**Topic: Output Devices**

Reading Time: 15 mins

**·        Note\* Highlight important/core points while reading**

·        Read the content and write the answers given in the document in your words, to get the solid grip on topic.

**Output Devices**

Output devices are hardware components that display or produce data that has been processed by the computer. These devices allow users to see, hear, or physically interact with the results of the computer's operations.

**1. Actuators**

* **Definition**: Actuators are devices that convert electrical energy into physical motion. They are commonly used in robotic systems, automation, and industrial applications to control movements such as opening or closing valves or moving robotic arms.
* **How It Works**:
  + Actuators are driven by electric motors or pneumatic systems. When the actuator receives an electrical signal, it produces a physical movement in response, such as rotating, pushing, or lifting objects.
* **Advantages**:
  + **Precise control**: Can provide accurate and repeatable physical movements.
  + **Versatile**: Used in a variety of applications, from robotics to manufacturing.
  + **Efficient**: Capable of converting energy efficiently for specific tasks.
* **Disadvantages**:
  + **Complexity**: May require complex control systems or programming.
  + **Power consumption**: Can be energy-intensive, especially for large or heavy-duty actuators.
  + **Wear and tear**: Mechanical actuators can experience wear over time, reducing efficiency.

**2. Light Projectors**

* **Definition**: Light projectors are devices that project images, videos, or presentations onto a surface, usually a screen or wall, using light.
* **How It Works**:
  + A projector uses a light source (such as a lamp or LED) combined with a lens system and a digital image or video processor to project an image onto a surface. Modern projectors may use DLP (Digital Light Processing) or LCD (Liquid Crystal Display) technology.
* **Advantages**:
  + **Large display**: Allows for a much larger image than traditional monitors or TVs.
  + **Portable**: Many projectors are compact and easy to carry.
  + **Flexible**: Can project onto different types of surfaces or screens.
* **Disadvantages**:
  + **Requires a dark environment**: For optimal image quality, projectors need a dark or dimly lit room.
  + **Maintenance**: Bulbs or light sources may need to be replaced over time.
  + **Resolution limitations**: Some projectors may have lower resolution compared to modern displays.

**3. Inkjet Printers**

* **Definition**: Inkjet printers are output devices that print text or images by spraying tiny droplets of ink onto paper.
* **How It Works**:
  + Inkjet printers use print heads with multiple nozzles to spray ink in a precise pattern on the paper, creating text or images. The ink is stored in cartridges that need to be replaced when empty.
* **Advantages**:
  + **High-quality prints**: Ideal for printing images and photos with high resolution.
  + **Compact**: Inkjet printers are usually small and affordable for home use.
  + **Wide media compatibility**: Can print on a variety of paper types and sizes.
* **Disadvantages**:
  + **Slower print speed**: Inkjet printers tend to print slower compared to other types, like laser printers.
  + **Ink cost**: Ink cartridges can be expensive, and they need to be replaced frequently.
  + **Clogging**: Ink can dry out in the nozzles, leading to clogging and print quality issues.

**4. Laser Printers**

* **Definition**: Laser printers are high-speed output devices that use a laser beam to produce text and images on paper.
* **How It Works**:
  + A laser printer uses a laser beam to create an electrostatic image on a drum, which attracts toner (powdered ink). The toner is then transferred onto paper and fused by heat to create the printed output.
* **Advantages**:
  + **Fast printing**: Laser printers print faster than inkjet printers, making them ideal for office environments.
  + **High-quality text**: Produces sharp and clear text, ideal for document printing.
  + **Cost-effective for high volume**: Toner cartridges last longer than ink cartridges, making it more economical for high-volume printing.
* **Disadvantages**:
  + **Higher initial cost**: Laser printers can be more expensive to buy than inkjet printers.
  + **Less effective for images**: While excellent for text, laser printers are not as effective for high-quality photo printing.
  + **Large size**: Typically, bulkier than inkjet printers, which may not be ideal for small spaces.

**5. LED and LCD Screens**

* **Definition**: LED and LCD screens are flat-panel displays used to show text, images, and videos on devices like televisions, computer monitors, and smartphones.
* **How It Works**:
  + **LCD (Liquid Crystal Display)**: Uses liquid crystals that are manipulated by electric fields to display images. A backlight is used to illuminate the crystals.
  + **LED (Light Emitting Diode)**: Similar to LCD, but uses LEDs as the backlight source, offering better contrast and energy efficiency.
* **Advantages**:
  + **High-resolution displays**: Offer sharp, vibrant images with excellent color accuracy.
  + **Energy-efficient**: LED screens use less power than traditional CRTs.
  + **Slim design**: Thin and lightweight, making them ideal for modern devices.
* **Disadvantages**:
  + **Limited viewing angles**: Some LCDs have limited visibility from the side.
  + **Motion blur**: Fast-moving images may cause blurring on some screens, especially lower-end models.
  + **Backlight bleeding**: In some models, the light from the backlight may be uneven, causing visual defects.

**6. (Loud) Speakers**

* **Definition**: Speakers are output devices that produce sound from the electrical signals generated by the computer or other devices.
* **How It Works**:
  + Speakers use an electrical signal to move a diaphragm, which generates sound waves that we hear. The diaphragm moves based on the variations in the audio signal sent to the speaker.
* **Advantages**:
  + **Audio output**: Provides sound for music, videos, games, or communication.
  + **Variety of options**: Available in various sizes and power outputs, from small portable speakers to large, high-fidelity systems.
  + **Customizable**: Can be used in various configurations, such as stereo, surround sound, or Bluetooth.
* **Disadvantages**:
  + **Power consumption**: High-quality speakers can consume a lot of power.
  + **Distortion at high volumes**: Speakers may distort sound when played at high volumes.
  + **Space and setup**: Large speakers can take up significant space and may require additional setup.

### ****A-Rated Questions/Answers By Examiner****

**Q1: How do actuators contribute to automation systems?**  
**Answer**: Actuators convert electrical energy into physical motion, enabling automated systems to perform actions like moving robotic arms, adjusting machinery, or opening/closing valves in response to a control signal.

**Q2: What is the primary difference between inkjet and laser printers?**  
**Answer**: Inkjet printers use liquid ink sprayed onto paper, producing high-quality images, while laser printers use toner and a laser beam to print text quickly and efficiently. Laser printers are faster and better for high-volume printing.

**Q3: Why are LED screens considered more energy-efficient than traditional displays?**  
**Answer**: LED screens use light-emitting diodes to illuminate the display, consuming less power than older technologies like CRT or LCD with fluorescent backlighting, making them more energy-efficient.

**Q4: What is a major disadvantage of using speakers in a high-volume setting?**  
**Answer**: At high volumes, speakers can produce distortion, and the sound quality may degrade, especially in cheaper or lower-quality speaker systems.

**Q5: How does a light projector display images?**  
**Answer**: A light projector uses a light source and a lens system to project images or videos onto a surface. It often uses technologies like DLP or LCD to process and display the content on a larger screen or wall.

### Write your Answers on your Notebook and Verify it on Next Screen

**Q6: What is the advantage of using actuators in industrial applications?**

**Q7: How do LCD screens differ from LED screens in terms of backlighting?**

**Q8: Why might inkjet printers be more suitable for home use compared to laser printers?**

**Q9: What are some challenges of using projectors in brightly lit rooms?**

**Q10: How do speakers convert electrical signals into sound waves?**

**6. Answer:** Actuators offer precise control and are versatile, making them suitable for various industrial applications like manufacturing and automation, where accurate, repeatable movements are essential.

**7. Answer:** LCD screens use fluorescent backlighting, while LED screens use light-emitting diodes, which provide better energy efficiency, contrast, and a slimmer design.

**8. Answer:** Inkjet printers are typically compact, affordable, and produce high-quality images, making them ideal for home use where high-volume printing is not necessary.

**9. Answer:** Projectors require a dark or dimly lit room for optimal image quality, as excessive ambient light can wash out the projected image, making it difficult to see clearly.

**10. Answer:** Speakers use an electrical signal to move a diaphragm. As the diaphragm moves, it creates vibrations in the air, producing sound waves that are audible to listeners.

**Kindly Write down your answers on your Note book and than verifiy it with answers given at the end**

1- A student has a portable tablet computer.

(b) Identify one output device that could be built into the portable tablet computer.

............................................................................................................................................. [1]

2- (a) The paragraph describes the process of printing a document using an inkjet printer.

Complete the paragraph using the most appropriate terms from the list. Not all of the terms in the list need to be used.

* binary
* buffer
* drum
* information
* interrupt
* laser
* liquid
* nozzles
* operating system
* powder
* thermal bubble
* toner

Data is sent from the computer to the printer. The data is held in a print ........................................................................ that is temporary storage until the data is processed to be printed.

Inkjet printers operate by having a print head that moves ........................................................................ side to side across the page. These spray ........................................................................ ink droplets onto the page. These ink droplets can be created using piezoelectric or ........................................................................ technology.

If the paper jams in the printing process, the printing stops and an ........................................................................ is sent to the computer.           [5]

(b) A printer is one example of an output device.

 Give three other examples of output devices.

Example 1 .................................................................................................................................

Example 2 .................................................................................................................................

Example 3 ................................................................................................................................. [3]

(c) Give three examples of input devices.

Example 1 .................................................................................................................................

Example 2 .................................................................................................................................

Example 3 ................................................................................................................................. [3]

2-  A train company wants to install a self-service ticket machine system for its train stations. When the customer has purchased their tickets, the machine will provide a paper ticket.

(a) One output device that is used in the ticket machine is a display screen.

 Identify one other output device that is used in the ticket machine system.

.........................................................................................................................................[1]

(b) The train company does not want users to use a keyboard or a mouse to enter their data, when buying a ticket. The company is worried that they may be stolen or get too dirty.

Identify one other input device that would be suitable for use in the ticket machine system, to allow users to enter their data.

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