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Standard Operating Procedure

for

MAINTENANCE OF UPS SYSTEMS AND BATTERIES

Approved in the Governing body meeting held on August 21, 2024(Updated in 2024)

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NOTIFICATION

In pursuance of the approval passed in the Governing Body meeting held on August 21, 2024, it is hereby notified that Manakula Vinayagar Institute of Technology has published the updated Standard Operating Procedure (SOP) for Maintenance of UPS systems and Batteries.

The SOP for Maintenance of UPS systems and Batteries would serve as a detailed guideline to be observed and followed with immediate effect.

Dr.S. Malarkkan

Principal

23.8.24

PRINCIPAL
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PREFACE

The Uninterruptible Power Supply - UPS systems play a critical role and it is important to maintain the UPS systems regularly to ensure optimal performance and protection capabilities in order to provide the backup power at any time in the event of power outage, mains failure, etc,.

Objective:

'Standard Operating Procedure for UPS systems' outlines the procedure to be followed to perform periodical maintenance of UPS systems and the connected Batteries.

Scope:

This SOP applies to all the UPS systems and connected Batteries installed. As of now, 14 UPS Systems and 400 Batteries are installed.

Responsibility:

System Administrator and the Electricians are responsible for the proper maintenance of UPS and the Batteries as per the SOP.

Procedure for installation of UPS Systems:

Optimal Performance of the UPS systems also depends on the proper installation of the UPS systems and Batteries. The procedure to be followed for proper installation of UPS system and Batteries is given below:

a. Install the UPS system in a cool, ventilated and dry place.
b. The place where the UPS system is to be installed must be free from dust, moisture, corrosive chemicals, water spillages, rodent entries etc,.
c. 24 x 7 Exhaust fans are to be provided in order to ensure proper aeration and to ensure ambient temperature in the room.
d. Atleast 2 feet distance is to be allowed from the wall for installing UPS systems.
e. Any objects should not block the air vents of the UPS systems.
f. Do not allow either direct sunlight falling over the UPS system or hot objects nearby.
g. Do not store unwanted materials, inflammable materials near the UPS and Batteries.
h. Connect only recommended types of loads to the UPS system.
i. Connect the load as per the UPS capacity and ensure not overloading.
j. Choose suitable MCBs, MCCBs for UPS input and output circuits.

k. Good quality Cables of suitable rating must be used for UPS input and output terminations.
l. Maintain minimum distance between UPS and batteries to prevent voltage drops.
m. Earthing must be properly connected to UPS as per standards.
n. Choose the battery capacity by assessing the Load level, UPS capacity, frequency of power fluctuations and outages, Backup time, etc.
o. Ensure power continuity to UPS input is always present.

Standard Operating Procedure stipulates the following activities to ensure optimum performance of the UPS systems:

1. Routine Maintenance
2. Preventive Maintenance
3. Corrective Maintenance
4. Performance Monitoring
5. Review and Documentation

1. Routine Maintenance:

   Inspect the UPS systems and connected Batteries regularly or daily basis to identify any signs of wear & tear and malfunction.

   Keep the EB Room always clean and ventilated, where the UPS systems and Batteries are installed.

2. Preventive Maintenance:

   Frequency of Maintenance: Monthly and Six-monthly.

   Monthly Preventive Maintenance: [To be done by 5th of every month]

   During Monthly Preventive Maintenance, following checks are to be carried out:

   UPS:

   i. Check for the sign of overheating and de-lamination of power component. Replace it, if required.
   ii. Check the output voltage. It should be between 405 – 425 volts.
   iii. Check the input frequency. It should be 49 – 51 Hz.
   iv. Check the output voltage. It should be 230 volts.
   v. Switch 'off' the input and Check that the battery is taking care of the entire load.
   vi. Maintain the record of all the checks carried out.

Batteries:

i. Check the Battery for physical deterioration and sign of deformation.
ii. Always keep the top surface of the battery clean and dry.
iii. The joints and cell connections should also be kept clean.
iv. Check and keep the Electrical connections always tight.
v. Check the level of the electrolyte and when the level goes down add pure distilled water to top up the cells.
vi. Correct level of the electrolyte should be maintained at all times.

Six-Monthly Maintenance: [To be done by 5th of June and 5th of Dec. every year]

During Six-Monthly Maintenance, following checks are to be carried out:

UPS:

i. Clean the inner side of the UPS and Batteries thoroughly using soft brush and air blowers.
ii. After cleaning, check and ensure the tightness of cable terminations, terminal blocks, PCBs and breakers.
iii. Check the healthiness of DC capacitor banks.
iv. Check the printed circuit board for cleanliness and integrity of the circuit board. Replace it, if any sign of deterioration are found.
v. Check the magnetic component for overheating. Replace it, if required.
vi. Check the status of the cooling fans.
vii. Check the output voltage. It should be between 405 – 425 volts.
viii. Check the input frequency. It should be 49 – 51 Hz.
ix. Check the output voltage. It should be 230 volts.
x. Switch 'off' the input and Check that the battery is taking care of the entire load.
xi. Maintain the record of all the checks carried out.

Batteries:

i. Always keep the top surface of the battery clean and dry.
ii. The joints and cell connections should also be kept clean.
iii. Check and keep the Battery connections always tight.
iv. Check the level of the electrolyte and when the level goes down add pure distilled water to top up the cells.
v. Correct level of the electrolyte should be maintained at all times.

Corrective Maintenance:

i. Identify and report any issues requiring corrective maintenance immediately to the AMC contractor.
ii. Follow it up and ensure that the AMC contractor responds immediately and carry out necessary repairs or replacements to restore the UPS and the Batteries at the shortest possible time.
iii. Document all corrective maintenance activities, including date, tasks performed and personnel involved. For this purpose, 'History and Maintenance Register of UPS and Batteries' are maintained. Format of the 'History and Maintenance Register of UPS and Batteries' is attached in the Annexure. All the details of maintenance are to be recorded in this Register and the same should be submitted to Principal, MVIT on 5th of every month for review.

Safety measures to be followed during maintenance work:

i. Naked lights, cigarette smoking or anything which may create a spark should be avoided in the Battery room.
ii. Care must be taken when using metal tools to prevent them from coming into accidental contact with connections and causing a short circuit. Only insulated tools should be used.
iii. Metal tools should not be left on the top of the cells.
iv. When handling electrolyte or concentrated acid, protective measures should be taken. Using of apron, rubber gloves and eye shields are must.
v. Care should be taken to see the vent holes in the Batteries do not become locked with dirt or grease.

Performance Monitoring:

i. Record the battery performance, voltage output, and system response during power interruptions.

Review and Documentation:

i. Review the 'History and Maintenance Register' of UPS and Batteries and the battery Performance Data regularly to identify the trends and areas for improvement.
ii. Based on the review findings, maintenance procedures and schedules may be updated or revised.

ANNEXURE to SOP for Maintenance of UPS and Batteries

Format – Register for UPS and Batteries and Maintenance [TO BE SUBMITTED TO PRINCIPAL ON 5th of EVERY MONTH BY SYSTEM ADMINISTRATOR]

Sl.No.	Date of Purchase	UPS Name	UPS capacity	PO NO.	PO Date	Invoice No.	Invoice Date	Equip. Sl. No	Location	Connected to	Dt of Purchase of Battery	Battery Type & capacity	No. Of Batteries	PO No	PO date	Invoice No.	Invoice date	Battery Warranty upto	Remarks/ Present Status

Details of Maintenance – UPS and Batteries											
Date of occurrence of fault	Date of complaint	Complaint made by	Date of visit of Technician/ AMC person	Name of the Technician	Nature of fault	Action Taken	Status [Pending/ Completed]	Electrician	Sys. Admn	Dy. Registrar	


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