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## Question 1

Explain the following?

1. Pseudo Colours.
2. True Colours.
3. Deep Colours.

### Pseudo Colours:-

Pseudo Colours refers to the process of displaying a grayscale image (containing different shades of gray) using artificially assigned colors. For example, darker areas in red may appear in blue, medium shades in green, and lighter areas in red. The main purpose of pseudo coloring is to make patterns, differences, or details in the image more visible and easier to interpret. It is similar to adding colors to a black and white weather map to highlight variations in temperature.

### True Colors:-

True color represents the actual color of an image as seen in real life.

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It uses three separate color channels - red, green, and blue (RGB) - to reproduce the original colors accurately.

The most common form of true color is 24-bit color, which includes 8 bits for instance of each channel, resulting in about 16.7 million colors.

For instance, the photos displayed on mobile phones or digital cameras, used true colour to show the real appearance of the scene.

## Deep Colors:

Deep color means using a higher number of bits per color channel to produce smoother and more realistic color transitions.

Common examples include 30-bit (10 bits per channel) and 36-bit (12 bits per channel) color.

This technique reduces visible color banding and provides better image quality for professional photography, video production, and

HDR (High Dynamic Range)

## Content.

In simple terms, deep color allows thousands of tiny color steps between black and white, making the overall image appear much more natural.

## Question 2

Explain the functioning of a CRT, its Evolution, and its Modern form.

1. functioning of a CRT (Cathode Ray Tube).

A Cathode Ray Tube (CRT) is a display device that works by directing a beam of electrons onto a phosphor-coated screen to create an image.

- Vacuum Tube: The inside of the glass tube is a vacuum, allowing electrons to move freely.
- Electron Gun: Located at the back of the tube, it emits a focused beam of electrons toward the screen.

- Deflection System: Magnetic or electrostatic coils steer the electron beam so it scans the screen line by line from top to bottom.
- Phosphor Screen: The screen's inner surface is coated with phosphor dots or stripes that glow when struck by the electron beam, forming a visible image.
- Color CRTs: Contain three electron guns (red, green, blue) and a shadow mask or aperture grille to ensure each beam hits the correct colored phosphor. The combination of these three colors produces full-color images.

## 2- Important Components:

- Electron Gun: Produces and directs the electron beam.
- Deflection Coils/Plates: Control the beam's direction to scan the screen.
- Phosphor Coating: Emits light when struck by electrons, displaying the image.
- Shadow Mask/Aperture Grille: Ensures accurate color alignment in color CRTs.

### 3- Evolution of the CRT:

- Early CRTs; Initially used in oscilloscopes and black-and-white television with simple single-beam displays.
- Color CRTs; Introduced multiple electron guns and a shadow mask, allowing the creation of color images.
- Improvement; Advancements in phosphor materials, screen brightness, flatness, and resolution enhanced image quality and reduced the size and weight of CRTs.
- Compact Design; Engineers developed slimmer and more efficient CRTs suitable for modern televisions and computer monitors.

**4. Modern form:** CRTs are now largely obsolete in consumer electronics. Modern flat-panel technologies such as LCD, LED, and OLED have replaced CRTs because they are thinner, lighter, more energy-efficient, and capable of larger screen sizes.