

# TRAINING MODULE

## FSTP O&M TECHNICIAN

Sector: **GREEN JOBS**

Sub-Sector: **WASTE MANAGEMENT**

Ref ID: **SCG/6403**





### **About Urban Management Centre (UMC)**

UMC works towards professionalizing urban management in India and worldwide by providing technical assistance and support to city governments and facilitates change through peer-to-peer learning processes. It enhances the capacity of city governments by providing expertise and ready access to innovations on good governance implemented in India and abroad. It facilitates city governments to design, implement and evaluate municipal development and management projects. UMC extensively works in the areas of urban water and sanitation, heritage management, urban planning, urban health, municipal finance, urban management, urban transportation and institutional restructuring. More details are available on [www.umcasia.org](http://www.umcasia.org)

**DISCLAIMER**

This training material has been prepared by Urban Management Centre (UMC) in consultation with Sector Skill Council for Green Jobs (SCJG) for all the aspiring youth who desire to gain special skills & gain meaningful & dignified livelihood in FSSM, sector. In the preparation of this training material UMC has been supported by the Consortium for DEWATS Dissemination Society (CDD Society). CDD Society is one of the leading organisation in the FSSM Sector.

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.

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# SCOPE OF TRAINING MODULE

This training module is a step to step guideline for operation and maintenance technicians of faecal sludge treatment plant. Module will help to understand the importance of operations and maintenance for faecal sludge treatment plants.

This module will act as a guidebook to:

1. To carry out day to day operations of FSTP
2. To carry out routine maintenance of FSTP
3. To maintain health and safety

# JOB ROLE

Name of the Job Role

**FSTP Operation & Maintenance Technician**

NSQF level

**4**

Education Qualification

**Minimum: ITI /Diploma or B.Tech or education qualification can be relaxed in case of extraordinary relevant field experience**

Job Entry Age

**18 years**

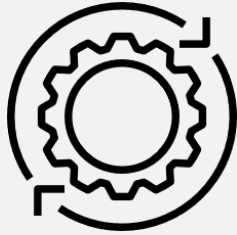
Experience

**Minimum 3 years of relevant industry experience for ITI /Diploma  
or**

**Minimum 2 years of relevant industry experience for B.Tech**

# TRAINING MODULES

## 1 CARRY OPERATION OF FSTP



Outcome:

1. Introduction to common tasks to Faecal Sludge Treatment Plants
2. Routine operations at Faecal Sludge Treatment Plants

## 2 CARRY OUT ROUTINE MAINTENANCE OF FSTP



Outcome:

1. Plant equipment for which routine repair & maintenance is needed.
2. Inspection of equipment & corrective measures

## 3 MAINTAIN HEALTH AND SAFETY IN FSTP



Outcome:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

## 4 WORKING EFFECTIVELY WITH OTHERS



Outcome:

- The importance and the correct way of working effectively with co-workers
- Importance of diversity and inclusion
- Procedure for addressing grievances.

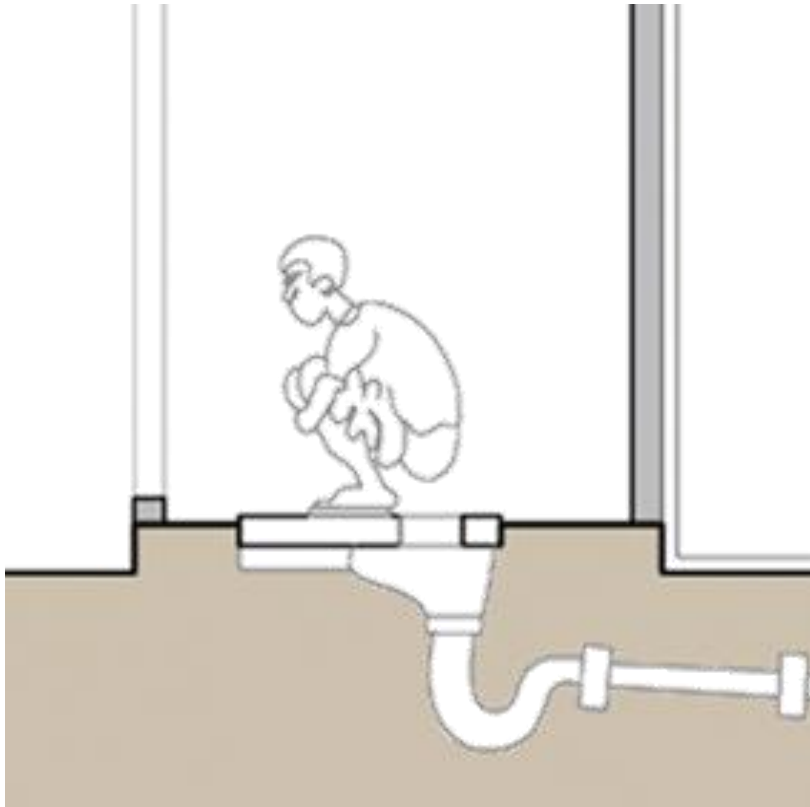
## 5 EMPLOYABILITY & ENTREPRENEURSHIP SKILLS



Outcome:

- Understand about digital literacy
- Understand about money related components
- Understanding about entrepreneurship

# TOILET: EVERYONE HAS TO GO!!



**Wondered, what happens when you flush?**

<https://www.youtube.com/watch?v=UJqlftFVNiE>

**Where you go matters!**

<https://www.youtube.com/watch?v=K12osl3B8co>

Video Source:

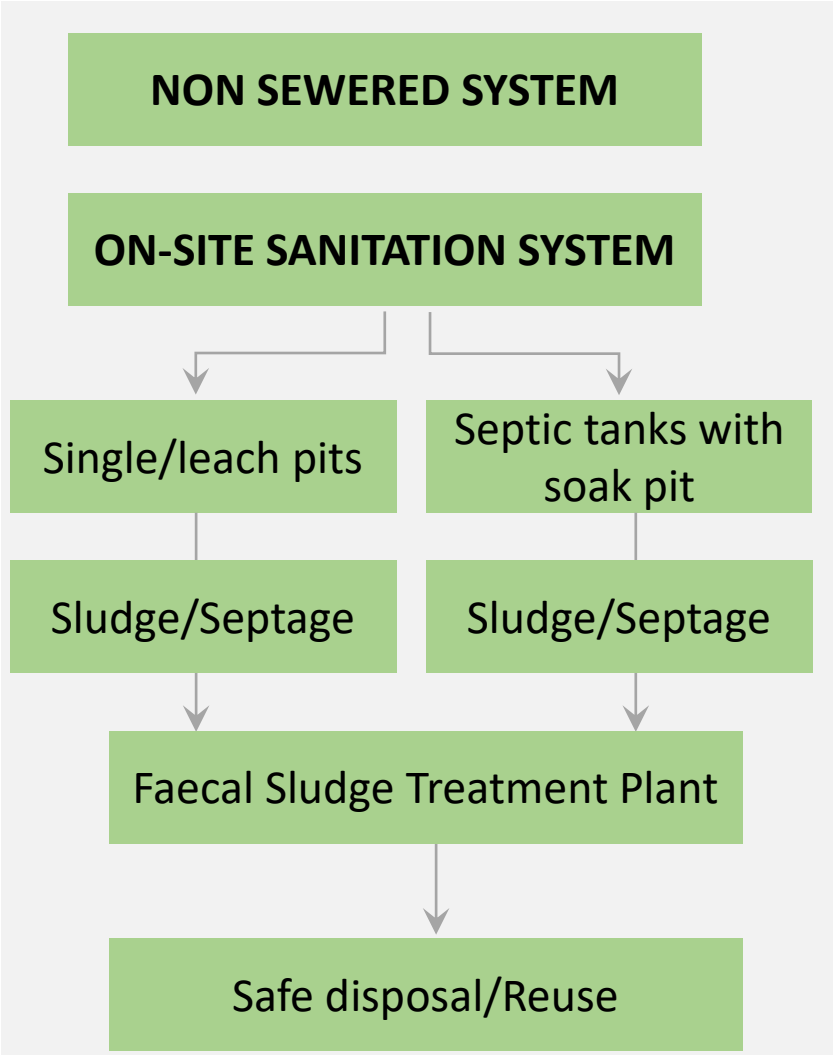
1. UN Water
2. Ministry of Sustainability & the Environment, Singapore

As on date 07.10.2019



# THE SYSTEM

## Toilet



### SEWERED SYSTEM

### OFF-SITE SANITATION SYSTEM

Underground drainage system

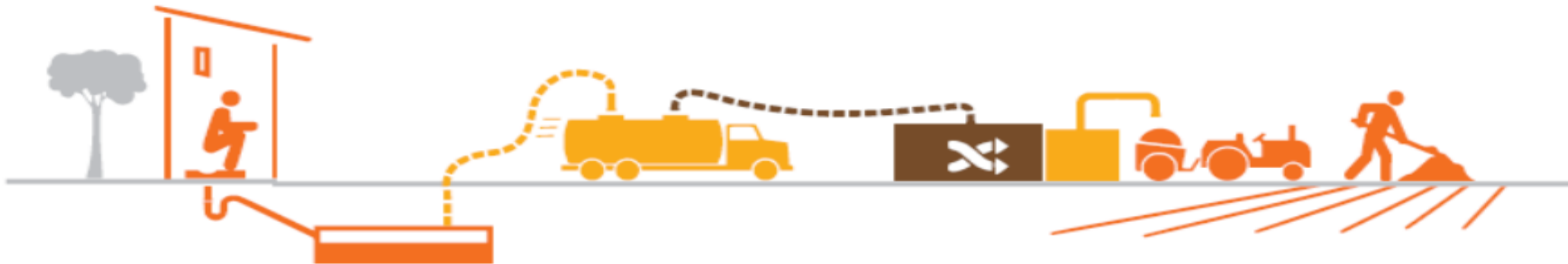
Grey and Black water

Sewage Treatment Plant

Safe disposal/Reuse

# FAECAL SLUDGE MANAGEMENT

M1



## Containment

Faecal sludge or septage in contained in an on-site system, together with grey water

## Emptying

On-site system is emptied by a de-sludging truck with a vacuum mechanism

## Transport

Faecal sludge or septage is transported to designated treatment plant or disposal site

## Treatment

Faecal sludge or septage is treated at Faecal Sludge Treatment Plant (FSTP) or co treated with sewage at a Sewage Treatment Plant

## Reuse/Disposal

Treated waste can be reused or disposed off

# DEFINITIONS TO UNDERSTAND

## Sewage

Is the liquid waste matter that is transported through the sewers. Normally combination of blackwater and greywater. Thus, sewage is domestic (household) wastewater in totality.

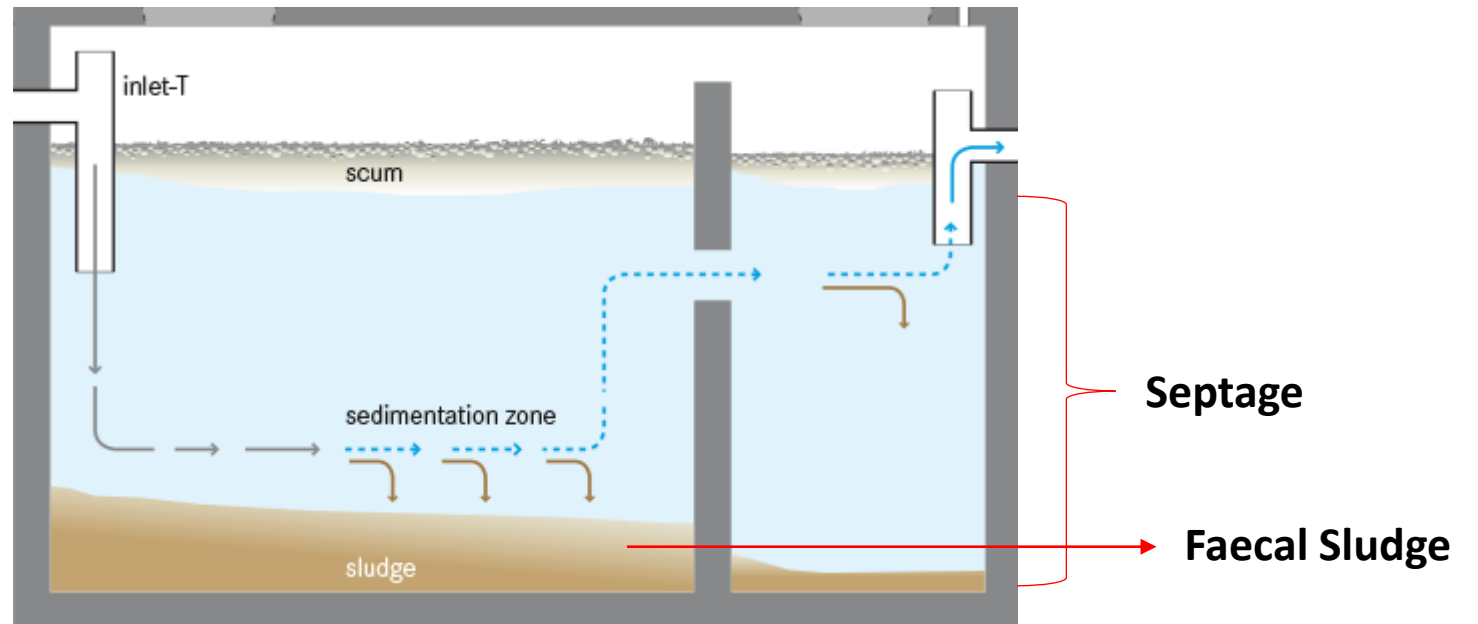


## Faecal Sludge

The accumulated semi-solid or solid portion that settled at the bottom of the septic tank.

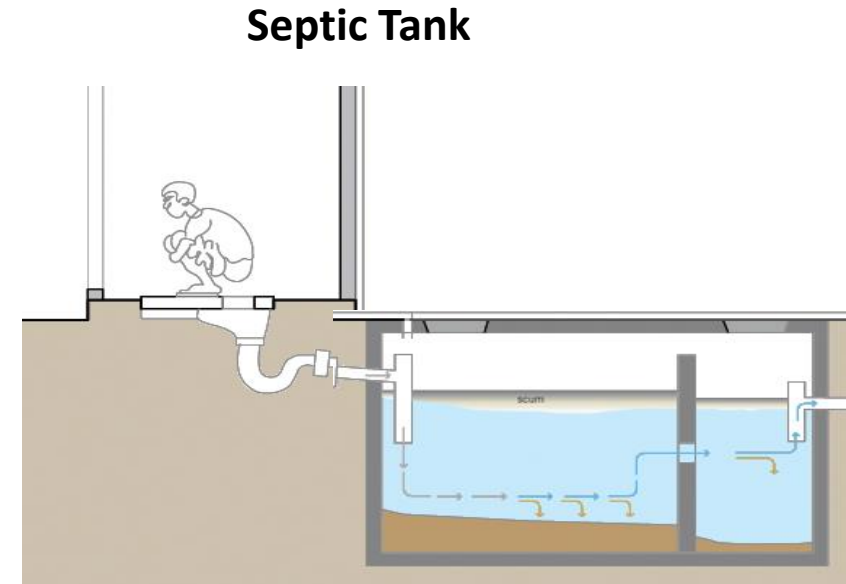
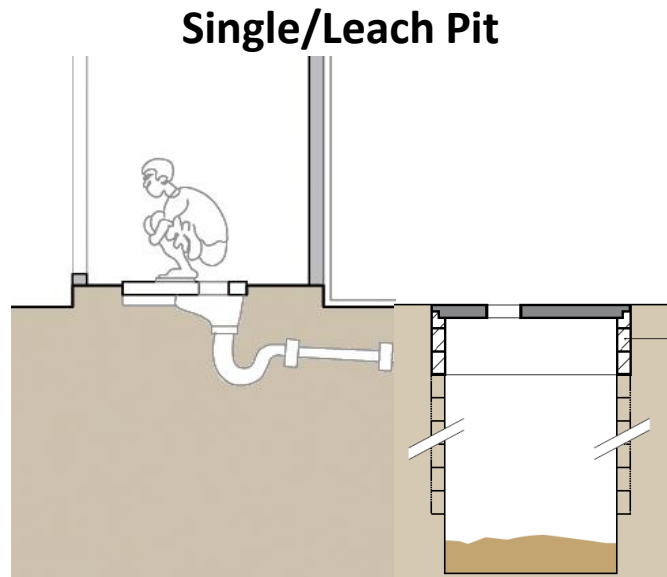
## Septage

Is the liquid and solid material that is pumped from a septic tank, cesspool, after it has accumulated over a period of time.



# ON-SITE SANITATION SYSTEMS

The systems where faecal sludge goes after the flushing are called the on-site sanitation system. Two types of OSS widely used:



to learn more about OSS Please watch the video below:

<https://www.youtube.com/watch?v=dFpF2RK-gO4>

<https://swachhbharat.azurewebsites.net/learner#/course/270/item/1962>

Video Source:

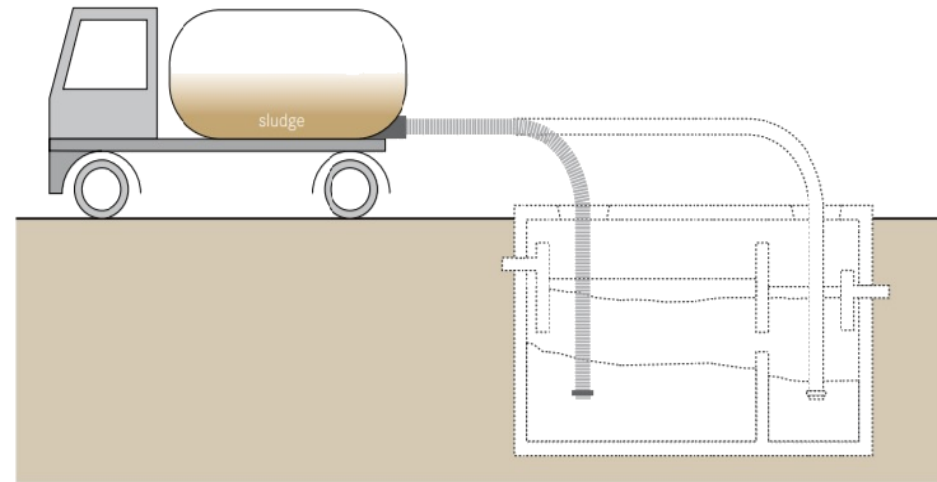
1. PIB India
  2. SBM E-Learn Portal
- As on date 11.10.2019

# WHAT IS DESLUDGING?

**Desludging is the process of emptying the On-Site Containment system.**

The Desludging vehicles act as a “Mobile Sewer Network” for onsite sanitation system.

They collect the septage from the residential, commercial and institutional areas and safely transport the sludge to the faecal sludge treatment plant



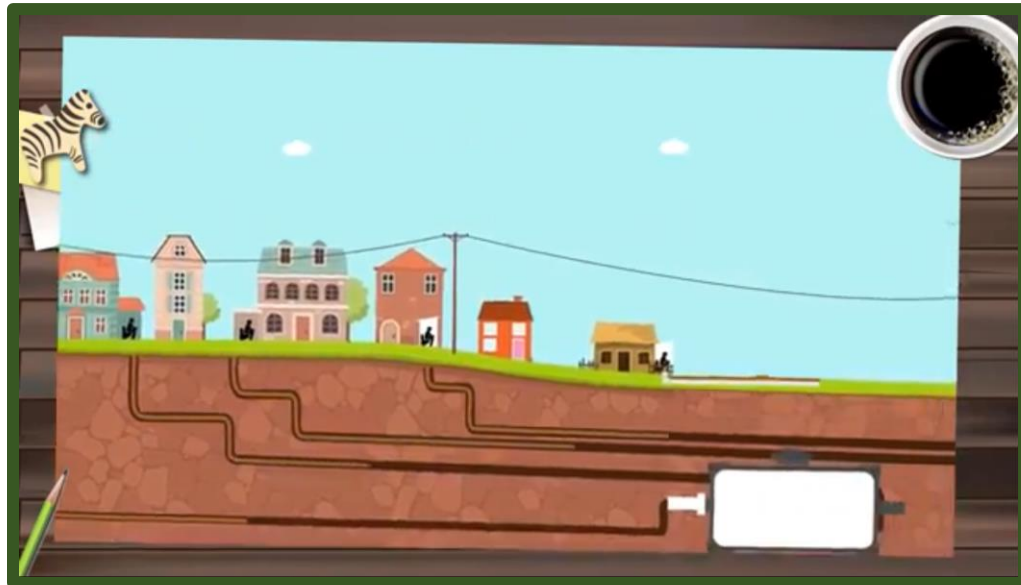
Date: as on 30/09/2019

Please watch the video to learn about successful desludging women operator <https://www.youtube.com/watch?v=r7GEiKjXzaA>

Video Source: Dasra India  
As on date 11.10.2019

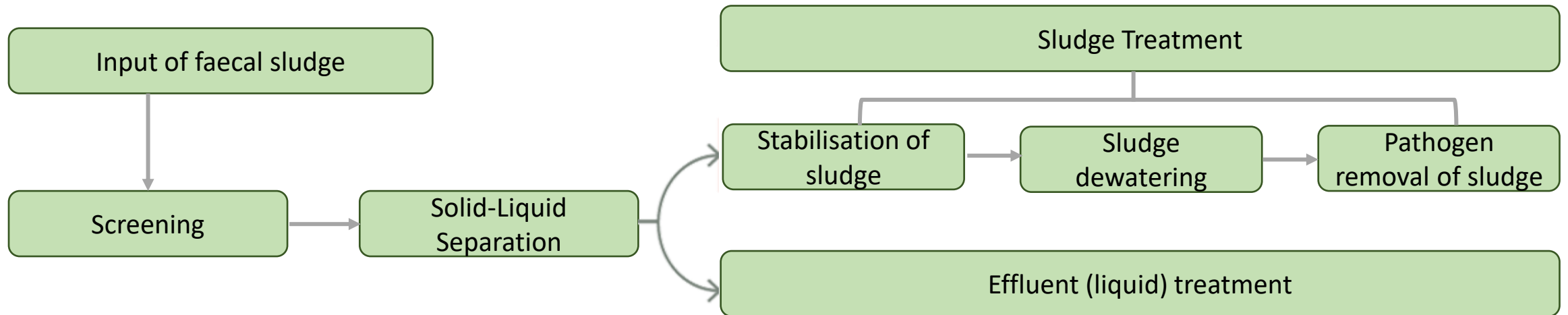
# WHAT IS FSTP?

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



Play the video to learn about requirement of FSTP  
<https://www.youtube.com/watch?v=4pQOkXZmugk>

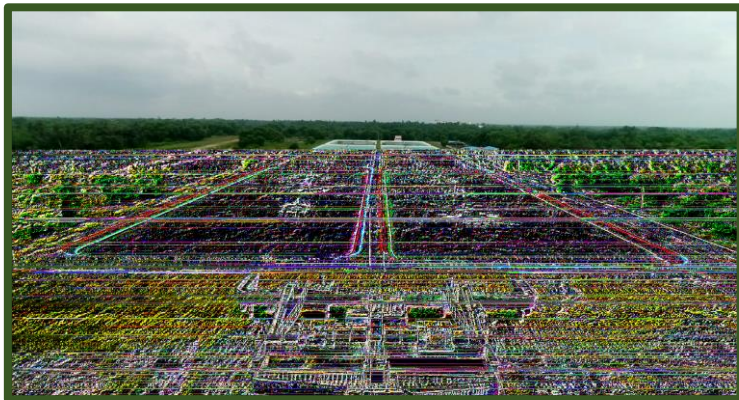
# PROCESS FLOW OF FAECAL SLUDGE TREATMENT



# COMPONENTS OF FSTP



Watch the video to learn about Components of Nature based FSTP at Jhansi  
<https://www.youtube.com/watch?v=XiJkhy9r11I>



Watch the video to learn about Components of Mechanised FSTP at Bhubaneshwar  
<https://www.youtube.com/watch?oNtaLaUDtMI>



# COMPONENTS OF FSTP

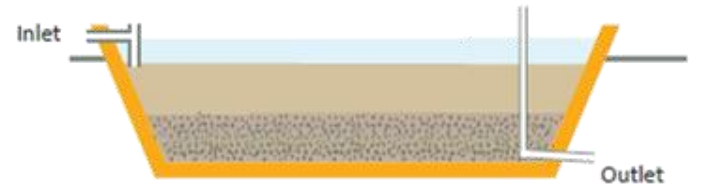
## 1 Screening

It is the first stage of FS treatment where impurities are removed by means of physical separation



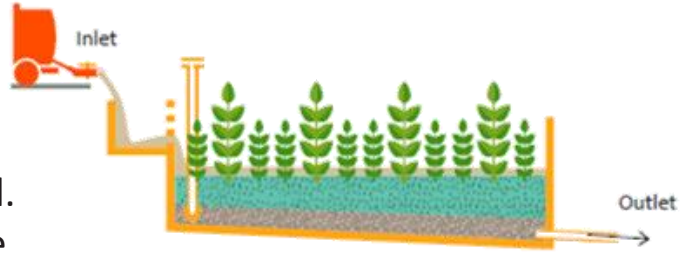
## 2 Solid-liquid separation

This process may be needed if the faecal sludge has very high-water content.



## 3 Sludge Treatment

Stabilisation: is the process in which the bio-degradable part of the faecal sludge is digested.  
Pathogen removal: is the stage at which pathogens are inactivated and/or destroyed.



Dewatering: is the process of removing easily removal moisture from the sludge.



## 4 Effluent treatment

The effluent or liquid coming out from various treatment processes are collected and treated at this stage

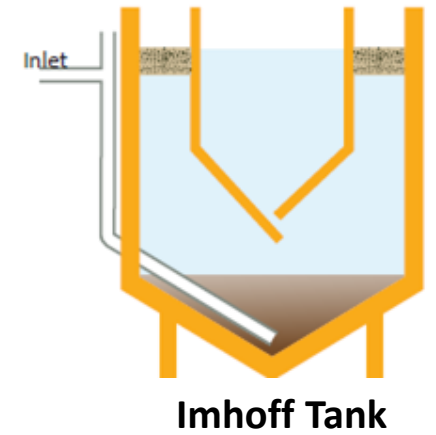
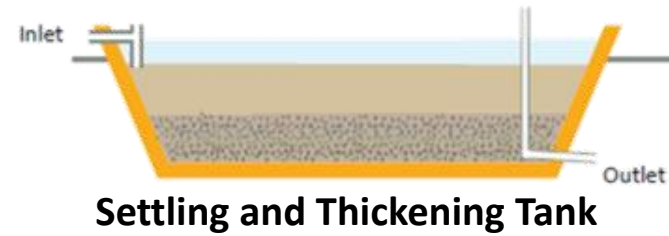


# TYPES OF TREATMENT TECHNOLOGIES

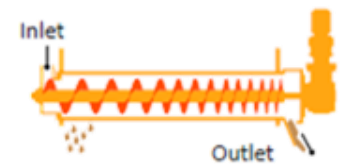
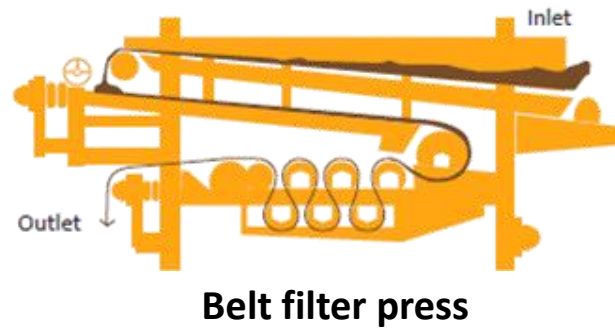
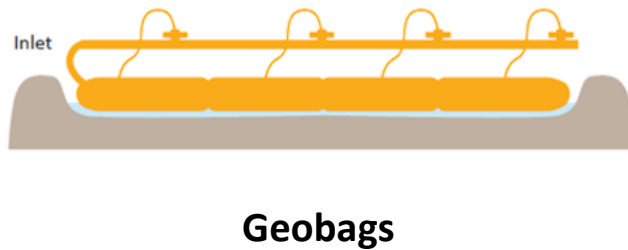
## 1 Screening



## 2 Solid Liquid Separation



## 3 Sludge Treatment: Dewatering

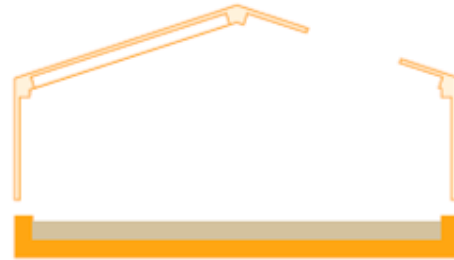


# TYPES OF TREATMENT TECHNOLOGIES

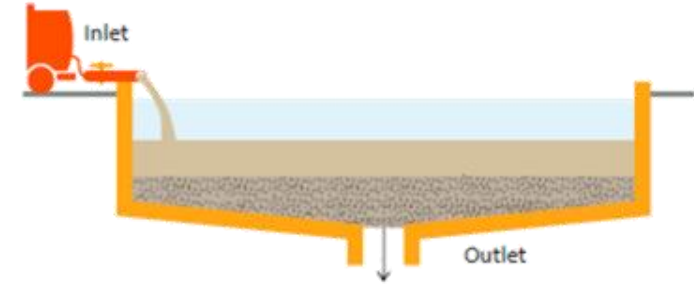
## Sludge Treatment: Dewatering



Screw Press



Solar Drying



Unplanted Drying Beds



Mechanical Conveyer Belt



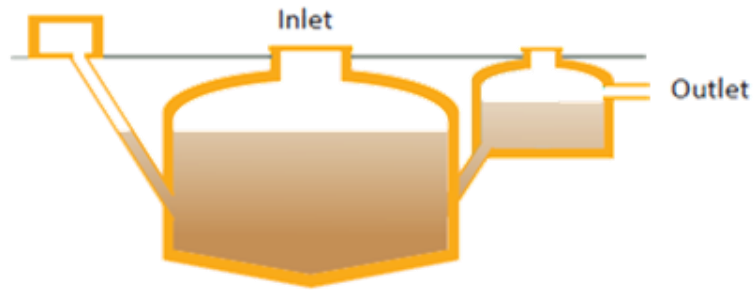
Pyrolysis



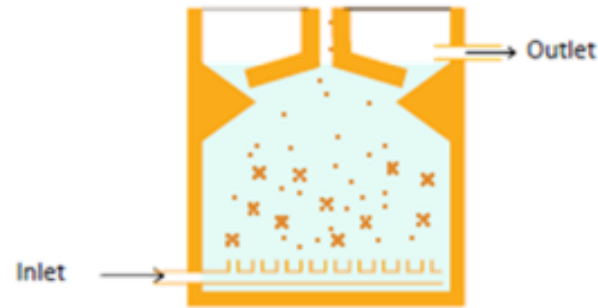
Incineration

# TYPES OF TREATMENT TECHNOLOGIES

## 4 Sludge Treatment: Stabilization



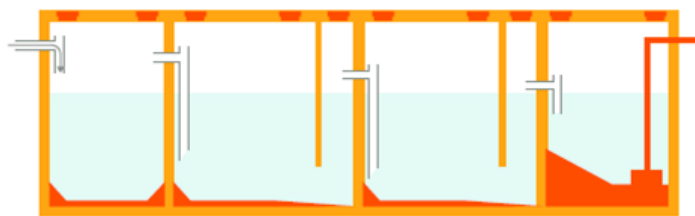
Biogas Digester



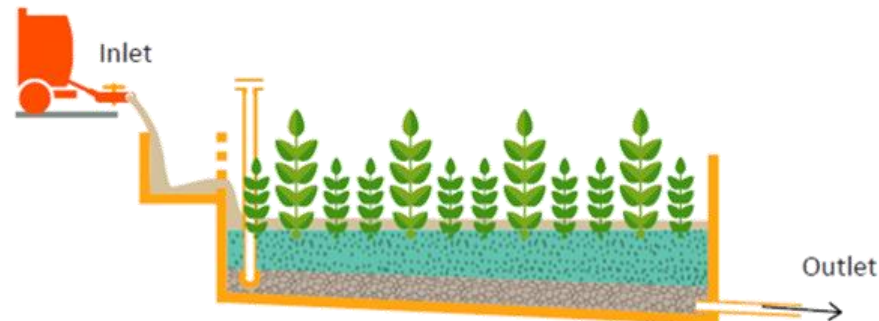
Upflow Anaerobic Sludge Blanket (UASB)



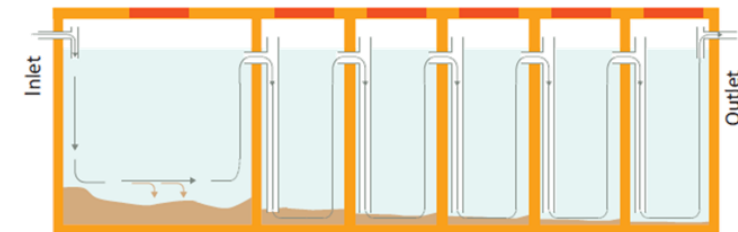
Deep row entrenchment



Stabilization Reactor



Unplanted Drying Beds



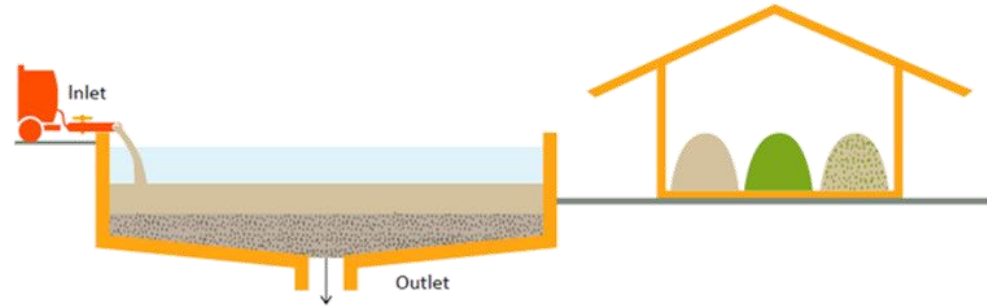
Anaerobic Baffle Reactor

# TYPES OF TREATMENT TECHNOLOGIES

## 5 Sludge Treatment: Pathogen Removal



Co-Composting



Unplanted Sludge Drying Bed + Co-Composting

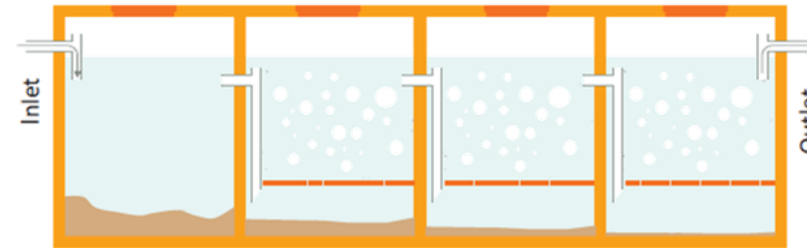


Membrane Bio-reactor

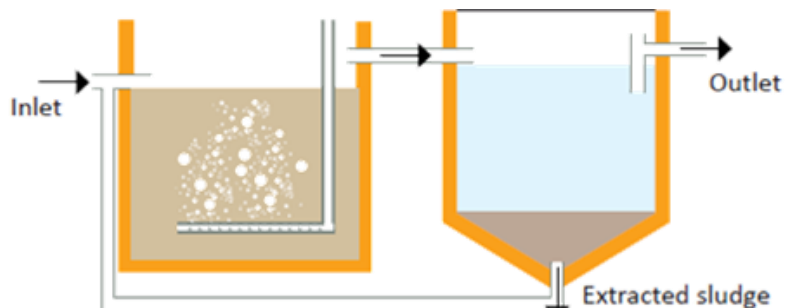
## 6 Effluent Treatment



Water Stabilization Pond



Anaerobic Filter



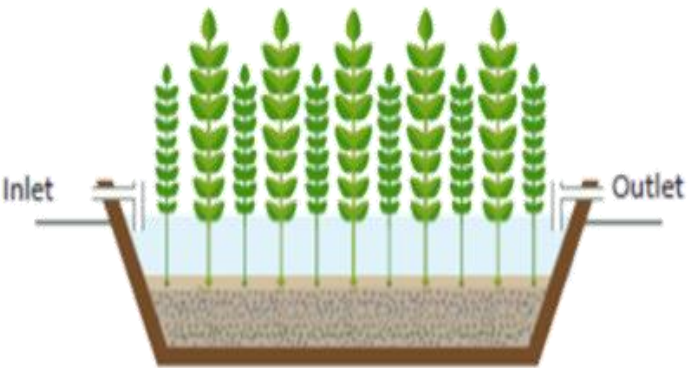
Activated Sludge Process

# TYPES OF TREATMENT TECHNOLOGIES

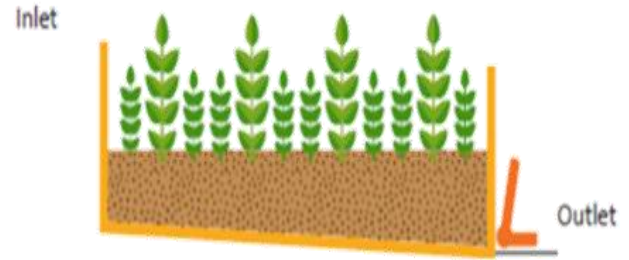
## 7 Effluent Treatment



Sequential Batch Reactor



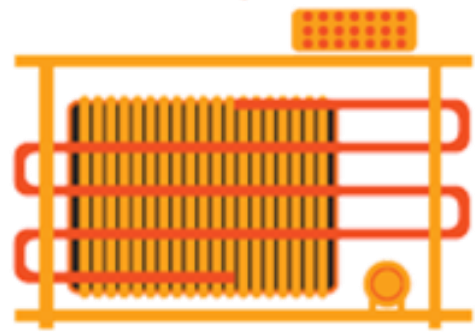
Constructed Wetland



Horizontal planted gravel filter



Polishing Pond



Pasteurization

# TYPES OF FST APPROACHES

Faecal sludge treatment approaches can be broadly divided into 2 categories:

**1 Nature-based treatment approach:** This treatment approach relies primarily on **natural processes**. In such treatment plant there is little to **no use of electricity, pumps, motorised equipments and chemicals** for treatment of faecal sludge. However, these this type of treatment approach usually uses a **larger land area**.

**2 Mechanised treatment approach:** This treatment approach relies primarily on **mechanised equipments** for treatment.

These treatment plants are energy intensive use equipments like pumps, motors, dryers, sludge press usually controlled by sophisticated control mechanisms. This treatment approach usually needs relatively **smaller land area** and can **handle huge quantities**.

# NATURE BASED TREATMENT APPROACHES

## Faecal sludge treatment plant at Leh, Jammu & Kashmir



Desludging Vehicle

1. Faecal Sludge (& septage) is received at the planted drying bed where the sludge undergoes the process of dewatering and mineralisation.

2. The percolate from the planted drying bed goes to the horizontal planted gravel filter. Here the plants take up the nutrients present in the water coming out of the planted drying bed, while at the same time enriching the water with oxygen.

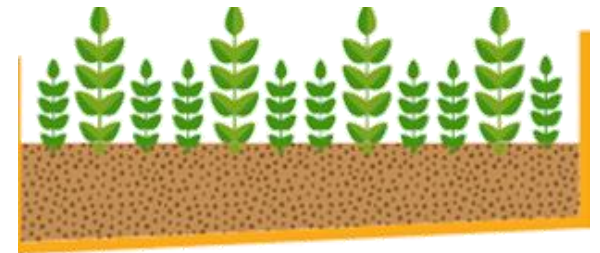
3. This is followed by the polishing pond, where the treatment percolate/ effluent is further treated by the sunlight.

1



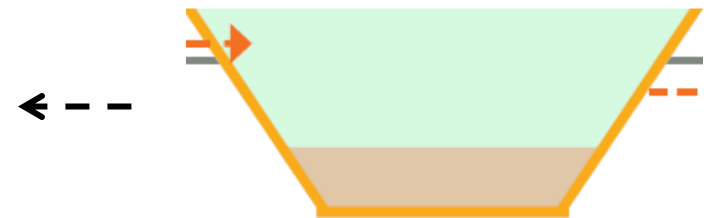
Planted Drying Bed (PDB) (10 Nos)  
Area = 48 m<sup>2</sup> /bed

2



Horizontal Planted Gravel Filter (2 Nos)  
Area = 60 m<sup>2</sup> /unit

3



Fishing Pond (1 No)  
Area = 24 m<sup>2</sup>

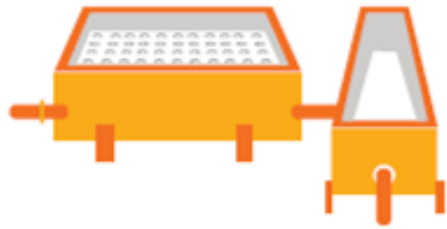


Treated Wastewater



# MECHANISED TREATMENT APPROACH

1



**Septage Receiving Station (SRS) :**  
Septage is passed through SRS to remove screenings & Grit



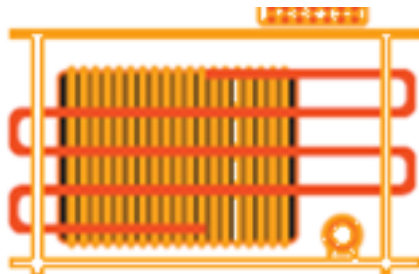
2



**Dewatering :**  
Solid-liquid separation



3



**Pasteurization :** Thermal deconstruction of pathogens and helminth eggs



**Mechanical Dryer:** Further drying of sludge for pyrolysis



4



**Waste water treatment:** Passive nature-based waste water treatment system for dewatered water



**Pyrolyser:** Dried sludge is pyrolysed into bio char

# MECHANISED TREATMENT APPROACH

## End product usage

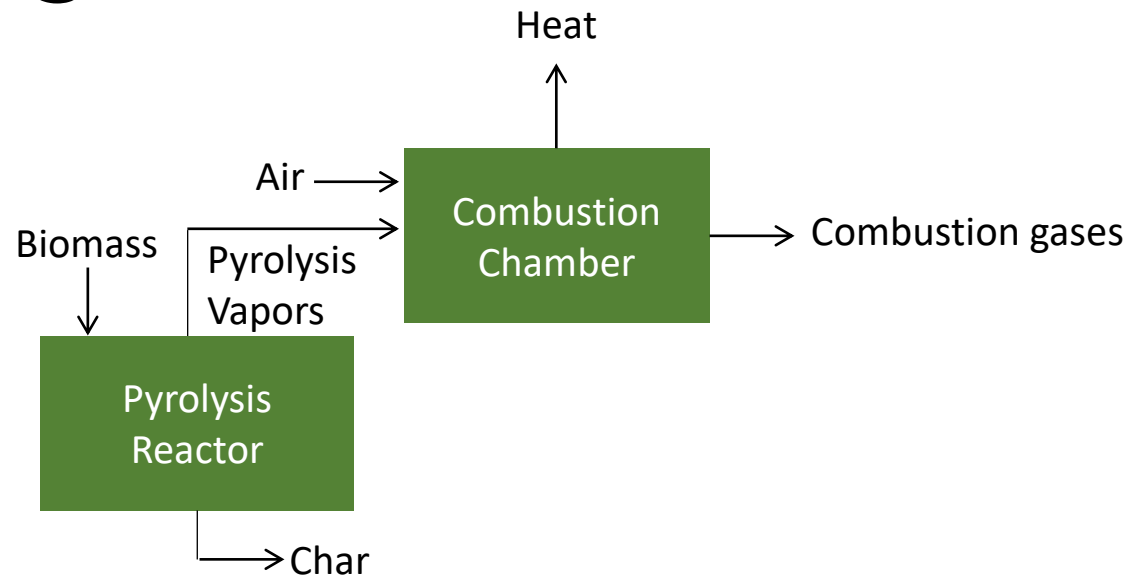
**1** Treated Water



**2** Bio char



**3** Thermal Energy



Thermal energy generation & reuse  
The heat is generated from the pyrolyser. The pyrolysing process generates heat

# TYPES OF EQUIPMENT

**1 Rake and Broom:**  
Used for cleaning the bars of screen chambers and other areas of the FSTP



**2 Trowel:** Used for removing the trash from screens and bars and putting into waste collection bucket



**3 Bucket:** Used for collecting trash



**4 Wheel barrow:** For transferring dried sludge from drying beds to storage house



**5 L- Shovel, straight shovel:**  
Used for moving and cleaning filter materials and removing the dried sludge from the drying bed



**6 Plastic sheet:**  
Used for moving and cleaning filter materials and removing the dried sludge from the drying bed

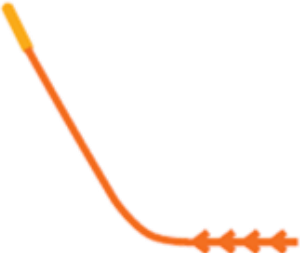


# TYPES OF EQUIPMENT

**7 Steel wire/ rod:** Used for removing any obstructions in the pipe



**8 Long steel sieve:** Used for removing any obstructions in the pipe



**9 Water pipe/hose:** Used for flushing any area with pressurized water



**10 Measuring tape:** Used for checking any levels



**11 Garden scissors, Sickle:** Used for trimming, harvesting and removing weeds from drying beds, landscaping etc.

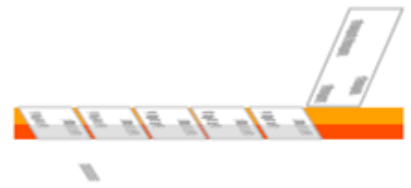


**12 L- Brush:** Used for trimming, harvesting and removing weeds from drying beds, landscaping etc. Used for checking any blockages in pipes (vent pipes)

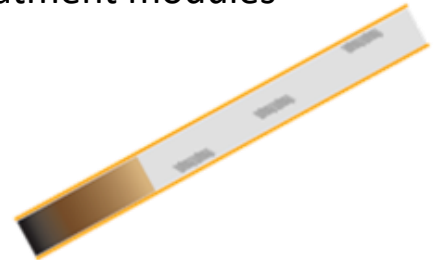


# TYPES OF EQUIPMENT

**13 Long stick wrapped white cloth:** Used for checking sludge level in septic tank and treatment modules



**14 Glass tube sludge sampler:** Used for checking sludge level in septic tank and treatment modules Used for measuring sludge levels in treatment modules



**15 Desludging pump:** Used for desludging solidified sludge from the bottom of treatment modules



**16 Screw driver:** Used for unscrewing the screens from screening chamber at the time of replacement



**17 Sample collection equipment:** Icebox - Used for collecting FS sample for laboratory tests



**18 Personal protective Equipment (masks, gloves etc.)**



# TYPES OF EQUIPMENT

**19** **First aid:** Fully stocked first aid kit should be available all the time at the FSTP



**20** **Wheel chocks:** Used for stopping the vehicle from moving when parked



**21** **Pumps:** They can help in transferring the sludge in between units in case of a level difference, adding chemicals in a controlled way to the plant etc.



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



**24** **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.



# TYPES OF EQUIPMENT

**25** **Blowers:** 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.



**26** **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.



# MODULE 1

M1

Name of Module **Module 1: CARRY OUT OPERATIONS OF FSTP**



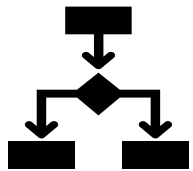
**Duration**



Theory Duration



Practical Duration



**Outcomes**

1. Introduction to common tasks to FSTP
2. Routine operations at FSTP



# TRAINING MODULES

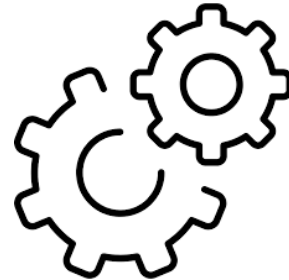
## 1 CARRY OPERATION OF FSTP



Outcome:

1. Introduction to common tasks to Faecal Sludge Treatment Plants
2. Routine operations at Faecal Sludge Treatment Plants

## 2 CARRY OUT ROUTINE MAINTENANCE OF FSTP



Outcome:

1. Introduction to list of equipment, issues faced and corrective measures

## 3 MAINTAIN PERSONAL HEALTH AND SAFETY IN FSTP

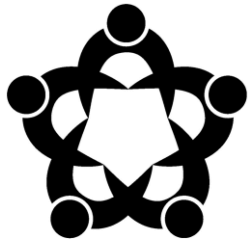


Outcome:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

## 4 WORKING EFFECTIVELY WITH OTHERS



Outcome:

- The importance and the correct way of working effectively with co-workers
- Importance of diversity and inclusion
- Procedure for addressing grievances.

## 5 EMPLOYABILITY & ENTREPRENEURSHIP SKILLS



Outcome:

- Understand about digital literacy
- Understand about money related components
- Understanding about entrepreneurship

# MODULE 1: CARRY OUT OPERATIONS AT FSTP

M1

## OUTCOME

STEP 1 – Introduction to common tasks to all FSTP

STEP 2 – Routine operations at FSTP

# STEP 1- COMMON TASKS TO FSTP

## 1 Septage receiving station

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

## 2 Operating plant machineries and equipment

## 3 Sample testing

- Collection of samples
- Analysis of sample
- Record keeping

## 4 Monitoring tasks

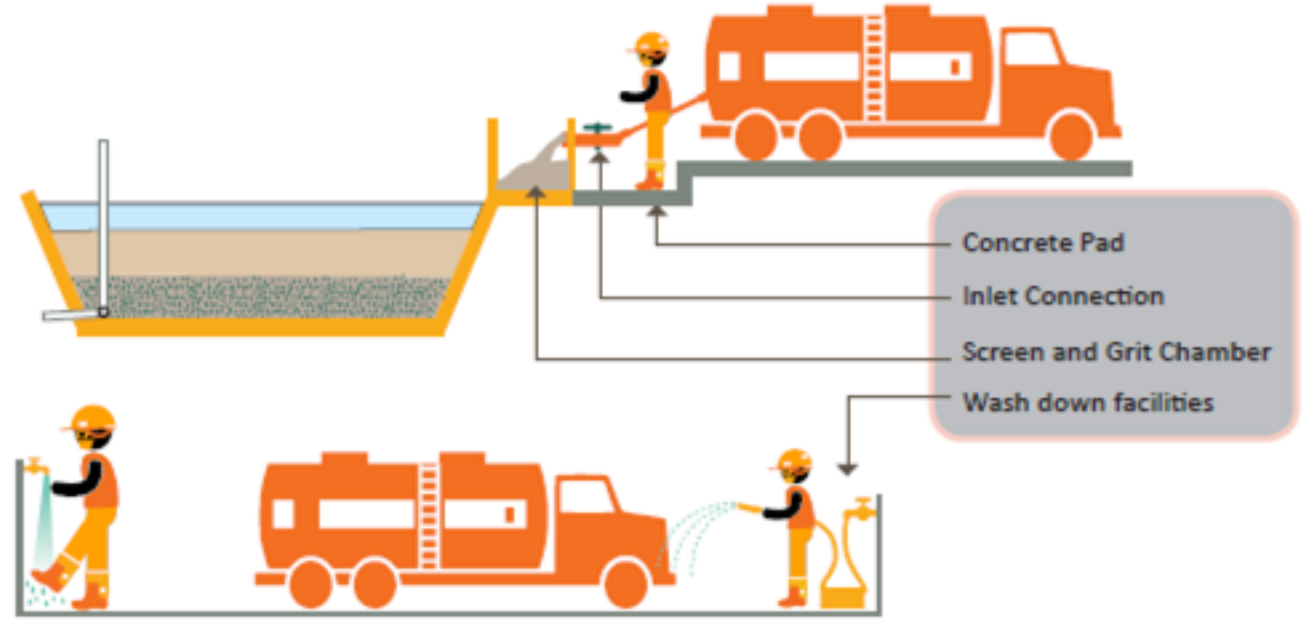
- Periodic checking of blockages in pipes
- Periodic checking of sludge height level
- Ensure free flow

## 5 Reporting of the FSTP O&M activities

## 6 Maintaining cleanliness of the exterior and interior of FSTP

# WHAT IS A SEPTAGE RECEIVING STATION?

Is an interface between desludging vehicle and the treatment plant for receiving the sludge safely into the treatment plant



# STEP 2- ROUTINE OPERATION AT FSTP

- 1** Collect information from desludging truck operator and record it



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



- 3** 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** Close the outlet valve of the truck



# STEP 2- ROUTINE OPERATION AT FSTP

**7** Visually inspect the incoming faecal sludge and septage in terms of **odour and appearance**. The usual colour of FS is **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 anaerobically digested methane



**9** In the sample collected in the beaker **test pH** using a **pH strip**. If the pH is in the range of 6-9 follow the below steps or else reject the sludge. 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.



# STEP 2- ROUTINE OPERATION AT FSTP

**10** Check for temperature: it usually ranges from 25 to 38C. Do not accept the sludge if it ranges beyond 40C.



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



**12** Collect FS samples in a 1L beaker while discharging into the septage receiving station. This bottle will be sent for laboratory testing.



**13** 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



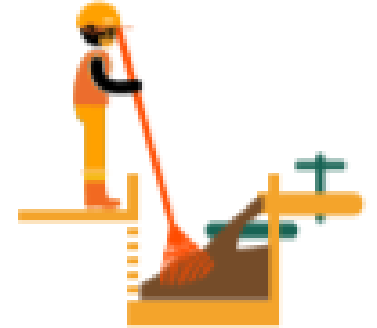


# STEP 2- ROUTINE OPERATION AT FSTP

**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



**17** Collect and discard the trash in a waste collection bucket



# DO'S – CARRY OUT OPERATIONS OF FSTP

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



**2** Do wash your hands after discharging faecal sludge & septage into the receiving station



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



**4** Do wash away any spillage during discharge with water hose



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



# DONT'S – CARRY OUT OPERATIONS OF FSTP

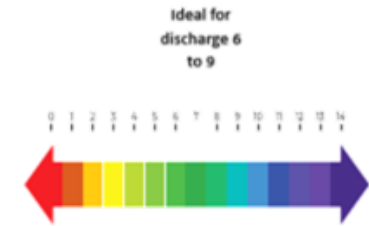
**1** Do not smoke while working at the FSTP



**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



**4** Do not allow disposal of faecal sludge if it has unusual odor. The color should vary from deep brown to black



**5** Do not let animals ransack the waste collection bucket.



**6** Do not delay disposing solid waste collected in FSTP

# SUMMARY

This training module gives information on following list:

1. Understanding on On-site sanitation system and Faecal Sludge Management.
2. Information about roles and responsibilities and different training modules for a FSTP O&M Technician
3. Understanding on the various components of FSTP
4. Understanding day to day routine operations at FSTP

# EXERCISE

M1

**Question:** Desludging operator, Vishnu has arrived at the FSTP plant after collection of faecal sludge from the site. Divide the participants in 2 groups and assign each group with the following tasks.

## **Tasks for Group 1:**

List down or explain the steps to be taken once the truck arrives at the FSTP.

## **Tasks for Group 2:**

List down or explain the tests to be conducted to accept or reject the sludge and parameters for on-site.

# MODULE 2

M2

Name of Module **Module 2: CARRY OUT ROUTINE MAINTENANCE OF FSTP**



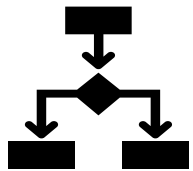
**Duration**



Theory Duration



Practical Duration

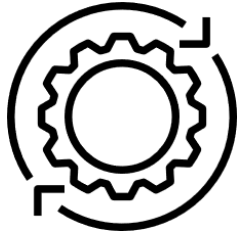


**Outcomes**

1. Introduction to List of equipment, Issues faced and Corrective measures
2. Routine operations at Faecal Sludge Treatment Plants

# TRAINING MODULES

## 1 CARRY OPERATION OF FSTP



Outcome:

1. Introduction to common tasks to Faecal Sludge Treatment Plants
2. Routine operations at Faecal Sludge Treatment Plants

## 2 CARRY OUT ROUTINE MAINTENANCE OF FSTP



Outcome:

1. Plant equipment for which routine repair & maintenance is needed.
2. Inspection of equipment & corrective measures

## 3 MAINTAIN HEALTH AND SAFETY IN FSTP

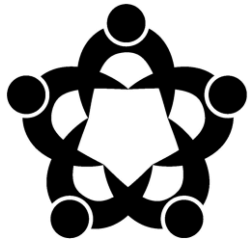


Outcome:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

## 4 WORKING EFFECTIVELY WITH OTHERS



Outcome:

- The importance and the correct way of working effectively with co-workers
- Importance of diversity and inclusion
- Procedure for addressing grievances.

## 5 EMPLOYABILITY & ENTREPRENEURSHIP SKILLS



Outcome:

- Understand about digital literacy
- Understand about money related components
- Understanding about entrepreneurship



## OUTCOME

STEP 1 – Plant equipment for which routine repair & maintenance is needed

STEP 2- Inspection of equipment and corrective measures

# WHY MAINTENACE OF EQUIPMENT IS REQUIRED?



- 1** To keep the equipment in good working condition





- 2** Poorly maintained machineries and equipment run inefficiently and result in breakdowns which are costly to repair or replace



# LIST OF EQUIPMENT ISSUES FACED AND CORRECTIVE MEASURES

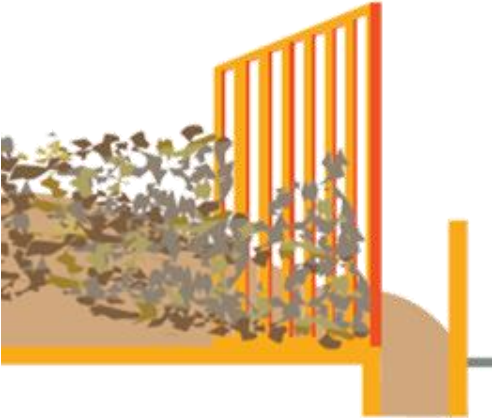
Plant machinery/Equipment	Issues Faced	Corrective Measures
<p><b>Wastewater pipes:</b> maintenance activities include checking and replacement of broken pipes. All the pipes of treatment modules need to be checked once a month.</p> <p><b>Vent pipes:</b> Vent pipes must be check for any blockage or choking.</p>	<p>Odor, gas and liquid leakage and clogging</p> 	<ol style="list-style-type: none"> <li>1. Check for any leakages or smell coming out of pipes.</li> <li>2. If there are any pipes broken inform the supervisor .</li> <li>3. Replace the damaged pipe with new pipe.</li> </ol>
<p><b>Pumps:</b> to keep pumps running properly, a regular maintenance schedule should be implemented and followed. It will also increase the lifespan of the pumping system.</p>	<p>Corrosion and debris accumulation</p> 	<ol style="list-style-type: none"> <li>1. Remove all wiring and clean the pump</li> <li>2. Check pump volute for any damage</li> <li>3. Check for any clogged debris and clean</li> <li>4. Follow the guidelines provided by the vendor for operating the pump</li> </ol>

# LIST OF EQUIPMENT ISSUES FACED AND CORRECTIVE MEASURES

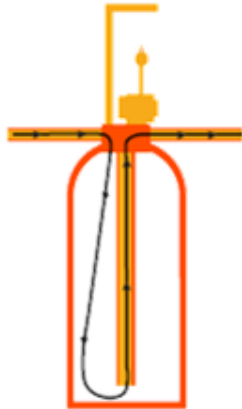

Plant machinery/Equipment	Issues Faced	Corrective Measures
<p><b>Filter media in treatment units:</b> Filter material need to be cleaned to avoid clogging of wastewater through the treatment system</p>		<p>Cleaning of filter material in treatment unit (Anaerobic filter):</p> <ol style="list-style-type: none"> <li>1. Open the maintenance holes covers of the unit</li> <li>2. Force water above the filter materials using a pump.</li> <li>3. Meanwhile, use a sludge pump to dewater the filter chamber through the desludging pipe</li> <li>4. Repeat the steps 3 or 4 times till you pump out clear water.</li> <li>5. Place the maintenance holes cover back over the maintenance holes.</li> </ol>
<p><b>Maintenance tools</b> used for cleaning such as rake, trowel, brooms, shovel, sieve, steel rod and garden scissors</p>	<p>Wear and tear, broken or damaged</p> 	<ol style="list-style-type: none"> <li>1. Clean all the tools directly with clean water, do not use any chemicals</li> <li>2. After that apply a light film of oil</li> </ol>

# LIST OF EQUIPMENT ISSUES FACED AND CORRECTIVE MEASURES




M2

Plant machinery/Equipment	Issues Faced	Corrective Measures
<p><b>Screening mesh:</b> 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.</p>	<p>Clogging and over flowing</p> 	<p><b>Cleaning of screen chamber:</b></p> <ol style="list-style-type: none"><li>1. Open the maintenance hole covers of Screen chamber.</li><li>2. Collect the solids accumulated at screens using the trowel and put them in a bucket.</li><li>3. Clean the bars using water and rake</li><li>4. Close the maintenance holes with covers</li></ol> <p><b>Replacement of screen chamber:</b></p> <ol style="list-style-type: none"><li>1. Unscrew the screens</li><li>2. Wash the screen using fresh water</li><li>3. Paint the screens with anticorrosive paints/ Replace with new ones as per drawings</li><li>4. Fix back the screens in the same position</li><li>5. Close the maintenance holes with cover</li><li>6. If screen plate is highly corroded, replace is entire plate with new one.</li></ol>




# LIST OF EQUIPMENT ISSUES FACED AND CORRECTIVE MEASURES

Plant machinery/Equipment	Issues Faced	Corrective Measures
<b>Sand and Carbon filter</b>		<ol style="list-style-type: none"><li>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.</li><li>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 guideline provided by the vendor to replace the sand and carbon (charcoal) filled in the treatment unit.</li></ol>
<b>Equipment for taking samples</b>	<p>Broken utensils, trouble in calibration of pH meter, electrical and thermal conductivity probes etc.</p> 	<ol style="list-style-type: none"><li>1. If there are any broken items report to supervisor.</li><li>2. Replace the damaged item with a new one.</li></ol>

# LIST OF EQUIPMENT ISSUES FACED AND CORRECTIVE MEASURES

Plant machinery/Equipment	Issues Faced	Corrective Measures
<b>Personal Protective Equipment</b>	Wear and tear, broken or damaged goggles and masks, torn uniform etc. 	<ol style="list-style-type: none"><li>1. If there are any broken items report to supervisor.</li><li>2. Replace the damaged item with a new one.</li></ol>
<b>Wheel chocks</b> to prevent vehicles from moving when parked	Wear and tear, damage 	Replacement
<b>Disinfectants, barriers and bags</b> for cleaning up activity	Broken or damaged 	Replacement

# LIST OF EQUIPMENT ISSUES FACED AND CORRECTIVE MEASURES

Plant machinery/Equipment	Issues Faced	Corrective Measures
<b>Control panels</b>	Burned out, defective buttons, requirement of upgrades 	Service repair and replacement (if required)
<b>Treatment units</b>	Unhygienic environment leads to breeding of mosquitos and bad odor 	<ol style="list-style-type: none"> <li>1. Remove unwanted growth of weeds/grass</li> <li>2. Remove accumulation of scum in treatment units</li> <li>3. Spray mosquito repellent to avoid mosquito nuisance</li> <li>4. Follow housekeeping rules mentioned in unit</li> </ol>
<b>Plant Machinery/ Equipment:</b> Machines and moving part	Friction 	<ol style="list-style-type: none"> <li>1. Check of the level of grease and lubricants in the machine. Switch off the machine and apply grease and lubricants</li> <li>2. Change the oil periodically in machines as directed by the manufacturer</li> </ol>



# CARRY OUT ROUTINE MAINTENANCE OF FSTP – DO'S

**1** Before performing the maintenance work on a mechanical equipment, switch it off.



**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 correct operation of the equipment



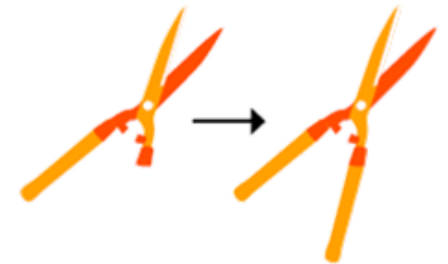
**4** Do use good lubricants to reduce friction around any moving part



**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.



# CARRY OUT ROUTINE MAINTENANCE OF FSTP – DO'S

**7** Do keep machineries clean



**8** Do maintain clean environment



**9** Do conduct regular inspection



# CARRY OUT ROUTINE MAINTENANCE OF FSTP – DON'T'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








# SUMMARY

This training module gives information on following list:

1. Understanding the importance of routine maintenance of equipment at FSTP
2. Understanding the issues faced in maintenance of various equipment and their corrective measures

# EXERCISE

Name the equipment	Issues Faced	Corrective Measures
		
		
		
		
		

# MODULE 3

Name of Module **Module 3: MAINTAIN HEALTH AND SAFETY AT FSTP**



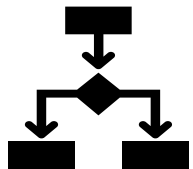
Duration



Theory Duration



Practical Duration

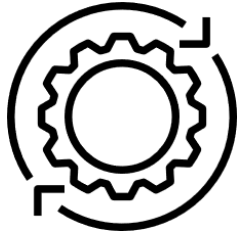


Outcomes

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

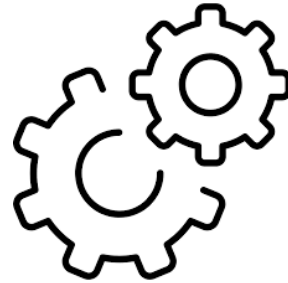
## 1 CARRY OPERATION OF FSTP



Outcome:

1. Introduction to common tasks to Faecal Sludge Treatment Plants
2. Routine operations at Faecal Sludge Treatment Plants

## 2 CARRY OUT ROUTINE MAINTENANCE OF FSTP



Outcome:

1. Plant equipment for which routine repair & maintenance is needed.
2. Inspection of equipment & corrective measures

## 3 MAINTAIN HEALTH AND SAFETY IN FSTP

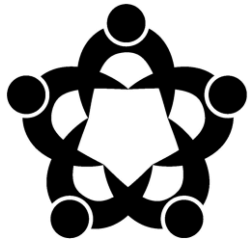


Outcome:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

## 4 WORKING EFFECTIVELY WITH OTHERS



Outcome:

- The importance and the correct way of working effectively with co-workers
- Importance of diversity and inclusion
- Procedure for addressing grievances.

## 5 EMPLOYABILITY & ENTREPRENEURSHIP SKILLS



Outcome:

- Understand about digital literacy
- Understand about money related components
- Understanding about entrepreneurship



# MODULE 3: MAINTAIN HEALTH & SAFETY AT FSTP

M3

STEP 1- Understanding potential hazards at workplace

STEP 2- Usage of Personal Protective Equipment

STEP 3- Usage of First Aid Equipment

STEP 4- Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# STEP 1- POTENTIAL HAZARDS AT FSTP

## 1. Biological hazard

A large number of bacteria and pathogens 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.



# STEP 1- POTENTIAL HAZARDS AT FSTP

## 3. Physical hazards



**A. Confined spaces** such as, tanks, maintenance holes, etc. lead to suffocation or worker getting trapped.



**B. Spillages from truck**



**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:** Pumps and motors are electrically powered devices, mishandling and malfunction in these equipment can lead to fatal electric burns, shocks and other injuries.



**E. Fire:** Faecal sludge is anaerobically digested and can generate methane which is an inflammable gas. Similarly, fires can light from electric equipments and chemicals



**F. Falling:** The presence of tanks, ponds and a number of other treatment systems in which water is present, creates a risk of fall, slippages and drowning.

# MITIGATING BIOLOGICAL HAZARDS

A large number of bacteria and pathogens exist in the faecal sludge. These pathogens can cause a number of diseases such as jaundice, worm infestation, infection, typhoid etc.



FSTP operator should take effective immunization for Tetanus, Hepatitis A and Diphtheria, Typhoid, Cholera, etc. on a regular basis



Use rubber hand gloves and cover skin with barrier cream



Take a shower after working at FSTP



After the work is completed, thoroughly wash hands with antiseptic soap



In case of any cuts or wounds, use bandage and antiseptic cream to cover the wound and prevent further infection



Take Deworming tablet: once in every 6 months

# MITIGATING PHYSICAL HAZARDS

## 1 PERSONAL PROTECTIVE EQUIPMENTS

Mandatory to wear PPE to avoid any kind of hazard while carrying out day to day operations at FSTP



## 2 TRAINING PROGRAMS

Training programs on health and safety measures, Importance and use of PPE and First Aid



## 3 MEDICAL CHECK UPS AND IMMUNIZATION

FSTP O&M technician should be immunized for Tetanus, Hepatitis A and Diphtheria on a regular basis



## STEP 2- PERSONAL PROTECTIVE EQUIPMENTS

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.



# STEP 2- PERSONAL PROTECTIVE EQUIPMENTS

1



HELMET

2



GUM BOOTS

3



HAND GLOVES

4



SAFETY GOGGLES

5



REFLECTIVE VEST

6



SAFETY TORCH

7



SAFETY HARNESS

8



FACE SHIELDS

# MAINTENACE OF PERSONAL PROTECTIVE EQUIPMENT

- Clean PPE with soap and hot water after each use and store properly.
- Clean contaminated work clothing daily.
- Eat in designated areas away from work area and removed all PPE before eating
- Store PPE away from eating and food storage areas.





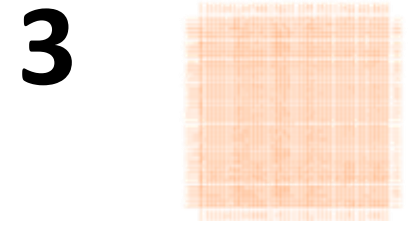
# STEP 3- FIRST AID COMPONENTS



**1**  
**FIRST AID CHART:** Chart details out the use of the first aid box in an emergency.



**2**  
**MEDICAL PLASTERS:** Elastic bandages are used without the need for dressing the injured area



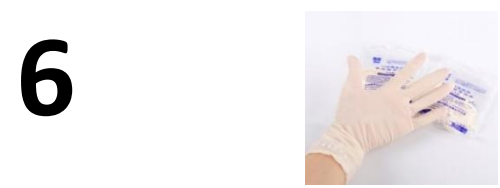
**3**  
**MEDICAL GAUZE:** Small, medium and large sterile gauze dressings



**4**  
**BANDAGES:** These bandages are used to hold the dressing on a wound.



**5**  
**DISTILLED WATER:** for cleaning wounds



**6**  
**STERILE GLOVES:** These gloves are used in medical examination.



**7**  
**SCISSORS:** The scissors are used in cutting of bandages, gauze and injured area etc.



**8**  
**CLEANSING WIPES:** The wipes are used in the cleaning of the wound.



**9**  
**ANTISEPTIC CREAM:** Used for Skin rash, spray to relieve insect bites and stings



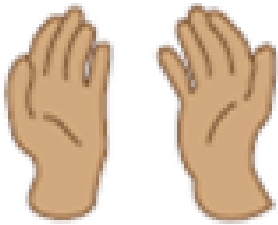
**10**  
**OINTMENT FOR BURNS:** Used in case of burns on skin



**11**  
**SOAP:** Handwash before and after desludging activities

# ELECTRIC SAFETY MEASURES

- 1** Keep hands dry while working on electricity



- 2** Switch off the machine while performing repair and maintenance activities



- 3** Use electric safety gloves while working on highly energised electric machineries and equipment

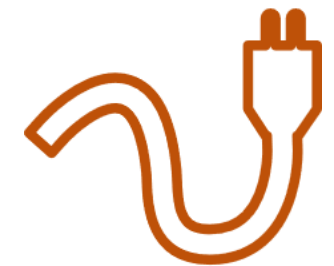


- 4** Wear shoes while working with electrical equipment



- 5** 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.

- 6** Never repair electrical cords or equipment unless qualified and authorized



# CHEMICALS STORAGE SAFETY

- 1** Store the chemicals away from heat and direct sunlight



- 2** Reduce the amount of chemicals stored by buying in limited quantities.



- 3** Store flammable chemicals separately



- 4** Look for unusual conditions in chemical storage areas, such as:

1. Improper storage of chemicals
2. Leaking or deteriorating containers
3. Spilled chemicals
4. Temperature extremes (too hot or cold in storage area)
5. Lack of or low lighting levels
6. Blocked exits or aisles
7. Trash accumulation
8. Open lights or matches
9. Lack of information or warning signs ("Flammable liquids", "Acids", "Corrosives", "Poisons", etc.)



# MITIGATING FIRE/HAZARD EMERGENCY

Number of chemicals and the flammable nature of the methane present in faecal sludge, fire is a real hazard at the FSTP.

## Causes of Fire:

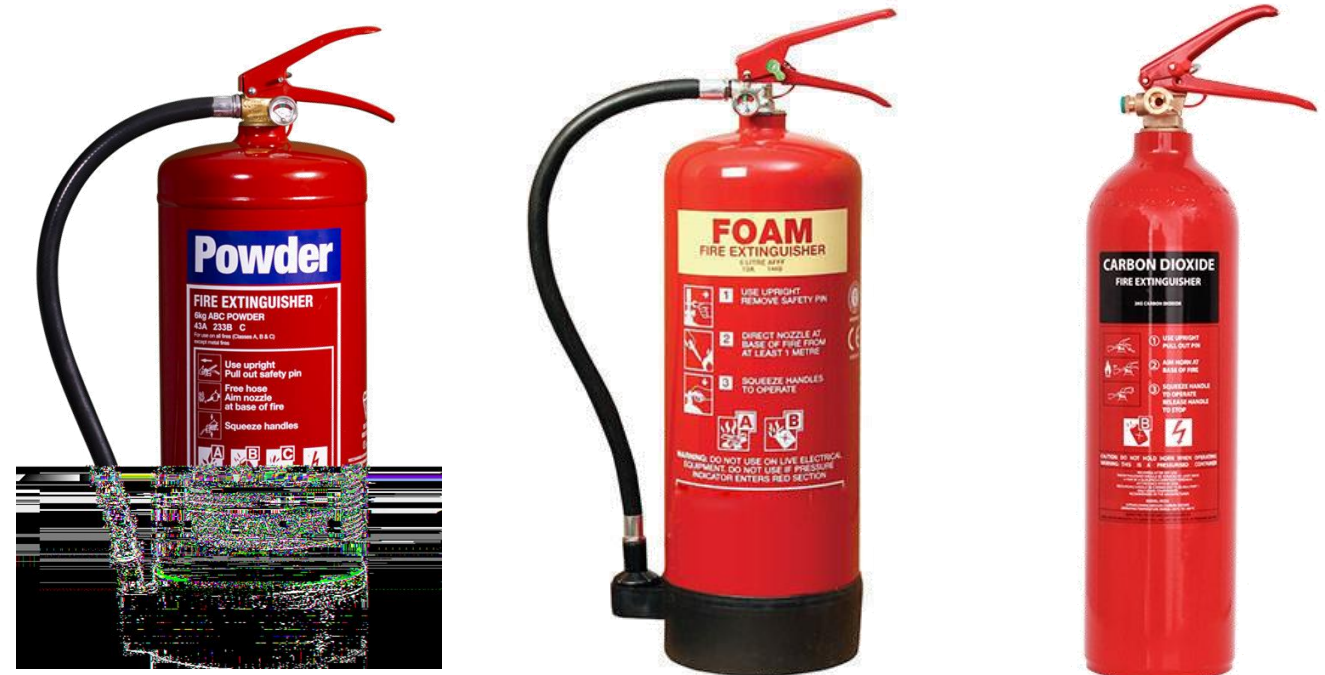
1. Chemical
2. Physical
3. Electrical

Fire can occur because of facilities or equipment, or unground electrical connections (wiring), accumulation, storage and improper handling of combustible materials, tank or fuel spillage.

## Three types of Fire Extinguisher can be used:

1. Clean Agent
2. Dry Powder
3. Carbon Dioxide

FSTP Technician should keep the Fire Extinguisher at the FSTP and use it in case of fire emergency.



# DO's – HEALTH AND SAFETY AT FSTP

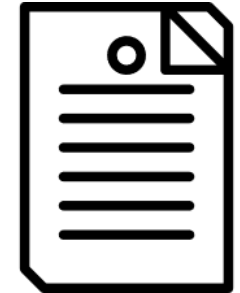
**1** Wear Personal Protective Equipment



**2** Keep First Aid kit in clean and accessible place



**3** Follow electrical, chemical and physical safety measures



**4** Wash hands prior to wearing and removing PPE and eating



**5** Always take effective immunization for Tetanus, Hepatitis A and Diphtheria, Typhoid, Cholera, etc. on a regular basis



# DONT's – HEALTH AND SAFETY AT FSTP

1



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

2



Do not eat or drink in areas where FS is treated and stored, and areas where chemicals are stored.

3



Do not smoke while at the FSTP to avoid fires.

4



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

5



Do not enter the offices and lounges wearing dirty clothes.

# SUMMARY

This training module gives information on following list:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# EXERCISE

How does this protect you?

Do you need any training to use this PPE?

What kind of hazard might be avoided through this PPE?

Why might you not want to wear this while working?





# MODULE 4

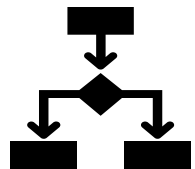
Name of Module **Module 4: WORKING EFFECTIVELY WITH OTHERS**



Theory



Practical

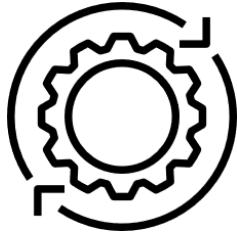


**Outcomes**

1. The importance and the correct way of working effectively with co-workers
2. Importance of diversity and inclusion in an organization
3. Procedure for addressing grievances

# TRAINING MODULES

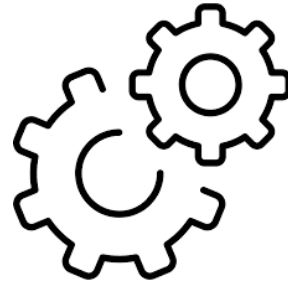
## 1 CARRY OPERATION OF FSTP



Outcome:

1. Introduction to common tasks to Faecal Sludge Treatment Plants
2. Routine operations at Faecal Sludge Treatment Plants

## 2 CARRY OUT ROUTINE MAINTENANCE OF FSTP



Outcome:

1. Plant equipment for which routine repair & maintenance is needed.
2. Inspection of equipment & corrective measures

## 3 MAINTAIN HEALTH AND SAFETY IN FSTP



Outcome:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

## 4 WORKING EFFECTIVELY WITH OTHERS



Outcome:

- The importance and the correct way of working effectively with co-workers
- Importance of diversity and inclusion
- Procedure for addressing grievances.

## 5 EMPLOYABILITY & ENTREPRENEURSHIP SKILLS



Outcome:

- Understand about digital literacy
- Understand about money related components
- Understanding about entrepreneurship

# MODULE 4: WORKING EFFECTIVELY WITH OTHERS

M4

## OUTCOME

STEP 1 – Understand about work ethics & etiquettes

STEP 2- Information & data security rules

STEP 3 – Aspects for diversity & inclusiveness at workplace

STEP 4 – Characteristics required to work effectively with others

STEP 5 – Expression of problems with the appropriate authority

# STEP 1 - WORK ETHICS AND ETIQUETTES

The following are the work ethics and etiquettes to be considered in addition to professional duties



Properly and consciously operate desludging services & equipment following the safety measures



Always consider personal safety, the safety of fellow workers and customers while working



Properly and accurately fill record books and/or make reports



Avoid unprofessional activities

# STEP 2 - INFORMATION AND DATA SECURITY RULES

It is crucial to keep certain data confidential and the kind of data which needs to be shared publicly.

Following are the information which you should share only with your senior



Employee details like, name, contact details, pay scale, etc.



Financial information

Following are the information which can be shared with the public



Brochures & flyers giving information about your work or company



Advertorials as news stories & reviews on newspaper



Newsletters to keep public informed about your desludging services or operations

# STEP 3 - DIVERSITY AT INCLUSION AT WORKPLACE

Following are the elements required to maintain diversity and inclusion at workplace, so the employees experience:

Fairness and respect

Value and belongingness

Safe and open

Empowered and growing

# STEP 4 - WORKING EFFECTIVELY WITH OTHERS

M4

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

Share the work load equally & assist others

Treat others with respect and dignity

Be an active listener and speak with discretion

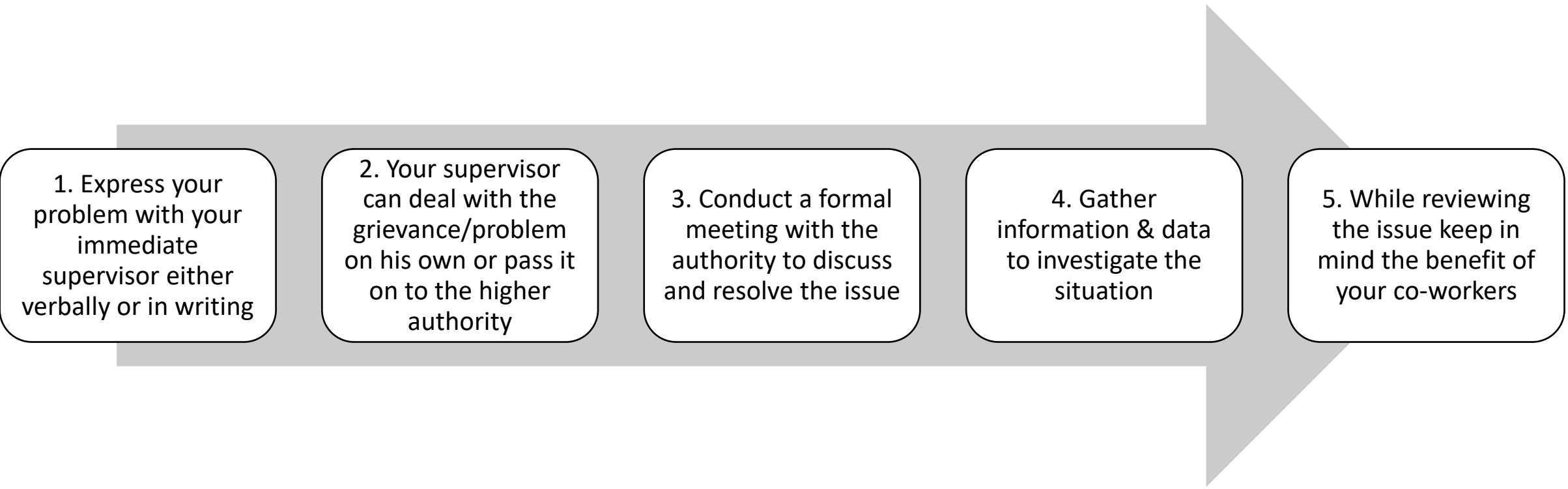
Acknowledge contribution of your team members



# STEP 5 - HOW TO EXPRESS PROBLEMS TO APPROPRIATE AUTHORITY

Problems or Grievances are basically a feeling of resentment or discontent which can be against a supervisor, co-worker, machine, equipment, about the environment, against workload etc.

Following is the general outline of a typical grievance process:



1. Express your problem with your immediate supervisor either verbally or in writing

2. Your supervisor can deal with the grievance/problem on his own or pass it on to the higher authority

3. Conduct a formal meeting with the authority to discuss and resolve the issue

4. Gather information & data to investigate the situation

5. While reviewing the issue keep in mind the benefit of your co-workers

# SUMMARY

This training module gives information on:

1. The importance and the correct way of working effectively with co-workers
2. Importance of diversity and inclusion in an organization
3. Best practices for a diverse and inclusive work culture
4. Procedure for addressing grievances.

# QUIZ

**Please answer the following question**

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

**Please answer the following question**

1. What is a grievance?

## Answer True or False

Laborer reports directly to his/her supervisor	
Smoking is allowed while working	
Financial information can be shared publicly	
Do not inform anyone if you feel discriminated	

# MODULE 5

m5

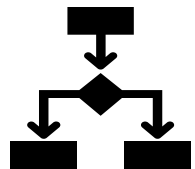
Name of Module **Module 5: EMPLOYABILITY & ENTREPRENEURSHIP SKILLS**



Theory



Practical

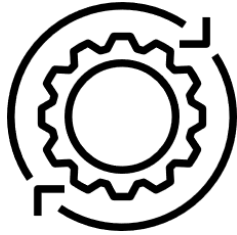


**Outcomes**

1. Understand about digital literacy
2. Understand about money related components
3. Understanding about entrepreneurship

# TRAINING MODULES

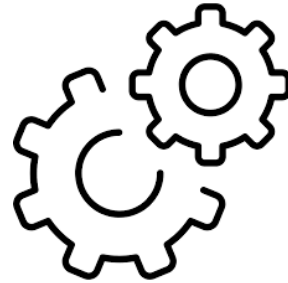
## 1 CARRY OPERATION OF FSTP



Outcome:

1. Introduction to common tasks to Faecal Sludge Treatment Plants
2. Routine operations at Faecal Sludge Treatment Plants

## 2 CARRY OUT ROUTINE MAINTENANCE OF FSTP



Outcome:

1. Plant equipment for which routine repair & maintenance is needed.
2. Inspection of equipment & corrective measures

## 3 MAINTAIN HEALTH AND SAFETY IN FSTP



Outcome:

1. Understanding potential hazards at workplace
2. Usage of Personal Protective Equipment
3. Usage of First Aid Equipment
4. Understand steps for mitigating Physical, Electrical, Chemical and Fire Hazards

# TRAINING MODULES

## 4 WORKING EFFECTIVELY WITH OTHERS



Outcome:

- The importance and the correct way of working effectively with co-workers
- Importance of diversity and inclusion
- Procedure for addressing grievances.

## 5 EMPLOYABILITY & ENTREPRENEURSHIP SKILLS



Outcome:

- Understand about digital literacy
- Understand about money related components
- Understanding about entrepreneurship

# MODULE 5: EMPLOYABILITY & ENTREPRENEURSHIP SKILLS

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## OUTCOME

STEP 1 – Understand about digital literacy

STEP 2 – Understand about money related components

STEP 3 – Understand entrepreneurship

# STEP 1 – DIGITAL LITERACY

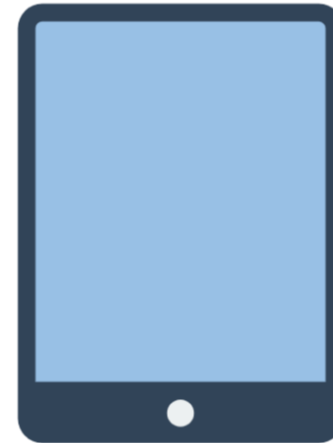
Following are the types of electronic devices:



Smart phone



Computer



Tablet



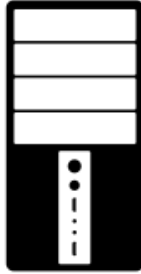
Laptop



# STEP 1 – DIGITAL LITERACY

m5

## Basic parts of a computer



### Central Processing Unit (CPU)

The brain of the computer. It interprets and carries out program instructions



### Hard Drive

A device that stores large amounts of data



### Monitor

The device that contains the computer screen where the information is visually displayed



### Desktop

The first screen displayed after the operating system loads



### Mouse

A hand-held device used to point to items on the monitor



### Printer

A device that converts output from a computer into printed paper documents

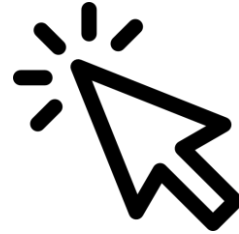
# STEP 1 – DIGITAL LITERACY

## Basic parts of a computer



### Icon

A small picture or image that visually represents something on your computer



### Cursor

An arrow which indicates where you are positioned on the screen



### Program Menu

A list of programs on your computer that can be accessed from the Start menu



### Taskbar

The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.



### Recycle Bin

A temporary storage for deleted files

# STEP 2 – MONEY MATTERS

## Why should one save money?

Saving money steadily through the years is so important, it will help improve your financial situation over time.

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

**Become financially independent**

**Pay for emergencies**

**Afford large purchases**

**Be prepared for surprise expenses**

**Get out of debt**

**Invest in yourself through education**

# STEP 2 – MONEY MATTERS

## Process for opening a bank account

### Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details Method of receiving your account statement
- Details of your initial deposit
- Manner of operating your account
- 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.

### 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

# STEP 3 – UNDERSTANDING ENTREPRENEURSHIP

m5

## Who is an Entrepreneur?

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur.



# STEP 3 – UNDERSTANDING ENTREPRENEURSHIP

As an entrepreneur in India, you can own and run any of the following types of enterprises:

## 1 Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise

## 2 Partnership

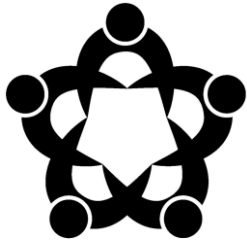
A partnership firm is formed by two or more people. The owners of the enterprise are called partners

## 3 Limited Liability Partnership (LLP)

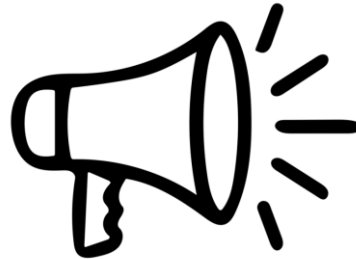
In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability.

# STEP 3 – UNDERSTANDING ENTREPRENEURSHIP

An entrepreneur requires a certain set of qualities or skills to run their enterprises successfully



Leadership and team work



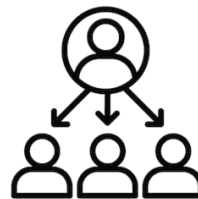
Effective communication skills



Problem solving & negotiation skills



Skills to identify business opportunities



Developing network with various stakeholders

# STEP 3 – UNDERSTANDING THE ENTREPRENEURSHIP

m5

Every entrepreneur requires a business plan before starting their own enterprise or business.

## 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 accountability and control the fate of the business

The following are the elements to be considered for developing a business plan:

### KEY PARTNERS

Who are your key partners/suppliers?

### KEY ACTIVITIES

What key activities does your value proposition require?

### VALUE PROPOSITION

What core value do you deliver to the customer?

### CUSTOMER RELATIONSHIP

What relationship that the target customer expects you to establish?

### CUSTOMER SEGMENT

For which customers are you creating your business for?

### KEY RESOURCE

What key resources does your value proposition require?

### DISTRIBUTION CHANNEL

Through which channels that your customers will be reached?

### COST STRUCTURE

What are the most cost in your business?

### REVENUE STREAMS

What are your various revenue channels?



# SUMMARY

This training module gives information on:

1. Understanding digital literacy
2. Understanding financial literacy
3. Understanding entrepreneurship skills required and components of a business plan.

# QUIZ

m5

**Please answer the following question**

1. Steps for opening a bank account

**Please answer the following question**

1. List the skills required to become a entrepreneur

**Please answer the following question**

1. Components of a business plan