintenance and cleanliness routine for equipment have a number of benefits. For example, it extends the life of the equipment, increases productivity and efficiency of treatment, saves you from the risk of hurting yourself etc.

4.5.1 Cleaning Activities to be Taken Up

Maintain a cleaning schedule based on the key points mentioned below to avoid making mistakes related to the frequency of cleaning i.e. failure to clean the plant machineries on time will lead to costly repairs and cleaning the plant machineries too frequently is a wastage of time and money.

1. Measure scum and settled sludge:

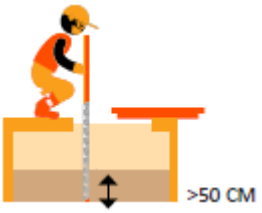
(Free Encyclopedia of Building & Environmental Inspection, Testing, Diagnosis, Repair, n.d.) A floating scum layer on top of treatment modules and settled sludge on the bottom of treatment module are key factors that determine the retention time. The scum layer comprises of oil and grease particles which are harmful for the treatment process. Settled sludge comprises of dissolved solids which are dense enough for settling at the bottom of the tank.



2. Scum removal mechanism:

You should clean the plant machinery if the scum layer has thickened to the point where it can overflow into the next treatment module.

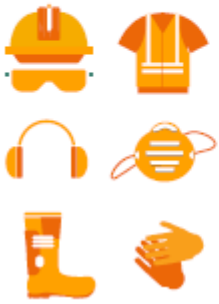
- Remove the scum either manually or using a mechanical rake as shown in figure
- Dispose the collected scum along with municipal solid waste in a landfill or a trench can be made and filled with the collected scum and then covered with mud or soil.

3. Settled sludge removal mechanism: As mentioned in Types and description of treatment units/ technologies; use a glass tube sludge sampler for measuring the height of settled sludge from the bottom of treatment module. If the height is more than 50cm, call for a desludging truck operator.	
4. Check the growth of grass or weed: Remove either manually or using a garden scissor or fork	

4.5.2 Do's and Don'ts

Do's

1. Do wear protective gears while cleaning



2. Do keep the cleaning tools and detergents at a designated, clean and dry place

3. Do wash your hands thoroughly after any cleaning activity

Do carefully handle the trash and collect it in trash collection bucket only

Do record the information of desludging truck operator in logbook

Dont's

Do not mishandle any tool or equipment

UNIT 4.6: Handling the Repair and Maintenance (R&M) Tools

Unit Objectives

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

1. Handle the repair and maintenance tools at a FSTP.
2. List the dos and don'ts of equipment repair and maintenance.

Tools can pose a safety risk if they are misplaced or improperly handled by workers. Thus, as the FSTP technician you must install the importance of safe handling of repair and maintenance tools in the workers. An example of inadequate maintenance of tools is given in the figure below.

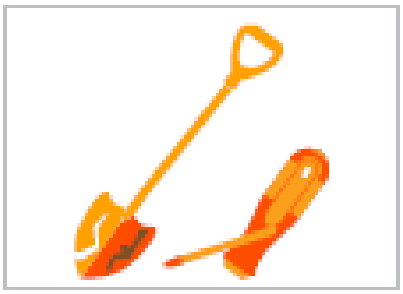


Fig. 4.6.1:Inadequate maintenance tools

General habits: Certain rules of handling are not specific to the type of tool and thus can be applied to anything that is used on duty.

- Keep an **inventory of tools** which is basically a list of the entire collection of tools, spare parts, essential consumables that you have in the FSTP with relevant information as shown in **Table Sample format for maintaining inventory of tools** and designate an area for tool storage.
- Clean and store the equipment correctly after every use. Make cleaning and storing the tools in the right place, a part of safe handling procedure.
- Remove any liquids that may have been contaminated.
- Apply a thin layer of oil (motor oil) on metal tools to avoid rust
- In case of rusting, remove the rust with a sand paper or wire brush
- Use a hand-held file to sharpen tools such as shovels, scissors, axes and trowels
- Keep power tools and electrical tools unplugged and disconnected when not in use

Inventory of tools					
Name	**Quantity**	**Price**	**Date of procurement**	**Current status**	**Place of storage**

Table 4.6.1: Sample format for maintaining inventory of tools

4.6.1 Do's and Don'ts

Do's

1. Read the maintenance/ cleaning/ repair instructions in the User Manual provided by the manufacture before performing the maintenance work on any equipment.

2. Do handle sharp tools carefully

3. Do carry tools in a tool box or in a tool pouch

4. Do check the tools for any damage before use

5. Do wear your PPE (personal protective equipment)

6. Use the right tool for the right job

Dont's

1. Do not put sharp and pointed tools in your pocket unless it has a cover

2. Do not put away tools unless it's ready for the next day's use.

3. Do not leave tools lying around when not in use

4. Do not toss a tool to your co-worker

Exercise

1. Name two inspection activities

_____

_____

_____

2. List the steps for a cleaning pump

_____

_____

_____

3. Name any four types of maintenance activity

_____

_____

_____

4. What are the steps for replacing screen in screen chamber?

_____

_____

_____

5. What is an inventory for tool?

_____

_____

_____

6. Which of the following is not the duty of the FSTP technician?
   a. Order new equipment
   b. fill inspection report
   c. clean equipment

True or False

	T/F
1. Apply grease on tools to avoid rusting	
2. Store each tool at its own place	
3. Screen chamber requires replacement of screens after 6 months	
4. Purchase replacement equipment on your own	
5. Do not wear protective equipment while doing maintenance work	
6. It is the responsibility of plant manager to fill the repair and maintenance report	

Summary

This chapter gives you information on the following list:

1. List of plant equipment and the issues that arise if they are not properly maintained.
2. The methods of solving issues
3. Importance of documenting the repair and maintenance activity
4. Method of reporting repair and maintenance activity
5. Correct steps of inspection work
6. Correct steps for handling of repair and maintenance tools

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5. Maintain Personal Health & Safety in FSSM

Unit 5.1 - Major hazards at the plant

Unit 5.2 - Personal protective equipment which are to be used while working

Unit 5.3 - Health and safety practices at the FSTP

Unit 5.4 - Electric safety measures

Unit 5.5 - Confined spaces safety

Unit 5.6 - Protection against falling and drowning hazards

Unit 5.7 - Chemical and material storage safety

Unit 5.8 - Sampling safety

Unit 5.9 - Managing movement of vehicles within the plant

Unit 5.10 - Medication

Unit 5.11 - Contingency measures in case of emergencies within the plant

Unit 5.12 - Natural hazard

Unit 5.13 - Visit plan

SGJ/N6410

Key Learning Outcomes

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

1. Identify violation of workplace safety policies
2. Identify the location of first aid materials
3. Administer first-aid
4. Identify personal safety hazards or work site hazards
5. Identify the personal protective equipment
6. Demonstrate safety drill
7. Demonstrate safe and accepted practices for personal protection
8. Use insect repellent at unhygienic places
9. Identify sign boards/caution such as “Work in progress” or “Danger” to avoid accidents

UNIT 5.1: Major Hazards at the Plant

Unit Objectives

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

1. Identify the potential major hazards at a FSTP.

The following is the list of major hazards in an FSTP and how to avoid them

Hazards	
1. Biological hazard A large number of coliform groups, various kinds of pathogen, and egg parasites exist in the faecal sludge. These pathogens can cause a number of diseases such as jaundice, worm infestation, infection, typhoid etc.	
2. Chemical hazards A number of chemicals are used in the FSTP for treatment, laboratory analysis and housekeeping. Direct contact with these chemicals can cause burns, itching, lung problems (if inhaled) and other damages.	
3. Physical hazards There are a number of potential physical hazards in an FSTP. These are:	
A. Confined spaces A space that is enclosed and has limited access, such as tanks, dry wells, pump rooms, maintenance holes etc. These places which have limited exit in terms of number of exit points, size of exit points etc.; are not designed for continuous occupancy and may have a hazardous atmosphere. Hence there is a possibility of engulfment, suffocation or a worker getting trapped through converging walls or a sloped floor, or any other factors causing a serious safety or health hazard.	
B. Spillages from trucks	

Hazards	
C. Leakages from treatment modules This can cause threat by means of contamination of the surrounding soil and water (in case of liquid leakages) and unpleasant odour and even fire accidents (in case of gaseous leakages)	
D. Electrical hazards A number of pumps, motors and other electrically powered devices (filters, press, mechanised treatment units) are used in an FSTP. Besides these, a number of equipments are used for the purpose of offices, housekeeping etc. Mishandling and malfunction in these equipments can lead to fatal electric shocks, burns and other injuries.	
E. Falling: The presence of tanks, ponds and a number of other treatment systems in which water is present, creates a risk of falling, slippages and drowning.	
F. Falling of objects: Areas where things are stacked up such as material storage rooms create spaces where objects can fall on top of a person.	
G. Fires Faecal sludge is anaerobically digested and can generate methane which is an inflammable gas. Similarly, fires can light from electric equipments and chemicals	
H. Natural hazards FSTPs are not very prone to natural hazards because they are usually constructed by keeping in mind the natural disasters to which the location of the FSTP is prone to. Still, it is a good practice to discuss the usual natural disasters that the region is prone to and how the FSTP O&M technicians should conduct themselves if they are within or around the premises. These include floods, storms and earthquakes.	

Table 5.1.1: Major hazards at a workplace

Source: (Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014)

UNIT 5.2: Personal Protective Equipment which are to be used while Working at FSTP

Unit Objectives

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

1. List the personal protective equipment to be used by a technician.
2. Illustrate the use and putting on personal protective equipment.

Wearing personal protective equipments (PPEs) is the first and foremost requirement while working at an FSTP, especially while handling sludge & wastewater, chemicals, plant equipments, any sharp tools and engaging in housekeeping activity. However, desk activities such as writing a report, entering logbook don't require PPE. Most of the risks and damages at the plant can be avoided by wearing personal protective equipment. These equipments provide protection against head injuries (eg. helmets), protection from contamination by avoiding direct contact; burns, abrasion and electric shock. The equipments include the following:

List of personal protective equipment	
1. Helmet Helmets to provide head protection in the event of a fall, slippage and falling objects. To be worn by everyone at the FSTP at all places where there is a danger of falling, slippages, objects falling over head, near large tanks and uneven surface.	
2. Safety glasses or goggles for eye protection To be worn be by operation & maintenance technician, plant workers, labourers and other staff while working with the plant machineries, tools and equipments which can throw up sparks, dust or micro-particles	
3. Face shields to protect against chemical or dust To be worn be by operation & maintenance technician, plant workers, labourers and other staff while working with the plant machineries, tools and equipments which can throw up sparks, dust or micro-particles	
4. Gloves Gloves (made from rubber or latex) for hand protection from transmitting infections, pathogens, burns and abrasion. To be worn by everyone working around the plant machineries and equipments at the FSTP	

List of personal protective equipment	
5. Electric Safety Gloves Gloves for protection against electric shocks. To be worn by operation & maintenance technician, plant workers and other staff while working on highly energised electric equipments or repairing electric equipments.	
6. Respirators, dust masks or self-contained breathing apparatus for protection from inhaling dust, fumes etc, While masks or respirators are to be used while regular operations, self-contained breathing apparatus are to be used for special tasks such as entering a unit such as maintenance holes, wet well, dry well etc., where air is highly contaminated and there are high chances of suffocation and inhaling dangerous fumes. To be worn by operation & maintenance technician, plant workers, labourers and other staff while working with the plant machineries, tools and equipments which can throw up sparks, dust, micro-particles, fumes, other dangerous gases especially if entering any treatment unit.	
7. Gum boots For protection of foot from burns, abrasion. To be worn by operation & maintenance technician and plant workers while working in areas with high level of contamination such as sludge dryings beds, large tanks, spillages, maintenance holes, broken tools and other areas with risk of contamination through feet.	
8. Plant Uniform Separate plant uniform to be worn at the plant to avoid contamination and damage to regular clothes. To be worn by operation & maintenance technician and plant workers while working with the plant machineries, tools and equipments.	
9. Safety Harness Harness for entering maintenance holes and other treatment modules below ground. To be worn while entering the maintenance holes	

Table 5.2.1: Personal protective equipment

5.2.1 Using Personal Protective Equipment (PPE)

Correct method of putting personal protective equipment (PPE) is essential to be maintain hygiene and be comfortable wearing the PPE. 5.2.1.1 and 5.2.1.2 detail out all the steps to be followed while putting on and removing PPE.

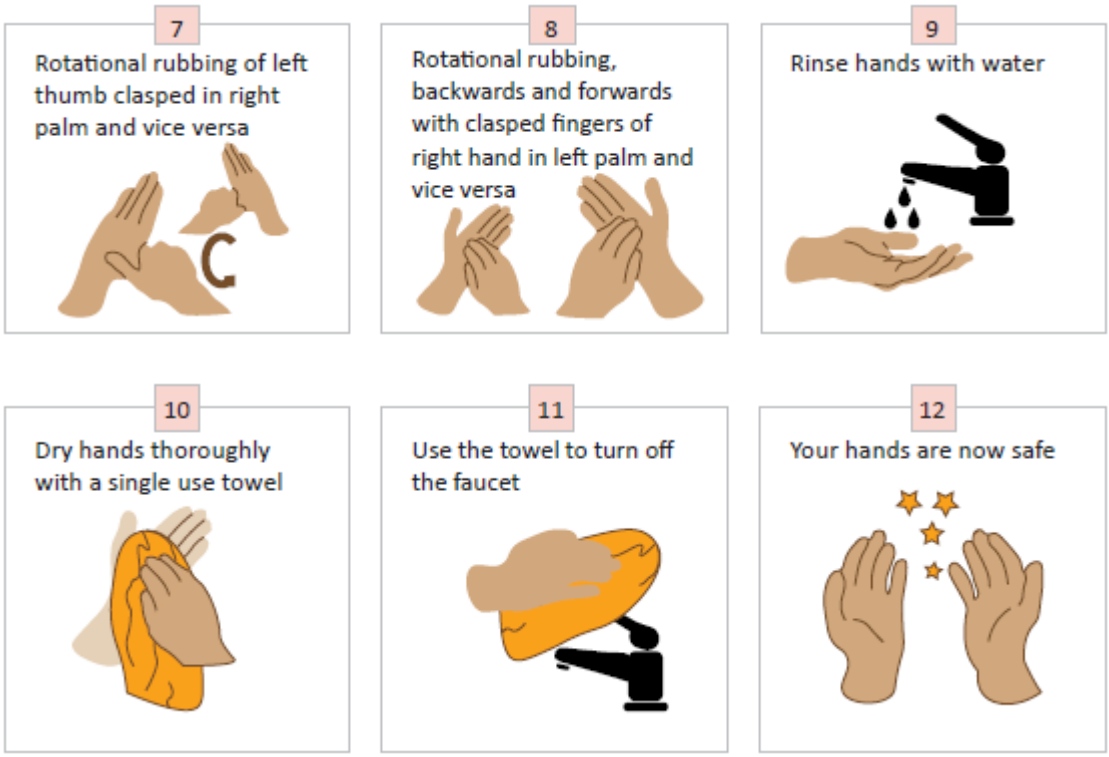
5.2.1.1 Putting on Personal Protective Equipment

Sequence of putting on personal protective equipment:

1. Perform hand hygiene
2. Put on the uniform
3. Put on the gum boots
4. Perform hand hygiene
5. Mask, respirator or self-contained breathing apparatus
6. Put on the goggles, face shield
7. Helmet
8. Perform hand hygiene
9. Gloves
10. Harness, if needed

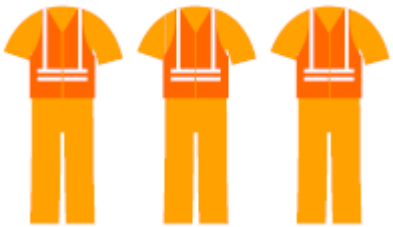
Perform hand hygiene

1. Wet your hands with clean, running water (warm or cold), turn off the tap, and apply soap.
2. Lather your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers, and under your nails.
3. Scrub your hands for at least 20 seconds.
4. Rinse your hands well under clean, running water.
5. Dry your hands using a clean towel or air dry them.
6. Source: (Centre for Disease Control and Prevention)
7. Duration of the procedure: 40 to 60 seconds



Wear uniform

- Wear the uniform as any other clothing, but it should be well fitted with no loose ends and comfortable.
- There should be at least 3 to 4 pairs of uniform. Wash each pair after each use.



Wear gum boots

- Wear gumboots as any other footwear, but it should be well fitted and comfortable.

Perform hand hygiene

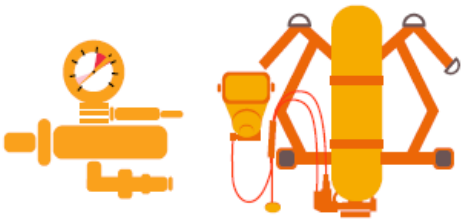
Wear mask, respirator and self-contained breathing apparatus

Mask or respirator

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit closely and tightly to face and below chin
- Fit-check respirator

Self-contained breathing apparatus (SCBA)

- Check if the bottle is full
- Check for leakages in hose and other parts



Check for tightness of the face mask and the whistles

- With demand valve still closed, try to hold the face mask on your face with hands and without using the straps
- If you are able to hold the face mask, it means face mask is able to hold the vacuum you created and is airtight.
- Activate the demand valve. Once demand valve is activated and air pressure is released and reaches the alarm level, whistle should sound.

Two ways of wearing SCBA

- Over the head: hold the back plate with both hands and lift the SCBA over your head
- Coat: hold one strap closer to the back plate and wear the SCBA like wearing a coat. After the SCBA is on the back, lean forward and pull the straps.

Wear the mask and open the cylinder valve before entering the maintenance holes, wet well etc.

Put goggles or face shield

- Place over the eyes and face and adjust to fit.

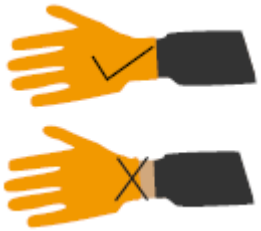
Wear helmet

- Place the helmet over your head and adjust to fit.

Perform hand hygiene

Wear gloves

- Wear the gloves on both the hands. They should extend to cover wrist of the uniform and should be tightly fitted.



Wear a harness

- Hold the harness by the rear D-ring and shake it to allow the straps to fall into place
- Place your arms through the shoulder straps, ensuring the webbing remains untwisted
- Ensure the D-ring is in the middle of the back between the shoulder blades. Adjust shoulder straps so the sub- pelvic strap sits under the buttocks.
- Pull each thigh strap through the legs and fasten the buckles. Adjust the tension or release the slack as necessary
- Connect the chest strap and adjust so that the shoulder straps are centred on the shoulder and tighten
- Once all straps are buckled, tighten them so that the harness fits comfortably and does not pinch or restrict movement.

5.2.1.2 Removing Personal Protective Equipment

Sequence of removing personal protective equipment		
1.	Remove the harness (if any)	
2.	Remove gum boots	
3.	Remove gloves	
4.	Perform hand hygiene	
5.	Remove helmet	
6.	Remove googles or face shield	
7.	Remove safety uniform	
8.	Remove mask or respirator	Remove the SCBA (Self-contained breathing apparatus) is before removing the uniform
9.	Perform hand hygiene	

Table 5.2.2: Sequence of removing PPE

Move to a safe area away from hazardous areas such as sludge drying bed, maintenance hole opening, slippery surfaces etc. Keep trash can and disinfectants nearby.

Remove safety harness

Unbuckle the harness and remove your arms followed by your legs one by one. Put the harness away for cleaning.

- It is best to begin with cleaning the harness on a flat surface, leaving open to visible inspection.
- Using a moist sponge, wipe down the harness to remove excess dirt and dust.
- Mix a cleaning solution using laundry detergent or dish soap. DO NOT use any cleansers that contain chlorine, bleach, or abrasives.
- Dip your sponge into the solution and thoroughly scrub each portion of the harness until a thick lather form.
- Using a sponge dipped in CLEAR water, wipe down the harness to remove the suds and soap residue.
- Let the safety harness dry in room temperature air. DO NOT use a mechanical heat dryer or expose the harness to long periods of sun-drying.
- When cleaning multiple harnesses, store each in a separate, dry compartment. Hang them in such a way that they are not crushed, worn, or creased.
- Never use gasoline or other 'drying solvents' to clean harnesses.

And the two most important cautions:

- Dampen but DO NOT SOAK the harness. The excessive expansion of the fibres by soaking (and the contraction by drying) can compromise the fabric's effectiveness and shorten the harness's life.
- NEVER put a harness in the dryer. Excessive heat and tumbling can (and will) damage the harness.

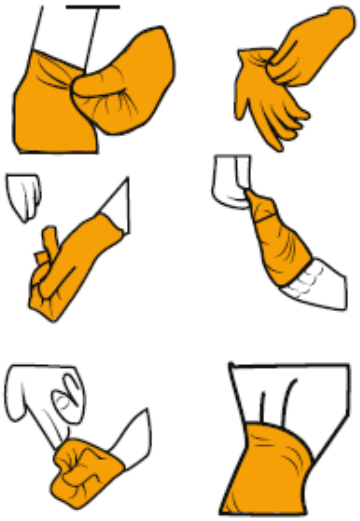
Remove safety boots

If wearing rubber boots, remove them while gloves still on your hands. Place the boots in a container with disinfectant.

Remove gloves

1. Pinch and hold the outside of the glove near the wrist area.
2. Peel downwards, away from the wrist, turning the glove inside out.
3. Pull the glove away until it is removed from the hand and hold the inside-out glove with the gloved hand.
4. With your un-gloved hand, slide your finger/s under the wrist of the remaining glove, taking care not to touch the outside of the glove.
5. Again, peel downwards, away from the wrist, turning the glove inside out.
6. Continue to pull the glove down and over the inside- out glove being held in your gloved hand.

This will ensure that both gloves are inside out, one glove enveloped inside the other, with no contaminant on the bare hands.Dispose the gloves in the waste container. The urban local body should collect the waste from the waste container daily.

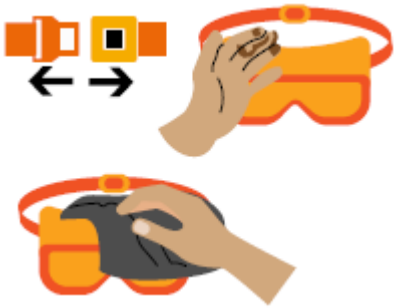
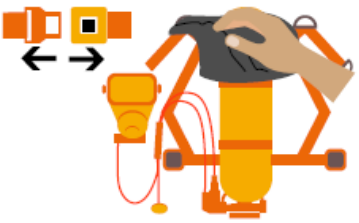
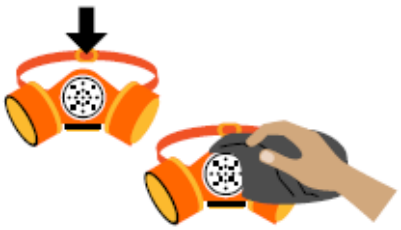


Perform hand hygiene

Refer to the beginning of **Perform hand hygiene**

Remove helmet

- Unbuckle the helmet.
- Avoid contact with the outer surface of the helmet.
- Wipe the surface with a cloth soaked in disinfectant followed by a dry cloth or as per the manufacturer's instructions

Remove goggles or face shield • Remove goggles or face shield from back by lifting head band or the ear pieces. • Avoid contact with the front of the goggle or face shield. • Wipe the surface with a cloth soaked in disinfectant followed by a dry cloth or as per the manufacturer's instructions.	
Remove SCBA (self-contained breathing apparatus) • Remove the mask from the back while avoiding contact with the front surface. • Unbuckle the SCBA. • Wipe the surface with a cloth soaked in disinfectant followed by a dry cloth or as per the manufacturer's instructions.	
Remove uniform • Remove the uniform by rolling it inside out in order to avoid contact with the outside surface. • The uniform should then be sent for washing.	
Remove mask and respirator • Remove the mask from the back while avoiding contact with the front surface. • Dispose it off if it is meant for single use. • In case it is recyclable, disinfect by wiping the with a cloth soaked in disinfectant followed by a dry cloth or as per the manufacturer's instructions.	
Perform hand hygiene Refer: 5.2.1.1 - **Perform hand hygiene**	

5.2.2 Do's and Don'ts

1

Keep hands away from mouth and face

2

Limit surfaces touched

3

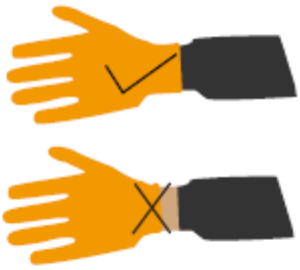
Avoid touching surfaces such as door knobs, stationary, mobiles while working to limit chances of contamination.

4

Change personal protective equipment immediately if damaged.

5

Ensure rubber gloves are long enough to extend well above the wrist, leaving no gap between the glove and coat or shirt sleeve



6

Perform hand hygiene whenever contamination is suspected while putting on and removing personal protective equipment and in case of damage of gloves

UNIT 5.3: Health and Safety Practices at the FSTP

Unit Objectives

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

1. Comply with the essential health and safety practices at the FSTP.

A number of personal hygiene practices should be maintained by you, the FSTP operation & maintenance technician, to avoid any occupation related diseases.

Do's

1. Use appropriate Personal Protective Equipment (PPE) to avoid contamination and stay safe from physical hazards at the plant. Refer **List of Personal Protective Equipment**, page 70-71

2. Follow procedures for using PPE. Refer **Putting on personal protective equipment**, page 71-75

3. Perform hand hygiene prior to wearing and removing PPE and eating

4. Take a shower after working at the FSTP, if possible.

5. When additional light is required while working on the treatment plant premises, use a battery powered flashlight, or an approved properly guarded electrical extension light.

Dont's

1. Do not use an open flame light such as a match, torch, or cigarette lighter.

2. Do not eat or drink in areas where FS is treated and stored, and areas where chemicals are stored to avoid faecal-oral contamination

3. Do not drink alcohol or smoke while at the FSTP to remain alert

4. Do not smoke while at the FSTP to avoid fires.

5. Do not enter the offices and lounges wearing dirty clothes.

6. Do not wear sandals or open toe shoes in the treatment plant premises to avoid injuries to the feet.

UNIT 5.4: Electric Safety Measures

Unit Objectives

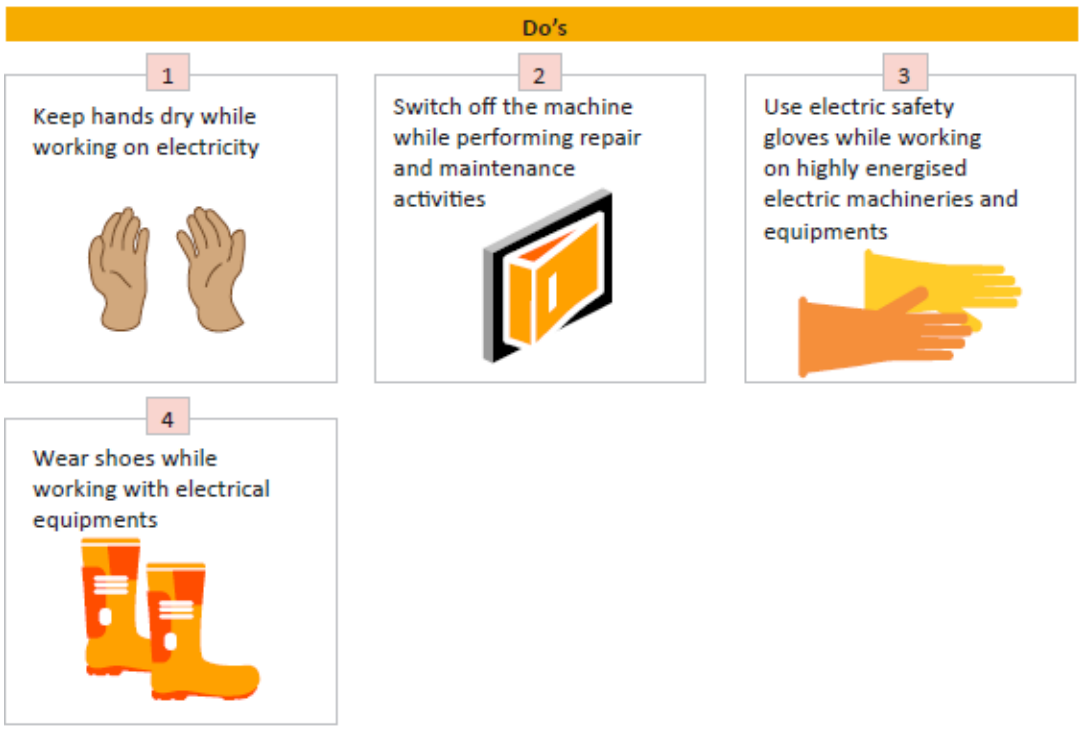
At the end of this unit, you will be able to:

1. List the dos and don'ts while working with the electric equipment.

Electric safety measures refer to all the measures to be taken while performing operation and maintenance activities on powered devices. According to the Occupational Safety & Health Administration, United States of America, the following are the key things to be kept in mind while working with electricity:

1. Always be cautious while working with electricity
2. Never operate electrical equipment while you are standing in water or if you have wet hands.
3. Overhead wires: Assume that all overhead wires are energized at very high voltages. Never assume that a wire is safe to touch even if it appears to be insulated. Never touch a fallen overhead power line. Call the electric utility company to report fallen electrical lines.
4. Never repair electrical cords or equipment unless qualified and authorized.
5. Have a qualified electrician inspect electrical equipment that has got wet or are malfunctioning before energizing it

5.4.1 Do's and Don'ts while Working with Electric Equipment



Dont's

1

Do not work with wet hands and feet

UNIT 5.5: Confined Spaces Safety

Unit Objectives

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

1. Ensure the safety of confined places at the FSTP.

A confined space is defined as any place in an FSTP that is enclosed and has limited access, such as tanks, dry wells, pump rooms. According to OSHA Guidelines, any space that meets the following three criteria is designated as a confined space:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a permit-required confined space if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard. (OSHA Fact Sheet: Confined Spaces in Construction: Sewer Systems)

According to the Faecal Sludge Management: Systems for Approach for Implementation and Operation, confined spaces are potentially hazardous as the breathable atmosphere may become compromised, either by depletion of oxygen or the presence of chemical gasses, such as chlorine or hydrogen sulphide. In order to prevent confined space accidents, a “Confined Space Entry Permit” programme is followed at FSTPs. When maintenance is required inside these areas, certain procedures can be defined in order to protect the worker. These typically include the following:

- a confined space entry permit is prepared by the worker and signed by the supervisor;
- prior to entry, the atmosphere is tested with an oxygen meter or, in the case of maintenance holes, with a hydrogen sulphide meter; and
- the work is conducted using the buddy system, with one person entering the confined space secured with a harness attached to a safety rope, and one person located outside of the confined space ready to provide assistance if needed. When the work is completed, the permit is returned to the supervisor for signature indicating the completion of the task.

5.5.1 Checklist for Confined Spaces

Take permission from the plant manager before entering the confined space	☐
If confined space is a maintenance holes, or any space that is below ground level or has inadequate ventilation, it can contain deadly gases. Prior to entering any confined space clean the confined space off sludge and keep the cover slab on for a minimum of 1 hour.	☐
Wear personal protective equipment	☐
Keep a co-worker located outside for rescue and support	☐

UNIT 5.6: Protection against Falling and Drowning Hazards

Unit Objectives

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

1. Adopt the protection policies against falling and drowning hazards.

FSTPs that utilise lagoons or waste stabilisation ponds, or even large reactor tanks need to have a drowning prevention programme in place that provides safety equipment, signage and training:

1. Plants with large tanks and lagoon cells often have boats from which O&M tasks are accomplished. In these situations,
2. workers must make use of floatation devices, work in pairs, and be trained in proper procedures to
3. minimise the hazard of drowning. At all FSTPs, measures should be taken to avoid slip hazards such as
4. preventing the spillage of FS, as well as ensuring that maintenance holes are closed in order to avoid falls.
5. Place "Work in progress" sign board at places where any maintenance work is going on so as to indicate to other to be careful while around that place

Source: (Faecal Sludge Management: Systems Approach for Implementation and Operation, 2014)

UNIT 5.7: Chemical and Material Storage Safety

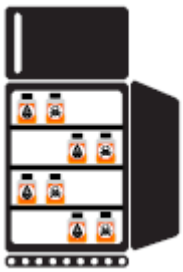
Unit Objectives

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

1. Ensure the adoption of safe safety practices of chemicals and other materials.

Chemical and material safety refers to the safety measures which need to be undertaken for the safety of the workers and the plant. A Material Safety Data Sheet (MSDS), a document that contains information on the potential hazardous materials present at a site, should be made available and the required safety measures should be followed accordingly. The following are the measures to be taken up:

Chemical storage	
Store the chemicals away from heat and direct sunlight	
Reduce the amount of chemicals stored by buying in limited quantities. Also, clear old stock by means of use, replacement & safe disposal.	
Store the chemicals in a segregated way based on considerations such as temperature, ignition control, ventilation, type and identification. Proper segregation is necessary to prevent incompatible materials from inadvertently coming into contact. A physical barrier and/or distance is effective for proper segregation.	
All chemical storage areas and cabinets should be inspected at least annually and any unwanted or expired chemicals should be removed.	
Flammable materials should be stored in an approved, dedicated flammable materials storage cabinet or storage room if the volume exceeds 37 litres. Keep cabinet doors closed	

Chemical storage	
Chemicals should be stored no higher than eye level and never on the top shelf of a storage unit. Do not overcrowd shelves. Each shelf should have an anti-roll lip.	
Avoid storing chemicals on the floor (even temporarily) or extending into traffic aisles.	
Liquids should be stored in unbreakable or double-contained packaging, or the storage cabinet should have the capacity to hold the contents if the container breaks.	
Volatile or highly odorous chemical shall be stored in a ventilated cabinet. Chemical fume hoods shall not be used for storage as containers block proper air flow in the hood and reduce available work space. Chemical fume hoods are chimney-like structures in a place where chemicals are used. They contain vapors, dusts, gases, and fumes generated within the hood, and remove them as air flows into the hood and then out via the laboratory exhaust system.	
All chemicals should be labelled and dated upon receipt in the lab and on opening.	
Chemicals stored in explosion-proof refrigerators or cold rooms shall be sealed and labelled with the name of the person who stored the material in addition to all other required hazard warnings.	

Chemical storage	
Look for unusual conditions in chemical storage areas, such as: • Improper storage of chemicals • Leaking or deteriorating containers • Spilled chemicals • Temperature extremes (too hot or cold in storage area) • Lack of or low lighting levels • Blocked exits or aisles • Doors blocked open, lack of security • Trash accumulation • Open lights or matches • Fire equipment blocked, broken or missing • Lack of information or warning signs ("Flammable liquids", "Acids", "Corrosives", "Poisons", etc.)	

Table 5.7.1: Conditions of safe chemical storage

Source: (Chemical Storage Guidelines from The CDC)

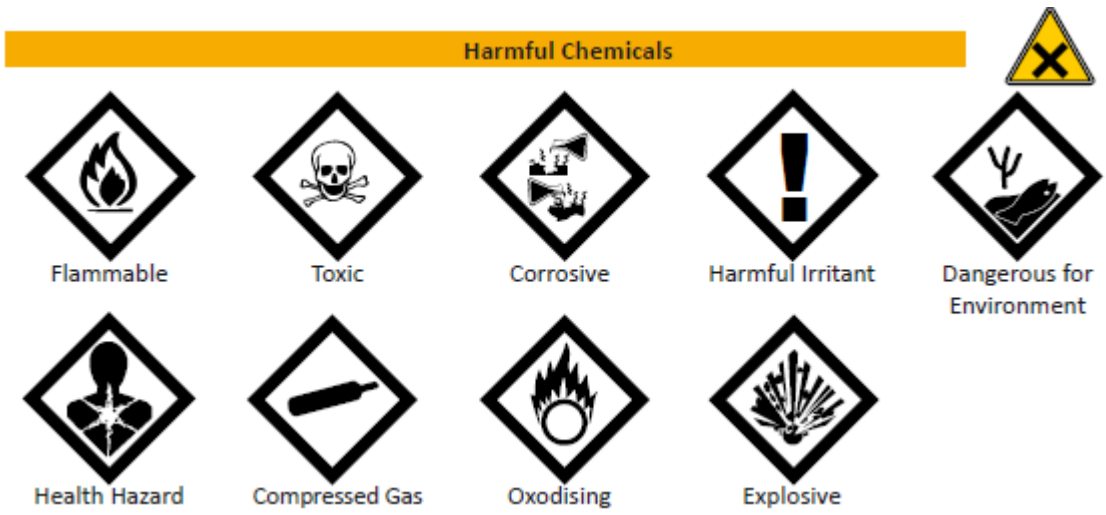


Fig. 5.7.1: Signs of harmful chemicals

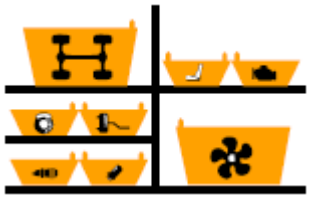
Material safety	
Materials and supplies used at a plant site should be stored in a neat and orderly manner to prevent them from falling off the shelves.	
Junk parts removed from the treatment module should be disposed off in a proper manner	
Spare parts used in the operation of the faecal sludge treatment plant should be kept in a neat and orderly manner with the item labelled to indicate on the of equipment on which the spare part is to be used.	
Do not allow paper and other lighter combustible materials to accumulate in the treatment plant premises to prevent them from getting into the treatment modules and causing fire.	
Do not store flammable liquids such as gasoline and diesel fuel in the treatment plant premises where they may cause a fire or leak onto the floor causing hazardous working conditions.	
Do not allow accumulation of oily rags and papers as they can spontaneously combust.	
Consider the size and weight of any object before attempting to lift or move the object. Do not lift any materials that cannot be handled comfortably. If necessary, take assistance or wait until assistance is available. When carrying objects near treatment modules take extra care to avoid falling in the tanks or dropping objects into the tanks.	
Use carbon dioxide or halon compressed gas extinguishers to control fires.	

Table 5.7.2: Safe storage conditions of materials

UNIT 5.8: Sampling Safety

Unit Objectives

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

1. Illustrate the safety practices.

Outmost care should be taken while sampling faecal sludge and transporting the samples to laboratory. This includes the following precautions:

Do's

1. Wear personal protective equipment

2. Handle samples with care to avoid spillage

3. Perform hand hygiene in case of contact with the faecal sludge

4. Clean up the sampling area after use

5. Clean sampling equipments after use

6. Tightly close the lid of the sample bottles to avoid leakage

7. Store samples in ice box. Transport the samples in the same ice box.

Dont's

1

Do not touch with bare hands and foot

UNIT 5.9: Managing Movement of Vehicles within the Plant

Unit Objectives

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

1. Manage the easy movement of vehicles within the plant.

Managing movement of vehicles within the plant is essential to avoid accidents. This includes managing the movement of:

- Desludging trucks
- Vehicles of the staff and visitors
- Any other vehicles

Checklist for vehicle movement within the plant	
Desludging trucks coming to the plant for disposal or cleaning should move only on their pre-defined route within the plant	
Vehicles of staff and visitors should be parked in designated parking area	
Other vehicles coming to the plant for maintenance purpose should follow the route for desludging trucks.	
All the personnel on the vehicle should wear gloves	

Table 5.9.1: Checklist for easy vehicle movement

UNIT 5.10: Medication

Unit Objectives

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

1. Follow the safety precautions at the workplace.
2. Illustrate the First-aid procedure.

Faecal sludge being a bio-hazardous material can affect your health. Besides this a number of chemicals are used to treat the FS, direct exposure to which can affect your health. Similarly, fall and accidents in FSTPs are things to be watched out for. Some of the common sickness, experienced by people working at FSTP are:

- Stomach infection
- Diarrhea
- Jaundice
- Typhoid
- Worm infestation
- Falls
- Cuts
- Burns
- Bleeding
- Fractures
- Electric shocks

5.10.1 Precautions to be Undertaken

The following precautions can help in avoiding serious health hazards while working at the FSTP:

Wear personal protective equipment	
Perform hand hygiene	
Always be alert at work	
Take vaccination: Ask your employer to provide vaccines against: • hepatitis A= 2 doses at least 6 months apart • typhoid= One dose provides protection. It should be given at least 2 weeks before travel to allow the vaccine to work. A booster dose is needed every 2 years for people who remain at risk.	
Deworming tablet: once in every 6 months	

Tetanus injection: to be taken following an injury. It is not required only if the last dose of the primary series, or of subsequent booster injections, was given less than 5 years ago for dirty wounds or less than 10 years ago for clean wounds	

Table 5.10.1: Safety precautions

5.10.2 First Aid

First aid is the initial assistance provided to any person suffering a sudden illness or injury, care provided to preserve life, prevent the condition from worsening, or to promote recovery. Since FSTPs are usually located in the periphery of the city, first aid should be available on the FSTP campus at all times to deals with any medical emergency situation till professional medical help comes. Creating A first aid kit is the first step towards being prepared to give first aid.

List the number of the nearby hospitals and emergency medical services

Anti-bacterial soap

Anti-bacterial wipes in case of heavy bleeding

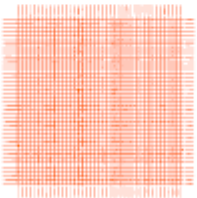
Disinfection solution/ lotions/ powders: to be used to disinfect cuts and abrasion

Cotton: rolls and balls: for applying anti-septic lotions, medicine; to stop bleeding and to dress the wounds

Tweezer: can be used to remove debris such as glass, dirt, or splinters from a wound.

Adhesive bandages in different sizes

Sterile gauze pads



Bandage: in case of larger cuts

Safety Pins: can be used to hold and secure wraps and bandages

Adhesive Tape: used for holding a bandage or other dressing onto a wound.

Scissors: in order to cut the bandage

Anti-septic cream/ ointment: to be applied on minor cuts, burns, grazes, scalds

Crepe Bandages: to be used in case of a sprain in joints

Oral Rehydration Solution: to be used in case someone is feeling dehydrated or having diarrhoea

Thermometer: to test temperature of the person

- Keep the first aid kit in a clean, cool and dry place.
- Keep the first aid kit in an easily accessible location and everyone in the plant should know it.
- Some items, such as solutions, may have use-by dates. Check regularly and replace when necessary.
- If an item is used from the first aid kit, promptly replace it

5.10.3 Administering First Aid for Different Kinds of Situation

5.10.3.1 Diarrhoea

Diarrhoea is the most common illness among sanitation workers. This is mainly due to accidental ingestion of pathogens.

Prevention: Wearing gloves while working and taking de-worming tablets can help prevent diarrhoea.

The following are the steps to be taken to provide first aid for diarrhoea:

Make sure the person drinks more fluids than they are losing through diarrhoea. Give the person Oral Rehydration Solution regularly to replace the fluid.	
Have the person rest as needed and avoid strenuous exercise. Send the person to residence, if possible. Ask the person to continue drinking fluids and ORS.	
Medical advice should be sought if symptoms do not improve in 48 hours.	

Call the doctor immediately if any of the following symptoms are there:
• Severe abdominal or rectal pain
• Blood in stool
• Black, tarry stools
• High fever (greater than 101.3 F)
• Signs of dehydration such as:
  ○ Moderate dehydration
  ▪ Thirst
  ▪ Dry or sticky mouth
  ▪ Not peeing very much
  ▪ Dark yellow pee
  ▪ Dry, cool skin
  ▪ Headache
  ▪ Muscle cramps
  ▪ Signs of severe dehydration include:
  ○ Not peeing or having very dark yellow pee
  ▪ Very dry skin
  ▪ Feeling dizzy
  ▪ Rapid heartbeat
  ▪ Rapid breathing
  ▪ Sunken eyes
  ▪ Sleepiness, lack of energy, confusion or irritability
  ▪ Fainting
	
	 

Table 5.10.2: First-aid procedure for diarrhoea

In case you are the one suffering, take the above measures as applicable and call for help if needed.

5.10.3.2 What should be done if someone is not breathing and heart beat has stopped?

You may find a person not breathing and their heart beat stopped under a number of circumstances:

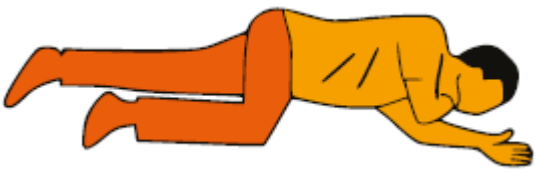
- Head injury
- Heavy bleeding
- Heat stroke
- Burns
- Electric shock

The person should receive immediate medical attention. Call the nearest hospital to send an ambulance. Meanwhile, the person should be given first aid, which is as follows:

- Take the person to a safe space away from dust and debris.
- Tap the person's shoulder and shout to see if the person can here you.
- Call the nearest hospital for an ambulance. In case you are not able to make the call, ask someone to do so.

- Loosen any tight clothing, if possible.
- First, open a person's airway to check if they are breathing (don't begin CPR if a patient is breathing normally).
- Check Airway
    - Clear any obstruction in the airway: The most common cause of airway obstruction is the tongue. To keep the airway open, perform the head-tilt, chin-lift. Place one hand on the victim's forehead and put the fingers of your other hand under the bony part of the chin. Press down on the forehead and lift out the chin so that the mouth is slightly open. If you suspect a spinal injury, do not press down on the forehead nor tilt the head back. Perform a chin lift only. The victim may start to breathe after you open the airway.

- If the victim is breathing, and no spine injury is suspected, place in the Recovery Position (on his/her side (preferably left) extending the lower arm above the head).



- If an obstruction to the airway is visible in the back of the mouth and the victim is unconscious, remove the object with your index finger. (Gloves should be worn.)
- Never place your fingers in the mouth of a conscious or semiconscious individual. If the victim is conscious, give first aid for Choking (Handal, n.d.)

CPR: Cardiopulmonary Resuscitation

Do hands-only CPR (Cardiopulmonary Resuscitation) to help circulation and get oxygen into the body.

1	Call 108/Ambulance or ask someone else to	
2	Kneel besides victims chest. Loosen clothing if practical.	
3	**Position your hand** Make sure the patient is lying on their back on a firm surface. Kneel beside the paitent and place the heel of your hand on the centre of the chest.	
4	**Interlock fingers.** Keeping your arms straight, cover the first hand with the heel of your other hand and interlock the fingers of both hands together. Keep your fingers raised so they do not touch the patient's chest or rib cage.	
5	**Give chest compressions** Lean forward so that your shoulders are directly over the patient's chest and press down on the chest about two inches. Release the pressure, but not your hands, and let the chest come back up. Repeat to give 30 compressions at a rate of 100 compressions per minute. Continue until patient starts breathing normally or medical help has arrived or you are exhausted giving CPR.	

Table 5.10.3: CPR method

5.10.3.3 Choking

Choking occurs when a foreign object lodges in the throat or windpipe, blocking the flow of air. In adults, a piece of food often is the culprit. Since choking cuts off oxygen to the brain, give first aid as quickly as possible.

Prevention: Wearing mask while at work can help protect against choking to some extent.

The universal sign for choking is hands clutched to the throat. If the person doesn't give the signal, look for these indications:

- Inability to talk
- Difficulty breathing or noisy breathing
- Squeaky sounds when trying to breathe
- Cough, which may either be weak or forceful
- Skin, lips and nails turning blue or dusky
- Skin that is flushed, then turns pale or bluish in colour
- Loss of consciousne

If the person is able to cough forcefully, the person should keep coughing. If the person is choking and can't talk, cry or laugh forcefully, the American Red Cross recommends a "five-and-five" approach to delivering first aid:

Give 5 back blows	Give 5 abdominal thrusts	Alternate
Stand to the side and just behind a choking adult. Place one arm across the person's chest for support. Bend the person over at the waist so that the upper body is parallel with the ground. Deliver five separate back blows between the person's shoulder blades with the heel of your hand.	Perform five abdominal thrusts (also known as the Heimlich manoeuvre).	Alternate between 5 blows and 5 thrusts until the blockage is dislodged.

To perform abdominal thrusts (Heimlich manoeuvre) on someone else

The American Heart Association doesn't teach the back-blow technique, only the abdominal thrust procedures. It's OK not to use back blows if you haven't learned the technique. Both approaches are acceptable. To perform abdominal thrusts (Heimlich manoeuvre) on someone else:

- Stand behind the person. Place one foot slightly in front of the other for balance. Wrap your arms around the waist. Tip the person forward slightly. If a child is choking, kneel down behind the child.
- Make a fist with one hand. Position it slightly above the person's navel.
- Grasp the fist with the other hand. Press hard into the abdomen with a quick, upward thrust — as if trying to lift the person up.
- Perform between six and 10 abdominal thrusts until the blockage is dislodged.

If you're the only rescuer, perform back blows and abdominal thrusts before calling your local emergency number for help. If another person is available, have that person call for help while you perform first aid. If the person becomes unconscious, perform standard cardiopulmonary resuscitation (CPR) with chest compressions and rescue breaths.

If you are the one who is choking then perform the abdominal thrusts on yourself as follows:

Abdominal thrusts (Heimlich manoeuvre) on yourself: First, if you're alone and choking, call your local hospital immediately. Then, although you'll be unable to effectively deliver back blows to yourself, you can still perform abdominal thrusts to dislodge the item.

- Place a fist slightly above your navel.
- Grasp your fist with the other hand and bend over a hard surface — a countertop or chair will do.
- Shove your fist inward and upward.

To clear the airway of a pregnant woman or obese person:

- Position your hands a little bit higher than with a normal Heimlich manoeuvre, at the base of the breastbone, just above the joining of the lowest ribs.
- Proceed as with the Heimlich manoeuvre, pressing hard into the chest, with a quick thrust.
- Repeat until the food or other blockage is dislodged. If the person becomes unconscious, follow the next steps.

To clear the airway of an unconscious person:

- Lower the person on his or her back onto the floor, arms to the side.
- Clear the airway. If a blockage is visible at the back of the throat or high in the throat, reach a finger into the mouth and sweep out the cause of the blockage. Wear gloves. Don't try a finger sweep if you can't see the object. Be careful not to push the food or object deeper into the airway.
- Begin CPR if the object remains lodged and the person doesn't respond after you take the above measures. The chest compressions used in CPR may dislodge the object. Remember to recheck the mouth periodically. Refer **CPR: Cardiopulmonary Resuscitation**, (Mayo Clinic, 2017).

5.10.3.4 Heat Stroke

Staff working at the FSTP work in open environment for long hours. In Indian conditions, where summer are very hots for most part of the country, there is a possibility of heat strokes. Symptoms of heat stroke:

- Core temperature is greater than 40 oC or 104oF
- Dizziness
- Throbbing heart
- Red, hot and dry skin
- Muscle cramps or weakness
- Rapid, shallow breathing
- Unconsciousness
- Lack of sweating despite of heat
- Seizures
- Nausea and vomiting
- Behavioural changes such as confusion, disorientation or staggering

Take the following steps to provide first aid for heat stroke:

Heat stroke is a medical emergency and can be fatal if immediate medical care is not provided. Call the nearest hospital for ambulance or rush the person to the hospital.

Meanwhile, take the following steps to provide first aid by the time the person gets medical help:

- Lower Body Temperature While Waiting for Emergency Services to Arrive
- Get the person into air conditioning if possible or out of the sun and into the shade.
    - Spray the person with cool water, or apply cold wet clothes or ice packs to the armpits, neck, and groin. Fan air across the person to increase cooling. These methods help cool the person more quickly.

- Do not give the person anything to drink if the person is not alert or is vomiting.

- Treat Symptoms
  - If the person experiences seizures, keep him or her safe from injury.
  - If the person vomits, turn the person on his or her side to keep the airway open.

In case you are the one suffering, take the above measures and call for help.

5.10.3.5 Minor Cuts

Workers at FSTP can get injured and bleed under a number of circumstances such as:

- Handling broken items such as glass, metals etc
- Tripping over or falling down

Take the following measures to provide first aid for the following:

Wash your hands thoroughly before touching the wound. Wear a pair of gloves.	
Stop the Bleeding: Apply direct pressure on the area	
Clean and Protect: Clean the area with warm water and gentle anti-septic soap. Apply an anti-septic ointment to reduce chance of infection. Put a new adhesive bandage on the area.	
Call a health care provider if: • The cut is deep or over a joint • You cannot get the cut or laceration clean • The injury is a deep puncture wound or the person has not had a recent (within the last 5 to 10 years) tetanus shot or booster • The cut is from a human or animal bite (WedMD, 2018)	

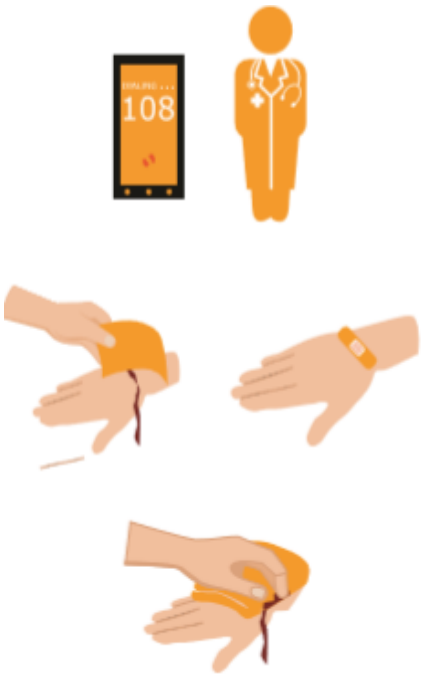
Table 5.10.4: First-aid for minor cuts

In case you are the one suffering, take the above measures as applicable and call for help if needed. If the bleeding is heavy, refer to the next section.

5.10.3.6 Heavy Bleeding

Take the following measure to provide first aid for heavy bleeding:

- Wash your hands thoroughly before touching the wound. Wear a pair of gloves.
- Clean the wound with a gauze pad or cloth in saline solution or tap water, or use an alcohol-free wipe, and gently dab or wipe the skin with it
- gently pat the area dry using a clean towel or pad of tissues, but nothing fluffy such as a cotton wool ball –strands of material can get stuck to the wound
- apply a sterile dressing, such as non-adhesive pad with a bandage, or a plaster – use a waterproof dressing if available.
- if blood soaks through the dressing, leave it in place and add another dressing, and continue to apply pressure on the wound to stop or slow down the flow of the blood.



Do's for heavy bleeding

1. Reassure victim that help is on the way.

2. Be calm.

3. Call emergency as soon as possible or take the patient to the hospital

4. Call ambulance immediately

5. Check victim's status regularly

6. Use direct pressure to stop bleeding

7

Check to see if victim's airways are clear

8

If no pulse or respiration, start CPR

9

To prevent transmission of disease, use latex gloves

10

Raise head if bleeding in upper body areas

11

Raise feet if bleeding in lower body areas

Don'ts for heavy bleeding

1

Don't move the patient if not required

2

Always suspect "spinal injury" (and don't move the victim)

3

Don't set fractures and breaks (simply immobilize the victim)

4

Use "direct" pressure to stop bleeding

5

Don't remove items imbedded in the eye

6

Don't use burn ointments

Source: (National Health Portal, India, 2019)

In case you are the one suffering, take the above measures and call for help.

5.10.3.7 Abdominal Wound

In case the wound is caused by tripping over a sharp object with stomach down or some form of deliberate or accidental injury to the abdomen, the patient must be taken to the hospital immediately. However, on the way to the hospital, the following first aid measures must be taken:

- Keep the patient flat on his back.
- Give nothing by mouth.
- Maintain warmth.
- If intestines protrude from the wound, do not attempt to touch or replace them.
- Apply sterile dressing and binder on the wound.
- Provide immediate transportation to the hospital.
- (Ministry of Labour & Employment, n.d.)

In case you are the one suffering, call the nearest hospital for help immediately.

5.10.3.8 Head Injury

Head injuries usually happen if a person falls or trips from a height or hits a hard, blunt or sharp object with their head. This can be prevented by wearing a helmet while working on the treatment plant machineries.

Most head trauma involves injuries that are minor and don't require specialized attention or hospitalization. However, even minor injuries may cause persistent chronic symptoms, such as headaches or difficulty in concentrating.

Call local emergency number or take the person to the hospital if any of the following signs or symptoms are apparent, because they may indicate a more serious head injury.

Symptoms of head injury:

- Head or facial bleeding
- Bleeding or fluid leakage from the nose or ears
- Headache
- Change in level of consciousness for more than a few seconds
- Black-and-blue discoloration below the eyes or behind the ears
- Cessation of breathing
- Confusion
- Loss of balance
- Weakness or an inability to use an arm or leg
- Unequal pupil size
- Slurred speech
- Seizures

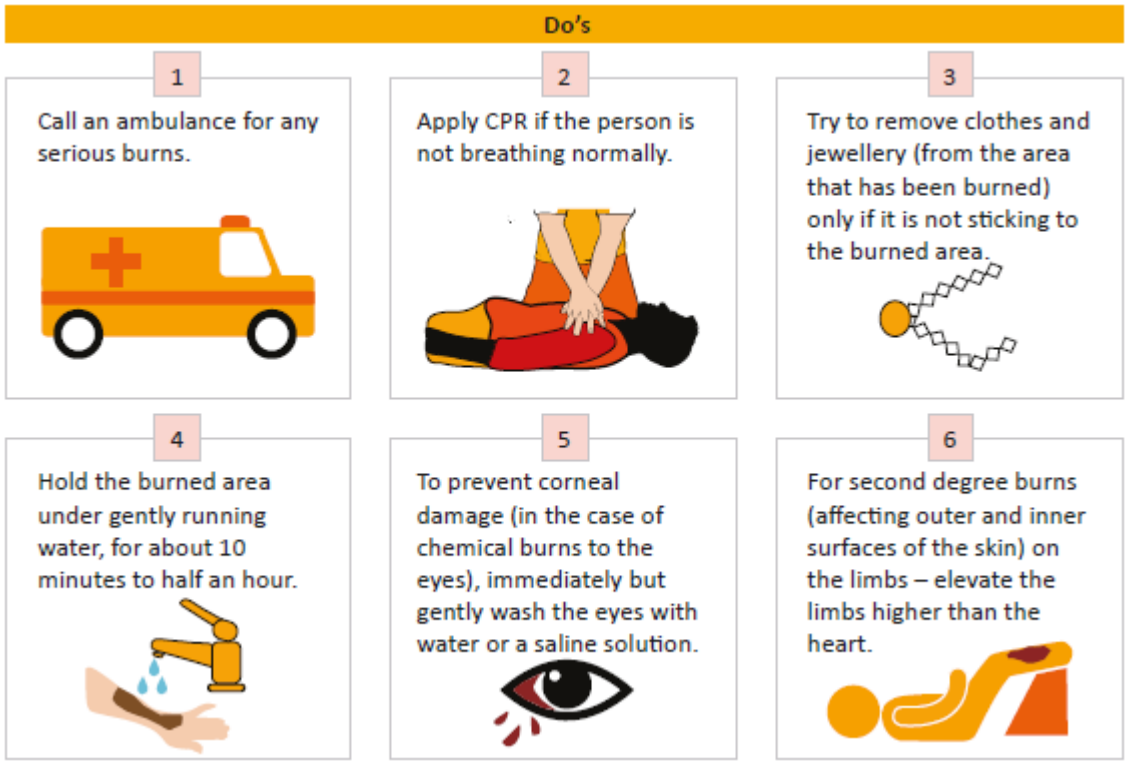
Until medical help is reached, take the following steps:

Keep the person still: Until medical help arrives, keep the injured person lying down and quiet, with the head and shoulders slightly elevated. Don't move the person unless necessary, and avoid moving the person's neck. If the person is wearing a helmet, don't remove it.	
Stop any bleeding: Apply firm pressure to the wound with sterile gauze or a clean cloth. But don't apply direct pressure to the wound if you suspect a skull fracture.	
Watch for changes in breathing and alertness: If the person shows no signs of circulation — no breathing, coughing or movement — begin CPR. (Mayo Clinic, 2018)	

Table 5.10.5: First-aid for head injury

In case you are the one suffering, call the nearest hospital for help immediately.

5.10.3.9 Burns



7

To reduce shock as well as loss of body heat, place clean, dry, non-fluffy cloths lightly over the burn.

8

Cover the person with a cool, wet, lint-free cloth, while waiting for an ambulance or when transporting the person to hospital.

Do's

1

Do not apply lotions, butter, grease or oil to burned area.

2

Do not use ice, as it may cause frostbite.

3

Do not remove any piece of clothing or any other thing stuck to the burnt area but remove clothing and other items around the burnt area.

4

Do not put plaster on the burnt area.

(National Health Portal, India, 2019)

In case you are the one suffering, take the above measures as applicable and call for help if needed.

5.10.3.10 Heat Stroke

Tilt the head backwards: This is done to avoid tongue to fall backwards and block the airway. Tilting the head backwards and pulling the tongue forward will help to clear the airways.

If you suspect a back or neck injury, it is still advisable to tilt the head slightly in order to help the patient breathe. The priority is to keep the patient breathing. Try to keep their spine in a straight line when turning them. If possible, get someone's else to help to turn them.

If someone is feeling faint, advise them to lie down on their back and raise their legs to improve blood flow to the brain. Fainting is caused by a temporary reduction in the flow of blood to the brain and can result in a brief loss of consciousness. A person who has fainted should quickly regain consciousness. If they don't, treat them as an unconscious person.

Give hands-only CPR.

(National Health Portal, India, 2019)

5.10.3.11 Burns

Symptoms of nose-bleeding:

- Bleeding from either or both nostrils
- Sometimes bleeding from ears/ mouth too.

Q. What are the causes of nose bleeding

- Dryness
- Blowing nose with force
- Use of medications, like aspirin
- Nose picking
- Pushing objects into nose
- Injuries / blow to the nose
- Infections of the nose
- Atherosclerosis
- Blood-clotting disorders

Q. How to manage nose bleeding?

- One should not panic and should make the patient sit in upright position with his head slightly forward.
- With thumb and index finger, one should apply pressure on soft part of nostrils below the nose bridge.
- Continue applying pressure until the bleeding stops.
- Ask the patient to breathe through the mouth while nostrils are pinched
- Loosen the tight clothing around the neck
- After 10 minutes, release the pressure on the nostrils and check to see if the bleeding has stopped
- If bleeding persists, seek medical aid

Note: Ask the patient not to sniff or blow their nose for at least 15 minutes

In case you are the one suffering, take the above measures as applicable and call for help (preferably the nearest hospital) immediately

5.10.3.12 Poisoning

There are chances of poisoning in an FSTP if person deliberately or accidently swallows, inhales or comes in direct contact with the chemicals present in the FS or used in treatment or analysis of FS. Rush the person to the nearest hospital or call the ambulance, whichever is earlier.

Meanwhile professional medical help is reached, the following needs to be done:

- Swallowed poison. Remove anything remaining in the person's mouth. If the chemical is identified, follow the instructions written on the bottle for accidental poisoning.
- Poison on the skin. Remove any contaminated clothing using gloves. Rinse the skin for 15 to 20 minutes in a shower or with a hose.
- Poison in the eye. Gently flush the eye with cool or lukewarm water for at least 15 minutes or until help arrives.
- Inhaled poison. Get the person into fresh air as soon as possible.
- If the person vomits, turn his or her head to the side to prevent choking.
- Begin CPR if the person shows no signs of life, such as moving, breathing or coughing.
- Have somebody gather the bottles, packages or containers with labels, and any other information about the poison to give to the ambulance team.

In case you are the one suffering, take the above measures as applicable and call for help (preferably the nearest hospital) immediately

5.10.3.13 Snake Bite

- Keep the victim calm, restrict movement.
- Assure the victim and do not let him panic. When under panic, it will enhance heart rate and would circulate the venom faster in the body.
- Remove any rings or constricting items; the affected area may swell.
- Stop lymphatic spread of venom - bandage firmly, splint and immobilise. The limb, which has been affected by the bite, should be immobilized with splint. Victim to keep the hand as close to the level of the heart as possible - this reduces the flow of venom to major areas. A compression bandage (as firm as you would put on a sprained ankle) should cover the entire limb with the splint. The wrapping should start from the digits and extend till armpit in case of hands and groin in case of bite to the leg.
- A snakebite victim is under tremendous psychological stress. It is necessary to keep the patient warm. However, no alcohol/hot beverages should be given.
- The patient should not be allowed to exert himself in any manner. Do not allow the victim to eat or to drink water in order to keep metabolism at low rate. No water No food is the golden rule.
- DO NOT COVER THE BITE AREA AND PUNCTURE OR CUT MARKS. The wound should be gently cleaned with antiseptic.

- Try to aspirate the venom out of the puncture marks with standard suction devices. It has been identified that a suction more than 270 mmHg can initiate the flow from the puncture marks. Suction instruments often are included in commercial snakebite kits. But the suction should be applied within 5 minutes of the bite.
- The only remedy for venomous snakebite is the anti-venom serum, which is available at most government hospitals and public health centres. Some private nursing homes have also started stocking it and treat snakebite cases. (Auroville, 2014)

First- Aid treatment protocol

First-aid currently recommended may be remembered by mnemonic **" CARRY NO R.I.G.H.T"**		
CARRY	Do not let victim to walk even for short distance. Transport by conveyance, especially when bite is in legs	
NO	NO- Tourniquet. NO- Cutting. NO- Electrotherapy. NO- Pressure immobilisation, nitric oxide donor (nitrogesic ointment/nitrate spray)	
R.I.G.H.T.		
R.	Reassure patient, since 70% of all snake bites are from non- venomous species. Only 50% of bites by venomous type of snakes actually envenomate (poison with venom) victims.	
I.	Immobilise limb in a fashion similar to a fractured limb, in case of bites on the limb. A bandage or cloth is used to hold the splints. Do not apply pressure and ensure that blood supply is not blocked. Compression in the form of tight ligatures does not work and may be dangerous even.	
G.H.	Get to Hospital immediately.	
T.	Tell any systemic symptoms that manifest on way to hospital.	

Table 5.10.6: First-aid treatment protocol

(National Health Portal, India, 2019)

In case you are the one suffering, take the above measures as applicable and call for help (preferably the nearest hospital) immediately.

5.10.3.14 Fractures

Symptoms of a broken bone:

- Pain and bleeding
- Swelling
- Bruising or discoloured skin around the affected area
- The patient is unable to put weight on the injured area
- The patient cannot move the affected area

(National Health Potral, India, 2015)

First-aid care for a broken bone

- Stop any bleeding: Elevate and apply pressure to the wound using a sterile bandage, a clean cloth, or a clean piece of clothing. Refer to Heavy bleeding
- Immobilize the injured area: If you suspect they've broken a bone in their neck or back, help them stay as still as possible. If you suspect they've broken a bone in one of their limbs, immobilize the area using a splint or sling.
- Apply something cold to the area: Wrap an ice pack or bag of ice cubes in a piece of cloth and apply it to the injured area for up to 10 minutes at a time.
- Treat them for shock: Help them get into a comfortable position, encourage them to rest, and reassure them. Cover them with a blanket or clothing to keep them warm.
- Get professional help: Call the nearest hospital or clinic or help them get to the emergency department for professional care.
- If the person doesn't appear to be breathing, is unconscious, or both, medical help and begin CPR.

5.10.3.15 Electric Shock

The danger from an electrical shock depends on the type of current, how high the voltage is, how the current travelled through the body, the person's overall health and how quickly the person is treated. Seek immediate medical help if the patient is showing the following symptoms:

- Severe burns
- Confusion
- Difficulty breathing
- Heart rhythm problems (arrhythmias)
- Cardiac arrest
- Muscle pain and contractions
- Seizures
- Loss of consciousness

Do's and Don't

Don't touch the injured person if he or she is still in contact with the electrical current.	
Turn off the source of electricity, if possible. If not, move the source away from you and the person, using a dry, nonconducting object made of cardboard, plastic or wood.	
Call your nearest hospital or local emergency number or take the person there.	
Don't move a person with an electrical injury unless he or she is in immediate danger.	
Take these actions immediately while waiting for medical help: • Begin CPR if the person shows no signs of circulation, such as breathing, coughing or movement. • Try to prevent the injured person from becoming chilled. • Apply a bandage. Cover any burned areas with a sterile gauze bandage, if available, or a clean cloth. Don't use a blanket or towel, because loose fibres can stick to the burns.	

Table 5.10.7: Dos and don'ts while electric shock

5.10.4 Handling a Medical Emergency

A sudden onset of medical condition characterised by acute symptoms of sufficient severity such that the absence of medical attention could reasonably be expected to result in:

- placing the patient's health in serious jeopardy,
- serious impairment to bodily functions or serious dysfunction or any bodily organ or part.

Steps to be followed while administering first aid during a medical emergency.

Keep the victim lying down.Examine the victim- look for serious bleeding

Lack of breathing and poisoning.

Keep the victim warm.

Send someone to call a physician or ambulance.

Remain calm. Do not be rushed into moving the victim unless absolutely necessary.

Never give an unconscious victim anything to eat or drink.

If there is a crowd, keep it away from the victim.

Ensure the victim is comfortable.

Don't allow the victim see his injury.

Give CPR, if required.

Source: (Operation and Maintenance Manual FSTP, Devanahalli)

UNIT 5.11: Contingency Measures in Case of Emergencies within the Plant

Unit Objectives

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

1. Handle the operational emergencies.
2. Demonstrate to use a fire extinguisher.

Given the number of hazardous materials at the FSTP, a contingency plan should be prepared beforehand to handle such situation. Broadly the emergency measures at the FSTP can be divided into operational emergencies, fire emergency, security emergency and medical emergency. Medical emergency has already been elaborated in unit Handling a medical emergency. This unit focuses on operational emergencies, fire emergencies and theft or vandalism.

General steps to be taken in order to be able to handle of any emergency at the FSTP:

- Prepare a list of emergency contact numbers.
  - Number of the police station in whose jurisdiction the FSTP falls
  - Number of the nearest hospital
  - Number of the fire brigade under whose jurisdiction the FSTP falls.
- This contact list should be posted at multiple locations around the plant and should be easily visible from all the staff and visitors.

For all FSTPs, but especially those in remote areas, first aid materials, supplies and equipment must be provided. A typical emergency procedure consists of the following actions:

Call your nearest hospital or local emergency number or take the person there.	
Contacting the appropriate emergency personnel: this can be a fire fighter in case of a fire and an ambulance in case of a medical emergency.	
Contacting the plant manager if not already on site; and providing support to affected personnel until emergency personnel arrives and takes control of the emergency situation.	

Table 5.11.1: Emergency procedure

Emergencies must be documented on an emergency report form that is then sent to management for investigation. All emergencies must also be fully detailed in the operators log book.

5.11.1 Operational Emergencies

5.11.1.1 In Case of Spillage from the Truck

Cause: Failure of outlet valve of desludging vehicle or wrong operation of outlet valve of the desludging vehicle.

How could this happen?

- Damage of the desludging vehicle's outlet valve during feeding into the receiving station
- Desludging vehicle outlet valve stuck in open position during feeding into the receiving station
- Spillage from the hose pipe used for feeding of faecal sludge into the receiving station

Emergency response measures to be taken:

- Desludging vehicle driver should close the outlet valve according to their standard operation.
- To clean the spilled sludge, pour soil over the sludge and let it dry for at least 2 hours and then clean it with water

5.11.1.2 In Case of Spillage from the Valves

Cause: Failure of valve due to blockages or wrong operation of valves.

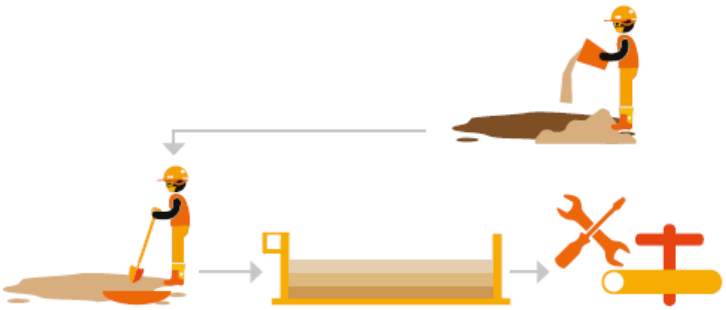
How could this happen?

- Failure of valve may happen due to solid waste/debris stuck at the valve's opening.
- Damage to the valve may happen due to wrong operations of the valve by the operator and turning the valves in the wrong direction forcefully.

Emergency response measures to be taken:

If sludge has spilled near the valve, clean the sludge performing the following steps.

- Pour soil over the sludge. Leave it for at least 2 hours.
- Using the shovel collect all the soil mixed with sludge in a plastic bowl.
- Dispose this sludge in the Sludge Drying bed SDB.
- Report the problem to the Urban Local Body.
- Repair or replace the valve if necessary.



5.11.1.3 Overflow from any Treatment Modules

Cause: The module outlet or the inlet of the next downstream module is clogged.

How could this happen?

- This can happen due to excessive accumulated scum or sludge as well as debris blocking the pipes or modules.
- Crushed or frozen modules or damage in the pipes connecting the various modules or excessive inflow of water into the module due to flooding may also be responsible for this kind of issue

Emergency response measures to be taken:

- Stop the flow into the module immediately if any.
- Clear the blockage in the pipes by inserting an iron bar or as instructed by the manufacturer of the treatment module and force pump water.
- Check if any debris is stuck in between outlet of the module and inlet of downstream module. If found, try to push it to the next module using the iron bar or as instructed by the designer of the treatment module and collect the debris from the inlet of downstream module. If debris cannot be moved from its place, immediately report it to the plant manager
- Check for damage/crushing of pipe. If found, immediately report it to the plant manager.
- Repair or replace the valve if necessary.

5.11.1.4 Gas Leakage

How could this happen?

This can happen due to external physical damage to a pipe or a treatment module

Emergency response measures to be taken:

- Locate where the smell is coming from;
- If damage is found, inform the plant manager
- Do not light any flammable objects near the area of gas leakage.

5.11.2 Fire Emergency

Due to the number of chemicals and the flammable nature of the methane present in faecal sludge, fire is a real hazard at the FSTP. The following are the measures which should be taken in the event of a fire.

Learn the cause

It is crucial to learn that there are four classes of fires (A, B, C, D) depending on the source of fire. Fires can be set off by different factors: chemical, physical, mechanical or electrical. They can occur because of facilities or equipment, or unground electrical connections (wiring), accumulation, storage and improper handling of combustible materials, tank or fuel spillage and for each of these kinds of fires.

Fire extinguishers

Different substances are used to extinguish fire depending on the source of origin. The equipments containing these substances are called EXTINGUISHERS. Fire extinguishers should be located in an area which is visible and easily accessible. It is portable and can be easily transferred to the site of incipient fire.

Remember

When fire is past its incipient stage, it is usually too big to fight with fire extinguisher and in that case safe evacuation is the best strategy.

Classification of fire and extinguishing agent

Type of Fire
Class A

Source of origin
Fires involving solid combustible materials of organic nature such as wood, paper, rubber, plastics, etc, where the cooling effect of water is essential for extinction of fires

Extinguishing agent : Water, foam, ABC dry power and halocarbons.

Type of Fire
Class B

Source of origin
Fires involving flammable liquids or liquefiable solids or the like where a blanketing effect is essential.

Extinguishing agent : Foam, dry powder, clean agent and carbon dioxide extinguishers.

Type of Fire
Class C

Source of origin
Fires involving flammable gases under pressure including liquefied gases, where it is necessary to inhibit the burning gas at fast rate with an inert gas, powder or vaporising liquid for extinguishment.

Extinguishing agent : Dry powder, clean agent and carbon dioxide extinguishers.

Type of Fire
Class D

Source of origin
Fires involving combustible metals, such as magnesium, aluminium, zinc, sodium, potassium, etc, when the burring metals are reactive to water and water containing agents and in certain cases carbon dioxide, halogenated hydrocarbons and ordinary dry powders. These fires require special media and techniques to extinguish.

Extinguishing agent : Extinguishers with special dry powder for metal fires.

Type of Fire
Electrical Fire

Source of origin
Where energized electrical equipment is involved in a fire, non-conductivity of the extinguishing media is of utmost importance

Extinguishing agent : Extinguishers expelling dry powder, carbon dioxide (without metal horn) or clean agent should be used. Once the electrical equipment is de-energized, extinguishers suitable for the class of the fire risk involved can be used safely.

Type of Fire
Sensitive items

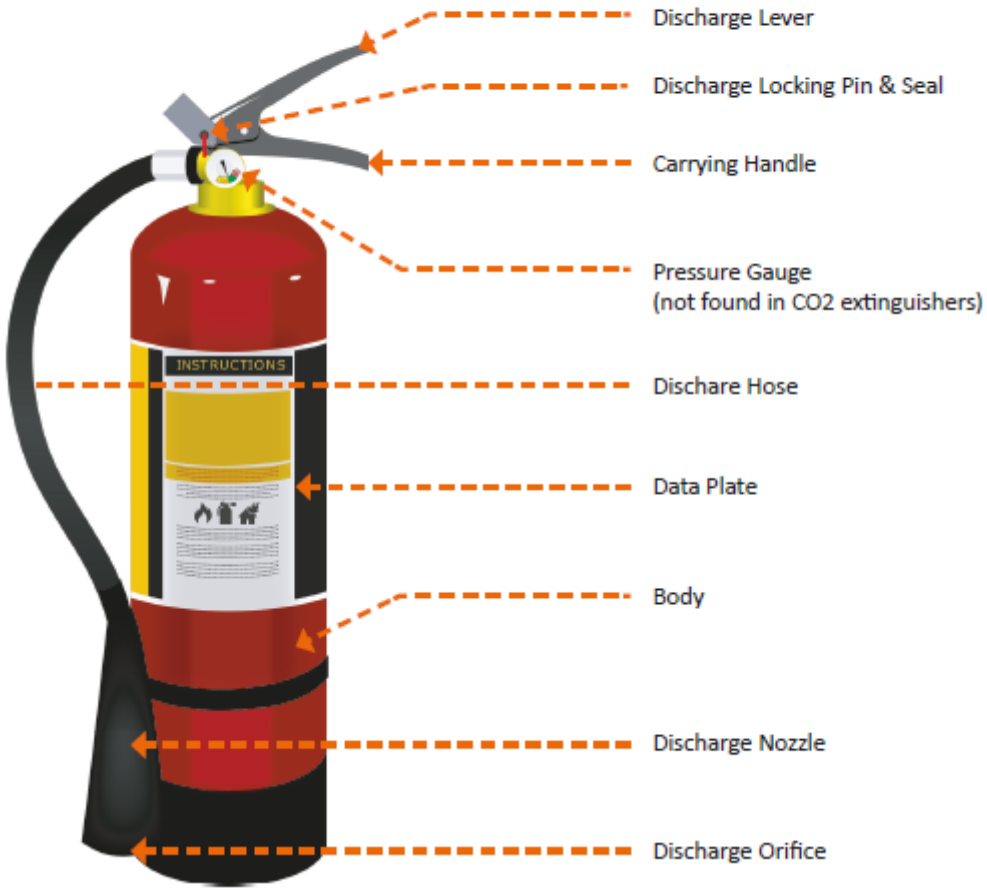
Extinguishing agent : carbon dioxide or clean agent type extinguishers

Source of origin
Equipment sensitive to dirt, contamination or whose control systems are likely to be affected are categorised as sensitive items.

(Bureau of Indian Standards, 2010)

Anatomy of a fire-extinguishers

The following first illustrates different parts of a fire extinguisher.

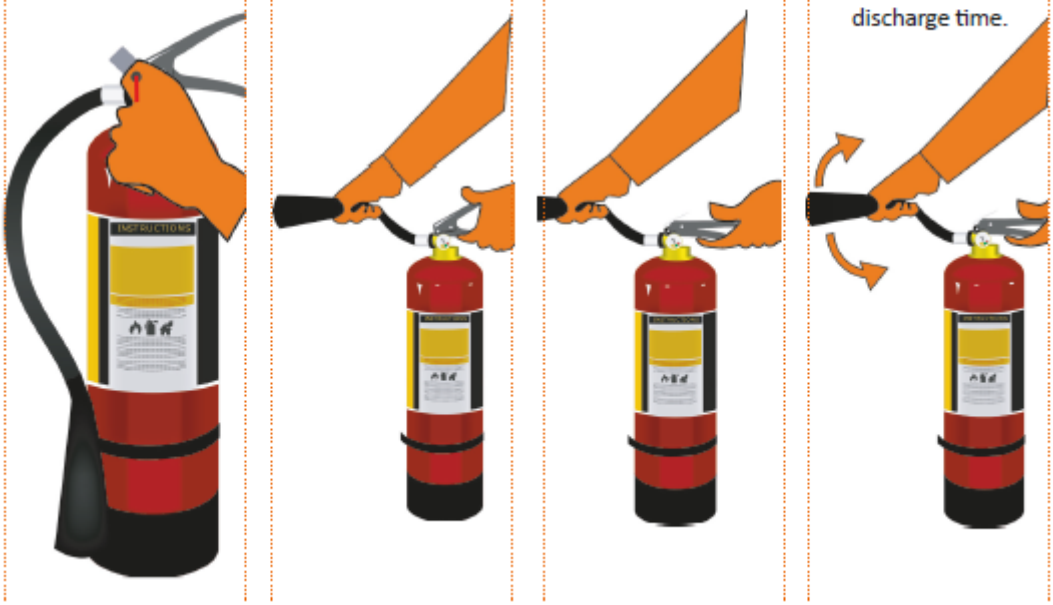


Using fire extinguisher

The steps to use a fire extinguisher is summed up using the acronym

" PASS"

P	A	S	S
PULL	**AIM**	**SQUEEZES**	**WEEP**
Pull the pin of the fire extinguisher.	Aim the nozzle at the base of the fire. Do not hit the top of the flame.	Squeeze the trigger. In a controlled manner, squeeze the trigger of the extinguisher to release the agent.	Sweep from side to side. Sweep the nozzle of the extinguisher from side to side until the fire is put out. Keep aiming at the base while you do so. Most extinguishers will give you about 10-20 seconds of discharge time.



Slowly walk backwards, away from the fire. Even if the fire appears to be extinguished, don't turn your back on it. There might be unseen hot spots or hidden fires that can ignite into a large flame at any moment. You should be cautious about it. Once a fire extinguisher has been used, it must be recharged or replaced even if the entire contents were not used.

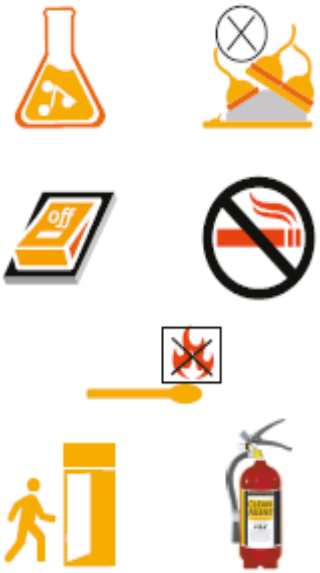
Do's and don'ts

Keep only limited people around the place of fire while extinguishing the fire. Ask the rest of the people to evacuate calmly.

Keep the fire extinguishers in places away from any corrosive fluids.

Preventive measures

- To identify the chemical properties of the products being stored
- Do not overload electric lines.
- Switch off electronic equipments when not in use
- Avoid connecting more than one appliance in each outlet.
- Redistribute equipment or install additional circuits.
- No smoking in the plant.
- Do not throw matches or any other lighted things indiscriminately. Extinguish them completely and then dispose them.
- Do not place oily rags around electric plugs, treatment modules or any other flammable items.
- Report the presence of gas or fuel leaks or flammable liquid spills.
- Identify fire exits and nearby phones to call external support groups.
- Adapt specific sites for fuel supply and storage.
- Place fire extinguishers according to the combustible material and in the appropriate places to provide emergency care.



Action in case of emergency

- Immediately warn the plant manager
- Remove people to a secure site
- If the threat is not controlled, get help from the Firefighters
- Ensure that all staff are in the safe meeting place
- After inspecting the fire investigation to proceed Start immediate evacuation, with the support of the brigade.
- Remove people at least at a distance of 10 m.

- Try to find out the source of fire and use the appropriate fire extinguisher to control the fire, if possible. If the outbreak of fire is not controlled immediately notify the firefighters.
- Help those who are injured, give first aid and take the person to the nearest hospital or call the emergency number of the hospital for sending an ambulance.

(General Guidelines on Occupational Health and Safety: Emergency and contingency plan, n.d.)

5.11.3 Security Emergency: Theft or Vandalism

Theft or vandalism of equipments and tools from the plant should be dealt as a security threat. Take the following steps in such event:

- Do not touch or move anything at the scene
- If you are not certain that the intruder has left the scene, leave.
- If people are around in the FSTP, raise an alarm
- Notify the police or call 100
- Report:
  - Location
  - Nature of the event
  - Your name and the number you are calling from
- Request immediate assistance
- Take action: Follow the instructions of the police personnel. If you are witnessing the crime, move to a safe location and call the police. Provided it is safe to do so, take a picture or record a video

(Yale University, n.d.)

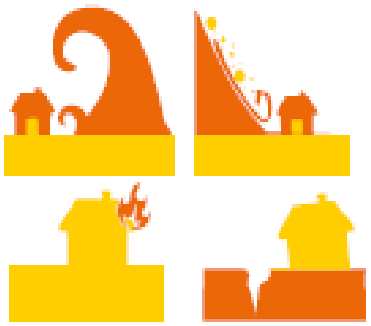
UNIT 5.12: Natural Hazard

Unit Objectives

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

1. Follow the safety procedure during a natural hazard.

Natural hazard are natural processes and therefore, human control over it is limited to preventing/ minimizing the damage to life and property. Usually FSTPs are constructed as per the standard norms, hence, the chances for damage to life and property is minimal. However, it is good to keep a watch in the deterioration of the FSTP over time and take measures to address them. At the same time, it is possible that the FSTP can be affected if the intensity of the natural hazard reaches unprecedented levels, something for which the FSTP was not constructed. Under such condition, it is essential to know the things to be done during and after the occurrence of such an event.



5.12.1 Thunderstorm

Preparedness against thunderstorm:

Look for indication of structural weakness of the FSTP such as cracks and get them repaired

Seal any leakages.

Repair any gas leakages or defective electrical wiring.

Remove dead or rotting trees and branches that could fall and cause injury or damage during a severe thunderstorm.

Regularly view the weather forecast.

Shutdown the FSTP and leave for home, if possible.

Look for early warning of thunderstorm such as vivid and frequent lightening.

Keep the emergency numbers (such as hospitals, fire brigade etc. ready)

Prepare an emergency kit with first aid, dry food items, mineral water, torch, batteries and sturdy ropes, in case of an event of thunderstorm. Periodically check the expiry date of the articles in this kit.

In case thunderstorm is forecasted, postpone outdoor activities Keep mobile phones, laptops any other chargeable items charged.

If at the FSTP during a thunderstorm:

- Stay indoors. Get inside the office of the FSTP.
- Secure all the doors, ventilation and windows.
- Unplug any electronic equipments: both plant machineries and office equipments.
- Avoid contact with corded phones and devices including those plugged for recharging.
- Avoid contact with electrical equipment or cords. Unplug appliances and other electrical items such as computers and turn off air conditioners. Power surges from lightning can cause serious damage.
- Avoid contact with plumbing. Do not wash your hands, do not take a shower, do not wash dishes, and do not do laundry. Plumbing and bathroom fixtures can conduct electricity.
- Stay away from windows and doors, and stay off porches.
- Do not lie on concrete floors and do not lean against concrete walls.
- Avoid natural lightning rods such as a tall, isolated tree in an open area.
- If in a vehicle, safely park and stay in the vehicle until the strong winds subsides. Avoid touching metal or other surfaces that can conduct electricity in and outside the vehicle.

If at the FSTP after a thunderstorm:

- Check if someone has been injured.
  - If yes, give appropriate first aid and take the person to the hospital
- Stay away from storm-damaged areas to keep from putting yourself at risk from the effects of severe thunderstorms.
- Stay away from drowned power lines and report them immediately.
- Report the damages to your plant manager

(National Disaster Management Authority, 2018)

5.12.2 Natural Hazard

Preparedness for flood:

Look for indication of structural weakness of the FSTP such as cracks and get them repaired

Seal any leakages.

Repair any gas leakages or defective electrical wiring.

Keep the emergency numbers (such as hospitals, fire brigade etc. ready)

Regularly view the weather forecast. If possible, shutdown the FSTP and leave for home

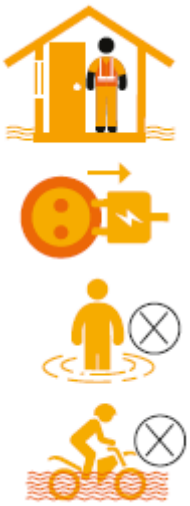
Prepare an emergency kit with first aid, dry food items, mineral water, torch, batteries and sturdy ropes, in case of an event of flood. Periodically check the expiry date of the articles in this kit.

Prepare a list of areas with higher elevation in the vicinity where you can move during flood.

Keep mobile phones, laptops any other chargeable items charged.

If at the FSTP during a flood:

- Secure all the doors, ventilation and windows of the FSTP office.
- Unplug any electronic equipments: both plant machineries and office equipments.
- Evacuate calmly and move to higher secure areas.
- Do not walk through moving water. Six inches of moving water can make you fall. If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness of the ground in front of you.
- Do not drive or ride a bike into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.



If at the FSTP after flood

- Check if someone has been injured.
  - If yes, give appropriate first aid and take the person to the hospital
- Stay away from drowned power lines and report them immediately.
- Report the damages to your plant manager

(National Disaster Management Authority, India)

5.12.3 Earthquakes

Preparedness against earthquakes

Look for indication of structural weakness of the FSTP such as cracks and get them repaired

Seal any leakages.

Anchor overhead lighting fixtures to the ceiling.

Fasten shelves securely to walls.

Place heavy objects in the lower shelves and lighter objects in the upper shelves.

Store breakable items like glass, chemicals in close but ventilated cabinets with latches.

Secure geysers, gas cylinders, huge chemical containers and flammable items to the floor or ceiling.

Keep the emergency numbers (such as hospitals, fire brigade etc. ready)

Regularly view any warnings against earthquakes in your area.

If possible, shutdown the FSTP and leave for home.

Identify safe places indoors and outdoors:
Inside:

- Under strong table
- Against an inside wall
- Away from places where glass can shatter or heavy furniture can fall.

In open, away from any collapsible structures such as buildings, trees, electric lines, telephone lines, poles, flyovers, bridges

Prepare an emergency kit with first aid, dry food items, mineral water, torch, batteries and sturdy ropes, in case of an event of flood. Periodically check the expiry date of the articles in this kit.

Look for indication of structural weakness of the FSTP such as cracks and get them repaired

If at the FSTP during an earthquake:

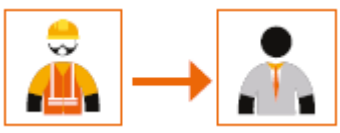
- Shutdown all electrical equipments in the FSTP and in this office.
- If indoors:
  - DROP to the ground; take COVER by getting under a sturdy table or other piece of furniture; and HOLD ON until the shaking stops. If there is no a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building.
  - Protect yourself by staying under the lintel of an inner door, in the corner of a room, under a table
  - Stay away from glass, windows, outside doors and walls, and anything that could fall, (such as lighting fixtures or furniture).
  - Move outside only if you are sure that the doorway is strong and it is safe to go outside.

- If outdoors:
  - Do not move from where you are. However, move away from buildings, trees, streetlights, and utility wires.
  - If you are in open space, stay there until the shaking stops. The greatest danger exists directly outside buildings; at exits; and alongside exterior walls. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

- If trapped under debris:
  - Do not light a match.
  - Do not move about or kick up dust.
  - Cover your mouth with a handkerchief or clothing.
  - Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.

- If in a moving vehicle
  - Stop as quickly as safety permits and stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses, and utility wires.
  - Proceed cautiously once the earthquake has stopped. Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

- If at the FSTP after an earthquake:
  - Check if someone has been injured.
    - If yes, give appropriate first aid and take the person to the hospital
  - Report the damages to your plant manager



(National Disaster Management Authority, India)

UNIT 5.13: Visit Plan

Unit Objectives

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

1. Arrange the plan for a visitor meet.

Since faecal sludge treatment plant (FSTP) is a unique and emerging solution in sanitation space, they usually attract a lot of visitors who come there for the purpose of learning, monitoring and evaluation. These visits should be planned out well so that they do not hinder the normal operations of the plant; ensure smooth learning process for the visitor and help in fulfilling the objectives of the visit. The first step towards this is creating a visit plan which should include the following:

- Time of visit
- Number of visitors
- Profile of the visitors:
  - Who are coming?
  - What are their objectives of visiting the plant?
- Classroom session for the visitors giving them the background to the plant
  - Discuss with the plant manager about it
- Visiting all the module in the treatment plant
  - Discuss with the plant manager about it
- Question and answer session
- Arrangement of refreshments keeping in mind the time of the day, budget and food preferences of the visitors.
- Distributing PR (public relations) materials such as brochure, leaflets etc.
  - Kinds of PR materials to be distributed
  - Number of PR materials to be distributed
- Creating a visitors' kit with PR materials, safety gear (gloves and helmet, if needed) and pen/pencil and note pads

5.13.1 Communication with the Visitors

The visitors come from a variety of background. Hence, the following points have to be kept in mind while communicating with them:

- Take into account the profile of the visitors
- Use simple language that is easily understood
- Be polite
- Be attentive to their queries

- Inform the visitors about the places where they can go and where they shouldn't go.
  - Visitors are not to be permitted to confined spaces and material and chemical storage areas without prior approval from the plant manager.
- Do not share sensitive information without prior approval of the plant manager

5.13.2 Emergency Situation Involving the Visitors

As discussed, there are a number of hazards in the FSTP. Refer to Major hazards at the plant. The presence of these hazards, create possibility of injury to the visitors. Refer to relevant sub-sections under section 5.10.3 Administering first aid for different kinds of situation, and 5.10.4 Handling medical emergency, to deal with any medical emergency involving the visitors. In other case such as fire or theft, follow the procedure mentioned in Contingency measures in case of emergencies within the plant. Besides this, any emergency involving the visitors should be informed to the plant manager.

5.13.3 Questions Frequently Asked by Visitor

The following are the questions visitors usually ask and you, as the FSTP operator should have the knowledge of these things:

1. What is the technology of the FSTP?
2. What is the capacity of the treatment plant?
3. When was the FSTP established?
4. What is the approximate amount of electricity consumed at the FSTP monthly?
5. How much is the amount of chemicals used at the FSTP monthly/ yearly?
6. How many people are working at the FSTP?
7. What is the approximate monthly/ yearly expenditure of the FSTP?
8. How much did it cost to establish the FSTP?
9. On an average, how much faecal sludge is received per day?
10. Where do the rejects from the FSTP go?
11. How much is earned from the sale of by-products (end products) per month

Exercise

1. What are the two-personal protective equipment to be worn in case of entering a maintenance hole?

_____

_____

_____

_____

_____

2. What are the types of emergencies in an FSTP?

_____

_____

_____

_____

_____

3. What are the types of fire extinguishers?

_____

_____

_____

_____

_____

4. What is CARRY NO R.I.G.H.T'?

_____

_____

_____

_____

_____

True or False

	T/F
1. ORS is to be given to a person suffering from diarrhoea	
2. Wet hands can be used while handling electric equipments	
3. Emergency numbers should be only available to the FSTP O&M Technician	
4. A deep wound should be washed with water	

Summary

This Chapter detailed out the various hazards in an FSTP and the resultant emergency situations. It also detailed out the preventive measures and contingency measures to handle such situations.

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6. Working Effectively with Co-Workers

Unit 6.1 - Reporting structure

Unit 6.2 - Work ethics and etiquettes

Unit 6.3 - Drug free workplace rules

Unit 6.4 - Information and data security rules

Unit 6.5 - Risk management at workplace rules

Unit 6.6 - Diversity and inclusion at workplace rules

Unit 6.7 - Facilitating the co-workers at FSSM while field visit or any investigations

Unit 6.8 - Working effectively with co-workers

SGJ/N0120

Key Learning Outcomes

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

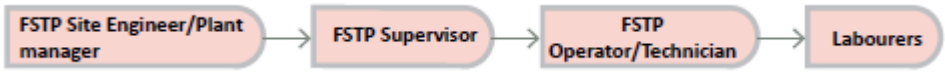
1. Identify ways to assist colleagues positively to maximize effectiveness and efficiency in carrying out tasks
2. Discuss importance of work culture
3. Demonstrate appropriate communication etiquette and dressing at work place
4. Demonstrate responsible and disciplined behaviours at the workplace
5. Identify ways to put up grievances and problems to appropriate authority
6. Demonstrate collaboration and group participation to achieve common goals

UNIT 6.1: Reporting Structure

Unit Objectives

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

1. Follow the reporting structure at the organization.



UNIT 6.2: Work Ethics and Etiquettes

Unit Objectives

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

1. Demonstrate the work ethics and etiquette to be followed.

You must understand that your behaviour serves as an example for other workers of FSTP. Your work ethic and etiquettes will set standards for how FSTP workers are expected to behave.

In addition to the professional duties, you shall:

1. Protect treatment plant infrastructure and the environment

- Properly and consciously operate and maintain the treatment plant
- Follow safe operating procedures
- Report to higher authority (plant manager/supervisor) of any violations of plant machineries and/or workers immediately
- Protect and wisely use resources and funds allocated for operation and maintenance of the treatment facility
- Strive to maintain the aesthetics of the treatment plant

2. Health and Welfare of the employees

- Always consider personal safety, the safety of fellow workers and any other person or visitor present within the FSTP boundary
- Communicate with each other and share experiences to promote the expansion of knowledge and valuable information

3. Properly and accurately fill record books and/or make reports

- Be truthful in data representation
- Acknowledge errors and do not distort any fact or incident

4. Avoid unprofessional activities

- Always be honest and truthful
- Always be on time
- Always respect your co-workers and managers. Do not intimidate and/or bully other workers
- Always use professional language in reports and in professional meetings
- Avoid the use of cell phones on duty unless it is an emergency
- Accept personal responsibility for your actions and do not criticise others untruthfully
- Do not wear inappropriate clothing to work
- Do not use loud, offensive or abusive language

UNIT 6.3: Drug Free Workplace Rules

Unit Objectives

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

1. List the rules to be followed to make the workplace drug-free.

A drug free workspace policy is required to protect any employee who may be working under the influence of alcohol or drugs from injuring himself or another employee. It can also help in avoiding other negative impacts of being under the influence of alcohol or drug such as absenteeism, lower productivity, unethical behaviour etc.

A drug-free workspace policy includes the following points (Ellen Aldridge, 2008)

- It is prohibited for the FSTP employees to possess, sell, consume, or be under the influence of alcoholic beverages or illegal drug while in the office and during working hours outside the office.
- It is not permitted for the FSTP employees to smoke in the FSTP premises, with the exception of the allocated smoking area
- Any FSTP employee who is under the influence of over-the-counter or prescription pills that may affect the safety of others and the ability to safely perform the job must inform the plant supervisor before starting or resuming work.
- Disciplinary action in the form of verbal warning, written warning, suspension or termination will be taken (depending on the gravity of the situation) against anyone who violates the rules.

It is your responsibility to ensure that the above-mentioned policy is adhered to. If any worker is found to be consuming alcohol/drug or smoking outside the allocated space, they should be stopped immediately and the plant supervisor or manager should be made aware of this breach of policy.

UNIT 6.4: Information and Data Security Rules

Unit Objectives

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

1. Identify the rules of data security.

Every organization has an obligation to keep certain information confidential and the kind of information which needs to be shared with the public.

Following are the information of confidential report which can be shared only after getting permission from plant manager

Reports on Lab results

FSTP Employee details (name, contact details, performance reviews, pay scale, health related information etc.)

Reports on operating expenses and revenue generation

Following promotional materials or PR materials can be shared with public

Brochures and flyers giving the overview of treatment plant

Brochures to describe the treatment technology of the treatment plant

Written policy documents of the treatment plant

Advertorials as news stories and reviews on newspaper

Reports on Operation and maintenance activities

E-newsletter to keep the public informed on the amount of FS treated, population served etc.

UNIT 6.5: Risk Management at Workplace Rules

Unit Objectives

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

1. Manage the risks at a workplace.

Anything that disrupts the workspace, impacts on the productivity of workers or poses a threat to other employees is called a risk and it needs addressing. Following table describes the type of risk and respective risk management rules to be followed:

Type of risk	Risk management rules
Health and Safety	Covered in Chapter 5 and Chapter 6
Interpersonal conflict	1. Be open to negotiation, 2. Never show favouritism, 3. Be humble of your capabilities and invite contribution from others 4. Have an open discussion with your colleague and brainstorm suggestions and solutions to solve the conflict
Communication issues	1. Conduct a private meeting and try to identify the cause of the issue, it can be hesitation, ego, unapproachability, confusion in the reporting structure etc. 2. Find a common solution
Harassment	1. Allow the workers to express themselves clearly 2. Find out whether the employee's allegations are true or not 3. Take necessary action after discussion with plant authority
Discrimination	1. Follow the rules mentioned in **Diversity and inclusion** at workplace rules to be followed
Pay discrepancies	1. Firstly, there should not be any discrepancies in pay based on class, colour or creed 2. The pay scale should be based only on qualification and the job description
Workspace theft	1. Be sure to keep your workspace clean and organization 2. Keep valuable personal items in lockers 3. Keep an inventory of plant equipment 4. Do not let unauthorized person to enter the FSTP 5. Do not let unauthorized entry into store rooms without prior permission 6. Install CCTV in store rooms and other areas where FSTP supplies are kept

Table 6.5.1: Risk management at work place

UNIT 6.6: Diversity and Inclusion at Workplace Rules

Unit Objectives

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

1. List the elements required to maintain diversity and inclusion at workplace.

FSTPs can be national and international workspaces with employees who come from a wide variety of backgrounds. Diversity typically includes, but is not limited to, differences in race, gender, sexual orientation, gender identity or expression, political and religious affiliation, socioeconomic background, cultural background, geographic location, physical disabilities and abilities, relationship status, veteran status, and age (Diversity and Inclusion, n.d.).

As the FSTP technician, you are closely involved with the superiors and your subordinates, thus, you can play an important role in delivering workspace inclusion by being vocal about the benefits of working with people from diverse background, and make others believe that workspace inclusion can drive stronger better performance and results.

The following diagram shows the key elements of a diverse and inclusive workspace which must be considered to mitigate risks which can arise out of working with co-workers from diverse backgrounds.

Refer Risk management at workplace rules, increase productivity and for the betterment of the FSTP.

Fig. 6.6.1: Four Key elements of Diversity and Inclusion

- Employees should be treated equitably and with respect, participation without favouritism is the key.
- Every employee should feel valued, they should believe their individuality is respected by others and at the same time should feel connected with the team
- Every employee should feel safe to speak up and be open without feeling judged or embarrassed
- When employees are confident with themselves, they feel empowered and give their best in the job which helps them grow along.

General points to be kept in mind:

- Do use a common language understood by all while speaking to a group
- Do speak to everyone with respect in the workspace, interact with all co-workers without discrimination
- Do not bully or make anyone feel inferior or left out
- Do have open discussions and involve everyone
- If possible, conduct informal get-togethers, celebrate festivals. It will help in engaging every employee, improving the organization culture and making the employees feel appreciated.

UNIT 6.7: Facilitating the Co-workers at FSSM while Field Visit or any Investigations

Unit Objectives

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

1. Facilitate the field visit for co-workers and other visitors.

Before the site/field visit ensure that you have the following:

- The list of visitors with respective contact details
- Purpose of visit and the agenda
- Time of arrival
- Duly signed permission letter for a guided field visit

During the site visit, you are expected to:

- Welcome everyone and review the agenda with everyone
- Distribute PPE (gloves and masks) to the visitors and instruct them to return it once the visit is over
- Introduce the staff and their job description
- Introduce the FSTP and give an overview of the technology
- Guide the group of visitors or investigators to each treatment unit one by one
    - Introduction of the list of equipment in the FSTP
    - Function of each equipment
    - Daily operational activity of each equipment and briefly explain the challenges, risks and mitigation procedures
- Address the queries clearly and appropriately
- Post the site visit
    - Make a note of the number of visitors and the organizations represented.
    - Conduct a short meeting with plant manager, supervisor and your co-workers to review the visit and identify areas of improvement.

UNIT 6.8: Working Effectively with others

Unit Objectives

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

1. Illustrate how to work effectively with co-workers.

Since you will be working mostly in teams it is very important to develop good habits to work effectively with co-workers. Following characteristics are required to work effectively with co-workers:

- Be honest and straight-forward
- Do share the load equally and assist others if required
- Treat others with respect and dignity
- Be an active listener and speak with discretion when communicating with your colleagues
- Acknowledge the contribution of your team members

6.8.1 Assisting co-workers in Performing the Tasks

- Show your staff and colleagues that you support them in their tasks in order to promote productivity and a healthy working environment.
- Every new employee should be trained properly before the commencement of work.
- Conduct periodic reviews on our co-workers work and assist wherever required.

6.8.2 Communicating and Behaving with the co-workers while Working in the Group

When you're working with a team, make sure to gather everyone's opinion and best ideas. It is also important to use their time and energy efficiently. Following are the points to be considered:

- Always be humble and open to suggestions
- Communicate your views openly using the correct language with respect
- Allow people to share alternative ideas
- Always explain your decision and give reasons behind your choice
- If you're the leader, delegate tasks as per a person's capability and area of expertise and briefly explain what needs to be done and why.

6.8.3 Work with the co-workers to Achieve the Common Goals

The FSTP will perform better when all the employees cooperate with each other and work effectively as a team. It signifies that everyone is working towards a common goal and in doing so they are sharing their own expertise and skills while cooperating with each other. Also, workers will be more engaged, effective and active in their work when they know how their contribution is helping in achieving common organizational goals.

6.8.4 How to Express the Grievances and Problems to the Appropriate Authority?

Define Grievances

Grievances is basically a feeling of resentment which can be against a supervisor, co-worker, machine, equipment, about the environment, against workload etc. A large number of work stoppages, strikes can be a result of faulty handling of grievances. The cost of grievances can be very high in terms of loss of time, poor work, damage to plant machineries due to neglect, conflict and so on (Chaudhary, 2005). Thus, it is your responsibility and duty to address grievances and problems at the FSTP, thus, you must equip yourself with the knowledge and skill required to handle grievances without being biased. There can be certain situations where the plant manager or supervisor needs to be involved

Grievances can be individual or group. In case of an individual grievance, it is not required to involve higher authorities, a one-on-one conversation and discussion of the problem can help in solving the issue. It does not need to be very formal and elaborate. In case of group grievances, they can make a formal written expression of the grievance and it should be bought to the attention of the plant manager and supervisor.

Following is the general outline of a typical grievance process:

- Express your problem with your immediate supervisor either verbally or in writing
- Your supervisor can deal with the grievance/problem on his own or pass it on to the higher authority
- Conduct a formal meeting between the staff and plant authority where everyone can present their side, discuss and resolve the issue
- Gather information and relevant data, investigate the situation
- Take a final decision after reviewing with seniors keeping in mind the benefit of the treatment facility

Expressing grievances is a skill. You can keep the following points in your mind when you want to make any such kind of conversation:

- Use positive language while reporting a complaint to your senior
- Remain assertive when under pressure
- Ask questions calmly. Do not intimidate or interrogate.
- Aim to achieve a win/win outcome for both the parties
- Honour the commitments and promises made to resolve the issues

Exercise

1. What are the four key elements of inclusive workspace?

_____

_____

_____

_____

_____

2. What is grievance?

_____

_____

_____

_____

_____

3. Should you ask for suggestions before taking a decision? (yes/no)

_____

_____

_____

_____

_____

True or false

	T/F
1. Laborer reports directly to plant manager	
2. Smoking is allowed in the FSTP when not in duty	
3. PR materials can be shared with public	
4. Do not inform anyone if you feel discriminated	

Summary

This unit covers the importance and the correct way of working effectively with co-workers, importance of diversity and inclusion in an organization, best practices for a diverse and inclusive work culture, procedure for risk mitigation and addressing grievances.

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7. Employability & Entrepreneurship Skills

Unit 7.1 - Personal Strengths & Value Systems

Unit 7.2 - Digital Literacy: A Recap

Unit 7.3 - Money Matters

Unit 7.4 - Preparing for Employment & Self-Employment

Unit 7.5 - Understanding Entrepreneurship

Unit 7.6 - Preparing to be an Entrepreneur

Key Learning Outcomes

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

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Discuss the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
9. Explain the importance of self-analysis
10. Discuss motivation with the help of Maslow's Hierarchy of Needs
11. Discuss the meaning of achievement motivation
12. List the characteristics of entrepreneurs with achievement motivation
13. List the different factors that motivate you
14. Discuss the role of attitude in self-analysis
15. Discuss how to maintain a positive attitude
16. List your strengths and weaknesses
17. Discuss the qualities of honest people
18. Describe the importance of honesty in entrepreneurs
19. Discuss the elements of a strong work ethic
20. Discuss how to foster a good work ethic
21. List the characteristics of highly creative people
22. List the characteristics of highly innovative people
23. Discuss the benefits of time management
24. List the traits of effective time managers
25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management
32. Identify the basic parts of a computer
33. Identify the basic parts of a keyboard
34. Recall basic computer terminology
35. Recall the functions of basic computer keys
36. Discuss the main applications of MS Office
37. Discuss the benefits of Microsoft Outlook
38. Discuss the different types of e-commerce
39. List the benefits of e-commerce for retailers and customers
40. Discuss how the Digital India campaign will help boost e-commerce in India
41. Describe how you will sell a product or service on an e-commerce platform
42. Discuss the importance of saving money

43. Discuss the benefits of saving money
44. Discuss the main types of bank accounts
45. Describe the process of opening a bank account
46. Differentiate between fixed and variable costs
47. Describe the main types of investment options
48. Describe the different types of insurance products
49. Describe the different types of taxes
50. Discuss the uses of online banking
51. Discuss the main types of electronic funds transfers
52. Discuss the steps to prepare for an interview
53. Discuss the steps to create an effective Resume
54. Discuss the most frequently asked interview questions
55. Discuss how to answer the most frequently asked interview questions
56. Discuss basic workplace terminology
57. Discuss the concept of entrepreneurship
58. Discuss the importance of entrepreneurship
59. Describe the characteristics of an entrepreneur
60. Describe the different types of enterprises
61. List the qualities of an effective leader
62. Discuss the benefits of effective leadership
63. List the traits of an effective team
64. Discuss the importance of listening effectively
65. Discuss how to listen effectively
66. Discuss the importance of speaking effectively
67. Discuss how to speak effectively
68. Discuss how to solve problems
69. List important problem solving traits
70. Discuss ways to assess problem solving skills
71. Discuss the importance of negotiation
72. Discuss how to negotiate
73. Discuss how to identify new business opportunities
74. Discuss how to identify business opportunities within your business
75. Explain the meaning of entrepreneur
76. Describe the different types of entrepreneurs
77. List the characteristics of entrepreneurs
78. Recall entrepreneur success stories
79. Discuss the entrepreneurial process
80. Describe the entrepreneurship ecosystem
81. Discuss the purpose of the Make in India campaign
82. Discuss key schemes to promote entrepreneurs
83. Discuss the relationship between entrepreneurship and risk appetite
84. Discuss the relationship between entrepreneurship and resilience
85. Describe the characteristics of a resilient entrepreneur
86. Discuss how to deal with failure

87. Discuss how market research is carried out
88. Describe the 4 Ps of marketing
89. Discuss the importance of idea generation
90. Recall basic business terminology
91. Discuss the need for CRM
92. Discuss the benefits of CRM
93. Discuss the need for networking
94. Discuss the benefits of networking
95. Discuss the importance of setting goals
96. Differentiate between short-term, medium-term and long-term goals
97. Discuss how to write a business plan
98. Explain the financial planning process
99. Discuss ways to manage your risk
100. Describe the procedure and formalities for applying for bank finance
101. Discuss how to manage your own enterprise
102. List important questions that every entrepreneur should ask before starting an enterprise

UNIT 7.1: Personal Strengths & Value Systems

Unit Objectives

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

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Discuss the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
9. Explain the importance of self-analysis
10. Discuss motivation with the help of Maslow's Hierarchy of Needs
11. Discuss the meaning of achievement motivation
12. List the characteristics of entrepreneurs with achievement motivation
13. List the different factors that motivate you
14. Discuss the role of attitude in self-analysis
15. Discuss how to maintain a positive attitude
16. List your strengths and weaknesses
17. Discuss the qualities of honest people
18. Describe the importance of honesty in entrepreneurs
19. Discuss the elements of a strong work ethic
20. Discuss how to foster a good work ethic
21. List the characteristics of highly creative people
22. List the characteristics of highly innovative people
23. Discuss the benefits of time management
24. List the traits of effective time managers
25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management

7.1.1 Health, Habits, Hygiene: What is Health?

As per the World Health Organization (WHO), health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This means being healthy does not simply mean not being unhealthy – it also means you need to be at peace emotionally, and feel fit physically. For example, you cannot say you are healthy simply because you do not have any physical ailments like a cold or cough. You also need to think about whether you are feeling calm, relaxed and happy.

Common Health Issues

Some common health issues are:

- Allergies
- Asthma
- Skin Disorders
- Depression and Anxiety
- Diabetes
- Cough, Cold, Sore Throat
- Difficulty Sleeping
- Obesity

7.1.1.1 Tips to Prevent Health Issues

Taking measures to prevent ill health is always better than curing a disease or sickness. You can stay healthy by:

- Eating healthy foods like fruits, vegetables and nuts
- Cutting back on unhealthy and sugary foods
- Drinking enough water everyday
- Not smoking or drinking alcohol
- Exercising for at least 30 minutes a day, 4-5 times a week
- Taking vaccinations when required
- Practicing yoga exercises and meditation

How many of these health standards do you follow? Tick the ones that apply to you.

1. Get minimum 7-8 hours of sleep every night. ☐
2. Avoid checking email first thing in the morning and right before you go to bed at night. ☐
3. Don't skip meals – eat regular meals at correct meal times. ☐
4. Read a little bit every single day. ☐
5. Eat more home cooked food than junk food. ☐
6. Stand more than you sit. ☐
7. Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day. ☐
8. Go to the doctor and dentist for regular check-ups. ☐
9. Exercise for 30 minutes at least 5 days a week. ☐
10. Avoid consuming lots of aerated beverages. ☐

7.1.1.2 What is Hygiene?

As per the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." In other words, hygiene means ensuring that you do whatever is required to keep your surroundings clean, so that you reduce the chances of spreading germs and diseases.

For instance, think about the kitchen in your home. Good hygiene means ensuring that the kitchen is always spick and span, the food is put away, dishes are washed and dustbins are not overflowing with garbage. Doing all this will reduce the chances of attracting pests like rats or cockroaches, and prevent the growth of fungus and other bacteria, which could spread disease.

How many of these health standards do you follow? Tick the ones that apply to you.

1. Have a bath or shower every day with soap – and wash your hair with shampoo 2-3 times a week. ☐
2. Wear a fresh pair of clean undergarments every day. ☐
3. Brush your teeth in the morning and before going to bed. ☐
4. Cut your fingernails and toenails regularly. ☐
5. Wash your hands with soap after going to the toilet. ☐
6. Use an anti-perspirant deodorant on your underarms if you sweat a lot. ☐
7. Wash your hands with soap before cooking or eating. ☐
8. Stay home when you are sick, so other people don't catch what you have. ☐
9. Wash dirty clothes with laundry soap before wearing them again. ☐
10. Cover your nose with a tissue/your hand when coughing or sneezing. ☐

See how healthy and hygienic you are, by giving yourself 1 point for every ticked statement! Then take a look at what your score means.

Your Score

- **0-7/20:** You need to work a lot harder to stay fit and fine! Make it a point to practice good habits daily and see how much better you feel!
- **7-14/20:** Not bad, but there is scope for improvement! Try and add a few more good habits to your daily routine.
- **14-20/20:** Great job! Keep up the good work! Your body and mind thank you!

7.1.1.3 Swachh Bharat Abhiyan

We have already discussed the importance of following good hygiene and health practices for ourselves. But, it is not enough for us to be healthy and hygienic. We must also extend this standard to our homes, our immediate surroundings and to our country as a whole.

The 'Swachh Bharat Abhiyan' (Clean India Mission) launched by Prime Minister Shri Narendra Modi on 2nd October 2014, believes in doing exactly this. The aim of this mission is to clean the streets and roads of India and raise the overall level of cleanliness. Currently this mission covers 4,041 cities and towns across the country. Millions of our people have taken the pledge for a clean India. You should take the pledge too, and do everything possible to keep our country clean!

7.1.1.4 What are Habits?

A habit is a behaviour that is repeated frequently. All of us have good habits and bad habits. Keep in mind the phrase by John Dryden: "We first make our habits, and then our habits make us." This is why it is so important that you make good habits a way of life, and consciously avoid practicing bad habits.

Some good habits that you should make part of your daily routine are:

- Always having a positive attitude
- Making exercise a part of your daily routine
- Reading motivational and inspirational stories
- Smiling! Make it a habit to smile as often as possible
- Making time for family and friends
- Going to bed early and waking up early

Some bad habits that you should quit immediately are:

- Skipping breakfast
- Snacking frequently even when you are not hungry
- Eating too much fattening and sugary food
- Smoking, drinking alcohol and doing drugs
- Spending more money than you can afford
- Worrying about unimportant issues
- Staying up late and waking up late

Tips

- Following healthy and hygienic practices every day will make you feel good mentally and physically.
- Hygiene is two-thirds of health – so good hygiene will help you stay strong and healthy!

7.1.2: Safety: Tips to Design a Safe Workplace

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Use ergonomically designed furniture and equipment to avoid stooping and twisting
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exits and ensure they are easily accessible
- Set down health codes and ensure they are implemented
- Follow the practice of regular safety inspections in and around the workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

7.1.2.1 Negotiable Employee Safety Habits

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Immediately report unsafe conditions to a supervisor
- Recognize and report safety hazards that could lead to slips, trips and falls
- Report all injuries and accidents to a supervisor
- Wear the correct protective equipment when required
- Learn how to correctly use equipment provided for safety purposes
- Be aware of and avoid actions that could endanger other people
- Take rest breaks during the day and some time off from work during the week

Tips

- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

7.1.3 Self-Analysis – Attitude, Achievement Motivation

To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within yourself that need to be further developed, changed or eliminated. You can better understand yourself by taking a deep look at what motivates you, what your attitude is like, and what your strengths and weaknesses are.

7.1.3.1 What is Motivation?

Very simply put, motivation is your reason for acting or behaving in a certain manner. It is important to understand that not everyone is motivated by the same desires – people are motivated by many, many different things. We can understand this better by looking at Maslow's Hierarchy of Needs.

7.1.3.2 Maslow's Hierarchy of Needs

Famous American psychologist Abraham Maslow wanted to understand what motivates people. He believed that people have five types of needs, ranging from very basic needs (called physiological needs) to more important needs that are required for self-growth (called self-actualization needs). Between the physiological and self-actualization needs are three other needs – safety needs, belongingness and love needs, and esteem needs.

These needs are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.

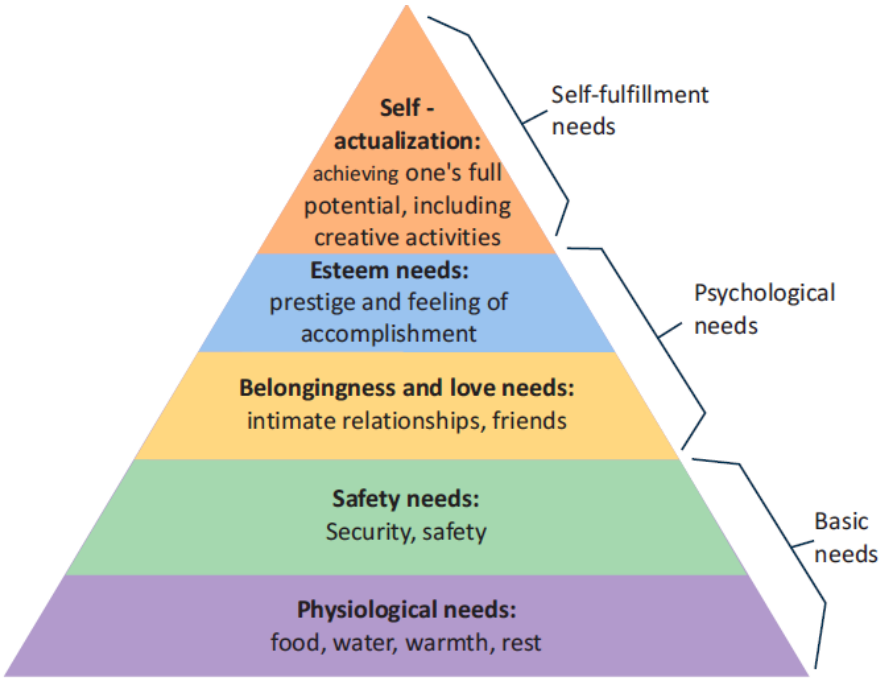

Fig. 7.1.1: Maslow's Hierarchy of Needs

The lowest level depicts the most basic needs. According to Maslow, our behaviour is driven by our basic needs, until those needs are fulfilled. Once they are fulfilled, we move to the next level and are motived by the next level of needs. Let's understand this better with an example.

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

7.1.3.3 Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation – a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

What Motivates You?

What are the things that really motivate you? List down five things that really motivate you. Remember to answer honestly!

I am motivated by:

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs with achievement motivation can be described as follows:

- Unafraid to take risks for personal accomplishment
- Love being challenged Future-oriented Flexible and adaptive
- Value negative feedback more than positive feedback
- Very persistent when it comes to achieving goals
- Extremely courageous
- Highly creative and innovative
- Restless - constantly looking to achieve more
- Feel personally responsible for solving problems

Think about it:

- How many of these traits do you have?
- Can you think of entrepreneurs who display these traits?

7.1.3.4 How to Cultivate a Positive Attitude?

The good news is attitude is a choice. So, it is possible to improve, control and change our attitude, if we decide we want to!

The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 15 minutes a day towards reading, watching or listening to something positive
- Avoid negative people who only complain and stop complaining yourself
- Expand your vocabulary with positive words and delete negative phrases from your mind
- Be appreciative and focus on what's good in yourself, in your life, and in others
- Stop thinking of yourself as a victim and start being proactive
- Imagine yourself succeeding and achieving your goals

7.1.3.5 What is Attitude?

Now that we understand why motivation is so important for self-analysis, let's look at the role our attitude plays in better understanding ourselves. Attitude can be described as your tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

"The only disability in life is a bad attitude."

When you start a business, you are sure to encounter a wide variety of emotions, from difficult times and failures to good times and successes. Your attitude is what will see you through the tough times and guide you towards success. Attitude is also infectious. It affects everyone around you, from your customers to your employees to your investors. A positive attitude helps build confidence in the workplace while a negative attitude is likely to result in the demotivation of your people.

7.1.3.6 What Are Your Strengths and Weaknesses?

Another way to analyse yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses.

Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses

Tips

- Achievement motivation can be learned.
- Don't be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

7.1.4 Honesty & Work Ethics: What is Honesty?

Honesty is the quality of being fair and truthful. It means speaking and acting in a manner that inspires trust. A person who is described as honest is seen as truthful and sincere, and as someone who isn't deceitful or devious and doesn't steal or cheat. There are two dimensions of honesty – one is honesty in communication and the other is honesty in conduct.

Honesty is an extremely important trait because it results in peace of mind and builds relationships that are based on trust. Being dishonest, on the other hand, results in anxiety and leads to relationships full of distrust and conflict.

7.1.4.1 Qualities of Honest People

Honest individuals have certain distinct characteristics. Some common qualities among honest people are:

- They don't worry about what others think of them. They believe in being themselves – they don't bother about whether they are liked or disliked for their personalities.
- They stand up for their beliefs. They won't think twice about giving their honest opinion, even if they are aware that their point of view lies with the minority.
- They are think skinned. This means they are not affected by others judging them harshly for their honest opinions.
- They forge trusting, meaningful and healthy friendships. Honest people usually surround themselves with honest friends. They have faith that their friends will be truthful and upfront with them at all times.

They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

- **Honesty and employees:** When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.
- **Honesty and investors:** For entrepreneurs, being honest with investors means not only sharing strengths but also candidly disclosing current and potential weaknesses, problem areas and solution strategies. Keep in mind that investors have a lot of experience with startups and are aware that all new companies have problems. Claiming that everything is perfectly fine and running smoothly is a red flag for most investors.

- **Honesty with oneself:** The consequences of being dishonest with oneself can lead to dire results, especially in the case of entrepreneurs. For entrepreneurs to succeed, it is critical that they remain realistic about their situation at all times, and accurately judge every aspect of their enterprise for what it truly is.

7.1.4.2 Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves.

Let's look at how being honest would lead to great benefits for entrepreneurs.

- **Honesty and customers:** When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.

7.1.4.3 What are Work Ethics?

Being ethical in the workplace means displaying values like honesty, integrity and respect in all your decisions and communications. It means not displaying negative qualities like lying, cheating and stealing.

Workplace ethics play a big role in the profitability of a company. It is as crucial to an enterprise as high morale and teamwork. This is why most companies lay down specific workplace ethic guidelines that must compulsorily be followed by their employees. These guidelines are typically outlined in a company's employee handbook.

7.1.4.4 Elements of a Strong Work Ethic

An entrepreneur must display strong work ethics, as well as hire only those individuals who believe in and display the same level of ethical behavior in the workplace. Some elements of a strong work ethic are:

- **Professionalism:** This involves everything from how you present yourself in a corporate setting to the manner in which you treat others in the workplace.
- **Respectfulness:** This means remaining poised and diplomatic regardless of how stressful or volatile a situation is.
- **Dependability:** This means always keeping your word, whether it's arriving on time for a meeting or delivering work on time.
- **Dedication:** This means refusing to quit until the designated work is done, and completing the work at the highest possible level of excellence.
- **Determination:** This means embracing obstacles as challenges rather than letting them stop you, and pushing ahead with purpose and resilience to get the desired results.

- **Accountability:** This means taking responsibility for your actions and the consequences of your actions, and not making excuses for your mistakes.
- **Humility:** This means acknowledging everyone's efforts and had work, and sharing the credit for accomplishments.

7.1.4.5 How to Foster a Good Work Ethic?

As an entrepreneur, it is important that you clearly define the kind of behaviour that you expect from each and every team member in the workplace. You should make it clear that you expect employees to display positive work ethics like:

- **Honesty:** All work assigned to a person should be done with complete honesty, without any deceit or lies.
- **Good attitude:** All team members should be optimistic, energetic, and positive.
- **Reliability:** Employees should show up where they are supposed to be, when they are supposed to be there.
- **Good work habits:** Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times and so on.
- **Initiative:** Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.
- **Trustworthiness:** Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.
- **Respect:** Employees need to respect the company, the law, their work, their colleagues and themselves.
- **Integrity:** Each and every team member should be completely ethical and must display above board behaviour at all times.
- **Efficiency:** Efficient employees help a company grow while inefficient employees result in a waste of time and resources.

Tips

- Don't get angry when someone tells you the truth and you don't like what you hear.
- Always be willing to accept responsibility for your mistakes.

7.1.5 Creativity & Innovation

What is Creativity?

Creativity means thinking outside the box. It means viewing things in new ways or from different perspectives, and then converting these ideas into reality. Creativity involves two parts: thinking and producing. Simply having an idea makes you imaginative, not creative. However, having an idea and acting on it makes you creative.

Characteristics of Highly Creative People

Some characteristics of creative people are:

- They are imaginative and playful
- They see issues from different angles
- They notice small details
- They have very little tolerance for boredom
- They detest rules and routine
- They love to daydream
- They are very curious

What is Innovation?

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

- They embrace doing things differently
- They don't believe in taking shortcuts
- They are not afraid to be unconventional
- They are highly proactive and persistent
- They are organized, cautious and risk-averse

Tips

- Take regular breaks from your creative work to recharge yourself and gain fresh perspective.
- Build prototypes frequently, test them out, get feedback, and make the required changes.

7.1.6 Time Management

Time management is the process organizing your time, and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done).

Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

- Greater productivity
- Higher efficiency
- Better professional reputation
- Reduced stress
- Higher chances for career advancement
- Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

- Missing deadlines
- Inefficient work output
- Substandard work quality
- Poor professional reputation
- Stalled career
- Increase in stress and anxiety

7.1.6.1 Traits of Effective Time Managers

Some traits of effective time managers are:

- They begin projects early
- They set daily objectives
- They modify plans if required, to achieve better results
- They are flexible and open-minded
- They inform people in advance if their help will be required
- They know how to say no
- They break tasks into steps with specific deadlines
- They continually review long term goals
- They think of alternate solutions if and when required
- They ask for help when required
- They create backup plans

7.1.6.2 Effective Time Management Techniques

You can manage your time better by putting into practice certain time management techniques. Some helpful tips are:

- **Plan out your day as well as plan for interruptions.** Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- **Put up a "Do Not Disturb" sign** when you absolutely have to complete a certain amount of work.
- **Close your mind to all distractions.** Train yourself to ignore ringing phones, don't reply to chat messages and disconnect from social media sites.
- **Delegate your work.** This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- **Stop procrastinating.** Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- **Prioritize.** List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- **Maintain a log of your work activities.** Analyse the log to help you understand how efficient you are, and how much time is wasted every day.
- **Create time management goals** to reduce time wastage.

Tips

- Always complete the most important tasks first.
- Get at least 7 – 8 hours of sleep every day.
- Start your day early.
- Don't waste too much time on small, unimportant details.
- Set a time limit for every task that you will undertake.
- Give yourself some time to unwind between tasks.

7.1.7 Anger Management

Anger management is the process of:

1. Learning to recognize the signs that you, or someone else, is becoming angry
2. Taking the best course of action to calm down the situation in a positive way

Anger management does not mean suppressing anger.

Importance of Anger Management

Anger is a perfectly normal human emotion. In fact, when managed the right way, anger can be considered a healthy emotion. However, if it is not kept in check, anger can make us act inappropriately and can lead to us saying or doing things that we will likely later regret.

Extreme anger can:

- **Hurt you physically**: It leads to heart disease, diabetes, a weakened immune system, insomnia, and high blood pressure.
- **Hurt you mentally**: It can cloud your thinking and lead to stress, depression and mental health issues.
- **Hurt your career**: It can result in alienating your colleagues, bosses, clients and lead to the loss of respect.
- **Hurt your relationships**: It makes it hard for your family and friends to trust you, be honest with you and feel comfortable around you.

This is why anger management, or managing anger appropriately, is so important.

7.1.7.1 Anger Management Strategies

Here are some strategies that can help you control your anger:

Strategy 1: Relaxation

Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

1. Take a deep breath from your diaphragm (don't breathe from your chest)
2. Visualize your breath coming up from your stomach
3. Keep repeating a calming word like 'relax' or 'take it easy' (remember to keep breathing deeply while repeating the word)
4. Picture a relaxing moment (this can be from your memory or your imagination)

Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving

Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication

When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment

If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

7.1.7.2 Tips for Anger Management

The following tips will help you keep your anger in check:

- Take some time to collect your thoughts before you speak out in anger.
- Express the reason for your anger in an assertive, but non-confrontational manner once you have calmed down.
- Do some form of physical exercise like running or walking briskly when you feel yourself getting angry.
- Make short breaks part of your daily routine, especially during days that are stressful.
- Focus on how to solve a problem that's making you angry, rather than focusing on the fact that the problem is making you angry.

7.1.8 Stress Management

We say we are 'stressed' when we feel overloaded and unsure of our ability to deal with the pressures placed on us. Anything that challenges or threatens our well-being can be defined as a stress. It is important to note that stress can be good and bad. While good stress keeps us going, negative stress undermines our mental and physical health. This is why it is so important to manage negative stress effectively.

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

- Constant worry
- Rigid thinking
- Unrealistic expectations
- Pessimism
- Negative self-talk
- All in or all out attitude

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do
- Difficulties at work or in school
- Financial difficulties
- Worrying about one's children and/or family

7.1.8.1 Symptoms of Stress

Stress can manifest itself in numerous ways. Take a look at the cognitive, emotional, physical and behavioural symptoms of stress.

Cognitive Symptoms	Emotional Symptoms
• Memory problems • Concentration issues • Lack of judgement • Pessimism • Anxiety • Constant worrying	• Depression • Agitation • Irritability • Loneliness • Anxiety • Anger

Fig.7.1.2: Stress symptoms

Physical Symptoms	Behavioural Symptoms
• Aches and pain • Diarrhoea or constipation • Nausea • Dizziness • Chest pain and/or rapid heartbeat • Frequent cold or flu like feelings	• Increase or decrease in appetite • Over sleeping or not sleeping enough • Withdrawing socially • Ignoring responsibilities • Consumption of alcohol or cigarettes • Nervous habits like nail biting and pacing

Fig.7.1.3: Stress symptoms

7.1.8.2 Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.

UNIT 7.2: Digital Literacy: A Recap

Unit Objectives

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

1. Identify the basic parts of a computer
2. Identify the basic parts of a keyboard
3. Recall basic computer terminology
4. Recall the functions of basic computer keys
5. Discuss the main applications of MS Office
6. Discuss the benefits of Microsoft Outlook
7. Discuss the different types of e-commerce
8. List the benefits of e-commerce for retailers and customers
9. Discuss how the Digital India campaign will help boost e-commerce in India
10. Describe how you will sell a product or service on an e-commerce platform

7.2.1 Computer and Internet Basics

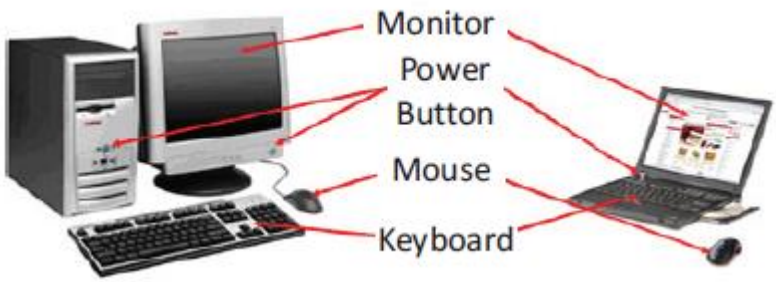

Fig.7.2.1. Parts of a Computer

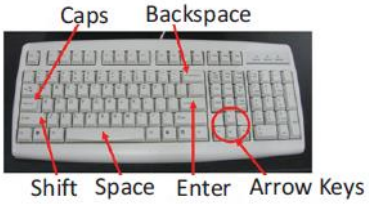

Fig.7.2.2. Parts of a Keyboard

Basic Parts of a Computer

1. **Central Processing Unit (CPU):** The brain of the computer. It interprets and carries out program instructions.
2. **Hard Drive:** A device that stores large amounts of data.
3. **Monitor:** The device that contains the computer screen where the information is visually displayed.

4. **Desktop:** The first screen displayed after the operating system loads.
5. **Background:** The image that fills the background of the desktop.
6. **Mouse:** A hand-held device used to point to items on the monitor.
7. **Speakers:** Devices that enable you to hear sound from the computer.
8. **Printer:** A device that converts output from a computer into printed paper documents.
9. **Icon:** A small picture or image that visually represents something on your computer.
10. **Cursor:** An arrow which indicates where you are positioned on the screen.
11. **Program Menu:** A list of programs on your computer that can be accessed from the Start menu.
12. **Taskbar:** The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
13. **Recycle Bin:** A temporary storage for deleted files.

Basic Internet Terms

- **The Internet:** A vast, international collection of computer networks that transfers information.
- **The World Wide Web:** A system that lets you access information on the Internet.
- **Website:** A location on the World Wide Web (and Internet) that contains information about a specific topic.
- **Homepage:** Provides information about a website and directs you to other pages on that website.
- **Link/Hyperlink:** A highlighted or underlined icon, graphic, or text that takes you to another file or object.
- **Web Address/URL:** The address for a website.
- **Address Box:** A box in the browser window where you can type in a web address.

Basic Computer Keys

- **Arrow Keys:** Press these keys to move your cursor.
- **Space bar:** Adds a space.
- **Enter/Return:** Moves your cursor to a new line.
- **Shift:** Press this key if you want to type a capital letter or the upper symbol of a key.
- **Caps Lock:** Press this key if you want all the letters you type to be capital letters. Press it again to revert back to typing lowercase letters.
- **Backspace:** Deletes everything to the left of your cursor

Tips

- When visiting a .com address, there no need to type http://or even www. Just type the name of the website and then press Ctrl + Enter. (Example: Type 'apple' and press Ctrl + Enter to go to www.apple.com)
- Press the Ctrl key and press the + or - to increase and decrease the size of text.
- Press F5 or Ctrl + R to refresh or reload a web page.

7.2.2 MS Office and Email

About MS Office

MS Office or Microsoft Office is a suite of computer programs developed by Microsoft. Although meant for all users, it offers different versions that cater specifically to students, home users and business users. All the programs are compatible with both, Windows and Macintosh.

Most Popular Office Products

Some of the most popular and universally used MS Office applications are:

- **Microsoft Word**: Allows users to type text and add images to a document.
- **Microsoft Excel**: Allows users to enter data into a spreadsheet and create calculations and graphs.
- **Microsoft PowerPoint**: Allows users to add text, pictures and media and create slideshows and presentations.
- **Microsoft Outlook**: Allows users to send and receive email.
- **Microsoft OneNote**: Allows users to make drawings and notes with the feel of a pen on paper.
- **Microsoft Access**: Allows users to store data over many tables.

Why Choose Microsoft Outlook?

A popular email management choice especially in the workplace, Microsoft Outlook also includes an address book, notebook, web browser and calendar. Some major benefits of this program are:

- **Integrated search function**: You can use keywords to search for data across all Outlook programs.
- **Enhanced security**: Your email is safe from hackers, junk mail and phishing website email.
- **Email syncing**: Sync your mail with your calendar, contact list, notes in One Note and…your phone!
- **Offline access to email:** No Internet? No problem! Write emails offline and send them when you're connected again.

Tips

- Press Ctrl+R as a shortcut method to reply to email.
- Set your desktop notifications only for very important emails.
- Flag messages quickly by selecting messages and hitting the Insert key.
- Save frequently sent emails as a template to reuse again and again.
- Conveniently save important emails as files.

7.2.3 E-Commerce

What is E-Commerce?

E-commerce is the buying or selling of goods and services, or the transmitting of money or data, electronically on the internet. E-Commerce is the short form for "electronic commerce."

Examples of E-Commerce

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- **Business to Business (B2B)**: Both the transacting parties are businesses.
- **Business to Consumer (B2C)**: Businesses sell electronically to end-consumers.
- **Consumer to Consumer (C2C):** Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B)**: Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A)**: Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A)**: Online transactions conducted between individual and public administration.

7.2.3.1 Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

7.2.3.2 Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

Tips

- Before launching your e-commerce platform, test everything.
- Pay close and personal attention to your social media.

UNIT 7.3: Money Matters

Unit Objectives

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

1. Discuss the importance of saving money
2. Discuss the benefits of saving money
3. Discuss the main types of bank accounts
4. Describe the process of opening a bank account
5. Differentiate between fixed and variable costs
6. Describe the main types of investment options
7. Describe the different types of insurance products
8. Describe the different types of taxes
9. Discuss the uses of online banking
10. Discuss the main types of electronic funds transfers

7.3.1 Personal Finance – Why to Save?

Importance of Saving

We all know that the future is unpredictable. You never know what will happen tomorrow, next week or next year. That's why saving money steadily through the years is so important. Saving money will help improve your financial situation over time. But more importantly, knowing that you have money stashed away for an emergency will give you peace of mind. Saving money also opens the door to many more options and possibilities.

Benefits of Saving

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

- **Become financially independent**: When you have enough money saved up to feel secure you can start making your choices, from taking a vacation whenever you want, to switching careers or starting your own business.
- **Invest in yourself through education**: Through saving, you can earn enough to pay up for courses that will add to your professional experience and ultimately result in higher paying jobs.
- **Get out of debt**: Once you have saved enough as a reserve fund, you can use your savings to pay off debts like loans or bills that have accumulated over time.
- **Be prepared for surprise expenses:** Having money saved enables you to pay for unforeseen expenses like sudden car or house repairs, without feeling financially stressed.
- **Pay for emergencies**: Saving helps you deal with emergencies like sudden health issues or emergency trips without feeling financially burdened.

- **Afford large purchases and achieve major goals**: Saving diligently makes it possible to place down payments towards major purchases and goals, like buying a home or a car.
- **Retire**: The money you have saved over the years will keep you comfortable when you no longer have the income you would get from your job.

Tips

- Break your spending habit. Try not spending on one expensive item per week, and put the money that you would have spent into your savings.
- Decide that you will not buy anything on certain days or weeks and stick to your word.

7.3.2 Types of Bank Accounts

In India, banks offer four main types of bank accounts. These are:

1. Current Accounts
2. Savings Accounts
3. Recurring Deposit Accounts
4. Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Saving Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

7.3.2.1 Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books)
- Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual need to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

Tips

- Select the right type of account.
- Fill in complete nomination details.
- Ask about fees.
- Understand the rules.
- Check for online banking – it's convenient!
- Keep an eye on your bank balance.

7.3.3 Costs: Fixed vs Variable

What are Fixed and Variable Costs?

Fixed costs and variable costs together make up a company's total cost. These are the two types of costs that companies have to bear when producing goods and services. A fixed cost does not change with the volume of goods or services a company produces. It always remains the same.

A variable cost, on the other hand, increases and decreases depending on the volume of goods and services produced. In other words, it varies with the amount produced.

Differences between Fixed and Variable Costs

Let's take a look at some of the main differences between fixed and variable costs:

Criteria	Fixed Costs	Variable Costs
Meaning	A cost that stays the same, regardless of the output produced.	A cost that changes when the
Nature	Time related.	Volume related.
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced
Unit cost	Inversely proportional to the number of units produced	Remains the same, per unit.
Examples	Depreciation, rent, salary, insurance and tax	Material consumed, wages, commission on sales and packing expenses

Fig.7.3.1: Fixed and variable costs

Tips

- When trying to determine whether a cost is fixed or variable, simply ask the following question: Will the particular cost change if the company stopped its production activities? If the answer is no, then it is a fixed cost. If the answer is yes, then it is probably a variable cost.

7.3.4 Investment, Insurance and Taxes

Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time. The main types of investment options are as follows:

- **Bonds:** Bonds are instruments used by public and private companies to raise large sums of money – too large to be borrowed from a bank. These bonds are then issued in the public market and are bought by lenders.
- **Stocks:** Stocks or equity are shares that are issued by companies and are bought by the general public.
- **Small Savings Schemes:** Small Savings Schemes are tools meant to save money in small amounts. Some popular schemes are the Employees Provident Fund, Sukanya Samriddhi Scheme and National Pension Scheme.
- **Mutual Funds:** Mutual Funds are professionally managed financial instruments that invest money in different securities on behalf of investors.
- **Fixed Deposits:** A fixed amount of money is kept aside with a financial institution for a fixed amount of time in return for interest on the money.
- **Real Estate:** Loans are taken from banks to purchase real estate, which is then leased or sold with the aim of making a profit on the appreciated property price.
- **Hedge Funds:** Hedge funds invest in both financial derivatives and/or publicly traded securities.
- **Private Equity:** Private Equity is trading in the shares of an operating company that is not publicly listed and whose shares are not available on the stock market.
- **Venture Capital:** Venture Capital involves investing substantial capital in a budding company in return for stocks in that company.

Insurance

There are two types of insurance, Life Insurance and General Insurance.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.

- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- **Unit-Linked Insurance Plan (ULIP):** Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.
- **Money Back Life Insurance:** While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.
- **Whole Life Insurance:** It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four-Wheeler Insurance and Two-Wheeler insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- **Marine Insurance:** This insurance covers goods, freight and cargo against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes:

1. Direct Taxes
2. Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable. Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- **Capital Gains Tax:** This tax is payable whenever you receive a sizable amount of money. It is usually of two types – short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.

- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied is on perks that have been acquired by a company or used by an employee.
- **Corporate Tax:** Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services. Some examples of Indirect Taxes are:

- **Sales Tax:** Sales Tax is levied on the sale of a product.
- **Service Tax:** Service Tax is added to services provided in India.
- **Value Added Tax:** Value Added Tax is levied at the discretion of the state government. The tax is levied on goods sold in the state. The tax amount is decided by the state.
- **Customs Duty & Octroi:** Customs Duty is a charge that is applied on purchases that are imported from another country. Octroi is levied on goods that cross state borders within India.
- **Excise Duty:** Excise Duty is levied on all goods manufactured or produced in India

Tips

- Think about how quickly you need your money back and pick an investment option accordingly.
- Ensure that you are buying the right type of insurance policy for yourself.
- Remember, not paying taxes can result in penalties ranging from fines to imprisonment.

7.3.5 Online Banking, NEFT, RTGS etc.

What is Online Banking?

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply need to use their unique customer ID number and password.

Internet banking can be used to:

- Find out an account balance
- Transfer amounts from one account to another
- Arrange for the issuance of cheques
- Instruct payments to be made
- Request for a cheque book
- Request for a statement of accounts
- Make a fixed deposit

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking.

Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose transferring funds:

- Into your accounts of the same bank.
- Into other people's accounts of the same bank.
- Into accounts in different banks through NEFT.
- Into other bank accounts though RTGS.
- Into various accounts through IMPS.

NEFT

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

- A transferring bank
- A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following information:

- Recipient's name
- Recipient's account number
- Recipient's bank's name
- Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time funds transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. The transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically.

RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account.

In order to complete this registration, you will require the following information:

- Name of the beneficiary
- Beneficiary's account number
- Beneficiary's bank address
- Bank's IFSC code

IMPS

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, you need to:

- Register for IMPS with your bank
- Receive a Mobile Money Identifier (MMID) from the bank
- Receive a MPIN from the bank

Once you have both these, you can login or make a request through SMS to transfer a particular amount to a beneficiary.

In order for the beneficiary to receive the transferred money, he must:

- Link his mobile number with his respective account
- Receive the MMID from the bank

In order to initiate a money transfer through IMPS, you will need to enter the following information:

- The beneficiary's mobile number
- The beneficiary's MMID
- The transfer amount
- Your MPIN

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

7.3.5.1 Differences between NEFT, RTGS & IMPS

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	₹1	₹2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹2 lacs
Maximum charges as per RBI	Up to 10,000 – ₹2.5 above 10,000 – 1 lac - ₹5 above 1 – 2 lacs ₹15 above 2 – 5 lacs ₹25 above 5 – 10 lacs ₹25	above 2 – 5 lacs ₹25 above 5 – 10 lacs ₹50	Up to 10,000 – ₹5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15

Fig.7.3.2: Differences between NEFT, RTGS & IMPS

Tips

- Never click on any links in any e-mail message to access your online banking website.
- You will never be asked for your credit or debit card details while using online banking.
- Change your online banking password regularly.

UNIT 7.4: Preparing for Employment & Self-Employment

Unit Objectives

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

1. Discuss the steps to prepare for an interview
2. Discuss the steps to create an effective Resume
3. Discuss the most frequently asked interview questions
4. Discuss how to answer the most frequently asked interview questions
5. Discuss basic workplace terminology

7.4.1 Interview Preparation: How to Prepare for an Interview?

The success of your getting the job that you want depends largely on how well your interview for that job goes. Therefore, before you go in for your interview, it is important that you prepare for it with a fair amount of research and planning. Take a look at the steps to follow in order to be well prepared for an interview:

1. **Research the organization that you are having the interview with.**
    - Studying the company beforehand will help you be more prepared at the time of the interview. Your knowledge of the organization will help you answer questions at the time of the interview, and will leave you looking and feeling more confident. This is sure to make you stand out from other, not as well informed, candidates.
    - Look for background information on the company. Ty and find an overview of the company and its industry profile.
    - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
    - Note down any questions that you have after your research has been completed.
2. **Think about whether your skills and qualifications match the job requirements.**
    - Carefully read through and analyse the job description.
    - Make a note of the knowledge, skills and abilities required to fulfil the job requirements.
    - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.

3. **Go through the most typical interview questions asked, and prepare your responses.**
   - Remember, in most interviews a mix of resume-based, behavioural and case study questions are asked.
   - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
   - Practice these answers until you can express them confidently and clearly.
4. **Plan your attire for the interview.**
   - It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
   - Ensure that your clothes are clean and well-ironed. Pick neutral colours – nothing too bright or flashy.
   - The shoes you wear should match your clothes, and should be clean and suitable for an interview.
   - Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.
5. **Ensure that you have packed everything that you may require during the interview.**
   - Carry a few copies of your resume. Use a good quality paper for your resume print outs.
   - Always take along a notepad and a pen.
   - Take along any information you may need to refer to, in order to fill out an application form.
   - Carry a few samples of your work, if relevant.
6. **Remember the importance of non-verbal communication.**
   - Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
   - Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
   - Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.
7. **Make a list of questions to end the interview with.**
   - Most interviews will end with the interviewer(s) asking if you have any questions. This is your chance to show that you have done your research and are interested in learning more about the company.
   - If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
   - Some good questions to ask at this point are:
     - What do you consider the most important criteria for success in this job?
     - How will my performance be evaluated?
     - What are the opportunities for advancement?
     - What are the next steps in the hiring process?
   - Remember, never ask for information that is easily available on the company website.

Tips

- Ask insightful and probing questions.
- When communicating, use effective forms of body language like smiling, making eye contact, and actively listening and nodding. Don't slouch, play with nearby items, fidget, chew gum, or mumble.

7.4.2 Preparing an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

Jasmine Watts
Breach Candy, Mumbai – India
Contact No: +91 2223678270
Email: jasmine.watts@gmail.com

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or as long as 8-10 bullet points.

Example:

Profile Summary

- A Content Writer graduated from University of Strathclyde having 6 years of experience in writing website copy.
- Core expertise lies in content creation for e-learning courses, specifically for the K-12 segment.

Step 3: Include Your Educational Qualifications

When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

If you have done any certifications and trainings, you can add a Trainings & Certifications section under your Educational Qualifications section.

Example:

Educational Qualifications

- Masters in International Management (2007) from Columbia University with 8.8 CPI.
- Bachelor of Management Studies (2004) from Mumbai University with 87% marks.
- 10+2 with Math, Stats (2001) from Maharashtra Board with 91% marks.
- High School (1999) from Maharashtra Board with 93% marks.

Step 4: List Your Technical Skills

When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

Technical Skills

- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

List down all the important projects that you have worked on. Include the following information in this section:

- Project title
- Organization
- Platform used
- Contribution
- Description

Example:

Academic Projects

Project Title: Different Communication Skills

Organization: True Blue Solutions

Platform used: Articulate

Contribution: Content writing and graphic visualization

Description: Development of storyboards for corporate induction & training programs

Step 6: List Your Strengths

This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths

- Excellent oral, written and presentation skills
- Action-oriented and result-focused
- Great time management skills

Step 7: List Your Extracurricular Activities

It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities

- Member of the Debate Club
- Played tennis at a national level
- Won first prize in the All India Camel Contest, 2010

Step 8: Write Your Personal Details

The last section of your résumé must include the following personal information:

- Date of birth
- Gender & marital status
- Nationality
- Languages known

Example:

Personal Details

- Date of birth: 25th May, 1981
- Gender & marital status: Female, Single
- Nationality: Indian
- Languages known: English, Hindi, Tamil, French

Tips

- Keep your resume file name short, simple and informational.
- Make sure the resume is neat and free from typing errors.
- Always create your resume on plain white paper.

7.4.3 Interview FAQs

Take a look at some of the most frequently asked interview questions, and some helpful tips on how to answer them.

Q1. Can you tell me a little about yourself?

Tips to answer:

- Don't provide your full employment or personal history.
- Offer 2-3 specific experiences that you feel are most valuable and relevant.
- Conclude with how those experiences have made you perfect for this specific role.

Q2. How did you hear about the position?

Tips to answer:

- Tell the interviewer how you heard about the job – whether it was through a friend (name the friend), event or article (name them) or a job portal (say which one).
- Explain what excites you about the position and what in particular caught your eye about this role.

Q3. What do you know about the company?

Tips to answer:

- Don't recite the company's About Us page.
- Show that you understand and care about the company's goals.
- Explain why you believe in the company's mission and values.

Q4. Why do you want this job?

Tips to answer:

- Show that you are passionate about the job.
- Identify why the role is a great fit for you.
- Explain why you love the company.

Q5. Why should we hire you?

Tips to answer:

- Prove through your words that you can not only do the work, but can definitely deliver excellent results.
- Explain why you would be a great fit with the team and work culture.
- Explain why you should be chosen over any other candidate.

Q6. What are your greatest professional strengths?

Tips to answer:

- Be honest – share some of your real strengths, rather than give answers that you think sound good.
- Offer examples of specific strengths that are relevant to the position you are applying for.
- Provide examples of how you've demonstrated these strengths.

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.
- Give an example of a trait that you struggle with, but that you're working on to improve.

Q8. What are your salary requirements?

Tips to answer:

- Do your research beforehand and find out the typical salary range for the job you are applying for.
- Figure out where you lie on the pay scale based on your experience, education, and skills.
- Be flexible. Tell the interviewer that you know your skills are valuable, but that you want the job and are willing to negotiate.

Q9. What do you like to do outside of work?

Tips to answer:

- The purpose of this question is to see if you will fit in with the company culture.
- Be honest – open up and share activities and hobbies that interest and excite you.

Q10. If you were an animal, which one would you want to be?

Tips to answer:

- The purpose of this question is to see if you are able to think on your feet.
- There's no wrong answer – but to make a great impression try to bring out your strengths or personality traits through your answer.

Q11: What do you think we could do better or differently?

Tips to answer:

- The purpose of this question is to see if you have done your research on the company, and to test whether you can think critically and come up with new ideas.
- Suggest new ideas. Show how your interests and expertise would help you execute these ideas.

Q12: Do you have any questions for us?

Tips to answer:

- Do not ask questions to which the answers can be easily found on the company website or through a quick online search.
- Ask intelligent questions that show your ability to think critically.

Tips

- Be honest and confident while answering.
- Use examples of your past experiences wherever possible to make your answers more impactful.

7.4.4 Work Readiness – Terms & Terminologies

Every employee should be well versed in the following terms:

- **Annual leave:** Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- **Compensatory Time (Comp Time):** Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's service to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- **Freelancer/Consultant/Independent Contractor:** A person who works for him or herself for temporary jobs and projects with different employers.
- **Holiday**: Paid time-off from work.
- **Hourly Rate**: The amount of salary or wages paid for 60 minutes of work.

- **Internship**: A job opportunity offered by an employer to a potential employee, called an at the employer's company for a fixed, limited time period.
- **Interview**: A conversation between a potential employee and a representative of an order to determine if the potential employee should be hired.
- **Job Application**: A form which asks for a candidate's information like the candidate's name, details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- **Job Offer**: An offer of employment made by an employer to a potential employee.
- **Job Search Agent**: A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies. background, made by the and pitches intern, to work employer, in address, contact
- **Lay Off**: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- **Letter of Agreement**: A letter that outlines the terms of employment.
- **Letter of Recommendation**: A letter written for the purpose of validating the work skills o f a person.
- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- **Minimum wage**: The minimum wage amount paid on an hourly basis.
- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- **Offer of Employment**: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract**: A contract of employment that continues till the employer or terminates it.
- **Overqualified**: A person who is not suited for a particular job because he or she has too m any years of work experience, or a level of education that is much higher than required f or the job, or is currently or was previously too highly paid.
- **Part-Time Worker**: An employee who works for fewer hours than the standard number of hours normally worked.
- **Paternity Leave**: Leave granted to a man who has recently become a father.
- **Recruiters/Head-hunters/Executive Search Firms**: Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations**: When an employee formally informs his or her employer that he or she is quitting his or her job.

- **Self-Employed**: A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet**: A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

UNIT 7.5: Understanding Entrepreneurship

Unit Objectives

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

1. Discuss the concept of entrepreneurship
2. Discuss the importance of entrepreneurship
3. Describe the characteristics of an entrepreneur
4. Describe the different types of enterprises
5. List the qualities of an effective leader
6. Discuss the benefits of effective leadership
7. List the traits of an effective team
8. Discuss the importance of listening effectively
9. Discuss how to listen effectively
10. Discuss the importance of speaking effectively
11. Discuss how to speak effectively
12. Discuss how to solve problems
13. List important problem solving traits
14. Discuss ways to assess problem solving skills
15. Discuss the importance of negotiation
16. Discuss how to negotiate
17. Discuss how to identify new business opportunities
18. Discuss how to identify business opportunities within your business
19. Understand the meaning of entrepreneur
20. Describe the different types of entrepreneurs
21. List the characteristics of entrepreneurs
22. Recall entrepreneur success stories
23. Discuss the entrepreneurial process
24. Describe the entrepreneurship ecosystem
25. Discuss the government's role in the entrepreneurship ecosystem
26. Discuss the current entrepreneurship ecosystem in India
27. Understand the purpose of the Make in India campaign
28. Discuss the relationship between entrepreneurship and risk appetite
29. Discuss the relationship between entrepreneurship and resilience
30. Describe the characteristics of a resilient entrepreneur
31. Discuss how to deal with failure

7.5.1 Concept Introduction

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur. Entrepreneurs run their own start-up, take responsibility for the financial risks and use creativity, innovation and vast reserves of self-motivation to achieve success. They dream big and are determined to do whatever it takes to turn their idea into a viable offering. The aim of an entrepreneur is to create an enterprise. The process of creating this enterprise is known as entrepreneurship.

7.5.1.1 Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

1. It results in the creation of new organizations
2. It brings creativity into the marketplace
3. It leads to improved standards of living
4. It helps develop the economy of a country

7.5.1.2 Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

- Extremely passionate about their work
- Confident in themselves
- Disciplined and dedicated
- Motivated and driven
- Highly creative
- Visionaries
- Open-minded
- Decisive

Entrepreneurs also have a tendency to:

- Have a high-risk tolerance
- Thoroughly plan everything
- Manage their money wisely
- Make their customers their priority
- Understand their offering and their market in detail
- Ask for advice from experts when required
- Know when to cut their losses

7.5.1.3 Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

- Bill Gates (Founder of Microsoft)
- Steve Jobs (Co-founder of Apple)
- Mark Zuckerberg (Founder of Facebook)
- Pierre Omidyar (Founder of eBay)

7.5.1.4 Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the losses the liability of the entrepreneur is unlimited.

Partnership

A partnership firm is formed by two or more people. The owners of the enterprise are called partners. A partnership deed must be signed by all the partners. The firm and its partners have no separate legal existence. The profits are shared by the partners. With respect to losses, the liability of the partners is unlimited. A firm has a limited life span and must be dissolved when any one of the partners dies, retires, claims bankruptcy or goes insane.

Limited Liability Partnership (LLP)

In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability. Each partner's liability is limited to their agreed contribution to the LLP. The partnership and its partners have a separate legal existence.

Tips

- Learn from others' failures.
- Be certain that this is what you want.
- Search for a problem to solve, rather than look for a problem to attach to your idea.

7.5.2 Leadership & Teamwork: Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company.

Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

- Creates an inspiring vision of the future.
- Motivates and inspires his team to pursue that vision.

7.5.2.1 Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

1. **Pragmatism:** This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
2. **Humility:** This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
3. **Flexibility:** It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.
4. **Authenticity:** This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
5. **Reinvention:** This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
6. **Awareness:** This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

7.5.2.2 Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

7.5.2.3 Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

7.5.2.4 Importance of Teamwork in Entrepreneurial Success

For an entrepreneurial leader, building an effective team is critical to the success of a venture. An entrepreneur must ensure that the team he builds possesses certain crucial qualities, traits and characteristics. An effective team is one which has:

1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.
4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problems before they turn into real problems.
6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.

Tips

- Don't get too attached to your original idea. Allow it to evolve and change.
- Be aware of your weaknesses and build a team that will complement your shortfalls.
- Hiring the right people is not enough. You need to promote or incentivize your most talented people to keep them motivated.
- Earn your team's respect.

7.5.3 Communication Skills

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

7.5.3.1 How to Listen Effectively?

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person
- Not let the speaker's mannerisms or habits irritate or distract you

7.5.3.2 The Importance of Speaking Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

7.5.3.3 How to Speak Effectively?

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times. Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.

- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

Tips

- If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- Always maintain eye contact with the person that you are communicating with, when speaking as well as listening. This conveys and also encourages interest in the conversation.

7.5.4 Problem Solving & Negotiation Skills

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

1. Goals
2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

7.5.4.1 How to Solve Problems?

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

- **Step 1:** Identify the problem
- **Step 2:** Study the problem in detail
- **Step 3:** List all possible solutions
- **Step 4:** Select the best solution
- **Step 5:** Implement the chosen solution
- **Step 6:** Check that the problem has really been solved

7.5.4.2 Important Traits for Problem Solving

Highly developed problem-solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

- Being open minded
- Asking the right questions
- Being proactive
- Not panicking
- Having a positive attitude
- Focusing on the right problem

7.5.4.3 How to Assess for Problem Solving Skills?

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

1. **Application forms:** Ask for proof of the candidate's problem solving skills in the application form.
2. **Psychometric tests:** Give potential candidates logical reasoning and critical thinking tests and see how they fare.
3. **Interviews:** Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
4. **Technical questions:** Give candidates examples of real life problems and evaluate their thought process.

7.5.4.4 What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate?

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a start-up. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate?

Take a look at some steps to help you negotiate:

- **Step 1:** Pre-Negotiation Preparation: Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
- **Step 2:** Discuss the problem: This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.
- **Step 3:** Clarify the Objective: Ensure that both parties want to solve the same problem and reach the same goal.
- **Step 4:** Aim for a Win-Win Outcome: Try your best to be open minded when negotiating. Compromise and offer substitute solutions to arrive at an outcome where both win.
- **Step 5:** Clearly Define the Agreement: When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.
- **Step 6:** Implement the Agreed Upon Solution: Agree on a course of action to set the solution in motion.

Tips

- Know exactly what you want before you work towards getting it
- Give more importance to listening and thinking, than speaking
- Focus on building a relationship rather than winning
- Remember that your people skills will affect the outcome
- Know when to walk away – sometimes reaching an agreement may not be possible

7.5.5 Business Opportunities Identification

"The entrepreneur always searches for change, responds to it and exploits it as an opportunity."

Peter Drucker

The ability to find good business opportunities is an important characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

A business opportunity is typically a good/favourable change that can be used to run a business in a given environment, at a given point of time.

Common Questions Faced by Entrepreneurs

A critical question that all entrepreneurs face is how to go about finding the business opportunity that is right for them.

Some common questions that entrepreneurs constantly think about are:

- Should the new enterprise introduce a new product or service based on an unmet need?
- Should the new enterprise select an existing product or service from one market and offer it in another where it may not be available?
- Should the enterprise be based on a tried and tested formula that has worked elsewhere?

It is therefore extremely important that entrepreneurs must learn how to identify new and existing business opportunities and evaluate their chances of success.

When is an Idea an Opportunity?

An idea is an opportunity when:

- It creates or adds value to a customer
- It solves a significant problem, removes a pain point or meets a demand
- Has a robust market and profit margin
- Is a good fit with the founder and management team at the right time and place

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

- Economic trends
- Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

- **Identify Market Inefficiencies:** When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.
- **Remove Key Hassles:** Rather than create a new product or service, you can innovatively improve a product, service or process.
- **Create Something New:** Think about how you can create a new experience for customers, based on existing business models.
- **Pick a Growing Sector/Industry:** Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.
- **Think About Product Differentiation:** If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities within Your Business

1. **SWOT Analysis**

   An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis framework:

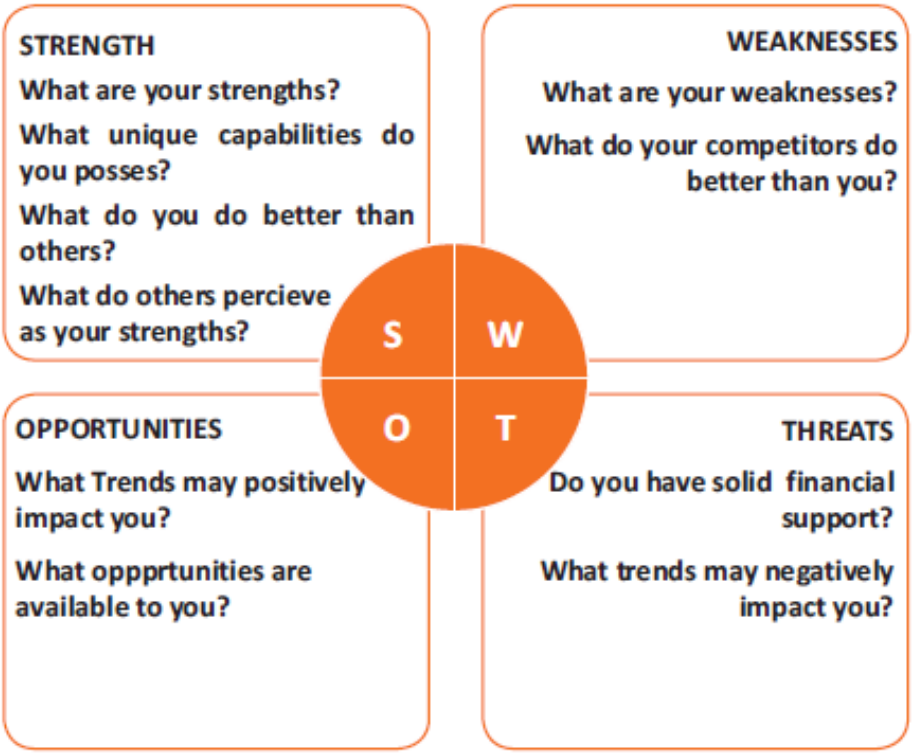

Fig.7.5.1. SWOT Analysis

Consider the following when looking for business opportunities:

By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. **Establishing Your USP**

   Establish your USP in such a way that positions you differently from your competitors. Identify the uniqueness about your product that will motivate customers to buy from you and then promote that reason.

Opportunity Analysis

Once you have identified an opportunity, you need to analyse it. To analyse an opportunity, you must:

- Focus on the idea
- Focus on the market of the idea
- Talk to industry leaders in the same space as the idea
- Talk to players in the same space as the idea

Tips

- Remember, opportunities are situational.
- Look for a proven track record.
- Avoid the latest craze.
- Love your idea.

7.5.6 Entrepreneurship Support Eco-System

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

1. **The Traditional Entrepreneur:** This type of entrepreneur usually has some kind of skill – they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
2. **The Growth Potential Entrepreneur:** The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
3. **The Project-Oriented Entrepreneur:** This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
4. **The Lifestyle Entrepreneur:** This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

- They are highly motivated
- They are creative and persuasive
- They are mentally prepared to handle each and every task
- They have excellent business skills – they know how to evaluate their cash flow, sales and revenue

- They are willing to take great risks
- They are very proactive – this means they are willing to do the work themselves, rather than wait for someone else to do it
- They have a vision – they are able to see the big picture
- They are flexible and open-minded
- They are good at making decisions

7.5.6.1 Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to door and offered a money back guarantee with every pack that was sold. He charged Rs.3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

7.5.6.2 The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

- **Stage 1:** Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.
- **Stage 2:** Germination or Recognition. In this stage a possible solution to the identified problem is thought of.
- **Stage 3:** Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.
- **Stage 4:** Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.
- **Stage 5:** Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.
- **Stage 6:** Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.
- **Stage 7:** Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.

Take a look at the diagram below to get a better idea of this process.

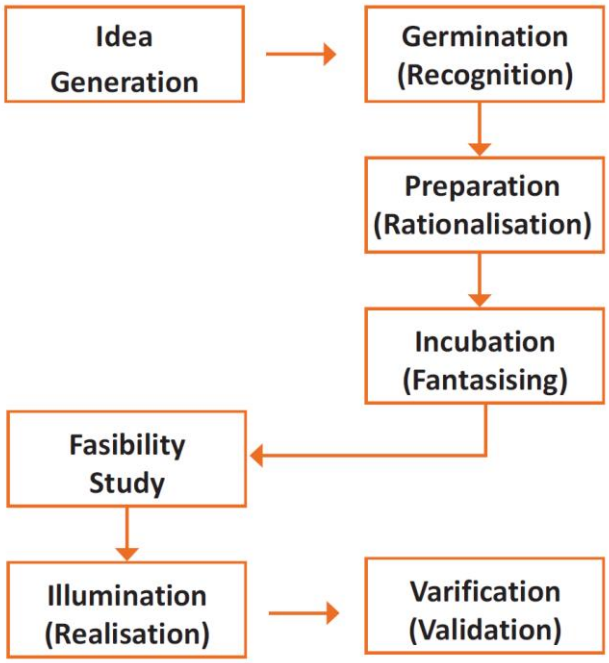

Fig.7.5.2: Stages of the entrepreneurial process

7.5.6.3 What is an Entrepreneur?

The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and public participants. These players nurture and sustain the new ventures, facilitating the entrepreneurs' efforts. An entrepreneurship ecosystem comprises of the following six domains:

1. **Favourable Culture:** This includes elements such as tolerance of risk and errors, valuable networking and positive social standing of the entrepreneur.
2. **Facilitating Policies & Leadership:** This includes regulatory framework incentives and existence of public research institutes.
3. **Financing Options:** Angel financing, venture capitalists and micro loans would be good examples of this.
4. **Human Capital:** This refers to trained and untrained labour, entrepreneurs and entrepreneurship training programmes, etc.
5. **Conducive Markets for Products & Services:** This refers to an existence or scope of existence of a market for the product/service.
6. **Institutional & Infrastructural Support:** This includes legal and financing advisers, telecommunications, digital and transportation infrastructure, and entrepreneurship networking programmes.

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem.

The six domains and their various elements have been graphically depicted.

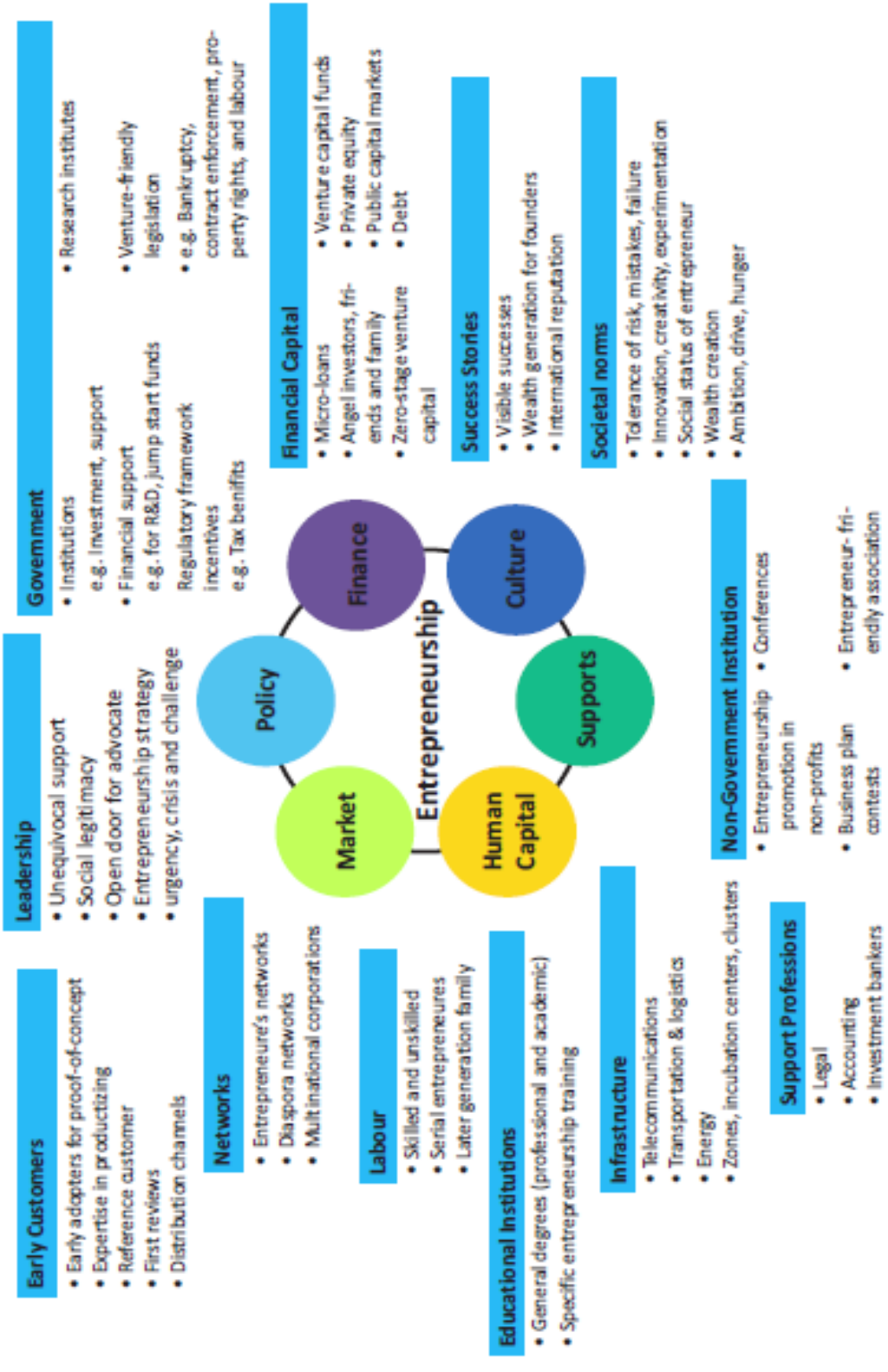

Fig.7.5.3. Entrepreneurship at a Glance

Every entrepreneurship support ecosystem is unique and all the elements of the ecosystem are interdependent. Although every region's entrepreneurship ecosystem can be broadly described by the above features, each ecosystem is the result of the hundred elements interacting in highly complex and particular ways.

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence focusing on sustain ability of the environment.

7.5.6.4 Government's Role in the Entrepreneurship Ecosystem

Encouraging new ventures is a major focus for policymakers. Governments across the world are recognizing that new businesses flourish in distinctive types of supportive environments. Policymakers should study the scenario and take into account the following points whilst they formulate policies and regulations that enable successful entrepreneurship support ecosystems.

- Policymakers should avoid regulations that discourage new entrants and work towards building efficient methods for business startups. Policies and regulations which help existing, leading firms over entrepreneurial ventures, limit competition and obstruct growth/formation of new companies.
- Therefore, in place of developing policies that are intended to improve market failures, policymakers should interact with entrepreneurs and understand the challenges faced by them. The feedback is used to develop policies which encourage exploring ideas, developing new products and increase the rates of deal flow.
- Entrepreneurial supporters ideally need to create a database that enables identifying who the members in the ecosystem are and how they are connected. The ecosystem database are useful tools in developing engagement strategies.
- Disruptions are inevitable in economic as well as social life. However, it's important to note that economic disruption gives rise to entrepreneurial opportunities. Architects of the entrepreneurship ecosystems (entrepreneurs, mentors, policymakers and consumers,) should anticipate these dips, thus capitalizing on the opportunities they create.

7.5.6.5 Snapshot of the Entrepreneurship Ecosystem in India

Entrepreneurship has earned a newfound respect in India. Many Indians, with exposure to the world of business, who traditionally would have opted for a job, are setting up their own ventures. Many elements of the entrepreneurship ecosystem are beginning to come together. For example, increase in venture capitalists, government schemes and incubators, academia industry linkages, and emerging clusters and support to rural economy.

All these initiatives are effective but there is a need to scale up and enrich the ecosystem further in the following ways:

1. We need to review our attitude towards failures and accept them as learning experiences.
2. We must encourage the educated to become entrepreneurs and provide students in schools and colleges with entrepreneurship skills.
3. Universities, research labs and the government need to play the role of enablers in the entrepreneurship support ecosystem.
4. Policymakers need to focus on reducing the obstacles such as corruption, red tape and bureaucracy.
5. We need to improve our legal systems and court international venture capital firms and bring them to India.
6. We must devise policies and methods to reach the secondary and tertiary towns in India, where people do not have access to the same resources available in the cities.

Today, there is a huge opportunity in this country to introduce innovative solutions that are capable of scaling up, and collaborating within the ecosystem as well as enriching it.

7.5.6.6 Make in India Campaign

Every entrepreneur has certain needs. Some of their important needs are:

- To easily get loans
- To easily find investors
- To get tax exemptions
- To easily access resources and good infrastructure
- To enjoy a procedure that is free of hassles and is quick
- To be able to easily partner with other firms

The Make in India campaign, launched by Prime Minister Modi aims to satisfy all these needs of young, aspiring entrepreneurs. Its objective is to:

- Make investment easy
- Support new ideas
- Enhance skill development
- Safeguard the ideas of entrepreneurs
- Create state-of-the-art facilities for manufacturing goods

Tips

- Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
- Failure is a stepping stone and not the end of the road. Review yours and your peers' errors and correct them in your future venture.
- Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

7.5.7 Risk Appetite & Resilience

Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite?

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives.

The levels of risk appetite can be broadly categorized as “low”, “medium” and “high.” The company’s entrepreneur(s) need to assess all possible alternatives and choose the option most likely to succeed. Companies have varying levels of risk appetites for different objectives. The levels depend on:

- The type of industry
- Market pressures
- Company objectives

For example, a start-up with a revolutionary concept will have a very high risk appetite. The start-up can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.

Risk Appetite Statement

Companies have to define and articulate their risk appetite in sync with decisions made about their objectives and opportunities. The point of having a risk appetite statement is to have a framework that clearly states the acceptance and management of risk in business. It sets risk taking limits within the company. The risk appetite statement should convey the following:

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired trade-off between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

- By developing a professional network of coaches and mentors
- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Ability to diversify and expand
- Strong social connections
- Survivor attitude
- Skill to learn from setbacks
- Cash-flow conscious habits
- Ability to look at the bigger picture
- Attention to detail

Tips

- Cultivate a great network of clients, suppliers, peers, friends and family. This will not only help you promote your business, but will also help you learn, identify new opportunities and stay tuned to changes in the market.
- Don’t dwell on setbacks. Focus on what you need to do next to get moving again.
- While you should try, and curtail expenses, ensure that it is not at the cost of your growth.

7.5.8 Success & Failures

Understanding Successes and Failures in Entrepreneurship

Shyam is a famous entrepreneur, known for his success story. But what most people don't know, is that Shyam failed numerous times before his enterprise became a success. Read his interview to get an idea of what entrepreneurship is really about, straight from an entrepreneur who has both, failed and succeeded.

Interviewer: Shyam, I have heard that entrepreneurs are great risk-takers who are never afraid of failing. Is this true?

Shyam: Ha ha, no of course it's not true! Most people believe that entrepreneurs need to be fearlessly enthusiastic. But the truth is, fear is a very normal and valid human reaction, especially when you are planning to start your own business! In fact, my biggest fear was the fear of failing. The reality is, entrepreneurs fail as much as they succeed. The trick is to not allow the fear of failing to stop you from going ahead with your plans. Remember, failures are lessons for future success!

Interviewer: What, according to you, is the reason that entrepreneurs fail?

Shyam: Well, there is no one single reason why entrepreneurs fail. An entrepreneur can fail due to numerous reasons. You could fail because you have allowed your fear of failure to defeat you. You could fail because you are unwilling to delegate (distribute) work. As the saying goes, "You can do anything, but not everything!" You could fail because you gave up too easily – maybe you were not persistent enough. You could fail because you were focusing your energy on small, insignificant tasks and ignoring the tasks that were most important. Other reasons for failing are partnering with the wrong people, not being able to sell your product to the right customers at the right time at the right price… and many more reasons!

Interviewer: As an entrepreneur, how do you feel failure should be looked at?

Shyam: I believe we should all look at failure as an asset, rather than as something negative. The way I see it, if you have an idea, you should try to make it work, even if there is a chance that you will fail. That's because not trying is failure right there, anyway! And failure is not the worst thing that can happen. I think having regrets because of not trying, and wondering 'what if' is far worse than trying and actually failing.

Interviewer: How did you feel when you failed for the first time?

Shyam: I was completely heartbroken! It was a very painful experience. But the good news is, you do recover from the failure. And with every subsequent failure, the recovery process gets a lot easier. That's because you start to see each failure more as a lesson that will eventually help you succeed, rather than as an obstacle that you cannot overcome. You will start to realize that failure has many benefits.

Interviewer: Can you tell us about some of the benefits of failing?

Shyam: One of the benefits that I have experienced personally from failing is that the failure made me see things in a new light. It gave me answers that I didn't have before. Failure can make you a lot stronger. It also helps keep your ego in control.

Interviewer: What advice would you give entrepreneurs who are about to start their own enterprises?

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive – push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money. I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another start-up. Lastly, I'd tell them that it's very important that they find the right investors.

Interviewer: That's some really helpful advice, Shyam! I'm sure this will help all entrepreneurs to be more prepared before they begin their journey! Thank you for all your insight!

Tips

- Remember that nothing is impossible.
- Identify your mission and your purpose before you start.
- Plan your next steps – don't make decisions hastily.

UNIT 7.6: Preparing to be an Entrepreneur

Unit Objectives

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

1. Discuss how market research is carried out
2. Describe the 4 Ps of marketing
3. Discuss the importance of idea generation
4. Recall basic business terminology
5. Discuss the need for CRM
6. Discuss the benefits of CRM
7. Discuss the need for networking
8. Discuss the benefits of networking
9. Discuss the importance of setting goals
10. Differentiate between short-term, medium-term and long-term goals
11. Discuss how to write a business plan
12. Explain the financial planning process
13. Discuss ways to manage your risk
14. Describe the procedure and formalities for applying for bank finance
15. Discuss how to manage your own enterprise
16. List important questions that every entrepreneur should ask before starting an enterprise

7.6.1 Market Study/The 4 Ps of Marketing/Importance of an IDEA

Understanding Market Research

Market research is the process of gathering, analysing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- **Primary information.** This is research collected by yourself or by someone hired by you.
- **Secondary information.** This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- **Exploratory:** This is open-ended and usually involves detailed, unstructured interviews.
- **Specific:** This is precise and involves structured, formal interviews. Conducting specific

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- **Public sources:** These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- **Commercial sources:** These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- **Educational institutions:** These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

7.6.1.1 The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place.

Let's look at each of these 4 Ps in detail.

Product

A product can be tangible, like a good or intangible, like a service.

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

- What need does the customer have for the product/service?
- What needs does it satisfy?
- Are there any more features that can be added?
- Does it have any expensive and unnecessary features?
- How will customers use it?
- What should it be called?
- How is it different from similar products?
- How much will it cost to produce?
- Can it be sold at a profit?

Price

Once all the elements of Product have been established, the Price factor needs to be considered. The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some typical questions to ask yourself include:

- What is the value of the product/service to customers?
- Do local products/services have established price points?
- Is the customer price sensitive?
- Should discounts be offered?
- How is your price compared to that of your competitors?

Promotion

Once you are certain about your Product and your Price, the next step is to look at ways to promote it. Some key elements of promotion are advertising, public relations, social media marketing, email marketing, search engine marketing, video marketing and more.

Some questions to ask yourself are:

- Where should you promote your product or service?
- What is the best medium to use to reach your target audience
- When would be the best time to promote your product?
- How are your competitors promoting their products?

Place

According to most marketers, the basis of marketing is about offering the right product, at the right price, at the right place, at the right time. For this reason, selecting the best possible location is critical for converting prospective clients into actual clients.

Some questions to ask yourself are:

- Will your product or service be looked for in a physical store, online or both?
- What should you do to access the most appropriate distribution channels?
- Will you require a sales force?
- Where are your competitors offering their products or services?
- Should you follow in your competitors' footsteps?
- Should you do something different from your competitors?

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.

Some ways to do this are by:

- Establishing a culture of brainstorming where you invite all interested parties to contribute
- Discussing ideas out loud so that people can add their ideas, views, opinions to them

- Being open minded and not limiting your ideas, even if the idea who have seems ridiculous
- Not discarding ideas that you don't work on immediately, but instead making a note of them and shelving them so they can be revisited at a later date.

Tips

- Keep in mind that good ideas do not always have to be unique.
- Remember that timing plays a huge role in determining the success of your idea.
- Situations and circumstances will always change, so be flexible and adapt your idea accordingly.

7.6.2 Business Entity Concepts: Basic Business Terminology

If your aim is to start and run a business, it is crucial that you have a good understanding of basic business terms. Every entrepreneur should be well versed in the following terms:

- **Accounting:** A systematic method of recording and reporting financial transactions.
- **Accounts payable:** Money owed by a company to its creditors.
- **Accounts Receivable:** The amount a company is owed by its clients.
- **Assets:** The value of everything a company owns and uses to conduct its business.
- **Balance Sheet:** A snapshot of a company's assets, liabilities and owner's equity at a given moment.
- **Bottom Line:** The total amount a business has earned or lost at the end of a month.
- **Business:** An organization that operates with the aim of making a profit.
- **Business to Business (B2B):** A business that sells goods or services to another business.
- **Business to Consumer (B2C):** A business that sells goods or services directly to the end user.
- **Capital:** The money a business has in its accounts, assets and investments. The two main types of capital are debt and equity.
- **Cash Flow:** The overall movement of funds through a business each month, including income and expenses.
- **Cash Flow Statement:** A statement showing the money that entered and exited a business during a specific period of time.
- **Contract:** A formal agreement to do work for pay.
- **Depreciation:** The degrading value of an asset over time.
- **Expense:** The costs that a business incurs through its operations.
- **Finance:** The management and allocation of money and other assets.
- **Financial Report:** A comprehensive account of a business' transactions and expenses.
- **Fixed Cost:** A one-time expense.

- **Income Statement (Profit and Loss Statement):** Shows the profitability of a business during a period of time.
- **Liabilities:** The value of what a business owes to someone else.
- **Marketing:** The process of promoting, selling and distributing a product or service.
- **Net Income/Profit:** Revenues minus expenses.
- **Net Worth:** The total value of a business.
- **Payback Period:** The amount of time it takes to recover the initial investment of a business.
- **Profit Margin:** The ratio of profit, divided by revenue, displayed as a percentage.
- **Return on Investment (ROI):** The amount of money a business gets as return from an investment.
- **Revenue:** The total amount of income before expenses are subtracted.
- **Sales Prospect:** A potential customer.
- **Supplier:** A provider of supplies to a business.
- **Target Market:** A specific group of customers at which a company's products and services are aimed.
- **Valuation:** An estimate of the overall worth of the business.
- **Variable Cost:** Expenses that change in proportion to the activity of a business.
- **Working Capital:** Calculated as current assets minus current liabilities.

7.6.3 CRM & Networking

What is CRM?

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
  - Increased sales
  - Identification of customer needs
  - Cross-selling of products
- It results in better marketing of one's products or services
- It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

7.6.3.1 What is Networking?

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

- Getting high quality leads
- Increased business opportunities
- Good source of relevant connections
- Advice from like-minded entrepreneurs
- Gaining visibility and raising your profile
- Meeting positive and enthusiastic people

- Increased self-confidence
- Satisfaction from helping others
- Building strong and lasting friendships

Tips

- Use social media interactions to identify needs and gather feedback.
- When networking, ask open-ended questions rather than yes/no type questions.

7.6.4 Business Plan: Why Set Goals?

Setting goals is important because it gives you long-term vision and short-term motivation. Goals can be short term, medium term and long term.

Short-Term Goals

- These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

- These goals are built on your short-term goals.
- They do not need to be as specific as your short-term goals.

Example: Arranging for a service contract to ensure that your machines don't fail again.

Long-Term Goals

These goals require time and planning.

They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan?

A business plan is a tool for understanding how your business is put together. It can be used to monitor progress, foster accountable and control the fate of the business. It usually offers a 3-5year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.

A business plan typically comprises of eight elements.

7.6.4.1 Elements of a Business Plan

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and business like way. It is an overview of your business and your plans. Ideally this should not be more than 1-2 pages.

Your Executive Summary should include:

- **The Mission Statement:** Explain what your business is all about.

  Example: Nike's Mission Statement

  Nike's mission statement is "To bring inspiration and innovation to every athlete in the world."
- **Company Information:** Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- **Growth Highlights:** Mention examples of company growth. Use graphs and charts where possible.
- **Your Products/Services:** Describe the products or services provided.
- **Financial Information:** Provide details on current bank and investors.
- **Summarize future plans:** Describe where you see your business in the future.

Business Description

The second section of your business plan needs to provide a detailed review of the different elements of your business. This will help potential investors to correctly understand your business goal and the uniqueness of your offering.

Your Business Description should include:

- A description of the nature of your business
- The market needs that you are aiming to satisfy
- The ways in which your products and services meet these needs
- The specific consumers and organizations that you intend to serve
- Your specific competitive advantages

Market Analysis

The market analysis section usually follows the business description. The aim of this section is to showcase your industry and market knowledge. This is also the section where you should lay down your research findings and conclusions.

Your Market Analysis should include:

- Your industry description and outlook
- Information on your target market
- The needs and demographics of your target audience
- The size of your target market

- The amount of market share you want to capture
- Your pricing structure
- Your competitive analysis
- Any regulatory requirements

Organization & Management

This section should come immediately after the Market Analysis. Your Organization & Management section should include:

- Your company's organizational structure
- Details of your company's ownership
- Details of your management team
- Qualifications of your board of directors
- Detailed descriptions of each division/department and its function
- The salary and benefits package that you offer your people

Service or Product Line

The next section is the service or product line section. This is where you describe your service or product, and stress on their benefits to potential and current customers. Explain in detail why your product of choice will fulfil the needs of your target audience.

Your Service or Product Line section should include:

- A description of your product/service
- A description of your product or service's life cycle
- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

Once the Service or Product Line section of your plan has been completed, you should start on the description of the marketing and sales management strategy for your business.

Your Marketing section should include the following strategies:

- **Market penetration strategy:** This strategy focuses on selling your existing products or services in existing markets, in order to increase your market share.
- **Growth strategy:** This strategy focuses on increasing the amount of market share, even if it reduces earnings in the short-term.
- **Channels of distribution strategy:** These can be wholesalers, retailers, distributers and even the internet.
- **Communication strategy:** These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

- **A salesforce strategy:** This strategy focuses on increasing the revenue of the enterprise.
- **A breakdown of your sales activities:** This means detailing out how you intend to sell your products or services – will you sell it offline or online, how many units do you intend to sell, what price do you plan to sell each unit at, etc.

Funding Request

This section is specifically for those who require funding for their venture. The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your long-term goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans – what these plans are and how much money you will require to put these plans in motions.
- Historical and prospective financial information. This can be done by creating and maintaining all your financial records, right from the moment your enterprise started, to the present day. Documents required for this are your balance sheet which contains details of your company's assets and liabilities, your income statement which lists your company's revenues, expenses and net income for the year, your tax returns (usually for the last three years) and your cash flow budget which lists the cash that came in, the cash that went out and states whether you had a cash deficit (negative balance) or surplus (positive balance) at the end of each month.

Financial Planning

Before you begin building your enterprise, you need to plan your finances. Take a look at the steps for financial planning:

- **Step 1:** Create a financial plan. This should include your goals, strategies and timelines for accomplishing these goals.
- **Step 2:** Organize all your important financial documents. Maintain a file to hold your investment details, bank statements, tax papers, credit card bills, insurance papers and any other financial records.
- **Step 3:** Calculate your net worth. This means figure out what you own (assets like your house, bank accounts, investments etc.), and then subtract what you owe (liabilities like loans, pending credit card amounts etc.) the amount you are left with is your net worth.
- **Step 4:** Make a spending plan. This means write down in detail where your money will come from, and where it will go.
- **Step 5:** Build an emergency fund. A good emergency fund contains enough money to cover at least 6 months' worth of expenses.
- **Step 6:** Set up your insurance. Insurance provides long term financial security and protects you against risk.

Risk Management

As an entrepreneur, it is critical that you evaluate the risks involved with the type of enterprise that you want to start, before you begin setting up your company. Once you have identified potential risks, you can take steps to reduce them. Some ways to manage risks are:

- Research similar business and find out about their risks and how they were minimized.
- Evaluate current market trends and find out if similar products or services that launched a while ago are still being well received by the public.
- Think about whether you really have the required expertise to launch your product or service.
- Examine your finances and see if you have enough income to start your enterprise.
- Be aware of the current state of the economy, consider how the economy may change over time, and think about how your enterprise will be affected by any of those changes.
- Create a detailed business plan.

Tips

- Ensure all the important elements are covered in your plan.
- Scrutinize the numbers thoroughly.
- Be concise and realistic.
- Be conservative in your approach and your projections.
- Use visuals like charts, graphs and images wherever possible.

7.6.5 Procedure and Formalities for Bank Finance

The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for start-ups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of start-ups, offering funding to thousands of start-ups every year.

7.6.5.1 What Information Should Entrepreneurs Offer Banks for Funding?

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- **Letter(s) of Introduction:** This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- **Your Profile:** This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- **Business Brochure:** A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- **Bank and Other References:** If you have an account with another bank, providing those bank references is a good idea.
- **Proof of Company Ownership or Registration:** In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan
- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

7.6.5.2 The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

- Good cash flow
- Adequate shareholders' funds
- Adequate security
- Experience in business
- Good reputation

The Procedure

To apply for funding the following procedure will need to be followed.

- Submit your application form and all other required documents to the bank.
- The bank will carefully assess your credit worthiness and assign ratings by analysing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
- The bank will make a decision as to whether or not you should be given funding.

Tips

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

7.6.6 Enterprise Management - An Overview

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large-scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle.

Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation. Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers.

This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Also, hire a marketing agency if you feel you need help in this area. Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

Tips

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

7.6.7 Considering Entrepreneurship

Questions to ask yourself before considering entrepreneurship.

1. Why am I starting a business?
2. What problem am I solving?
3. Have others attempted to solve this problem before? Did they succeed or fail?
4. Do I have a mentor1 or industry expert that I can call on?
5. Who is my ideal customer2?
6. Who are my competitors3?
7. What makes my business idea different from other business ideas?
8. What are the key features of my product or service?
9. Have I done a SWOT4 analysis?
10. What is the size of the market that will buy my product or service?
11. What would it take to build a minimum viable product5 to test the market?
12. How much money do I need to get started?
13. Will I need to get a loan?
14. How soon will my products or services be available?
15. When will I break even6 or make a profit?
16. How will those who invest in my idea make a profit?
17. How should I set up the legal structure7 of my business?
18. What taxes8 will I need to pay?
19. What kind of insurance9 will I need?
20. Have I reached out to potential customers for feedback

Tips

- It is very important to validate your business ideas before you invest significant time, money and resources into it.
- The more questions you ask yourself, the more prepared you will be to handle to highs and lows of starting an enterprise.

Footnotes:

1. A mentor is a trusted and experienced person who is willing to coach and guide you.
2. A customer is someone who buys goods and/or services.
3. A competitor is a person or company that sells products and/or services similar to your products and/or services.
4. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. To conduct a SWOT analysis of your company, you need to list down all the strengths and weaknesses of your company, the opportunities that are present for your company and the threats faced by your company.
5. A minimum viable product is a product that has the fewest possible features, that can be sold to customers, for the purpose of getting feedback from customers on the product.
6. A company is said to break even when the profits of the company are equal to the costs.
7. The legal structure could be a sole proprietorship, partnership or limited liability partnership.
8. There are two types of taxes – direct taxes payable by a person or a company, or indirect taxes charged on goods and/or services.
9. There are two types of insurance – life insurance and general insurance. Life insurance overs human life while general insurance covers assets like animals, goods, cars etc.

Notes

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