Environmental Management System

ISO 14001:2015 Certification

Operational Controls

Normal Conditions

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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Table of Contents

1. HIGH-TENSION ELECTRICITY

1. Title	Standard operating procedure for "Utilization of high-tension electricity supply from Electricity Board"

2. Purpose	To define the procedure related to utilization of high-tension electricity supply from Electricity Board

3. Scope	This procedure is related to the operation of utilization of high-tension electricity supply from Electricity Board

4. Responsibility	Respective assistant maintenance engineer - Electricals

5. Procedure

5.1 HT Vacuum Circuit Breakers

- During normal course of action HT Breakers are in Continuous ON mode (No fault Condition) as mentioned below.

Sl. No.	Description	Normal Operating Condition
1	HT Main Incomer Breaker	ON
2	Breaker -1 - Outgoing to Transformer -1	ON
3	Breaker -2 - Outgoing to Transformer -2	ON

- However, manual operation is carried out sometimes basis the requirement like maintenance or any trip condition.

5.1.1 Normal Operation Mode:

- Check all the parameters listed in daily check list and inform to Engineer/FM if any abnormality.
- Note down the parameters like voltage/ current / KWH every day.
- Check the output of 24V battery charger, if any abnormal please inform to Engineer/FM.
- Check the Insulation Mats / Breaker Handle / Earth Rod / HT gloves are in proper condition and are in designated place.

5.1.2 Manual Operation

a) Stopping Procedure:

- Please inform the nature of activity to Engineer/FM and take approval from FM for the activity in case of any emergency, shift the supply through the redundancy source if available or refer point No b for further process. Take Electrical work permit from the FM.
- Ensure that all the Departments are informed prior on the activity in case of no power supply or interruption verbally or via email.
- Changeover the Load supplies either to DG Sets or other transformer basis the activity.
- Switch off the Breaker and rack out the breakers from both ends and apply LOTO as applicable.
- In case of operating handle for operating the breaker, put it in “OFF" position with the help of Handle and make sure that green indicator should glow.

b) Starting Procedure:

- Please inform the completion status to Engineer/FM and take approval from FM for charging the Transformer.
- Engineer/FM has inspected the site and found the work is completed.
- Remove the earth rod. And ensure all the enclosures are closed & gaps are sealed properly and LOTO is removed by the person working on it.
- Before operating the breaker, Ensure Breaker is in Service position.
- While breaker is in Service positions ensure healthiness of the tripping relays and spring charging mechanism.
- After confirming all necessary steps, switch On the Breaker, “ON” indication lamp should light and must be Glowing.

  Note: AMF will not changeover in case of any abnormality in the input Voltage. If any please report to Engineer/FM for immediate support and wait for their instructions.
- Report to Engineer/FM once the activity is completed.

5.2 Transformers

- During normal course of action Transformers are operated in continuous ON mode. However, normal & Maintenance & Manual operation of OLTC is defined below.

5.2.1 Normal Operation Mode:

- Check the input Voltage / Current at HT panel level.
- Check for any Oil leakages from the Transformer, if identified please inform the Engineer/FM and wait till further instructions and provide container below.
- Check the Oil Level in the Conservator and ensure should be as per desired level i.e. more than 1/4th and to be topped up as and when required through the AMC provider.
- Check the Silica gel condition in breather and ensure colour should be blue if white please replace with the support of AMC provider.
- Ensure OLTC is in remote mode & RTCC in Auto Mode.
- Note down the parameters as per daily checklist attached in the annexure.
- Observe the Transformer humming noise physically if any abnormal please inform Engineer/FM/AMC service provider and wait for their further instructions.

5.2.2 Maintenance or Breakdown Procedure:

a) Stopping Procedure:

- Please inform the nature of activity to Engineer/FM and take approval from FM for the activity in case of any emergency, shift the building supply to DG sets & HT panel and inform Engineer/FM for further process and take work permit from the Facility Manager.
- Ensure that all the Departments are informed prior on the activity in case of no power supply or interruption verbally or via email.
- Ensure all the tools & PPE's are ready.
- Please trip the LT Incomer breaker and is in rack out position & LOTO is applied.
- Please trip the HT breaker and is in Rack out position & LOTO is applied.
- Carry out the maintenance or rectification activity.

b) Starting Procedure:

- Please inform the completion status to Engineer/FM and take approval from FM for charging the Transformer
- Engineer/FM to inspect the site and found the work is completed and satisfactory.
- Remove the earth rod. And ensure all the enclosures are closed & gaps are sealed properly.
- Ensure OLTC is in remote mode & RTCC in Auto Mode.

- Ensure all the tools are returned and verified.
- Please rack in the HT breaker in service position & LOTO is removed.
- Please check the output voltage of the transformer and are within limits. If any Check the HT 3phase Voltage. If any abnormal please report to substation for their support.
- If LT voltage found Ok, please rack in the LT breaker in service position & LOTO is removed. Note: AMF will automatically changeover the load basis the healthiness of the voltage.
- Observe the Transformer humming noise physically if any abnormal please inform Engineer/FM/AMC service provider and wait for their further instructions.
- Report to FM once changeover and activity is completed.

5.3 Others

- Dispose the used oils as per Hazardous waste management rules, 2016
- Dispose the obsolete coils and other obsolete components to authorized recyclers as per E-waste management rules, 2022

Effective Date (from)	Description	Version
03.03.2023	SOP for EB Panel Board	01
22.04.2024	SOP for Utilization of high-tension electricity supply from Electricity Board	02

Prepared by	Verified by	Approved by
Mr. Velmani AME-Electrical	Mr. Marudhamuthu ME - Electricals	Dr. V. Thirumurugan Associate Director – Campus Life

2. GENSETS

1. Title	Standard operating procedure for "Operation of Gensets"

2. Purpose	To define the procedure for diesel generator

3. Scope	This procedure is related to the manual and auto operation of diesel generators

4. Responsibility	Respective assistant maintenance engineer - Electricals

5. Procedure

5.1. For Diesel Generator Manual Start:

- Engine Start/Stop switch in local position.
- Voltage Up / down positions selector switch in Local position.
- Engine Speed raise/ lower switch in local position.
- Push the start button to start the engine.
- Check oil pressure after engine start.
- Start DG scrubber.
- Starts fans cooling pump and radiator.
- Jacket temperature should be between 80 deg. C – 90 deg. C

5.2. For Diesel Generator AutoStart:

- The engine starts automatically when the power supply fails
- Check the individual DG set panel whether the panel positions are put in auto position
- Engine control switch on DC ON position
- Mode selector switch on Auto position.
- Engine START / STOP switch in local position.
- Battery charger on mains position.

5.3. Routine Checklist for Generator (DG) Set:

- Diesel is subject to contamination and corrosion when a period of one year.
- Regular generator set exercise is highly recommended to use up stored fuel before it degrades.
- Engine exercise is recommended to be executed at least once a month for a minimum of 30 min.
- Testing Batteries, weak or undercharged starting batteries are a common cause of standby power system failures.
- Check the coolant level during shutdown periods at the specified interval.
- Check the exhaust system in case there are leaks along the exhaust line they should be repaired immediately.
- Oil drips and other issues are easy to spot and take care of when the engine is nice and clean.
- Visual inspection can guarantee that hoses and belts are in good condition.

5.4. Actions for safety into the transformer.

- Secure all tools with hand lines. Any metallic item dropped into a
    - Transformer must be removed to prevent serious trouble in future.
- Discharge the both ends (primary and secondary) of transformer with earth rods.
- Inspect the degree of dust accumulation inside terminal boxes, marshalling box on insulator conductive bolt and bus and clean away the dust by vacuum cleaner and dry & clean cloth recommended cleaning liquids can be used if required.
- Functionality checks of the transformer protection relay to be ensured at HT switchgear end.
- Measure the insulation resistance of transformer winding as per test standard and then discharge the both ends (primary and secondary) of the transformer with earth rods.
- Check the tightness of the bus bar connection including cable terminations.
- Check insulation of all HT, LT & control, metering & instrument cables for insulation and their proper terminations.

5.5. When electrical maintenance work is to be done

- Functionality check of the transformer oil & winding temperature indicators to be ensured.
- All electrical connections must be tight and mechanically secured at transformer HT and LT switchgear end.
- Check the double body and neutral earthing connections of the transformer.
- Carry out main tank & OLTC oil test if due.
- Check winding resistances of both primary (at all taps) & secondary.
- Check conservator oil level, level switch.
- Check gas relays mounted on oil tank & OLTC
- Check PRV & explosion vent fittings & connections.
- Check breathers & silica gel – if found pink then replace. Also check for oil level in the breather bottom cup.

5.6. Working Condition Actions for safety

- Make sure all for engine materials are clear before closing manhole and energizing.
- Check the quantity of all tools brought out from a tank.
- Remove the grounding wires on the line terminals of the transformer.
- Remove the earth switches, wherever applicable.
- Switch the position of isolators to CLOSE
- Switch ON the breaker at primary side.
- Observe and record the transformer oil and winding temperature.
- Observe the noise level of transformer.
- Close the work permit.

5.7 Others

- Minimum stack emission height is to be maintained as 20 ft for safe emission of air pollutants
- Acoustic chambers must be built to reduce noise pollution
- Used oils must be disposed as per the Hazardous waste management rules, 2016
- Obsolete motors, pumps and other components must be disposed as per the waste management rules

- Obsolete batteries must be disposed as per Battery waste management rules, 2022

Effective Date (from)	Description	Version
03.03.2023	SOP for Diesel Generator	01
22.04.2024	SOP for Operation of Gensets	02

Prepared by	Verified by	Approved by
Mr. Velmani AME - Electrical	Mr. Marudhamuthu ME - Electricals	Dr. V. Thirumurugan Associate Director – Campus Life

3. ELECTRICITY FROM SOLAR

1. Title	Standard operating procedure for "Generation of electricity through Solar"

2. Purpose	To define the procedure related to Solar panels

3. Scope	This procedure is related to the operation of solar panels

4. Responsibility	Respective assistant maintenance engineer - Electricals

5. Procedure

5.1 Turn ON the solar module

- Turn ON the DC Breaker
- Then, switch ON the AC breaker
- Turn ON the AC inverters main supply
- Check the generation readings in the solar meter

5.2 Turn OFF the solar module

- Turn OFF the AC inverter's main supply in the meter box
- Then, turn OFF the AC breaker. This stops the energy supply to the grid from the solar module.
- Go to the combiner box of the installation and turn OFF the DC breaker. If unable to do this, contact the service provider
- Switching OFF the DC breaker stops the electricity flow to the inverter
- Thus, the entire PV system is shut down

5.3 Others

- Dispose the used electric cables, obsolete components and PV waste to authorized recyclers

Effective Date (from)	Description	Version
22.04.2024	SOP for Generation of electricity through Solar	01

Prepared by	Verified by	Approved by
Mr. Velmani AME - Electrical	Mr. Marudhamuthu ME - Electricals	Dr.V.Thirumurugan Associate Director – Campus Life

4. CHILLER PLANT

1. Title	Standard operating procedure for "Regulation of indoor temperature using Air conditioner (Centralized Unit)"

2. Purpose	To define the procedure for chiller plants

3. Scope	This procedure is related to the operational process of chiller plants

4. Responsibility	Chiller plant in-charges

5. Procedure

5.1. Procedure to switch "ON" the Chiller

1. Open the Chiller pump inlet & outlet valves
2. Open the Condenser pump inlet & outlet valves
3. Open the evaporator inlet & outlet valves
4. Open the condenser inlet & outlet valves
5. Open the cooling tower inlet & outlet valves
6. Ensure all the valves are opened
7. Switch "ON" Main power supply (MCCB 400A)
8. Switch "ON" Chiller pump (By Push button)
9. Switch "ON" Condenser pump (By Push button)
10. Switch "ON" Cooling tower fan motor (By Push button)
11. Switch "ON" Chiller control panel (By Selector switch)
12. Switch "ON" the compressor 1 and 2 (By Selector switch)
13. Switch "ON" all AHU'S (By push button)

5.2. Procedure to switch "OFF" the Chiller

1. Switch "OFF" the compressor 1 and 2 (By selector switch)
2. Switch "OFF" Chiller control panel (By selector switch)
3. Switch "OFF" Cooling tower fan motor (By Push button)
4. Switch "OFF" Condenser pump (By Push button)
5. Switch "OFF" Chiller pump (CH) (By Push button)

6. Switch “OFF” Main power supply (MCCB 400A)
7. Close the all valves as above from sl.no. (5 to 1)

5.3. Preventive maintenance

- Once a month cooling towers cleaning work to be done.
- Three months once Floor AHU, CSU and FCU’s pre filters cleaning process to be done.
- AHU’s motors running condition check, motor belt tightening, motor bearing grease packing and motor bed alignment work in every 2 months once.
- Chiller motor to pump joint tire coupling tightness checking every 2 weeks.
- Motors and pumps bearing grease packing once a month.
- Motor’s power supply terminals, connectors’ tightness checking once a month.
- Chiller panel power supply connecting point tightness check.
- Chiller system’s all joints leak testing.
- Chiller plant’s panel’s incomer cable termination checking.

5.4 Others

- Dispose the used oils as per Hazardous waste management rules, 2016
- Dispose the used electric cables and coils to authorized recyclers as per E-waste management rules, 2016
- Run the chiller plants in a closed environment to prevent the effects of noise pollution
- Workers must wear PPEs during chiller plant operation
- Dispose the obsolete components as per the waste management rules
- Direct the wastewater generated to effluent treatment plants

6. References	1. User manual

Effective Date (from)	Description	Version
03.03.2023	SOP for Chiller Plant	01
22.04.2024	SOP for Regulation of indoor temperature using Air conditioner (Centralized Unit)	02

Prepared by	Verified by	Approved by
Mr. A. Senthil Kumar Centralized AC Plant Supervisor	Mr. Marudhamuthu ME - Electricals	Dr. V. Thirumurugan Associate Director – Campus Life

5. UNIT AIR CONDITIONER

1. Title	Standard operating procedure for "Regulation of indoor temperature using Air conditioner (Individual Unit)"

2. Purpose	To define the procedure for Individual Air Conditioning unit

3. Scope	This procedure is related to the operational process of split AC units

4. Responsibility	Plant in-charges

5. Procedure

5.1 Start up and Stop procedure

- Press I/O button, start operation, and stop when repressed.
- Ensure there is no leakage from unit
- Press TEMPERATURE ADJUSTMENT button, decreases 1 by press button once, and increas1 C and by press button once.
- Press FAN SPEED button, change the fan speed of indoor unit in the order of (low) (medium) (high) (auto)
- Press SLEEP button, set sleep operation, and cancel when repressed.
- Control with remote controller to adjust up/down air flow direction, avoid turning deflector with hand to avoid injury

5.2 Service and Maintenance

- Filters should be cleaned once every Month
- Take out filters.
- Clean filters and Condenser Coil fins with a Blower or by typing them gently. (If they are very dirty, wash them in warm water below 45 degrees dissolved with neutral scouring agent.).
- Clean filters with clean water, then dry them in cool air.
- Insert them at original position, then push down and close front panel.
- Ensure Drain point should be cleared.

- Note down the Compressor Voltage/Current and Unit.

5.3 Safety Practices:

- Before carrying out any activity, Operator in coordination with the Supervisor must arrange the proper PPE. After that ensure that safety measures to be discuss with the team and take corresponding work permit Like Hot/ General / Confined Space work / Height permit from FM & must switch "OFF" the supply for the particular Panel / equipment and LOTOTO to be provided and make sure to display "Caution! Work In Progress".
- Good Housekeeping standards to be followed.
- Site Team to ensure that the workers are wearing the desired PPE's, adequate lighting is available and ventilation is provided.
- Any welding activity in plant supervisor and site team must ensure no flammable liquids/ chemicals or Material nearby. And proper earthing to be provided.
- To use trolleys or sufficient manpower to be provided to avoid manual handling.
- Caution or work signage's to be display and area should be cordoned off.
- Physical Inspection of tools and ladders to be carried out prior commencing the work and tools must be electrically well insulated.
- Atmospheric conditions to be checked if working in confined space/Hot/Height.
- Team should work in Buddy pair system and both the persons should be aware of handling emergencies.
- Appropriate fire extinguishers shall be placed at the work location.
- Do not use liquid cleaners, always use dry and clean cloth for cleaning.
- Do not bypass any electrical safeties provided.
- Always keep the surrounding area clean and free of any combustible substances like diesel, kerosene, petrol, toxic and explosive, Oil etc.
- Report to Engineer/FM once activity is completed and work permit is closed.
- In case of any minor injuries the first aid kit is available in Utility which shall be brought into quick use and first aiders shall be called immediately. Any major emergency, call Security for ambulance. And incident report shall be raised for safety team review.

5.4 Others

- Make sure to switch OFF the AC during non-occupancy hours to lessen the emissions

- Dispose the obsolete components as per waste management rules

Effective Date (from)	Description	Version
22.04.2024	SOP for Regulation of indoor temperature using Air conditioner (Individual Unit)	01

Prepared by	Verified by	Approved by
Mr. A. Senthil Kumar Centralized AC Plant Supervisor	Mr. Marudhamuthu ME - Electricals	Dr. V. Thirumurugan Associate Director – Campus Life

6. OPERATION OF LIFT

1. Title	Standard operating procedure for "Operation of lift"

2. Purpose	To define the procedure for Lift operation

3. Scope	This procedure is related to the operational process of Lifts

4. Responsibility	Lift in-charges

5. Procedure

5.1 General

- Check lift alarm & emergency light and automatic rescue device properly.
- Inspect all car call push bottom & landing push bottom working normally. Check lift cabin light is working properly.
- Check all landing door are closed properly & gate lock is working properly.

5.2 In case of power outage

- If the problem is suspected to be a power outage and power can be restored, or will be restored in a short period of time, it is best NOT to attempt to remove trapped passengers by rescue operations.
- Power restoration will typically allow elevators to return to normal, safe operation.
- If conditions require passengers be removed from the car before the arrival of elevator service personnel, removal should be performed with extreme caution.
- Because safety is the prime consideration, Department members must be trained in elevator rescue procedures and must be familiar with the operation of the particular elevator system.
- It is the responsibility of each company to stay familiar with elevators in their first-due areas and maintain an awareness of their operation.
- Due to the many different types of elevators found in buildings, it is not possible to list exact rescue procedures applying to every situation. The procedures listed in this

section are offered as a guide and should be supplemented with additional knowledge of the particular elevator system.

- Direct a member with a portable radio to locate the elevator power shut-off switch, shut off the power to the stalled elevator, and remain at the location. The member stationed at the shut-off switch must not allow the switch to be moved without direct orders from the officer in charge.
- Locate the stalled elevator car by observing the floor indicator in the lobby or program selector indicator in the elevator machine room. Alternatively, voice contact can be made with the car occupants to confirm the location of the elevator.
- Communications with the passengers either through the elevator door or by the telephone inside the car should be initiated as soon as possible. Passengers should be counseled to remain calm and be made aware of efforts to rescue them. It is important to find out from the passengers what direction the car was traveling when it stalled and at which floor the door was last opened. If the emergency stop switch was activated by the passengers, have them return it to the original position. This will silence the alarm bell, which often adds to the confusion and discomfort of the trapped occupants.
- Call a working elevator car to the level at which rescue personnel are operating and place it on independent or emergency service to hold it at the location. Examine the door opening mechanisms and control panel features on this car, as they should be identical to the stalled car.
- Begin the rescue effort with a simple recall attempt to the ground floor.
- If a recall attempt does not open the elevator, direct the person stationed at the power shut-off switch to turn it back on. During the period the power to the elevator is off, the programming equipment may reset itself and cause the door to open if the car is level with the floor. If not, instruct a passenger to depress the door-open button inside the elevator. Many times, this will cause the door to open.
- Elevator keys, which are on all fire companies, can be utilized to open the hoist way door for the stalled elevator car. Keyholes and other access points for the elevator keys should be identified and the devices used in a systematic process.
- Maintenance representatives from the building can be important resources to determine the appropriate elevator access key. If these operations are not successful in opening the door, send a firefighter to the floor landing where the elevator door was last opened.

It is possible there is a faulty contact switch on the hoist way door at the location and shaking the door may cause the switch to make contact allowing the car to move.

- Also, have a passenger shake the elevator car door in case the problem is in the contact switch. If the car still does not move or the door does not open, send a firefighter to depress the hall button on the next floor to where the elevator is stalled, in the opposite direction from which the elevator was traveling. For example, if the elevator was traveling downward, the hall button on the floor above should be depressed. This may cause the elevator to return to the floor and open.
- If the above operations have not caused the elevator car to move to a landing level and opened the door, the elevator power shut-off switch should be returned to the off position. With the power shut off, most elevator doors can be opened from the inside by the passengers pushing the doors in the opening direction. On most high-rise elevators, if the car floor is within the landing zone (usually 18 inches above or below the landing floor level), a pick-up vane on the car door will engage the hoist way door and open them. If the car is not within the landing zone, after the car door is opened, a passenger can manually move the latching device on the hoist way door.
- If the doors cannot be opened by any of the methods listed to this point, and it is imperative passengers be removed quickly, the doors can be forced with pry bars or other traditional forcible entry methods. This should be considered only as a last resort and only for lifesaving operations due to the danger it presents to passengers and the extensive damage that is done to the doors. Prior to beginning operations to force or cut the doors, passengers should be informed of what is going to be done and advised to move to a position in the car away from the doors. To force doors sufficient pressure must be exerted at the top of the hoist way door to break the latch mechanism. Once the hoist way door is opened, the car door can be manually opened by pushing or prying it in the direction of opening travel.
- Once elevator doors have been opened, extreme caution is required in removing passengers from the elevator, especially if the car is not level with the floor landing. Electrical power to the elevator machinery must remain off to prevent any unexpected movement of the car. On some installations it is possible to insert pry bars in the elevator drive sheave to prevent movement of the car. Passengers should be removed, one at a time, as quickly as possible as is consistent with safety, utilizing ladders if the distance from the floor level to the elevator requires it. If the car is above the floor

landing, any open space between the bottom of the car and the floor landing must be barricaded as it presents a hazard to passengers exiting the car and rescue personnel who are assisting them.

- After the passengers have been removed, the car and hoist way doors should be closed and the elevator kept out of service until it is examined by elevator service personnel. This procedure should be followed even if the elevator appears to return to normal operation after rescue operations have been completed.

5.3 Safety Device Engagement

- If safety devices have activated and caused the elevator car to stop in the hoist way, it may be an indication of a serious malfunction in elevator control equipment or machinery.
- Under these conditions movement of the elevator car or removal of the passengers should not be attempted until a qualified elevator mechanic is on the scene to assist in rescue operations.
- If hoist ropes are parted or contain noticeable slack, it is an indication safety device at the bottom of the car have engaged. In this situation, if the car is moved upward, even a slight amount, the safety devices may disengage possibly allowing the elevator car to drop.

5.4 Others

- Dispose used oils as per the Hazardous waste management rules, 2016
- Dispose the obsolete batteries as per Battery waste management rules, 2022
- Dispose the used electric cables as per E-waste management rules, 2016
- Dispose the obsolete components as per the respective waste management rules

Effective Date (from)	Description	Version
03.03.2023	SOP for Lift	01
22.04.2024	SOP for Operation of lift	02

Prepared by	Verified by	Approved by
Mr. Velmani AME - Electrical	Mr. Marudhamuthu ME - Electricals	Dr. V. Thirumurugan Associate Director – Campus Life

7. GROUNDWATER EXTRACTION

1. Title	Standard operating procedure for "Groundwater Extraction Process"

2. Purpose	To define the procedure to operate and maintain Groundwater Extraction Process

3. Scope	This procedure is related to the Groundwater Extraction Process

4. Responsibility	Groundwater Extraction in-charge

5. Procedure

1. The bore well and open well are equipped with capacitive motors.
2. Now, Switch ON the motor.
3. The pumped water is directed to the storage tanks through the pipeline networks.
4. There will be a warning sign by sensors as soon as the water overflows.
5. Then, Switch OFF the motor.

6. Maintenance

1. Motor will be replaced when its repair cost exceeds 50% to 80% of a new motor.
2. Pipe replacement occur whenever there is a water spills and scaling (flow obstruction)

Effective Date (from)	Description	Version
22.04.2024	SOP for Groundwater Extraction Process	01

Prepared by	Verified by	Approved by
Mr. Thirunavukkarasu G RO unit in-charge	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

8. REVERSE OSMOSIS UNIT

1. Title	Standard operating procedure for "Reverse Osmosis Unit"

2. Purpose	To define the procedure to operate RO unit(s)

3. Scope	This procedure is relating to the production of treated water, storage of treated water, storage and consumption of consumables and tools related RO unit(s)

4. Responsibility	RO - unit in-charge(s)

5. Procedure

5.1. Operation of raw water pump

- Ensure the Raw Water Tank is fully filled with water.
- Ensure the Valve in the Inlet pipe connected to the Raw Water pump in open Position.
- Ensure the Rejection valve in the RO System is completely in open position.
- Switch on the Raw Water Pump

5.2. Operation of antiscalant dosing pump

- Ensure the antiscalant dosing pump tank is filled with antiscalant and mixed properly with raw water.
- Keep the switch of the antiscalant dosing pump in the position "ON"
- Ensure the availability of water in the RO inlet water storage tank
- Switch ON the power supply
- Open the raw water supply valve
- Switch ON the feed pump
- Backwash and rinse the sand and carbon filter for 10 minutes [feasible pressure range in the filter pressure gauge for normal operation is < 2 kg/cm^2]
- Change the multiport valve to service
- Switch ON high pressure pump [feasible pressure range in the high-pressure pump gauge for normal operation is between 10 and 15 kg/cm^2]
- Adjust the pressure on the control valve – RO – 1000 LPH and Reject – 1200 LHP [feasible pressure range in the inlet pressure gauge for normal operation is between 6 and 15 kg/cm^2]

- Check TDS for the RO treated water as per IS 10500:2012 standard requirements
- Fill the information in the daily log report and maintain it
- Once the RO treated water tank is full, neutralise the pressure control valve
- Switch OFF high pressure pump
- Switch OFF feed pump
- Close the raw water valve
- Switch OFF main supply

5.3 Maintenance of pressure sand filter (PSF)

- Regularly once in twenty-four hours pressure sand filter has to be backwashed, rinsed and the filter valve should be kept in the position of "ON" position.
- Initially please ensure the pump is kept in the "OFF" position.
- Keep valve of the PSF in "backwash" position.
- Switch on the raw water pump and run the pump till all the suspended solids collected in the PSF is drained out through drain pipe and clear water flow through drain pipe (operation may take minimum 10 minutes).
- After PSF is fully backwashed, switch off the raw water pump.
- Keep the valve of the PSF in "rinse" position.
- Switch on the raw water pump and run the filter for 5 minutes till the media settles to the normal position.
- Switch off the raw water pump keep the valve of the PSF in the position" position.
- Switch on the raw water pump.

5.4. Maintenance of activated carbon filter (ACF)

- Regularly once in twenty-four hours activated carbon filter has to be backwashed, rinsed and the filter valve should be kept in the position of "ON" Position.
- Initially please ensure the pump is kept in the "OFF" position.
- Keep valve of the ACF in "Backwash" position.
- Switch on the raw Water pump and run the pump till all the DIRT Coloured water collected in the ACF is drained out through drain pipe and CLEAR water flow through drain pipe (Operation may take minimum 10-15 minutes).
- After ACF is fully backwashed, Switch off the raw water pump.
- Keep the valve of the ACF in "RINSE" Position.
- Switch on the raw water pump and run the filter for 5-8 minutes till the media settles to the normal position.

- Switch off the raw water pump keep the valve of the ACF in the position "ON" position.
- Switch on the raw water pump.

5.5. Maintenance of micron filter

- In the position of the entire system regularly once in month both the micron filters housing has to be removed and the cartridges has to be washed with normal water and do not use any sort of brushes and washing soap or liquid.
- The cartridges after washing it have to be properly inserted inside the housing and fit the same as early position and tighten it properly.
- Compulsory once in 3 months the pre-filter micron cartridges has to be replaced.

5.6. Precautionary measures

- DO not switch on the high-pressure pump without or immediate switching on the raw water pump.
- Do not switch on the raw water pump without keeping raw water tank outlet valve in open position.
- Do not operate the Valves of PSF and ACF when the raw water pump is the on position.
- Do not exceed the pump pressure >10 Kg/cm^2

5.7. Process of chemical cleaning

- Chemical Cleaning process shall be recommended based on the flow, taste and output of the water time to time.
- Using Hazardous chemicals may be result in failure of RO Membranes.

Others:

- Use reject water for plate washing, flushing and harvest beds.
- Spilled Antiscalant shall be cleaned with spill kit.
- Obsolete components shall be collected, segregated and disposed as per waste management rules.

6. References	1. IS 16240 : 2015 - Reverse Osmosis (RO) Based Point-of-Use (PoU) Water Treatment System — Specification

Effective Date (from)	Description	Version
03.03.2023	SOP for Reverse Osmosis Unit	01
22.04.2024	“Others” section newly added in SOP	02

Prepared by	Verified by	Approved by
Mr. Thirunavukkarasu G RO unit in-charge	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

9. SOFTENER PLANT

1. Title	Standard operating procedure for "Softener Plant"

2. Purpose	To define the procedure to operate and maintain the Softener Plant

3. Scope	This procedure is related to the Water Softening Process

4. Responsibility	Softener Plant in-charge

5. Procedure

- The hard water from the intake storage tank will be pumped to the raw water feed tank, which contains sand filter media to remove suspended, floating, and sinkable matter from water.
- Maintain 2 bar inlet pressure in sand filter media
- Filtered water is pumped to a resin vessel to remove Ca and Mg ions.(To prevent scaling in water pipelines)
- Maintain 2 bar inlet pressure in resin vessel.
- Check the hardness of the water.
- Send the water to regeneration tank when hardness exceeds **300 ppm.**
- The regeneration tank consist of brine solution (mixture of water and salt).
- During regeneration, the brine's high sodium concentration overpowers Ca and Mg ions, causing hardness ions to be knocked off beads and replaced by sodium ions.
- The Ca and Mg ions are then flushed out of the tank with the remaining water from the brine, and the softener is ready to perform again.
- Then collect soft water from resin vessel and store it in softener water tanks for further use.
- Now, check the TDS and hardness of the water.

Backwashing

- For every 8 hours the sand filter media is backwashed to remove the waste.

- The resin vessel is also backwashed to remove salts.
- The backwashed water from sand filter and regeneration wastewater are sent to harvesting pits.

Others

- The waste generated are collected, segregated and disposed as per the waste management rules.
- Maintain Log Book.
- Record plant operation hours and total running hours.

Effective Date (from)	Description	Version
22.04.2024	SOP for Softener Plant	01

Prepared by	Verified by	Approved by
Ms. D. Poorani Shri . AME - EMS	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

10. SEWAGE TREATMENT PLANT

1. Title	Standard operating procedure for "Sewage Treatment Plant (STP)"

2. Purpose	To define the procedure for the sewage treatment plant

3. Scope	This procedure covers the operational and maintenance process related to sewage treatment plant

4. Responsibility	STP in-charge

5. Procedure

1. Switch ON feed inlet motor in the blower room

   1.1 Set the inlet flow limit as 75 cubic m/hr in the raw water collection room
2. Switch ON motors for blowers in the blower room (3 blowers) (50 HP/ 2hrs)

   2.1 Switch OFF blower motor after 2 hours and alternatively switch on another blower motor.
3. Switch ON recycle motor in the clarifier room (3 HP / 5 x 2 (standby))
4. Switch ON filter feed pump for the sand and carbon filters (7.5 HP / 5 x 2 (standby)) in the panel board room.

   4.1 Switch ON Chlorination tank to add chlorine to the water

   (Chlorination tank – 33% HCL + 20% chlorine dioxide – 50 liters of H_2O)
5. Switch ON pump with motor of treated waste collection tank (7.5 HP 5 x 2 (standby)) in the main panel board room.
6. Switch ON ultrafiltration (UF) inlet motor in the UF panel room for the UF tank (10 HP x 2 (standby)) 1 stand by.
7. Ensure the level of 150 KLD in the UF tank.
8. Perform JAR test from the sample collected in MBBR unit.

   8.1 If the sludge volume in the JAR test is lower than 300 mg/l continue the process till 10.

   8.2 If the sludge volume in the JAR test is greater than 300 mg/l switch OFF recycle motor pump.

   8.3 Switch ON sludge transfer pump and transfer the sludge to sludge holding tank.

9. Run the decanter as per its SOP

5.1. Sand and Carbon filter back wash

Back wash is performed at the end of every shift to clean the filter media in sand and carbon filters. The normal flow of waste water treatment is presented in figure 1.

1. During the normal flow, the valves (5) on the sand and carbon filters shall be in the position as presented in figure 2 a.
2. Turn the respective valves as presented in figure 2.b while performing the backwash in both sand and carbon filter individually.

After 5 minutes, turn the respective valves as presented in figure 2.c to finish the backwash process.

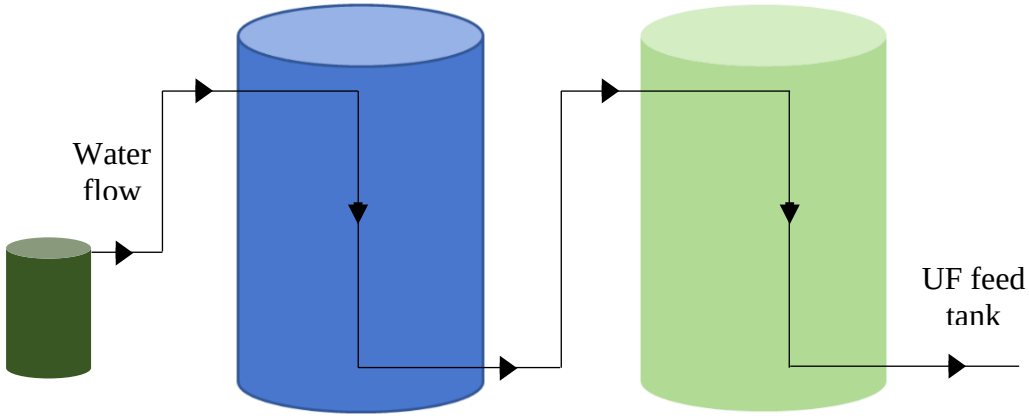

Fig1: Normal waste water treatment workflow

5.2. Ultrafiltration - UF

5.2.1. Regular operation

1. Switch ON main supply in the ultrafiltration room
   (Compressor switch ON auto, mode and OFF mode to release air locks of 6 inlet valves).
2. Turn ON push button in the UF panel.
3. Turn the knob to manual mode and press every value push button.
   3.1 Ensure air release sound in every value
      3.1.1 If the air release sound does not appear, check for the individual value to remove the blockages.

4. After air releasing all the fire valves, turn the knob to "(auto)" mode.
5. Turn ON the other knob towards '1' - feed motor (1) 10 HP – for 2 hours and turn ON the knob towards '2' - feed motor 2 for another 2 hours. Continue the process alternatively.
6. Turn OFF the push button in the UF panel
7. Turn both the knobs to neutral

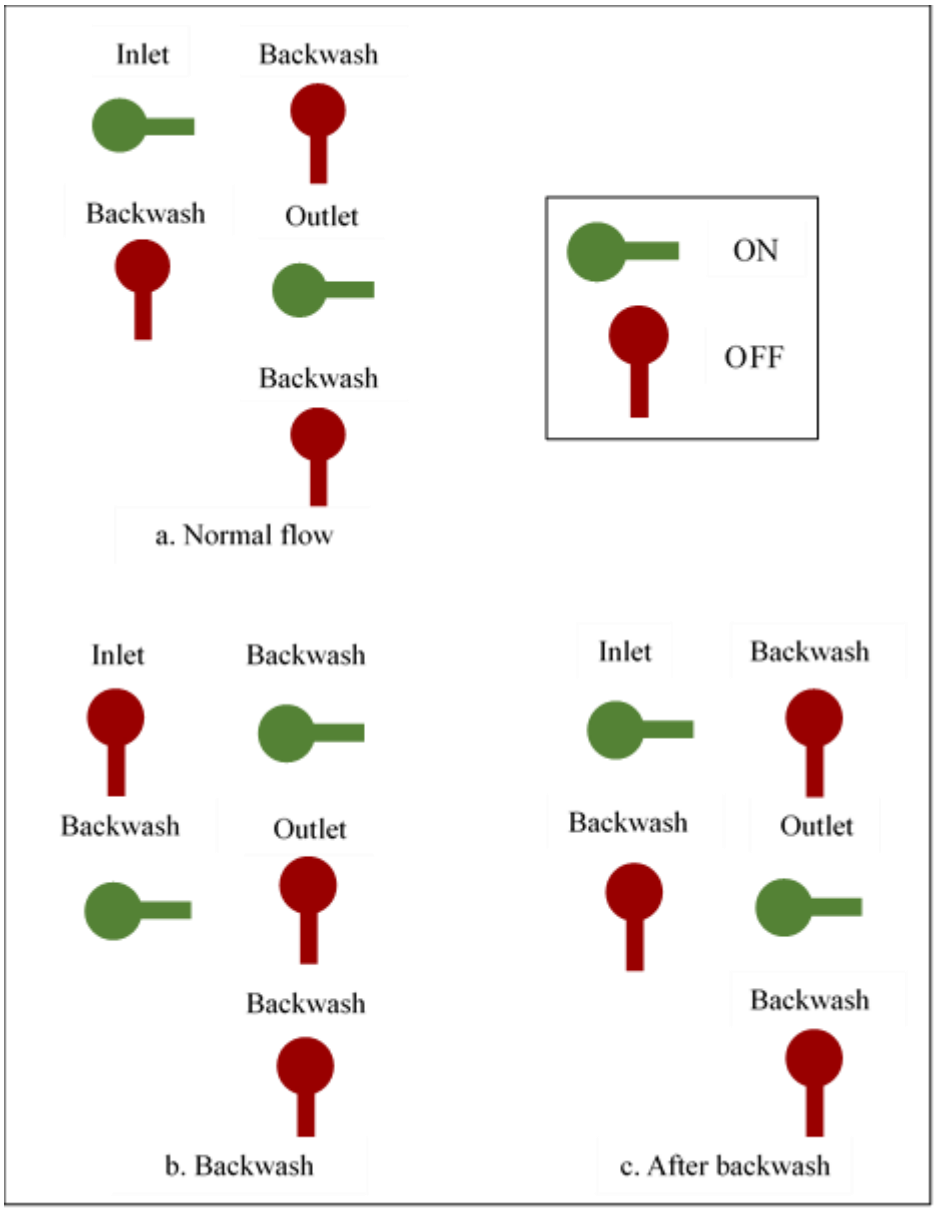

Fig 2: Back wash valve position

5.2.2. Chemical backwash - UF

1. When the pressure reaches 2 PSI or kg/cm^2 in the top and bottom feed indicators in the UF unit, initiate chemical backwash.
2. Fill 5 liters of hydrochloric acid (HCL) and 995 liters of water in the chemical back wash water storage tank.
3. Maintain a pH of 2 in the water storage tank.
4. Turn both the knobs to neutral “0” position in the UF panel boards
5. Open the backwash valve
6. Switch ON “CIP” button
7. Turn both knob to manual “1” in the UF panel board 2
8. Run the UF unit for 30 minutes with the position of backwash valve as mentioned in fig 3.b.
9. Run the UF unit for another 30 minutes with the position of backwash valve as mentioned in fig 3.c.
10. Switch ON valve 6 button to drain backwash water for 3 minutes and switch it OFF
11. Turn the back was value position as mentioned in fig 3.a.
12. Fill 1000 liters of water in the chemical back wash water storage tank.
13. Repeat step 8 and 9 for 15 minutes respectively. Followed by repeat steps 10 and 11.
14. Fill 7 kg of caustic soda in the chemical back was water storage tank and fill water in the tank. Maintain a pH of 14.
15. Repeat step 8 and 9 for 30 minutes respectively. Followed by repeat steps 10 and 11.

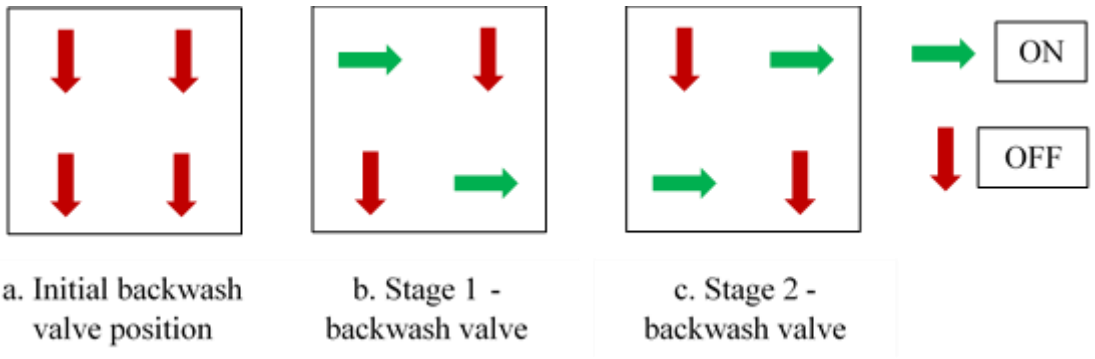

Fig 3: UF backwash valve position

5.3. Decanter

1. Switch ON the sludge motor in the near the sludge holding tank.
2. Prepare the chemical dosing – Cationic Polymer 1 kg (powder form) + 500 liters of water, agitate for 60 minutes
3. Switch ON decanter main supply in the panel board
4. Open raw water inlet valve and close it after 3 minutes for cleaning the decanter
5. Switch ON decanter when the RAM display reaches 4000 rpm
6. Turn ON chemical dosing pump
7. Switch ON screw pump in the lamella tank
8. Turn OFF screw and dosing pump
9. Open and close raw water valve
10. Switch OFF decanter in the panel board
11. Switch OFF sludge motor pump

5.4. Routine works and general work instructions

5.4.1. Equalization tank/Collection Tank:

- Keep air mixing on at all times
- Ensure that the air flow/ mixing is uniform over the entire floor of the tank.
- Adjust the placement of diffusers and the air-flow rate as needed.
- Keep the equalization tank nearly empty before the expected peak load hours (otherwise it will overflow)
- Check and clean clogged diffusers at regular intervals Manually evacuate

Transfer Pumps:

- Switch between the main and standby pump every 4 hours (approximately).
- Check oil in the pump every day; top up if necessary
- Check motor-to-pump alignment after every dismantling operation
- Check condition of coupling and replace damaged parts immediately
- Check for vibrations and tighten the anchor bolts and other fasteners
- Check condition of bearings, oil seals, mechanical seal and replace if necessary completely drain out oil and replace afresh as per manufacturer's recommendation
- Always keep safety guard in its proper condition.
- Ensure discharge of raw sewage into the aeration tank is visible and can be monitored Maintain the flow rate at designed level (no tampering with the bypass valve)

Aeration Tank:

- Operation considerations include maintaining the correct design level of MLSS (biomass concentration) in the aeration tank. Problems arise both in the case of excess or shortage of biomass, causing an imbalance, leading to failure of the process.
- Visual observation will indicate if there is uniform aeration and mixing over the entire area of the tank.
- Local violent boiling/ bubbling is indicative of ruptured membranes.
- Dead zones on the sewage surface indicate that membranes are blocked from the air side or the liquid side. Both conditions call for immediate attention, by cleaning or replacing the membranes.
- Cleaning of membranes is generally carried out by lifting out the defective units and scouring out the adhering materials by high-pressure hosing.
- Scrubbing with mild acid solution may also be resorted to in case of stubborn encrustation.
- Foaming in the aeration tank may be caused by excessive inflow of detergent-like substances:
- In a great majority of cases, the cause may be traced to an imbalance in the aeration tank recipe (Food: Microorganisms: Air: Nutrients), and corrective measures may be taken as indicated

Secondary Clarifier/ Settling Tank:

- Allow settling of biomass solids in the Mixed Liquor (biomass slurry) coming out of the aeration tank, to the bottom of the clarifier
- To thicken the settled biomass, in order to produce a thick underflow
- To produce clear supernatant water, in the overflow from the clarifier the clarifier tank is only a passive device:
- All the above actions occur due to gravity.
- The thick biomass is recirculated back to the aeration tank.

Sludge Recirculation:

- Sludge recirculation rates are typically from 50 % to 100 % of the through output rate of sewage in the STP. Hence, in a majority of cases, the capacity and specifications of the raw sewage lift pumps are replicated for this duty as well.

Clarified Water Sump:

- There are no special requirements, as this tank plays a passive role in STP functioning. In general, look after aeration, and inspect the tank periodically for sediments.
- Remove sediments as required.

Filter Feed Pumps (FFP)

- Switch between the main and standby pump every 4 hours (approximately).
- Check gland packing every day.
- Check motor-to-pump alignment after every dismantling operation
- Check condition of coupling and replace damaged parts immediately
- Check for vibrations and tighten the anchor bolts and other fasteners
- Check condition of bearings, stuffing box if necessary
- Always keep safety guard in its proper position
- Ensure discharge of raw sewage into the aeration tank is visible and can be monitored
- Maintain the flow rate at designed level (no tampering with the bypass valve)

Pressure Sand Filter (PSF):

- The operations essentially consist of a long filtration run, followed by a short backwash sequence.
- The filter needs backwash when the pressure drop across the filter exceeds 0.5 kg/cm^2
- However, it is a good practice to backwash once in a shift, irrespective of the actual amount of pressure loss.
- A five to ten-minute backwash will typically rid the filter of all accumulated muck

Activated Carbon Filter (ACF):

- Just as the PSF, the ACF also needs to be backwashed, albeit at a lesser frequency to dislodge any solid particles trapped by simple filtration action.
- When the carbon gets exhausted (indicated by no improvement in water quality across the ACF), fresh carbon needs to be filled into the filter

MLSS:

- Take one litre of the Aeration Tank sample (The Mixed Liquor) and allow to settle in the jar for 30 minutes. At the end of the 30 minutes, measure the volume occupied by the settled sludge. If it is 350 mL, we take the MLSS to be 3500 mg/L. If it is 400 mL, the take MLSS to be 4000 mg/L.

- The assumption here is that the STP is functioning normally, and therefore the so-called "Sludge Volume Index – SVI) is 100, meaning dry solids weighing 1 gram occupy 100 mL volume after 30 minutes of settling. And so, 4 grams of microbes (4000 mg) will occupy 400 mL volume in the cylinder.
- The STP is operated within a band of say 3500 mg/L (350 mL) and 4500 mg/L (450 mL). When the MLSS exceeds 450 mL, the excess sludge is taken out of the system to bring the MLSS down to the say 350 mL, and the process continues until the sludge again builds up to 450 ml.

Monitoring frequency

Air Blowers:

Weekly:

- Maintain proper lubricant level

Quarterly:

- Check for abnormal noises and vibration
- Check if air filters are in place and not clogged
- Check motor bearing for rise in temperature
- Check that all covers are in place and secure
- Lubricate motor ball bearings
- Check wiring integrity
- Check that electrical connections are tight.

Biannually:

- Lubricate motor sleeve bearing
- Inspect and clean rotor ends, windings and blades
- Check that electrical connections are tight and corrosion is absent

Annually:

Check bearing oil

Others:

- Obsolete components and generated waste will be collected, segregated and disposed as per waste management rules.

- The treated water shall be used for bus service station, fish pond, dual plumbing system and maintain zero liquid discharge.
- Develop green belt area and rainwater harvesting facilities.
- There should be no manual cleaning and maintain good housekeeping facility.

6. References	1. User manuals

Effective Date (from)	Description	Version
03.03.2023	SOP for Sewage treatment plant (STP)	01
22.04.2024	“Others” section newly added in SOP	02

Prepared by	Verified by	Approved by
Mr. Venkatesan K STP in-charge	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

11. EFFLUENT TREATMENT PLANT

1. Title	Standard operating procedure for "Effluent Treatment Unit(s)"

2. Purpose	To define the procedure and controls to operate effluent treatment unit(s)

3. Scope	This procedure is relating to the effluent treatment from transit laundry stations and laboratories

4. Responsibility	ETP in-charge

5. Procedure

- Switch ON pump with motor in the ETP raw water collection tank panel board (2HP)
- Switch ON main supply in the ETP panel board
- Turn ON F8, F9, F13 and F14 in the ETP panel board
- Turn ON F3, filter feed pump in the panel board
- Set the valve in backwash mode in the multiforte filter and run F4, Softener feed pump for 3 minutes
- Set the valve in rinse mode in the multiforte filter and run F4, Softener feed pump for 3 minutes
- Set the valve in filter mode in the multiforte filter and run F4, Softener feed pump
- Replace the dual media in the multiforte filter when pressure reaches 2 PSI of kg/cm^2
- After the treatment, turn OFF pump with motor in the ETP raw water collection tank panel board
- Turn OFF F8, F9, F13, F14, F3, and F4 in the ETP panel board
- Turn ON the motor in sludge tank and remove the sludge collected at the bottom
- Transfer the collected sludge to the hazardous waste collection point

Others

- Collected Sludge should be disposed as per hazardous waste management rule.
- Spilled Chemicals will be cleaned with help of spill kit.
- Obsolete components will be segregated and disposed as per waste management rules.

Effective Date (from)	Description	Version
03.03.2023	SOP for Effluent Treatment Unit	01
22.04.2024	“Others” section newly added in SOP	02

Prepared by	Verified by	Approved by
Mr. Mallavaranan G ETP In-charge	Dr. S. Gopinath Assistant Professor	Dr. V.Thirumurugan Associate Director – Campus Life

12. RAINWATER HARVESTING SYSTEM

1. Title	Standard operating procedure for "Rain Water Harvesting(RWH) System"

2. Purpose	To define the procedure to operate and maintain the RWH System

3. Scope	This procedure is related to the Rain Water Harvesting Process

4. Responsibility	RWH System in-charge

5. Procedure

5.1 General

1. A masonry wall encircling the RWH structure allows water to flow vertically.
2. RWH structure are backfilled with boulders (5-20 cm), gravels (5-10 mm), and coarse sand (1.5-2 mm) in graded form.

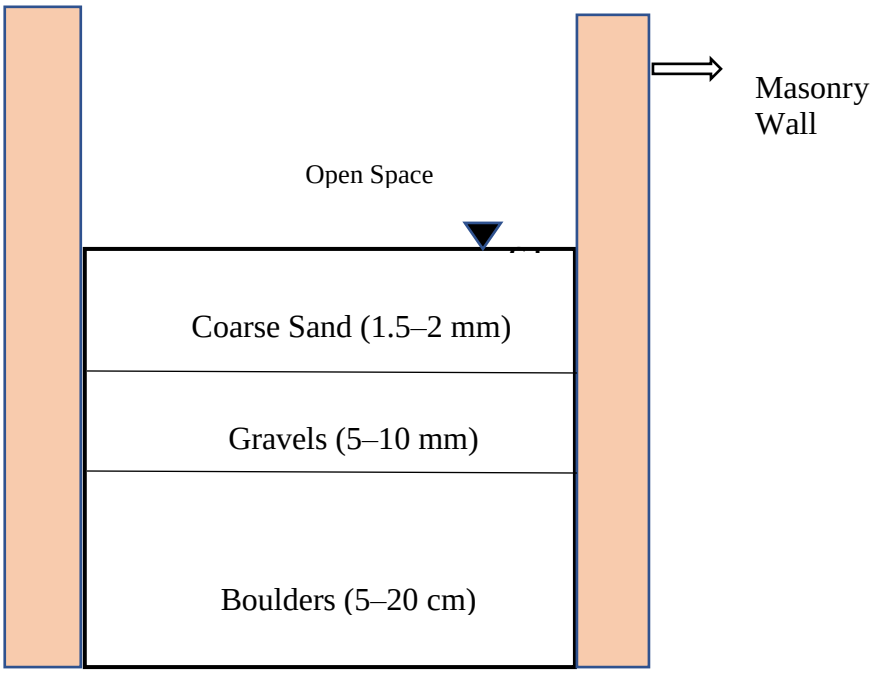

Fig1: Rain Water Harvesting Structure

5.2 Process and Maintenance

1. A pipe collects the roof-top water, which then flows to RWH structure. This leads to groundwater recharge after entering various layers.(filter media)
2. A mesh should be provided at the roof so that debris are prevented from entering the RWH structure through pipelines.
3. Pipe replacement will occur whenever there is damage or water spills.
4. The RWH structure and Pipelines will undergo seasonal pre-monsoon and periodic post-monsoon maintenance to guarantee the water flow from the debris. (leaves, branches, solid waste and etc.,)
5. Whenever a layer becomes deteriorated, its material will be replaced. The top layer of sand should be cleaned periodically to maintain the recharge rate.

Effective Date (from)	Description	Version
22.04.2024	SOP for RWH System	01

Prepared by	Verified by	Approved by
Ms. D. Poorani Shri AME - EMS	Dr. S. Gopinath Assistant Professor	Dr. V.Thirumurugan Associate Director – Campus Life

13. STORM WATER DRAINAGE

1. Title	Standard operating procedure for "Storm Water Drainage"

2. Purpose	To define the procedure to operate and maintain Storm Water Drainage

3. Scope	This procedure is related to the Storm Water Drainage Process

4. Responsibility	Storm Water Drainage in-charge

5. Procedure

1. The rainfall runoff are collected through trenches and discharged to the main drains.
2. During the pre-monsoon season, the trenches and main drains will be periodically cleared of garbage, such as solid waste and leaves and etc.,
3. During the monsoon, the main drains and trenches will undergo frequent maintenance to avoid blockages.
4. As soon as the drainage structure sustains damage and stagnation, it will be corrected.
5. The main drains will also receive a direct rainfall runoff.
6. The water from the main drains will be safely discharged into nearby water body, preventing flooding and soil erosion.

Effective Date (from)	Description	Version
22.04.2024	SOP for Storm Water Drainage	01

Prepared by	Verified by	Approved by
Ms. D. Poorani Shri AME - EMS	Dr. S. Gopinath Assistant Professor	Dr. V.Thirumurugan Associate Director – Campus Life

14. SOLAR STEAM PLANT

1. Title	Standard operating procedure for "Solar Steam (Cooking) Plant"

2. Purpose	To define the procedure to operate and maintain Solar Steam Plant

3. Scope	This procedure is related to the Solar Steam Plant

4. Responsibility	Solar Steam Plant in-charge(s)

5. Procedure

5.1 Start Up

Ensure all safety requirements as follows.

- Do not stand or walk between dish and receiver.
- Wear heavy duty sun goggles always while inside the solar field.
- Use always safety helmet while moving inside the installation area.
- Use hand gloves while handling the mirror.

➢ Check all pressure and temperature settings, water level in the feed water tank or in the header.

➢ Open the system vent valve and ensure entrapped air in the piping is released and water is in circulation.

5.2 Tracking system using PLC based control panel

- Ensure that hooter is not giving signal, if giving, correct the fault.
- Push the "Master start" button to 'ON' in the control panel.
- Operator has to adjust the position of dish so that focus is at the centre.
- The dish moves in forward direction in steps, Set 01 sec **ON** and 18.02 sec **OFF** time in PLC.
- This tracking shall continue for the whole day automatically.
- At the end of the day when dish motor reaches and touches the '***Full forward limit switch'*** forward movement of the motor stops and the motor draws reverse supply from

the PLC it starts reversing automatically. The dishes shall reverse back to original position and touch '***Full reverse limit switch*** 'and stop.

5.3 Dish Tracking System

- It is very much essential to track the sun position from the sun rise till sunset.
- Ensure concentrated focus is always at the central position of the respective receiver.

5.4 Concentrated solar radiation focus setting:

- ***Horizontal movement*** of focus at the centre of the respective receiver: It is taken care by the control system, if not, adjust it by the push button provided in the control panel.
- ***Vertical movement*** of focus at the centre of the respective receiver: It is taken care by adjusting upper & lower seasonal adjustments.

Once the desired (set) pressure is reached in the steam drum, drain the stagnant water (for a minute) in the process pipeline first with the help of valve and open the process utility valve for the utilization of the steam.

5.5 Plant Shutdown

Ensure water level in gauge glass and fill up the water in evening up to desired level i.e. 50% of gauge glass for next day's use.

- Close the main steam valve.
- Switch off the water pump once achieved the desired level in gauge glass.
- Check the dish position, it takes approximately 30 minutes for auto reversal.
- Cut off the power by pushing ***Master Stop*** button given in panel.

Effective Date (from)	Description	Version
22.04.2024	SOP for Solar Steam (Cooking) Plant	01

Prepared by	Approved by
Mr.Rajaram Technical Assistant	Mr. Thirunavukarasu Associate Professor

15. SOLID WASTE MANAGEMENT

1. Title	Standard operating procedure for "Solid waste management"

2. Purpose	To improve current cleanliness level in the SRM Institute of Science and Technology and involve stakeholders as change makers.

3. Scope	This procedure for SRM Institute of Science and Technology is applicable to all the schools, colleges, and departments in the Kattankulathur Campus, Tamil Nadu, India to manage the solid waste generated in the campus.

4. Responsibilities	Heads of campus administrations would be responsible for ensuring compliance to the SOP for the campus under their management. Each campus should have a committee overseeing sanitation and cleanliness in their premises to monitor and supervise the works being carried out by the responsible party (Management/Contracted Agency) and ensure compliance to the SOP. The committee should also ensure compliance to infrastructure requirements as laid out in this SOP. Further, in case of contracting an external agency to carry out the cleanliness works, Service Level Agreements should be drafted and signed by both parties.

4.1. Responsibilities of the Facility Management /Contracted Agency

It is the responsibility of the Campus administration / Contracted Agency to carry out the Cleaning of the institute premises on a regular basis, and comply with the following guidelines:

- Ensure a clean environment for the students and staff through proper selection of agencies required for the job
- Regular surprise inspection of the premises to ensure compliance with the SOP
- Attain and maintain high standards of cleanliness and general upkeep
- Train, control and supervise staff under its establishment
- Control and issue of cleaning materials and equipment
- Maintain official records on staffing, cleaning materials and equipment
- Cleaning standards, frequency and accountability for cleaning are clearly defined (i.e., who cleans, what and how do they clean and when do they clean it)
- Cleaning schedules ensure that no area is missed from routine cleaning

- Statutory requirements are met in relation to Waste Management, Environment Protection Act, Food hygiene, and Pest control

5. Procedure

Periodic Inspection
Daily inspection

To be conducted by: Direct supervisor of the Maintenance Staff	
S.No.	**Area and Activity**
1.	Check if the institute premises have been swept/cleaned and waste removed appropriately.
2.	Check if the playground/basketball courts have been adequately swept and cleaned.
3.	Check if corridors inside the institute have been regularly cleaned.
4.	Check if the canteen is maintaining adequate standards of cleanliness and hygiene.
5.	Check if all the dustbins have been emptied and cleaned.
6.	Check if activity rooms, swimming pool are cleaned every day.
7.	Check if towels, swimming costumes etc. are being cleaned after one use.(If applicable)
6.	Check that the garbage is being collected and disposed regularly.
7.	Check that all stairs/ Lifts have been properly cleaned.
8.	Ensure that there are no open sewers, gutters, damaged drain pipes, sewage blockages; and if there are, address them immediately.
9.	Check if cleaning and scrubbing of toilets along with their wash basins, sanitary fittings, glasses and mirrors and toilet floors has been done.
10.	Check if toilets are clean and dry, and all fixtures (light bulbs, wash basin, exhaust fans) are functional.
11.	Check if cleaning and disinfecting of all vitreous fixtures including toilet bowls, urinals, sinks, toilet seats, containers etc. has been done properly. Check below water level and under rims including areas at hinges and cistern handles. Check if restock of toiletries, including liquid hand soap, toilet paper, air freshener, and sanitary cubes and naphthalene balls in toilets has been done.

12.	Check if one maintenance staff is present in front of every common toilet.
13.	Check whether mowing, hedge clipping has been done and waste from the ground has been adequately removed.
14.	Check if construction, renovation waste has been adequately disposed.
15.	Check if any kind of water logging is present at hand washing, utensil washing areas in canteen, lab sinks and toilets.
16.	Check whether dusting of general storage, desks and benches and toy/book storage for has been done.

Weekly Inspection

Weekly Inspection To be conducted by: Representative of Waste Management Committee (by turns)	
S.No.	**Area and Activity**
1.	Check all daily reports since past week for compliance. Check all items as outlined in daily inspection report during weekly inspection as well.
2.	Check past 3 weekly reports for areas identified for improvement/corrections and check if the same have been addressed.
3.	Check for any damages in the premises and ensure that they are addressed.
4.	Check for cleaning of electrical fittings and ensure they are in good, working condition.
5.	Check if there are potholes or spaces where stagnant water is collecting and immediately address them.
6.	Inspect drinking water fountains/taps and ensure they have been cleaned.

Monthly Inspection

To be conducted by: Department of Campus Administration	
S.No.	**Area and Activity**
1.	Check all daily and weekly reports since last month for compliance. Check all items as outlined in daily and weekly inspection report during monthly inspection as well.
2.	Check past 3 monthly reports for areas identified for improvement/corrections and check if same have been addressed.
3.	Conduct self-evaluation as per parameters given in assessment tool above. Identify areas of improvement and delineate action items.

4.	Conduct infrastructure gap assessment (as outlined previously in this document) and identify action items (can be done quarterly as well, depending on need).
5.	Check all major infrastructural items and fittings to ensure they are in good condition.
6.	Check if all buildings, roads, boundary walls, entry-exit points; fittings, fixtures in toilets and grounds are in good condition.
7.	Check roster/daily register of cleaning staff to see that the deployment is adequate and timely.

Quarterly Inspection

To be conducted by: Department of Campus Administration	
S.No.	**Area and Activity**
1.	Thorough cleaning of the roof, water outlets, checking for cracks, coping, etc. Checking and repairing of leaky roofs
2.	Check the water tank thoroughly for leakage etc. Seal it with water proof cement or sealant and clean it at regular intervals.
3.	In case of an underground tank, check if the cover and the brim of the tank are intact and sufficiently raised from the surrounding ground level.
4.	Check for levelling and cleaning of open institute ground.
5.	Checking of electrical lines and earthing (if applicable).
6.	Check, if all the fans, tube lights are dusted properly.
7.	Check if coolers (if any) and water tank cleaned properly. Change pads; check all electrical systems and earthing.
8.	Check the functioning of hinges, bolts and other hardware of all doors and windows.
9.	Check if drinking water is safe as per WHO Guidelines for Drinking-water Quality or national standards and acceptance levels concerning chemical and radiological parameters.

Assessments & Inspections

Waste Identification:

Wet Waste	Cooked and uncooked food, plant leaves, compostable materials, coffee powder, tea powder, meat and poultry waste etc.
Sanitary Waste	Menstrual cloth (used), disposable diapers, sanitary napkins, bandages, etc.
Dry Waste (paper)	All types of paper, paper plates, tickets, telephone bills, wrappers, leaflets, flyers, etc.
Dry Waste (plastic/ glass)	All types of plastic, plastic bags, coke bottles, water bottles, garbage packs, milk packets, pouches, bangles, crockeries,

Dry Waste (hazardous)	Used syringes, insecticides and containers, discarded medicines, battery cells, household chemicals, etc.
E-Waste	Mobile, CDs, electronic equipment, CFL, Tube lights,
Dry Waste (others)	Metal items, tetra packs, aluminium foils, aluminium cans, thermocol, bottles, plates, utensils, packaging material etc
Garden Waste	Plant leaves, dry and wet cut branches
Inert Waste	All types of construction materials, cement, mud, sweeping dust etc

Segregation, Collection and Storage:

There are three stages of segregation, collection and storage of waste to be done within campus

a) Primary Level i.e. at classroom and corridor level

b) Secondary Level i.e. at wing level (senior wing, Junior Wing)

c) Tertiary Level i.e. at campus level

Waste should be segregated under the below categories:

a) Wet Waste

b) Dry Waste

c) Hazardous/ Infectious Waste from Labs and Sick Room

d) E-Waste from Computer Labs

e) Inert

Collection Receptacle used covered and of different sizes as per the above indicated three levels and should be colour codified as under:

a) Wet Waste Green

b) Dry Waste White

c) Hazardous/ Infectious Waste Red

d) E-Waste Black

e) Inert Brown

Cleaning Practices

All corridors, open spaces, parks, other common spaces like activity rooms, science labs of the

campus (both external and internal) should be cleaned at any given time. The following cleaning routine should be adhered to:

Sweeping and Mopping of floor

a) Sweeping of corridors with disinfectant at least once a day.

b) Frequent brooming of the corridor through the course of the day

c) Vacuum cleaning of carpets at least daily using appropriate vacuum cleaning equipment.

Garbage Bins

a) Remove garbage from dustbins and clean them if required.

b) Provide separate dustbins for biodegradable and non-biodegradable materials.

c) Replace cleared dustbins to original spot.

d) If any trash is found anywhere in the complex, pick up immediately.

Doors, Windows and Walls

a) Spray windows and glass surfaces with water or appropriate cleaning solution.

b) Removal of all cobwebs and stains.

c) Extensive cleaning of outer-surface of windows to be carried out by contracted agency at least once a month.

d) If any fingerprints, smudges or stains found on the corridor wall then the same to be cleaned immediately.

Vents and Fixtures

a) Dusting of light fittings, wall decorations, other fixtures using feather brush and duster.

b) Air conditioning vents and sprinklers should also be dusted and checked for proper functioning.

Toilets:

a) Fixtures including toilets and sinks should be free of streaks, soil, stains and soap scum.

b) Should have good quality basic fitments like ablution taps and wash basins, etc.

c) Mirrors and windows should be free of dust and streaks.

d) Dispensers should be free of dust, soiling and residue and replaced/replenished when empty.

e) Waste should be disposed of appropriately on a daily basis.

f) Provisioning of soap, toilet paper, hand towel/dryer, sanitary pads dispenser, dustbins, and other necessary items.

g) Toilet bowls, urinals and adjoining areas should be cleaned with disinfectant on a daily basis, and the use of acid-based disinfectants should be avoided.

h) Toilet floors should be kept dry to the extent possible/feasible.

i) There should be well functioning drainage system.

Common spaces:

a) Sweeping of corridors, pavements, other external areas at least twice a day.

b) Cleaning internal common spaces like lift, stairs area, indoor parking area, etc. regularly.

c) Composting leaves, biodegradable waste (if feasible)

Playground:

a) Sweeping of park/garden area regularly.

b) Removing grass and hedge trimmings same day.

c) Cleaning park benches and other outdoor equipment every day.

d) Sweeping basketball court/volleyball court area.

e) Ensure that no water trenches stay in the playground.

Lab and Other Activity Rooms' Equipment

a) Lab equipment should be regularly cleaned and well maintained.

b) A list of all chemicals and salts present must be regularly updated and safe disposal of chemicals to be ensured.

c) Sports room equipment should be checked at regular intervals to see if there is need of repair or replacement with new equipment.

d) Other activity rooms" equipment like music instruments should be checked at regular intervals to see if there is need of repair or replacement with new equipment.

Cafeteria/Canteen:

a) Canteen should be regularly cleaned.

b) Dustbins should be placed at easily accessible spots to prevent littering.

c) There should be hand washing facility in the canteen (Utensil washing sinks in case of attached kitchen).

d) Segregation and composting of food waste (if feasible)

An Intensive cleaning of the campus premises to be carried out at least once in two months which should also involve participation all teaching faculty and staff for disposal of

redundant/unused hardware, furniture which can be added to inventory and re-allocated as per demand.

Weeding and recording of files should be resorted to at least once in 6 months. The old student records, examination papers, etc. in the record room should be reviewed once a year and destroyed as per guidelines. This would ensure that constant space is created for keeping more recorded files.

If necessary extra manpower for this purpose should be resorted to.

Waste Management

A strategy needs to be in place to ensure proper management of waste generated and reduction of waste through recycling and reusing.

Types of waste generated

a) Bio-degradable (dry) waste {green waste, food waste, paper waste, biodegradable plastics

b) Hazardous waste,

c) Construction and demolition waste,

d) Bulk garden and horticulture waste including recyclable tree trimmings,

e) All other non-biodegradable (dry) waste {recyclable and non-recyclable}

Management of Waste

1. Bio-degradable Solid Waste if not composted by the generator, shall be stored by generators of such waste within their premises and its delivery shall be ensured by every such generator to the Municipal Vehicle or to the bio-degradable waste collection vehicle provided for specified commercial generators of bulk bio-degradable waste. Local composting of waste shall be promoted to minimize transportation of waste.

2. Hazardous Waste, especially waste from labs and sick room shall be scientifically disposed as per Municipal Solid Waste Management norms. Good management practice should ensure that hazardous wastes are stored, collected, transported and disposed of separately, preferably after suitable treatment to render them innocuous.

3. Construction and Demolition Waste shall be stored only within the premises of buildings, or in containers where such facility of renting out containers is available, till finally removed from the premises. No person shall dispose of construction waste or debris on the streets, public spaces, footpaths or pavements. If contractors have the obligation to collect the C&D waste, it should be done immediately after all work is finished. Failure to do so will attract penalty (for

example CPWD does not pick up the waste on time and leaves the unused cement bags etc. lying for months. As a result the C&D waste gets spread around. While, in normal course, all the waste is picked up together, but it should also be done in piecemeal manner)

4. Bulk garden and horticultural waste shall be kept un-mixed and composted at source.

5. All other Non-biodegradable ("Dry") waste – both recyclable and non-recyclable – shall be stored and delivered by every generator of waste to the dry waste collection vehicle.

6. Burning of waste: Disposal by burning of any type of solid waste is prohibited.

7. The Campus Administration/Contracted Agency must ensure that officials do not throw any waste on the streets, footpaths, open spaces, drains or water bodies and instead store the waste at source of waste generation in two bins/bags, one for food waste/bio-degradable waste and another for recyclable waste such as papers, plastic, metal, glass, rags etc.(as under):-

Types of Wastes to be put in the Bin Meant for Food Wastes & Bio-degradable Wastes:

a. Food wastes of all kinds, cooked and uncooked, including eggshells.

b. Flower and fruit wastes including juice peels and house-plant wastes.

c. Classroom sweepings.

Types of recyclable and other non-bio-degradable wastes to be kept separately:

a. Paper and plastic, all kinds

b. Cardboard and cartons

c. Containers of all kinds excluding those containing hazardous material

d. Packaging of all kinds

e. Glass, all kinds

f. Metals, all kinds

g. Rags, rubber, wood

h. Foils, wrappings, pouches, sachets and tetra Pak (rinsed)

i. Cassettes, computer diskettes, printer cartridges and electronic parts

j. Discarded clothing, furniture and equipment

8. Wastes such as used batteries, containers for chemicals and pesticides, discarded medicines and other toxic or hazardous waste if and when produced, should be kept separately from the above two streams of waste.

Do's and Don'ts

DO	DON'T
Collect waste, rubbish and debris within the campus and dispose as per set frequency.	DO NOT let waste and trash accumulate within the premises.
Dispose all waste as per guidelines.	DO NOT dispose waste outside or near parking lots, playground, drainage, swimming pool, ditches or any other location where they can damage the environment.
Keep all equipment clean; do not allow a build-up of wastes.	DO NOT let equipment get damaged or rusted; replace if unsuitable for further use.
Oversee contractors to ensure that correct procedures are followed and SOP guidelines are complied with.	DO NOT let contractors conduct maintenance in conflict with proper procedures and guidelines; monitor closely
Impose Penalty on defaulters for littering/spitting/open urinating within the campus premises or near the boundary walls	DO NOT allow littering, spitting, open urination or any other practices that affect the cleanliness and aesthetics of the premises.
Conduct surprise inspections of the campus to ensure a clean, hygienic and healthy environment for members and staff.	DO NOT allow accumulation of unnecessary wastes anywhere.
Involve students and staff in such a manner that they voluntarily contribute towards cleanliness.	DO NOT overcharge students in the name providing cleaner and hygienic surroundings

Effective Date (from)	Description	Version
03.03.2023	SOP for Solid waste management	01

Prepared by	Verified by	Approved by
Mr.S.Mohanakrishna AME-EMS	Dr.S.Gopinath Assistant Professor	Dr.V.Thirumurugan Associate Director – Campus Life

16. HAZARDOUS WASTE MANAGEMENT

1. Title	Standard operating procedure for "Hazardous waste management"

2. Purpose	To define the procedure by which hazardous waste is managed as per the compliance requirements

3. Scope	This procedure relates to the generation, storage, labelling, and disposal of hazardous waste management

4. Responsibility	Operational heads and Gensets/Transit station in-charge

5. Definition

Definition

- "**used oil**" means any oil:

(i) derived from crude oil or mixtures containing synthetic oil including spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludge's; and

(ii) suitable for reprocessing, if it meets the specification laid down in Part A of Schedule V but does not include waste oil;

- "**hazardous waste**" means any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances, and shall include

(i) waste specified under column (3) of Schedule I;

(ii) waste having equal to or more than the concentration limits specified for the constituents in class A and class B of Schedule II or any of the characteristics as specified in class C of Schedule II; and

(iii) wastes specified in Part A of Schedule III in respect of import or export of such wastes or the wastes not specified in Part A but exhibit hazardous characteristics specified in Part C of Schedule III;

"waste oil" means any oil which includes spills of crude oil, emulsions, tank bottom sludge and slop oil generated from petroleum refineries, installations or ships and can be used as fuel in furnaces for energy recovery, if it meets the specifications laid down in Part-B of Schedule V either as such or after reprocessing.

6. Procedure

- For the management of hazardous and other wastes, the operational head shall follow the following steps, namely:
    - prevention;
    - minimization;
    - reuse,
    - recycling;
    - recovery, utilisation including co-processing;
    - safe disposal.
- The operational head shall be responsible for safe and environmentally sound management of hazardous and other wastes.
- The hazardous and other wastes generated in the establishment shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility.
- The hazardous and other wastes shall be transported from an occupier's establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of hazardous and other waste management rules.
- The operational head who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal.
- The operational head shall take all the steps while managing hazardous and other wastes to
    - contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and
    - provide persons working in the site with appropriate training, equipment and the
    - information necessary to ensure their safety.

- The authorised actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorisation.
- Handing over of the hazardous and other wastes to the authorised actual user shall be only after making the entry into the passbook of the actual user.
- Every operational head, shall maintain a record of hazardous and other wastes managed by him in **Form 3** and prepare and submit to the State Pollution Control Board, an annual return containing the details specified in **Form 4** on or before the 30th day of June
- Used oil generated from the service of diesel generators and vehicles are hazardous waste and it shall be disposed only through authorized vendor through the concerned departments.

6.1. Packaging and Labelling

- Any occupier handling hazardous or other wastes and operator of the treatment, storage and disposal facility shall ensure that the hazardous and other wastes are packaged in a manner suitable for safe handling, storage and transport as per the guidelines issued by the Central Pollution Control Board from time to time. The labelling shall be done as per **Form 8.**
- The label shall be of non-washable material, weather proof and easily visible.

6.2. Transportation of hazardous and other wastes

- The transport of the hazardous and other waste shall be in accordance with the provisions of these rules and the rules made by the Central Government under the Motor Vehicles Act, 1988 and the guidelines issued by the Central Pollution Control Board from time to time in this regard.
- The occupier shall provide the transporter with the relevant information in **Form 9,** regarding the hazardous nature of the wastes and measures to be taken in case of an emergency and shall label the hazardous and other wastes containers as per **Form 8.6.3.**

Manifest system (Movement Document) for hazardous and other waste to be used within the country only

- The sender of the waste shall prepare seven copies of the manifest in **Form 10** comprising of colour code indicated below and all seven copies shall be signed by the sender:

Copy number with colour code	Purpose
(1)	(2)
Copy 1 (White)	To be forwarded by the sender to the State Pollution Control Board after signing all the seven copies.
Copy 2 (Yellow)	To be retained by the sender after taking signature on it from the transporter and the rest of the five signed copies to be carried by the transporter.
Copy 3 (Pink)	To be retained by the receiver (actual user or treatment storage and disposal facility operator) after receiving the waste and the remaining four copies are to be duly signed by the receiver.
Copy 4 (Orange)	To be handed over to the transporter by the receiver after accepting waste.
Copy 5 (Green)	To be sent by the receiver to the State Pollution Control Board.
Copy 6 (Blue)	To be sent by the receiver to the sender.
Copy 7 (Grey)	To be sent by the receiver to the State Pollution Control Board of the sender in case the sender is in another State.

- The sender shall forward copy 1 (white) to the State Pollution Control Board, and in case the hazardous or other wastes is likely to be transported through any transit State, the sender shall intimate State Pollution Control Boards of transit States about the movement of the waste.
- No transporter shall accept waste from the sender for transport unless it is accompanied by signed copies 3 to 7 of the manifest.
- The transporter shall submit copies 3 to 7 of the manifest duly signed with date to the receiver along with the waste consignment.
- The receiver after acceptance of the waste shall hand over copy 4 (orange) to the transporter and send copy 5 (green) to his State Pollution Control Board and send copy 6 (blue) to the sender and the copy 3 (pink) shall be retained by the receiver.
- The copy 7 (grey) shall only be sent to the State Pollution Control Board of the sender, if the sender is in another State.

6.4. Accident reporting system

- Any accident incurred with the hazardous materials shall be recorded using **Form 11** and maintained.

6.5. Storage of hazardous and other wastes

- The generated used oil shall be stored for the period of ninety (90) days

6.6. Utilisation of hazardous and other wastes

- The generated used oil from the service of DG sets and transit vehicles shall not be utilised for any other purpose.

6.7. Records and returns

- The occupier handling hazardous or other wastes and operator of disposal facility shall maintain records of such operations in **Form 3.**
- The occupier handling hazardous and other wastes and operator of disposal facility shall send annual returns to the State Pollution Control Board in **Form 4.**

Effective Date (from)	Description	Version
22.04.2024	SOP for Hazardous waste management	01

Prepared by	Verified by	Approved by
Mr.S. Mohanakrishna AME - EMS	Dr.S.Gopinath Assistant Professor	Dr.V.Thirumurugan Associate Director – Campus Life

17. E- WASTE MANAGEMENT

1. Title	Standard operating procedure for "E -waste management"

2. Purpose	To define the procedure to handle the E- waste management.

3. Scope	This procedure relating the E- waste management

4. Responsibility	ITKM and team members.

5. Procedure

5.1 Operation of E- waste management

The steps given below are to be followed for managing the e-Wastes by all the stakeholders in the campus.

- After an electronic item is considered to be as an e-waste, the concerned department shall make the entries of the details of the item in the maintaining Records of E-Waste
- The maintaining Records of E-Waste will then be submitted to the ITKM department.
- The ITKM department shall verify the e-waste details mentioned in the maintaining Records of E-Waste
- After verification, the item shall be transferred to the E- waste store room.
- Channelize the E-waste to the TNPCB authorized recyclers.

5.2. SOP – E-Waste Management System

- All such condemned electronic items are collected at the store room along with report submitted to ITKM department
- The valuation and record of all the e-waste so collected shall be stored in E- waste storage room.
- The stored e-waste generated shall be sold to authorized TNPCB recyclers.

- The E- waste manifest form 6 is also maintained.

Effective Date (from)	Description	Version
22.04.2024	SOP for E- waste management	01

Prepared by	Verified by	Approved by
Mr.S. Mohanakrishna AME - EMS	Dr.S.Gopinath Assistant Professor	Dr.V.Thirumurugan Associate Director – Campus Life

18. HORTICULTURE ACTIVITY

1. Title	Standard operating procedure for "Horticulture Activity"

2. Purpose	To define the procedure to operate Horticulture Activity.

3. Scope	This procedure relating the Plantation ad Sowing Activities

4. Responsibility	Horticulture manager and team members.

5. Procedure

5.1 Operation of Horticultural Activity

The gardeners will be responsible for following activities under the supervision of the Horticulture Manager and Assistant Horticulture Managers.

- Care of all the plants including (Trees, Shrubs, Herbs, Palms, Seasonal plants, Lawn and Groundcovers).
- Daily cleaning and general maintenance of lawn, ground covers and surroundings.
- Drip irrigation/sprinkler irrigation of all areas up to the adequate requirements of plants.
- Care and maintenance of nursery.
- Propagation of plants through sexual and asexual techniques.
- Mowing of grass when required. Adjustments of mower height and quality of cut, etc.
- The sowing of seasonal plant seeds, transplanting of seedlings from bags to pots and their
  arrangements.
- The use and maintenance of hand tools and machinery.
- Application of fertilizers and insecticides whenever required.
- Keep the tool shed / store room clean and tidy.
- Report equipment malfunctions when noticed.

- Pruning and trimming of trees and hedges whenever required.
- Painting of pots and planters.
- Shifting of pots and their arrangements.
- Shifting of garden sittings and benches.
- Ensure all equipment's and machinery is stored securely and clean after use.

5.2 Maintenance of Cultural practices

- Regular practices in campus:
  - Irrigation
  - Weeding
  - Hoeing
  - Fertilization
  - Pruning/trimming/cutting
  - Digging
  - Spray
  - Edging

Effective Date (from)	Description	Version
22.04.2024	SOP for Horticulture Activity	01

Prepared by	Approved by
Ms.C.Kanimozhi Assistant Professor	Mr.D.Muthamil Selvan Horticulture Manager

19. HORTICULTURE WASTE MANAGEMENT

1. Title	Standard operating procedure for "Horticulture waste management"

2. Purpose	To define the procedure to operate Horticulture waste management.

3. Scope	This procedure relating the Horticulture waste management.

4. Responsibility	Horticulture Manager and team members

5. Procedure

5.1 Operation of Horticulture waste management

- Daily sweeping and the unwanted branches from the tree are pruned and these wastes are collected at the primary collection points.
- From the primary collection point the wastes is collected a truck and unloading in the Solid waste yard for the shredding process and composting process.

5.2 Horticulture shredder

- Before the starting of the machine complete the safety checklist.
- Move the positions (UP) of the 3 trippers above the starter box to ON position.
- Push the green start button in three starter boxes one by one (from right to left) to start the machine.
- The weighed logs of maximum of 5cm diameter shall be feeder in the shredder conveyor belt which transports it to the shredder as the grinding takes place. (The grinded wood chipper saw dust is collected at the collection point)
- The shredded horticulture waste is collected by the operator, weighed, and recorded in the operational log book.
- Maintain a maximum run time of 30 minutes/cycle of horticulture shredder operation.

- Push the red stop button in three starter boxes one by one (from right to left) to stop the machine.
- Move the 3 trippers' position to OFF (Down position).
- The machine shall be started after 20 minutes of rest.
- Follow the aforementioned procedure for the next cycle.

5.3 Vermicomposting Method

- Vermicompost is nothing but the excreta of earthworms which is rich in humus. We can rear earthworms artificially in a brick tank.
- By feeding these earthworms with bio-mass and watering property the food (bio-mass) of earthworms, we can produce the required quantities of Vermicompost.
- Before filling the tank, slurry made of cow dung and water should be sprinkled on the floor and the wall
- First layer: Plant residues available on the yard are spread evenly in layers to a thickness of 6 inches.
- Second layer: Cattle dung, 4 to 5 kg in 125 to 150 liters of water on the first layer of the trash.
- Third layer: It consists of clean dry sieved soil (keeping apart stones, pebbles, glass plastic etc.) Then 50 to 60 kg (4 to 5 baskets) of soil are spread on moist layer of farm refuses sprinkling of water is repeated.
- The tank is filled in this way layer by layer and it is filled till the materials up to ground level.
- The whole tank is to be filled within 1 or 2 days. Eleven to twelve layers are required for filling the tank to its capacity.
- As an alternative practice, tank can be filled 1/3 or ½ of its capacity in parts. Full tank should be covered and sealed by 3-inch layer of soil (300 to 400 kg). It should be pasted with a mixture of dung and soil.
- After 15 to 20 days the fresh contracts and becomes more compact and goes down in the tank by 8-9 inches.
- The procedure described in the first filling is repeated and again sealed and pasted with mud and dung.
- It takes about 3 to 4 months in compost making by NADEP (Narayan Deotao Pandharipande method). In order to maintain 15 to 20 % moisture, the compost is sprinkled with cattle dung and water.

Effective Date (from)	Description	Version
22.04.2024	SOP for Horticulture waste management	01

Prepared by	Approved by
Ms.C.Kanimozhi Assistant Professor	Mr.D.Muthamil Selvan Horticulture Manager

20. FOOD PRODUCTION

1. Title	Standard operating procedure for "Food Production"

2. Purpose	To define the procedure to operate Food Production.

3. Scope	This procedure relating the production of food

4. Responsibility	Mess manager-Operations team members`

5. Procedure

5.1. PURCHASE PROCEDURE

DEFINITION OF SPS:

Standard Purchase Specification (SPS) is concise descriptions of quality, size, weight, Yield managements or count factors desired for a particular item includes Commodities as well as cooking Equipment / Utensils / Crockeries

An SPS must contain (Based on purchase cycle – daily / weekly / fortnightly / monthly)

i) Definition of each item,

ii) Grade or brand name of the items,

iii) Quality, Size, Weight or Count,

iv) Unit against which prices should be quoted

v) Special note for the commodity if any

OBEJECTIVE OF SPS:

- To establish a suitable buying standard for a particular commodity for the mess
- Approved Vendors for purchasing the products By Vendor Registration

- To furnish to the suppliers in writing in specific terms the requirements of the catering establishment,

1) To help in deciding the price of a commodes
2) To obtain a standard product.
3) To measure the performance against the standard product.

PURCHASE PROCEDURE:

The purchase procedure has the following steps,

- Using SPS, contact new suppliers & authorized suppliers
- Receiving quotations from both new and approved suppliers
- Fixing the Brand for the supplies of Products
- Selecting suppliers – based on the price offered/Received for the particular quality
- Discussing and deciding on time delivery needs with the suppliers
- Placing the order as per the approvals

FOOD -PRODUCTION

Points to be checked before production.

- Make sure that the ingredients are indented & relevant pick up is done from the store before preparation in a safer manner by the Chef or Cook In charge of different kitchen s such as, South Indian, North Indian, Bakery, Sweet and beverage section.
- Food production based on the Hostlers count received from the individual hostels.
- Food production plan to be evidenced and maintained by Head chef and approved by the operation manager.
- Pre preparation to be done based on the inputs given by the department Head chefs
- Cook foods to its optimal temperature. Avoid over-cooking as per the different production requirements such as, Backing, Boiling, Steaming and frying…
- Frozen ingredients need to be properly thawed before cooking.
- Thaw food needed for immediate service under potable running water. Prepare the product within 4 hours of thawing.

- Do not refreeze thawed food, unless they are first cooked or processed.
- Use the lowest shelf in the cooler for thawing raw meat to prevent cross-contamination and separate raw products from cooked and ready-to-eat products
- Use separate cutting Board to avoid cross contaminations
- Clean and sanitize all food contact surfaces prior to use and after use.
- Use only required ingredient for the dish and avoid using ingredients which are not relevant to the dish.
- The Chef in charge for north & south should arrange the staffs for the live kitchen operations and need to make sure that the staff for the live kitchen is available in the respective sites on or before 30 minutes of service to avoid the delay.
- The Assistant Manager/Supervisor should ensure that the live kitchen staff is available in the kitchen before 30 minutes of service if not escalate the same to the Manager operations for necessary action.

FOOD PRODUCTION & QUANTITY INDENTING PROCEDURE:

- Our main kitchen is operated in Sannasi mess and line items such as Dosa, Poori, Chapati forums and pappad is been prepared from the respective dining halls and main dishes are prepared from North and south Indian kitchens,
- The quantity for each dining hall will be decided as per number of students dining in each dining hall based on the count receipt from the Hostel help desk.
- No of Students staying in each hostel will be provided by the respective wardens to plan the food production.
- The production quantity to be suggested by the supervisor of each dining hall every day. (i.e. Next day's production quantity requirement should be submitted by previous day on or before 4pm)
- The Consolidated quantity will be prepared by the Head Chef / Operational Manager - Dining Hall and sent to approvals to the operational Manager.
- The Operational Manager – Head Chef will allocate the menu to the respective kitchen team (North Indian items/South Indian Items) based on the menu.

- The respective chef will then make indent for the menu and will submit for approval to the Operational Manager

The indent needs to be raised by the Chef in charge and the approval to be taken before 5 pm on a daily basis. The production Requirement sheet attached for your reference.

FOOD TASTING & QUALITY CHECK

The Food which is ready for the distribution will be tasted by the Head chefs Operational Manager / GM –Mess / canteen for the feedbacks on the following parameters.

- Taste
- Texture
- Color
- Aroma
- Presentation & Garnish

The corrections will be made as per the feedbacks from food tasting team, the same will be ready for distribution from main kitchen

Quality Controls:

Scientific Testing Methods To ensure Quality

- Cooked food, RTE Food items. Non veg, Milk Products. Bakery Products to be send for the NABL Lab test once in a Month to ensure the quality of the products as directed by FSSAI Standards
- HALAL Certificated to be maintained and received from the vendors for Meat and meat products
- Once in 6 Months – The raw materials to be send for the lab test to check the compliance as directed by FSSAI Standards
- Swab test to be conducted with work equipment's, Cleaned equipment's, employee uniform and Hands, Service vessels
- Water used for cooking and washing to be sent to the lab testing on monthly basis and a compliance report to be maintained as per FSSAI Guidelines.

- COA/ Form E To be submitted by the vendor at the time of supplies and Raw materials quality testing reports to be maintained.
- The cooked food will be stored and retained for 72 Hours on case of any reporting's on Food borne illness this will be send to lab for testing and analysis for compliance
- Cooking Oil –TPC Will be checked on periodically to meet the standards

DISTRIBUTION & SERVICE

Distribution Procedure:

- The Production requirement will be prepared in the centralized kitchen.
- The indented quantity shall then be picked up with the respective supervisors under the supervision of Kitchen In charge/ Operational Manager.
- The menu items will be ready in the kitchen for pick up before 1 hour of the service.

Food Pick Up Timings:

BREAK FAST	6.30 AM
LUNCH	11 PM
SNACKS	4.00 PM
DINNER	6.30 PM

- The supervisor/ Kitchen Manager need to ensure that we use appropriate material for transportation.

Specifications	**Vessel used for Transportation**
Tea, Milk, Coffee	Hot Cans
Chapatti, Idli, Dosa	Hot Boxes
Sambar, Rasam, Chutney, Rice,	
Subzi, Kootu, Poriyal	Closed Counter vessels, Drums with lids

- The picked food shall be properly packed for its transportation.
- The picked food shall be transported in a clean and neat vehicle.

- The food material should reach the respective food counters before 15 minutes of its service time.
- The Supervisor & the manager Operations should ensure that the food counters are kept for the service
- All food items as per the menu have to be available in the counter till the end of session.
- Excess production to be captured in the Production requirement tracker and the same shall be notified to the Manager – Operations. Manager Operations will then discuss brief the chef in-charge to understand the excess production and will utilize the same for other outlets.
- The Food waste will be tracked and updated on daily basis
- The respective supervisors & Operation Manager are responsible for the cleanliness of the vessels in which the food is being transported.
- The Kitchen In-Charge (Chef) /supervisor will capture the excess/ shortage of the production quantity while distribution. The same should be recorded and highlighted to the Operation Manager for necessary action.
- Apart from the students who are staying in the hostel incase a Guest / Vendor- dining in the dining hall the same should be tracked in a separate register and same will be sent to the Operation Manager.

FOOD WASTAGE:

Food Wastage occurs along the entire spectrum of production. Reasons include students and staff, pests or inadequate climate control, losses from cooking and intentional food wastage.

Monitor of Food wastage:

Several different factors contribute to Mess food waste. The three most common reasons for food waste include

i) Spoilage

ii) Miscalculated persons

iii) Food spillage

Plate wastage -Post to the consumption

Lack of awareness from the students

We are maintaining the Food wastage Report on daily basis to understand which food is getting wasted for reducing the food wastage.

Wastage Report as

- Cooked food wastage Tracking
- Plate wastage tracking
- Vegetable wastage tracking's

Awareness and relevant locations to staff on reduction of food waste to be given

Reducing the Food Wastage Measurement:

There are many ways to reduce food waste. Here are five methods that can be implemented to directly address the most common sources.

i) Reduction in Excess orders –That get spoilages

ii) Continuous monitoring of a food waste tracker

iii) Proper storage conditions to maintain proper shelf life.

iv) Food Wastage Awareness Messages and communications

v) Consistency of Persons Calculated for food production.

Dispose of Food Wastage:

Listed are some of the best disposal methods for food waste, as well as ways in which can be reduce the amount of food waste they produce.

i) Convert Food Scrap into Biogas & Bio Diesel

ii) Reuse the Food Packaging Material usage and procurement

iii) Food Waste Recycling

Handling of Food Waste

- Remove all type of canteen waste except plastic bag properly and put it in the closed container kept for the purpose and hand over to bio-gas units. Plastic bags after segregation are to be put in the scrap area.
- Don't discharge any waste to drainage.
- Provide wire mesh to the washing area/wash basin to avoid waste entry.
- Clean all utensils in the designated area so that washing water does not go in the

  Storm water drain.

  Ensure that wastewater from the canteen is discharge to STP which after treatment is used as water for gardening.
- Ensure that the drainage is not blocked or damaged and should be cleaned Periodically.
- Measure the quantity of food waste generated on daily basis and maintain its record

CLEANING & SANITATION

Objectives of Cleaning:

- Cleaning plays important role in food production and service units.
- The kitchen and the food serving are shall be maintained neat and clean to avoid cross contamination in foods.
- Equipment & Vessels is washed, rinsed, and sanitized after each use to ensure the safety of food served to customers.

The Kitchen Cleaning timings:

Morning	7.00 AM to 8.00 AM
Afternoon	11.00 AM to 1.00 PM
Night	8.00 PM to 9.30 PM

The Dining hall cleaning timings:

Morning	6.00 AM to 7.00 AM
Afternoon	2.00 PM to 3.00 PM
Night	9.30PM to 10.30 PM

Cleaning Procedure:

- After the production /service hours the floor should be cleaned properly.
- Clean - work- Clean Policy will be implemented – Any startup of the any activity area to be cleaned and then the work to be started and then cleaned.
- The tables and chairs have to cleaned, arranged for the next service.
- Windows & Walls have to be checked and cleaned if required.
- The used equipment/Vessels will be handed to the dish washing team and they will be responsible for washing and sanitizing.
- Wash, rinse and sanitize all food contact surfaces of the equipment & vessels.
- Allow all parts of the equipment to air dry.

The Operation Manager / Supervisor will make surprise visits once in a day after the completion of cleaning. He will counter sign the cleaning checklist once in a day after audit.

Periodical Maintenance & Service of an Equipment

Objectives of servicing the cooking Equipment:

The cooking equipment should be serviced in periodically to ensure safety and for smooth operation.

Servicing Procedure:

Pre-planned maintenance Activity - Preventive Maintenance

- Any machinery which has break down will be intimated to the Maintenance Supervisor for its immediate service.
- Servicing of equipment will be done as
  - Servicing under Authorized Vendor By HO
  - Immediate Service by providing Work Order.
- Servicing under Authorized Vendor will be for Boilers, Gas pipelines, Cold Rooms, Duct and Hood, Air reticulation unit.

Break down - Maintenance / emergency Requirements

- Immediate servicing will be for Ranges, Bakery equipment's, Graters, cutting machines and Wet grinders. And another kitchen equipment
- We are also maintaining service registers for the repair and maintenance.
- Equipment Inventory register to be maintained.

Grooming & personal hygiene

Personal Hygiene & Personal Cleanliness Policy:

All food handlers will communicate health concerns and maintain good personal hygiene practices to ensure the safety of the food.

Grooming:

- The staff working in the Kitchen and in the service, area is expected to:
- Arrive at work clean with clean hair, clean clothing, teeth brushed, bathed and daily use of deodorant.
- Maintain short, clean, and polish-free fingernails. No artificial nails are permitted in the food production area.
- Wash hands (including under fingernails) and up to forearms vigorously and thoroughly with soap and warm water for a period of 20 seconds, following

Hand washing Procedure:

- When entering the facility before work begins.
- Immediately before preparing food or handling equipment.
- As often as necessary during food preparation when contamination occurs.
- Before putting on gloves to start a task that involves working with food.
- In the restroom after toilet use and when you return to your work station.
- When switching between working with raw foods and ready-to-eat or cooked foods.
- After touching face, nose, hair, or any other body part, and after sneezing or coughing.
- After cleaning duties.
- Between each task performed and before wearing disposable gloves.

- After smoking, eating, or drinking.
- Any other time an unsanitary task has been performed –i.e. taking out garbage, handling cleaning chemicals, wiping tables, picking up a dropped food item, etc.
- Wash hands only in hand sinks designated for that purpose.
- Dry hands with single use towels or forced air dryer.
- Turn off faucets using a paper towel, in order to prevent recontamination of clean hands.

Dress code:

- Wear appropriate clothing –clean uniform with sleeves and clean non-skid close-toed work shoes (or leather tennis shoes) that are comfortable for standing and working on floors that can be slippery.
- Wear apron on site, as appropriate.
- Do not wear apron to and from work.
- Take off apron before using the restroom,

Hair Restraints and Jewellery:

- Wear a hair net or bonnet in any food production area so that all hair is completely covered.
- Front-of-house staff must wear a hair restraint that keeps hands out of hair and hair out of food.
- Keep beards and mustaches (only allowed for front of house staff) neat and trimmed. Facial hair (beard) restraints are required in any food production area. Note, restaurants can impose greater rigor and ban any facial hair.
- Do not wear false eyelashes.
- Refrain from wearing jewellery in the food production area to prevent physical and microbial contamination of foods.

Illness:

- Report any flu-like symptoms, diarrhoea, jaundice, sore throat with fever, uncovered open wounds with fluid, boils, and/or vomiting to the unit supervisor. Employees with these symptoms will be sent home with the exception of symptoms from a non-infectious condition.

Employees could be re-assigned to activities so that there is no risk of transmitting a disease through food.

- Instances of illness or recent exposure to Norovirus, Hepatitis A, Non-typhoidal Salmonella, Salmonella Typhi, Shigella, or Shiga Toxin-producing Escherichia Coli must be reported to the unit supervisor. Exclude the foodservice employee if diagnosed with an infection from Norovirus, Hepatitis A, Non-typhoidal Salmonella, Salmonella Typhi, Shigella, or Shiga Toxin-producing Escherichia Coli.

Cuts, Abrasions, and Burns:

- Bandage any cut, abrasion, or burn that has broken the skin.
- Cover bandages on hands with gloves and finger cots, and change as appropriate. Inform unit supervisor of all wounds

Effective Date (from)	Description	Version
22.04.2024	SOP for Food Production	01

Verified by	Approved by
Mr. Jayakumar	Mr. Irudayaraj
Operational Manager	General Manager

21. BIOGAS PLANT

1. Title	Standard operating procedure for "Bio Methanation Unit "

2. Purpose	To define the procedure and controls to operate Biogas plant

3. Scope	This procedure is relating to the production of bio gas using the food waste

4. Responsibility	Bio gas unit in-charge

5. Procedure

- The operator has to first check for the overflow in the system. And for this he will have to open the overflow valve on top and drain it completely.
- The operator must ensure that there is no block in the overflow valve failing which it will have a major impact on the system.
- The operator has to have a check on the quantity of the overflow as this has to be informed to GPS personnel located at Bangalore.
- The operator has to circulate the slurry for a time ranging between 30 minutes to 1 Hour which will be informed by GPS personnel.
- Sample has to be taken and filtered 3 times post which the titration test will be done and the results will have to be shared with the GPS team.
- Based on the titration results, the team from GPS will mention the quantity of food waste that has to be added on that particular day.
- The operator has to ensure that the waste that is to be added must be segregated.
- After the segregation, the food waste must be put into the shredder and shredded into the hopper and it is then mixed with the slurry from the Digester and pumped back into the Digester.
- The ratio of the mixture of food waste and slurry is food 1:4.
- The shredder and the hopper of the system must be washed and cleaned thoroughly on a daily basis after the food waste addition is done.
- Once the food waste addition is completed, the operator has to proceed to do the basic preventive check which includes – - Checking the oil level of the compressor, - Draining the water of the 2 scrubbers and also of the compressor.

- The operator must ensure that the valves of the scrubbers must be closed after draining the scrubbers.
- The pressure in the pressure vessel must be checked on a daily basis by the operator.
- The water in the compressor tank must be drained on daily basis.

Effective Date (from)	Description	Version
03.03.2023	SOP for Biogas Methanation Unit	01

Prepared by	Verified by	Approved by
Mr. Manimaran Assistant Engineer - Electrical	Mr. Duraimurugan Executive Engineer	Dr.Jawahar Philips Assistant Director – Hostel

22. LPG MANIFOLD

1. Title	Standard operating procedure for "LPG Manifold"

2. Purpose	To define the procedure to operate LPG manifold

3. Scope	This procedure relating the arrangement of LPG cylinders and operation of manifold.

4. Responsibility	Operations manager - Mess

5. Procedure

5.1 Operation and connections for LPG cylinder Manifold

- Turn ON the valve of individual gas cylinders connected in the manifold
- Turn ON the valve of manifold
- Ensure the pressure range of 40 to 60 kg/cm^2 is maintained in the manifold pressure gauge
- If the pressure range is < 40 kg/cm^2 replace the empty cylinder(s)
- After the cooking is completed, turn OFF the valve of individual gas cylinders connected in the manifold
- Turn OFF the valve of manifold
- All The cylinders at the customers 'premises shall always be connected to the manifold wherever the installed cylinders at the premises are more than four.
- The cylinders should not be left unconnected or stored elsewhere.
- Additional cylinders which are to be kept loose, can be stored as per stipulations in Gas Cylinders Rules, 1981. However, such cylinders should not be stored in manifolded room.
- Each arm of the manifold shall have a control valve. To each arm of the cylinder manifold, cylinders shall be connected through a pigtail.
- For 'SC' type valve cylinders, it is necessary to use an adaptor to connect the cylinder pigtail. The distance between the nipples on the manifold to which pigtails are attached,

depends upon the type of cylinder arrangement required i.e., standard or staggered. The staggered arrangement is to be used when availability of space is limited.

- The flexible hose/pigtail shall be in the same room and its length shall not exceed 2m.
- Flexible hose/ pigtail shall not pass through doors, windows, walls, ceiling (or) floors.
- The pigtails shall be accessible for inspection

5.2 Maintenance of LPG cylinder Manifold

- Use gas cylinder economically.
- Replace the rubber hose of the gas cylinders periodically.
- Clean burners regularly and ensure regulators are working smoothly.
- Do not store any inflammable materials in the cooking area.
- Check for leakages LPG pipelines regularly.
- Ensure the availability of fire extinguishers.

Effective Date (from)	Description	Version
03.03.2023	SOP for LPG Manifold and food waste	01
22.04.2024	SOP for LPG Manifold – presented as separate document	02

Verified by	Approved by
Mr. Jayakumar Operational Manager	Mr. Irudayaraj General Manager

23. FIREFIGHTING SYSTEM

1. Title	Standard operating procedure for "Firefighting system"

2. Purpose	To define the procedure related to firefighting

3. Scope	This procedure is related to the operation of firefighting system

4. Responsibility	Fire safety team - ERP

5. Procedure

- Fire Hydrant system always kept in wet condition auto mode and Maintain Pressure 10 Bar
- Always Fire Tank Should maintain 100% and Motorized valve should Kept in Auto mode.
- Through HNS system fire tank will fill automatically with the help of Motorized valve
- Jockey Pump Should maintain the pressure from 9 bar to 10 bar
- Main Pump Should start at 6 bar on hydrant line but there is no auto cut off for Main Hydrant Pump
- In case of any Hydrant Valve opening FHS automatically Switch ON and Based on the Pressures System will run in Auto mode
- Power supply for the FHS will always in ON condition
- All Valves always kept in Open Position
- System Auto Operation Should check once in a month
- Periodic maintenance of all the equipment must be carried out
- Maintain the sounders decibel level as 65 dB or 5 dB above the ambient level, whichever is higher
- Do not operate without supervision of Fire Operator/Engineer/FM and notify in case of any deviations / deficiencies observed in the system / equipment.
- Please remember "safety first" always, hence follow the safety norms without any deviation.

Others

- Dispose the used oils and hazardous waste generated as per the Hazardous waste management rules, 2016
- Fire safety personnel's
- are required to wear Personal Protective Equipment (PPE) while executing the firefighting operations

Effective Date (from)	Description	Version
22.04.2024	SOP for Firefighting system	01

Prepared by	Verified by	Approved by
Mr. Somu Fire Safety Officer	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

24. TRANSPORTATION

1. Title	Standard operating procedure for "Operation of transportation services"

2. Purpose	To define the procedure to be followed in the transportation services

3. Scope	This procedure is relating to the transportation services

4. Responsibility	Service in-charges

5. Procedure

Diesel vehicle

- All the proper documents must be maintained (Driver's license for transport vehicles, insurance, fitness certificate, pollution under certificate)
- Proper first aid kit should be always maintained
- Check for fuel and recharge it if required before every transit
- Use distilled water or deionized water to refill the battery water
- Make sure to periodically maintain the vehicle for smooth transit

5.1. Tyre maintenance

Frequency - Once in 15 days

- Check the tyre air pressure, recommended air pressure is 90 – 95 bar for both front and rear wheels
- Check for air fault, punctures, and any other malfunction.
- If any of such is observed, resolve it with puncture solution and patch
- Increase the air pressure if it is < 90 bars up to the recommended air pressure
- Check for tyre flatness using a levelling tool
- If the cross section of tyre is not in a levelled condition, remove tyre and flip it and position it.

5.2. Replacement of tyre

- When the vehicle reaches 85000 km
- Remove the existing tyre from the vehicle, and replace with a tyre which has sufficient tread thickness (re-treaded tyre)
- Use tyre depth gauge to measure the thickness of tyre tread
- Perform re-treading (1st instance) for the old tyre and use it for 35,000 km, further.
- Further, second and third re-treading shall be recommended after 30,000 km, respectively.
- After then, based on the casing condition, usefulness of tyre shall be decided.

5.3. Wheel maintenance

Frequency – Every 85,000 km

Conditions:

1. Existence of noise during the rotation of drum manually (or)
2. Presence of rusting material in the grease existing in the wheel system (or)
3. Existence of oil spill on the oil seal.

- Grease pack the wheel system and its components
- Remove the tyre, break, drum, inner, and outer bearing
- Remove the oil seal inside and outside the bearing
- Remove the old grease
- Clean the bearing, oil seal, drum with kerosene.
- Check the lining thickness
- If the lining thickness is less, increase it up to appropriate level
- Perform drum facing at the interior side in lathe shop
- Perform grease pack for bearing at both inside and outside, inside of drum.
- Fix the oil seal, break drum, and position the wheel in the vehicle

5.4. Battery maintenance

Frequency - Once in 15 days

- Remove the battery and check the level of distilled water using hydrometer
- If the distilled water level is low, fill the distilled water upto the desired mark
- Check the charge indicator on the battery

- If it is low, put up the battery in charge until it is fully charged
- If the battery is dead (no increase in the level of charge), replace the battery

5.5. Oil service

Frequency – 35,000 km for Leyland vehicles and 30,000 km for Tata 912 vehicles

- Remove the sum dry nut and empty the engine oil
- Remove the oil filter
- Remove the diesel filter
- Remove the air filter and fuel strainer
- Tighten the sump dry nut
- Displace the old engine oil and store it in a separate container
- Fill the new engine oil through head cap
- Fix the oil filter, diesel filter, air filter, and fuel strainer.

5.6. Water wash

- Mount the vehicle in the cleaning place
- Set the air pressure 80 bar
- Water wash the exterior and interior surfaces of vehicles

5.7. Painting

- After the water wash, remove the stickers, reflectors, and number plates in the vehicles
- Perform fibre and metal finishing works
- Check the platform and other components and ensure proper functioning
- Cover the glass windows and lights with light-weight materials
- Perform putty and grinding work wherever necessary (surface damages)
- Apply primary coat (white colour) on the surface
- Apply the second and third coat in yellow colour
- Apply black colour under chassis suspension area
- Place new sticker, reflectors, and number plate

5.8. Regular maintenance

Ensure the availability first aid and fire safety extinguisher and its usable condition

The concerned electrician, mechanic is to be informed immediately if any of the following items are not in proper working condition.

- Head light
- Break light
- Indicator light
- Parking light
- Reverse light
- Wiper
- Air conditioner (recommended temperature 23 – 25 degree Celsius)
- Air check (all the tyres)

Battery vehicle (Electric Golf cart)

5.9 Procedure

- Make sure the batteries are charged and are in place.
- Ensure that there is no acid spillage from the battery.
- Check the air pressure in the tyre before operation (36 PSI).
- Make sure the tyre has no cracks or wear and tear.
- Check whether all the passengers are seated and do not overload.
- Insert the key, turn to the right and start the vehicle.
- Accelerate according to the road conditions and apply brakes whenever necessary.
- Press the brake pedal to reduce speed and stop the EV.
- After stopping the EV, pull up the hand brake.
- Turn the key to the left in the keyhole and remove the key.

5.10 Maintenance

- Charge batteries in a ventilated area as explosive hydrogen gas is produced while charging.
- Batteries must be properly cleaned. If there is any corrosion, the top of the batteries must be cleaned with soda water. Make sure the cleaning material doesn’t enter the battery.
- Check the fluid level before and after charging.
- Add brake oil to the brake system, if it is less than half level.

- Once in a month, check the electrolyte level.
- Check for loose connections every month and clean the lube pedal control area.
- Check the wire insulations once in every 6 months
- Check for grease leakage and replace gear box oil every 4 months.
- Every year perform a discharge test.

5.11 Others

- Dispose the waste tyres and used oils as per Hazardous waste management rules, 2016
- Dispose the e-waste and solid waste generated as per the E-waste management rules, 2016 and solid waste management rules, 2016
- Dispose the used paint containers as per the waste management rules
- Wear PPEs during painting and tinkering works
- Direct the effluent generated during water wash to nearby effluent treatment plant

6. References	1. Automotive skills development council, Participant Handbook, ASC/Q1407, Version 1.0 NSQF Level 3, National Skill Development and Corporation, Government of India.

Effective Date (from)	Description	Version
03.03.2023	SOP for Vehicle Maintenance	01
22.04.2024	SOP for Operation of transportation services	02

Prepared by	Verified by	Approved by
Ms. A. Blessy AME - EMS	Mr. Dharanikumar Workshop Manager - Transport	Mr. Anand General Manager - Transport

25. HOUSEKEEPING ACTIVITIES

1. Title	Standard operating procedure for "Housekeeping Activities"

2. Purpose	To define the procedure to operate and maintain Housekeeping activity

3. Scope	This procedure is related to the Housekeeping Process

4. Responsibility	Housekeeping in-charge(s)

5. Procedure

- The housekeeping work shall be distributed to the housekeeping associates as per the schedule.

Table 5.1 Housekeeping Cleaning Schedule

S.No	Description	Details
1	Monday to Friday	Routine cleaning & daily overlapping schedule
2	Saturday	Classrooms & Common areas deep cleaning
3	Sunday	Washroom deep cleaning

- The cleaning detergent, capex's and accessories are given to the housekeeping associates from the store.
- The associates will start their respective work and reported to their supervisors.
- Supervisors provide continual monitoring and correction point briefings.
- Supervisors will report the work progress to the housekeeping managers.

5.1 Housekeeping Documents

- ❖ Attendances Register
- ❖ Log Book
- ❖ Snag List Report
- ❖ Washroom checklist – Gents/Ladies
- ❖ Daily Cleaning Register

- ❖ Store Requisition
- ❖ Housekeeping Material Stock Register
- ❖ Training Attendances
- ❖ Duty Roaster
- ❖ Leave Form

5.2 Daily Cleaning Covered Areas

- ❖ Washroom
- ❖ Classrooms
- ❖ Faculty rooms
- ❖ Dean, Director & HOD rooms
- ❖ Office rooms
- ❖ Common areas – Lobby, Staircase & Corridor
- ❖ Lift
- ❖ Labs & Library
- ❖ Conference Hall, Seminar Hall & Meeting Hall
- ❖ Garbage room
- ❖ Parking areas
- ❖ Front & Back Outer areas
- ❖ Guestroom

5.3 Housekeeping 5S Rules Implementation & Follow ups

- ❖ **Sort** – Identity & Segregate Unwanted things
- ❖ **Set in Order** – A Place for everything & everything in its place
- ❖ **Shine** – Always keep the workplace area neat & Clean
- ❖ **Standardize** – Maintain a high standard of cleanliness at workplace
- ❖ **Sustain** – 5S is self-discipline & needs continual improvement

Others

- Obsolete components and generated waste are collected, segregated and disposed as per the waste management rules.
- Provision of spill kits and first aid kits in the work place.
- Provision of personal protective equipment to the housekeeping associates.

Effective Date (from)	Description	Version
22.04.2024	SOP for Housekeeping Activities	01

Prepared by	Verified by	Approved by
Mr.P. Ramachandran Housekeeping Manager	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

26. CIVIL MAINTENANCE ACTIVITIES

1. Title	Standard operating procedure for "Civil Maintenance Activities"

2. Purpose	To define the procedure to operate and maintain Civil Activities

3. Scope	This procedure is related to the Civil Maintenance Activities

4. Responsibility	Technician / Executive Engineering

5. Procedure

- Estimation and measurement of the work including labour and materials.
- Get the work order approval as per college norms.
- Requesting for material purchase as per college norms.
  - Prepare stores requirement slip and submit to purchase department.
  - Materials will be purchased through the purchase department.
  - Materials will be delivered with the store indent.
- Then, the selection of contractors according to their quote and previous works.
- Release the purchase order to the selected contractor.
- The work will be monitored continuously by the engineers and supervisors.
- After completion, the site engineer will record the work in the M book, followed by quality surveyors, managers, and auditors for verification.
- Then auditors will recommend for the payment to the contractors.

Others

- Obsolete components and generated wastes are collected, segregated and disposed as per waste management rules.
- Provision of emergency kits and spill kits.
- Provision of caution boards in the construction area.

Effective Date (from)	Description	Version
05.04.2023	SOP for Civil Maintenance Activities	01
22.04.2024	SOP for Civil Maintenance Activities - Revised	02

Prepared by	Verified by	Approved by
Mr. Venkatesan AME - Civil	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

27. MEP SERVICES

1. Title	Standard operating procedure for "Mechanical Electrical and Plumbing Services" (MEP)

2. Purpose	To define the procedure for MEP services

3. Scope	This procedure is included for all the MEP Services

4. Responsibility	Assistant Maintenance Engineer/Maintenance Engineer

5. Procedure

- The MEP services is provided based on the input information received from the following process
    - Mail request
    - ITKM Ticket raising
    - Request letter submission
- Upon the receipt of complaint, the service request is assigned to the respective area in charge
- The person in charge initiate the MEP service works in the following approaches
- If the service work is minor, i.e. minor water leakage, fused switches, etc
- The in charge shall rectify and repair the problem
- If the service work is major, which includes purchase of resources to execute it, then the in charge shall raise a work order request with necessary budget requirements.
- Following which, Purchase Order is to be initiated and awarded to execute the work.
- The in charge mentions the status of MEP service work in one of the following ways
    - Assigned
    - In progress
    - On hold
    - Submitted
- Submitted status indicates that the particular MEP service work is completed and updated to the higher level.

Others

- The obsolete components shall be collected, segregated and disposed as per waste management rules.
- It also includes the repair and provision of plumbing facilities.
- The required components will be purchased as per needs.

Effective Date (from)	Description	Version
05.04.2023	SOP for MEP Services	01
22.04.2024	"Others" section newly added in SOP	02

Prepared by	Verified by	Approved by
Ms. D. Poorani Shri AME - EMS	Dr. S. Gopinath Assistant Professor	Dr. V. Thirumurugan Associate Director – Campus Life

28. STORES

1. Title	Standard operating procedure for "Stores"

2. Purpose	To define the procedure to operate Stores.

3. Scope	This procedure relating the purchasing of materials

4. Responsibility	Purchase manager and team members.

5. Procedure

5.1 Operation of Stores

- The indent raised by the supervisor to the respective operational head and Qc will check the calculations and the manager will sign with the budget seal as per the current financial year plan.
- Then the indent forward to the Associate Director for supervision and the letter forwards to the Purchase Head and the Auditor for the Intimation of purchasing and auditing purposes.
- The Work order will be raised by the supervisor and will be approved by the authorities.
- With the Approval order copy the three similar product quotations should be submitted to Purchasing Head in the stores.
- Then the letter will be put forward to the Head office with the PO number there the payment will be done and the material will be delivered to the campus.
- The first Inspection will be made by the respective operational heads and then the installation process of the machine shall be made.

Effective Date (from)	Description	Version
22.04.2024	SOP for Stores	01

Prepared by	Verified by	Approved by
Mr.S. Mohanakrishna AME- - EMS	Dr.S. Gopinath Assistant Professor	Dr.V. Thirumurugan Associate Director – Campus Life