Micro-LEDs

Why in News?

Apple is reportedly **working on a new** display technology **called microLEDs,** which is considered the next big thing in the display industry.

- **MicroLEDs are self-illuminating diodes** that have brighter and better colour reproduction than Organic Light Emitting Diode **(OLED) display technology.**

What are MicroLEDs ?

- **About:**
  - MicroLED technology is based on the **use of sapphires,** which are known for their ability to shine on their own indefinitely.
    - The technology involves the **use of tiny** light-emitting diodes **(LEDs) that are packed tightly together** to create a bright and high-quality display.
  - Unlike OLED displays, **microLED displays use inorganic material** such as gallium nitride.
  - A microLED is as **small as cutting a centimetre of hair into 200 smaller pieces.** Each of these microLEDs are semiconductors that receive electric signals.
    - Once these microLEDs are gathered, **they form a module.** Several modules are then combined to form screens.
- **Benefits:**
  - Brighter screens with **better colour reproduction** and viewing angles.
  - **Limitless scalability,** as microLED displays are **resolution-free, bezel-free, ratio-free, and even size-free.**
  - The ability to **freely resize the screen in any form for practical usage.**
  - **Self-emissive microLEDs** that individually produce **red, green, and blue colours** without needing backlighting or colour filters.
- **Challenges:**
  - **Manufacturing Complexity:** The process of manufacturing microLEDs is **highly complex**, and it **requires precise control** over many variables to produce high-quality displays.
  - **Cost:** The **cost of manufacturing microLED displays is currently very high**, and it may take some time for the technology to become affordable enough for widespread adoption.
  - **Power Consumption**: MicroLEDs require a lot of **power** to operate, which can make them **less energy-efficient** than other display technologies.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q1. With reference to street lighting, how do sodium lamps differ from LED lamps? (2021)

1. Sodium lamps produce light in 360 degrees but it is not so in the case of LED lamps.
2. As street lights, sodium lamps have a longer lifespan than LED lamps.

3. The spectrum of visible light from sodium lamps is almost monochromatic while LED lamps offer significant colour advantages in street lighting.

Select the correct answer using the code given below.

(a) 3 only
(b) 2 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (c)

Q2. Organic Light Emitting Diodes (OLEDs) are used to create digital display in many devices. What are the advantages of OLED displays over Liquid Crystal displays? (2017)

1. OLED displays can be fabricated on flexible plastic substrates.
2. Roll-up displays embedded in clothing can be made using OLEDs.
3. Transparent displays are possible using OLEDs.

Select the correct answer using the code given below:

(a) 1 and 3 only
(b) 2 only
(c) 1, 2 and 3
(d) None

Mains

Q. The Nobel Prize in Physics of 2014 was jointly awarded to Akasaki, Amano and Nakamura for the invention of Blue LEDs in 1990s. How has this invention impacted the everyday life of human beings? **(2021)**

Source: TH