

Practical No.20: Make the input and output connections and check the operation of UPS under normal and overload condition

I Practical Significance:

Uninterruptible Power Supplies (UPS) have vital role in various applications where a reliable and continuous power supply is essential.

II Industry/Employer Expected Outcome(s):

In industrial, domestic and commercial applications continuous AC mains supply is needed. This can be provided by UPS. The employee is expected to select UPS of suitable ratings and test it under normal and overload conditions.

III Course Level Learning Outcome(s):

Use relevant diode in different Electronic circuits.

IV Laboratory Learning Outcome(s):

Check the abnormal and normal operation of UPS.

V Relevant Affective Domain related outcome(s):

1. Handle the equipment's and components carefully.
2. Follow safety precautions.

VI Relevant Theoretical Background (With diagrams if required):

In normal operation, a double-conversion UPS continually processes power twice. If the AC input supply falls out of predefined limits, however, the input rectifier shuts off and the output inverter begins drawing power from the battery instead. If you overload your UPS, it will either shut down or the load will be transferred to by-pass until the condition is reversed. When this happens, all of the devices connected to it will lose power.

X Procedure:**a. When the load is OFF**

1. Measure output voltage of UPS with the help of multimeter.
2. Measure Backup time with the help of stop watch.

b. When the load is overload

1. Measure output voltage of UPS with the help of multimeter.
2. Measure Backup time with the help of stop watch.

XI Required Resources/apparatus/equipment with specifications:

S. No	Instruments/Components	Suggested broad specification	Quantity
1	UPS	Input voltage - 230 V AC $\pm 15\%$	1
2		output voltage - 230 V $\pm 1\%$	
3		power capacity - 1 kVA	
4	Digital multimeter	DMM: 3 $\frac{1}{2}$ digit display	1

XII Actual procedure followed:

- a. when the load is OFF
1. measure output voltage of UPS with help of multimeter
 2. measure backup time with the help of stop watch.
- b. when the load is overload
1. measure output voltage of UPS with help of multimeter
 2. measure Backup time with the help of stop watch.

XIII Observations and Calculations:**When the load is OFF**

1. Output voltage of UPS 48 Volts [DC]
2. Backup time = 720 min.

When the load is overload:

1. Output voltage of UPS 240 Volts (AC) [48 Volts DC]
2. Backup time, ...min. 360 mins

XIV Results:

We have learn to make the input and output connections and to check operations of UPS under normal and overload conditions.

XV Interpretation of Results:

In this practical we studied input and output connections and check operations of UPS under normal and overload conditions.

XVI Conclusions & Recommendations:

Hence, we have studied in this practical input & output connection and to check operations of UPS under normal and overload conditions.

XVII Practical Related Questions:

1. Write the technical specifications of the given UPS.
2. Write the type of battery used in UPS.
3. State the backup time of the UPS used.
4. List applications of UPS.

[Space for Answers]

1. --- ?
→ 1. Power capacity (VA / kVA)
2. output power (W)
3. Input voltage range
4. Battery type
5. output voltage
2. --- ?
→ 1. lead - Acid Batteries
2. lithium - Ion (Li-ion) Batteries
3. Nickel - cadmium (NiCd) Batteries
4. Nickel - Metal Hydride (NiMH) Batteries
3. --- ?
→ Small UPS: (500 VA to 1000 VA): At 50% load: 10 to 30 Min
Medium UPS: (1500 VA to 3000 VA): At 50% load: 20 to 45 min
Large UPS: (5000 VA and above): At 50% load: 30 to 60 mins.
4. --- ?
→ 1. Home and office use
2. Healthcare facilities
3. Industrial Applications