3.1 Colour Science

Color

- Color is the frequency of a light wave within the narrow band of the electromagnetic spectrum to which the human eye responds.
- Infrared light is radiated heat. Ultraviolet light is beyond the higher end of the visible spectrum and can be damaging to humans.
- By adjusting the combinations of the 3 colors Red, Green and Blue, the eye and brain interpolates the in between colors.

Color Models

- Models used to specify colors in computer terms are RGB, HSB, HSL, CMYK, CIE, etc.

- E.g: 24-bit RGB model has 8 bits each for Red, Green and Blue. i.e. 256 choices to set each amount of red, green and blue. Thus, there can be 256*256*256=16,777,216 colors.

HSB and HSL models

- HSB-Hue, Saturation, Brightness
- HSL- Hue, Saturation, Lightness
- Hue or Color is specified as an angle from 0 to 360 degrees on a color wheel and saturation, brightness and lightness as percentages.
- Saturation is the intensity of a color. At 100% saturation, a color is pure. At 0% saturation, the color is white, black or gray.
- Lightness or brightness is the % of black or white that is mixed with a color. 100% -white, 0%- black, 50% pure color.

CMYK model

- C-Cyan, M-Magenta, Y-Yellow and K-black
- Less applicable in Multimedia production.
- Used in printing trade.

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Color Palettes

- Mathematical tables that define the color of a pixel displayed on the screen.

- They are called CLUT's. i.e. Color Look Up Tables on the Macintosh.

- Most commen pallettes are 1, 4, 8, 16 and 24 bits deep and can define 2, 16, 256, 65,536 and 16,777,216 respectively.

Dithering

- Suppose the colors of a 24-bit scanned image have to be reduced to an 8-bit, 256 color image.

- Dithering is the process where the color value of each pixel is changed to the closest matching color value in the target palette using a mathematical algorithm.