

# ***Review Questions on Computer Power Supplies***

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1. What are the nominal voltages usually provided in a computer power supply?
2. How many amperes are normally required to operate a 17-inch monitor operating on a supply voltage of 115 Volts AC? A small laser printer operating on a supply voltage of 220 Volts AC? A CD-ROM drive operating on a supply voltage of 12 V DC? Why is it important to specify the supply voltage in the question?
3. What is the upper bound of the resistance value in typical computer cables and wires, beyond which the connection is not considered to be continuous (i.e., nominally a zero-ohms connection)?
4. What is the power rating of a typical power supply for a desktop or mini-tower computer designed for home or office use?
5. Define each of the following terms:
  - Rectifier:**
  - Transformer:**
  - Voltmeter:**
  - Ammeter:**
  - Ohmmeter:**
  - Multimeter:**
  - Short Circuit:**
  - Doze Time:**
  - Standby Time:**
  - Standby Mode:**
  - Suspend Time:**
  - Suspend Mode:**
  - Sleep Time:**
  - Sleep Mode:**

## CS-511: Review Questions on Computer Power Supplies

**Hard Drive Standby Time:**

**APM:**

**ATA:**

**DPMS:**

**Let-Through Voltage or Clamping Voltage:**

**Power Conditioner or Line Conditioner:**

**“Uninterruptible” Power Supply (UPS):**

**In-Line UPS:**

**Standby UPS:**

**Line-Interactive UPS:**

6. What should be the power rating for a UPS (“Uninterruptible” Power Supply)?

## Answers to Selected Questions:

1. What are the nominal voltages usually provided in a computer power supply?

*Answer:* +12V DC, —12V DC, +5V DC, —5V DC

2. How many amperes are normally required to operate a 17-inch monitor operating on a supply voltage of 115 Volts AC? A small laser printer operating on a supply voltage of 220 Volts AC? A CD-ROM drive operating on a supply voltage of 12 V DC? Why is it important to specify the supply voltage in the question?

*Answer:* 2 Amperes; 1 Ampere; 1 Ampere. Many devices can accept multiple (international) supply voltages; the **product** of voltage and current is characteristic for the device, and therefore if the supply voltage is *twice* as high (most of Europe and Asia), then the current drawn will be *half* as great.

3. What is the upper bound of the resistance value in typical computer cables and wires, beyond which the connection is not considered to be continuous (i.e., nominally a zero-ohms connection)?

*Answer:* 20 Ohms

4. What is the power rating of a typical power supply for a desktop or mini-tower computer designed for home or office use?

*Answer:* Desktop, 200-Watts;  
Mini- or Mid-Tower, 230 Watts;  
Full-Tower, 250 Watts;  
Server:  $\geq$  600 Watts

5. Define each of the following terms:

*Answer:*

**Rectifier:** converts AC to DC.

## CS-511: Review Questions on Computer Power Supplies

**Transformer:** changes both the voltage and the current in an AC circuit, while keeping the product of voltage and current approximately constant.

**Voltmeter:** a device that measures the electrical voltage difference between two points in a circuit in units of Volts, Kilovolts, millivolts or microvolts.

**Ammeter:** a device that measures the amount of electrical current flowing through one point in a circuit in units of Amperes (“amps” for short), milliamperes (“milliamps”), or microamperes (“microamps”).

**Ohmmeter:** a device that measures the amount of resistance in a component of an electrical circuit by application of Ohm’s Law. Typically, a fixed amount of voltage is applied to the component being tested, and the amount of current that flows as a result is measured. The scale is calibrated in Ohms, Kiloohms, or Megohms.

**Multimeter:** a measurement device which can be used to measure voltage, current, or resistance. Multimeters come in two principal varieties: analog and digital. In addition, scales are usually set manually, but more expensive multimeters are autoranging.

**Short Circuit:** a usually unintentional low-resistance alternative pathway available for the passage of current between two points that were intended to be connected only by a path of substantially higher resistance. Most of the current will be diverted through the low-resistance path, and the circuit will behave in unexpected ways, since the current was expected to have to traverse the high- and not the low-resistance path.

**Doze Time:** in Energy-Star-compliant systems, the amount of time until the system goes into **Doze Mode**, where the power consumption of the computer is reduced by  $\geq 80\%$  from the fully-operational level.

**Standby Time:** in Energy-Star-compliant systems, the amount of time until the system goes into **Standby Mode**, where the power consumption of the computer is reduced by  $\geq 92\%$  from the fully-operational level.

**Suspend Time:** in Energy-Star-compliant systems, the amount of time until the system goes into **Suspend Mode**, where the power consumption of the computer is reduced by  $\geq 99\%$  from the fully-operational level.

**Sleep Time:** in Energy-Star-compliant systems, the amount of time until the monitor goes into **Sleep Mode**, where its power consumption is reduced to a **total of  $\leq 30$  Watts**.

**Hard Drive Standby Time:** in Energy-Star-compliant systems, the amount of time until the Hard Disk Drive shuts down.

## CS-511: Review Questions on Computer Power Supplies

**APM:** Advanced Power Management, a standard promulgated by Intel and Microsoft to lower the power consumption of an idle computer.

**ATA:** *AT* Attachment, a power management standard for IDE drives.

**DPMS:** Display Power Management Signaling, a power management standard established by VESA (Video Electronics Standards Association) for use in video adaptor cards and video monitors.

**Let-Through Voltage** or **Clamping Voltage:** the maximum voltage allowed to pass through a surge suppressor and to be applied to the power input terminals of the device being protected. The accepted standard for protection of computer equipment is  **$\leq 330$  Volts**.

**Power Conditioner** or **Line Conditioner:** a device that regulates or conditions the electrical power provided to sensitive electrical circuitry, such as computer circuits, providing relatively purely sinusoidal voltage and current compensated for overvoltage and brownouts, as well as protected against surges.

**“Uninterruptible” Power Supply (UPS):** a device that provides backup power for a limited time to keep equipment functioning long enough after a power failure to allow for a controlled shutdown. A UPS contains: (i) a storage battery large enough to hold about 15 minutes’ worth of electrical power for the equipment it is protecting; (ii) a battery charger to keep the storage battery fully charged at all times while utility-supplied power is present; (iii) an inverter which can convert the DC of the storage battery into AC that the computer power supply requires; and (iv) a switch that selects between the battery-inverter output and the filtered-and-surge-suppressed raw power from the utility line as the immediate source of power to the computer equipment.

**In-Line UPS:** uses the battery-powered circuit as the primary power source for the PC, even while normally-generated power from the utility lines is present and available. The AC utility supply line is switched directly into the computer power input lines only when a malfunction is detected in some portion of the charger-battery-inverter chain.

**Standby UPS:** during normal, generated-power-available conditions, feeds power from the regular power lines through surge suppression and filter circuits into the computer, and switches to backup battery and inverter circuitry only when generated power fails.

**Line-Interactive UPS:** a variant of the standby UPS that keeps the inverter working, so that when the generated power fails and it becomes necessary to switch to battery power, there is no delay for inverter start-up.

6. What should be the power rating for a UPS (“Uninterruptible” Power Supply)?

*Answer:* 125% of the total supply needs of the supported equipment

## CS-511: Review Questions on Computer Power Supplies