Texturing Artist

(Job Role)

(Qualification Pack: Ref. Id. MES/Q2503)
Sector: Media and Entertainment

Textbook for Class XI

171104

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एन सी ई आर टी
NCERT

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Foreword

The National Curriculum Framework–2005 (NCF–2005) recommends bringing work and education into the domain of the curricular, infusing it in all areas of learning while giving it an identity of its own at relevant stages. It explains that work transforms knowledge into experience and generates important personal and social values, such as self-reliance, creativity and cooperation. Through work one learns to find one's place in the society. It is an educational activity with an inherent potential for inclusion. Therefore, an experience of involvement in productive work in an educational setting will make one appreciate the worth of social life and what is valued and appreciated in society. Work involves interaction with material or other people (mostly both), thus creating a deeper comprehension and increased practical knowledge of natural substances and social relationships.

Through work and education, school knowledge can be easily linked to learners' life outside the school. This also makes a departure from the legacy of bookish learning and bridges the gap between the school, home, community and the workplace. The NCF–2005 also emphasises on Vocational Education and Training (VET) for all those children who wish to acquire additional skills and/or seek livelihood through vocational education after either discontinuing or completing their school education. VET is expected to provide a 'preferred and dignified' choice rather than a terminal or 'last-resort' option.

As a follow-up of this, NCERT has attempted to infuse work across the subject areas and also contributed in the development of the National Skill Qualification Framework (NSQF) for the country, which was notified on 27 December 2013. It is a quality assurance framework that organises all qualifications according to levels of knowledge, skills and attitude. These levels, graded from one to ten, are defined in terms of learning outcomes, which the learner must possess regardless of whether they are obtained through formal, non-formal or informal learning. The NSQF sets common principles and guidelines for a nationally recognised qualification system covering Schools, Vocational Education and Training Institutions, Technical Education Institutions, Colleges and Universities.

It is under this backdrop that Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), Bhopal, a constituent of NCERT has developed learning outcomes based modular curricula for the vocational subjects from Classes IX to XII. This has been developed under the Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education of the Ministry of Education, erstwhile Ministry of Human Resource Development.

This textbook has been developed as per the learning outcomes based curriculum, keeping in view the National Occupational Standards (NOS) for the job role and to promote experiential learning related to the vocation. This will enable the students to acquire necessary skills, knowledge and attitude.

I acknowledge the contribution of the development team, reviewers and all the institutions and organisations, which have supported in the development of this textbook.

NCERT would welcome suggestions from students, teachers and parents, which would help us to further improve the quality of the material in subsequent editions.

HRUSHIKESH SENAPATY
Director
National Council of Educational
Research and Training

New Delhi
September, 2020

About the Textbook

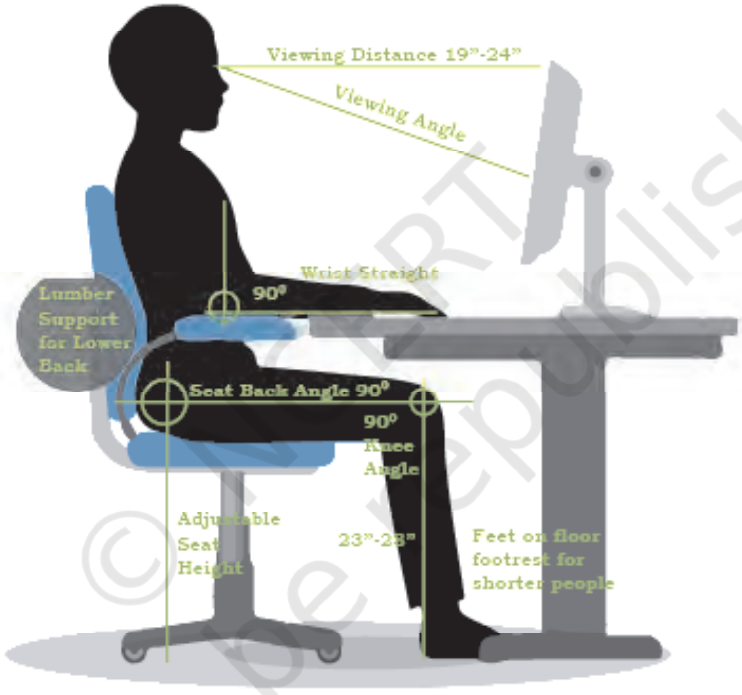
Indian animation companies are creating animated multimedia content for film and animation industry. One of the key stages in the production of animated content is texturing, which is done by a 'Texturing Artist'.

A Texturing Artist creates and modifies textures and mounts them on 3D models. The textbook on the job role of a Texturing Artist has been developed to impart knowledge and skills through hands-on-learning experience.

The textbook has been developed with the contribution and expertise provided by subject and industry experts and academicians for making it a useful and enriching teaching-learning resource material for vocational students. Care has been taken to align the content of the textbook with the National Occupational Standards (NOSs) for the job role so that they acquire necessary knowledge and skills as per the performance criteria mentioned in the respective NOSs of the Qualification Pack. The textbook has been reviewed by experts so as to ensure that the content is not only aligned with the NOSs but is also of high quality.

Unit 1 of the textbook explains the colour theory, which includes the principles of colour theory, colour wheel, digital colour wheel, RGB display mechanism and colour schemes. Unit 2 focuses on the various aspects of digital photography, camera angles and movements and pre-production. Unit 3 deals with the various tools of Adobe Photoshop for drawing and painting. This software has been used as an exemplar for developing understanding about the various tools used in texturing, as most teachers or trainers are familiar with it. Unit 4 will help students to learn about the lighting in photography and correct exposure in terms of depth of field and recording of movement.

Vinay Swarup Mehrotra
Professor and *Head*
Curriculum Development and
Evaluation Centre and NSQF Cell,
PSSCIVE, NCERT, Bhopal



Correct posture while sitting in front of a computer

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The Council expresses its gratitude to Rajesh P. Khambayat, *Joint Director*, PSSCIVE, Bhopal, for his support in completing the project. We also thank Saroj Yadav, *Professor* and *Dean* (Academic), NCERT, and Ranjana Arora, *Professor* and *Head*, Department of Curriculum Studies (DCS), for their efforts in coordinating workshops, for reviewing and finalisation of this textbook. The contribution of Hemlata Baghel, *Consultant*, PSSCIVE, in reviewing the draft is acknowledged. Acknowledgements are due to all contributors for sharing their knowledge, expertise and time by responding to our requests.

The contributions of officials of the Technical Support Group of MoE, National Skill Development Agency (NSDA), National Skill Development Corporation (NSDC), and Media and Entertainment Sector Skills Council are also duly acknowledged.

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Gratitude is also due to the Publication Division, NCERT, for transforming the manuscript into an attractive textbook. Blue Fish Designs Pvt. Ltd. and C. Thangminlal Doungel, *Editorial Assistant* (Contractual), are acknowledged for copyediting this book. Chanchal Chauhan, *Proofreader* (Contractual) is acknowledged for proofreading this book. Pawan Kumar Barriar, *DTP Operator* and Nitin Kumar Gupta and Naresh Kumar, *DTP Operators* (Contractual), Publication Division, NCERT, are acknowledged for flawless layout and design. We thank Sunita Koli, *Computer Operator* (Grade III), PSSCIVE, for typing the text.

Contents

CHILDREN'S BILL OF RIGHTS

A child is every person under the age of 18 years. Parents have the primary responsibility for the upbringing and development of the child. The State shall respect and ensure the rights of the child.

Dignity and Expression

- I have the right to know about my Rights. *(Article 42)*
- I have rights being a child and no matter who I am where I live, what my parents do, what language I speak, what religion I follow, whether I am a boy or a girl, what culture I belong to, whether I am disabled, whether I am rich or poor. I should not be treated unfairly on any basis. Everyone has the responsibility to know this. (*Article 2)*

- I have the Right to express my views freely which should be taken seriously, and everyone has the Responsibility to listen to others. (*Article12,13)*
- I have the Right to make mistakes, and everyone has the Responsibility to accept we can learn from our mistakes. (*Article 28)*
- I have the Right to be included whatever my abilities, and everyone has the Responsibility to respect others for their differences. (*Article 23)*

Development

- I have the Right to a good education, and everyone has the Responsibility to encourage all children to go to school. (*Article 23, 28, 29)*
- I have the Right to good health care, and everyone has the Responsibility to help others get basic health care and safe water. (*Article 24)*
- I have the Right to be well fed, and everyone has the Responsibility to prevent people from starving. *(Article 24)*
- I have the Right to a clean environment, and everyone has the Responsibility not to pollute it. *(Article 29)*

- I have the Right to play and rest. (*Article 31)*

Care and Protection

- I have the Right to be loved and protected from harm and abuse, and everyone has the Responsibility to love and care for others. *(Article 19)*
- I have the Right to a family and a safe and comfortable home, and everyone has the Responsibility to make sure all children have a family and home. *(Article 9,27)*

- I have the Right to be proud of my heritage and beliefs, and everyone has the Responsibility to respect the culture and belief of others. *(Article 29,30)*
- I have the Right to live without violence (verbal, physical, emotional), and everyone has the Responsibility not to be violent to others. (*Article 28,37)*
- I have the Right to be protected from economic exploitation and sexual exploitation, and everyone has the Responsibility to ensure that no child is forced to work and is given a free and secure environment. (*Article 32,34)*

- I have the Right to protection from any kind of exploitation and everyone has the Responsibility to ensure that I am not being subjected to be taken advantage in any manner. (*Article 36)*

IN ALL ACTION CONCERNING CHILDREN, THE BEST INTERESTS OF THE CHILD SHALL BE A PRIMARY CONSIDERATION

All these rights and responsibilities are enshrined in the United Nations Convention on the Rights of the Child, 1989. It contains all the rights which children have all over the world. The Government of India signed this document in 1992.

Source: National Commission for Protection of Child Rights (NCPCR), Government of India

Chapter 1

Colour Theory

Texture, which means the feel, appearance or consistency of a surface or a substance, is the perceived surface quality of visual art. Texturing demands competency in the techniques of art, as well as, design. Art, as you know, is the knowledge of the theory and techniques required to compose, produce and perform works of visual arts and sculptures.

The visual arts are the various art forms, which include drawing, painting, crafts, photography, videography, filmmaking, architecture and sculpture.

Design, which is the knowledge of techniques, tools and principles involved in the production of precision blueprints, drawings and models, is the process of selection of all visual elements used by artists to express themselves. These elements include shape, value, texture, colour, line, mass and space. The elements could be two-dimensional (2D) and three-dimensional (3D).

Texture instills an image with depth and detail. Any element that has texture attracts the viewer more as compared to a plain visual, as it tempts the viewer to imagine the feel of the texture. To promote the detailing in a texture, elements like colours, shadows, mid-tones, highlights and effective lighting are applied.

A Texturing Artist must have an in-depth understanding of the colour theory, and nature and


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content of the artwork to be produced. They should be well versed with the vocabulary of terms specific to the visual arts, and two or three dimensional designs. The person must be able to apply different textures, using suitable software for image manipulation, and to maintain portfolios of artistic work, especially to demonstrate one's styles, interests and abilities.

In this Unit, you will learn about colour wheel, and the application of colour theory in texturing.

Session 1: Principles of Colour Theory

Light is made up of wavelengths of light, and each wavelength is a particular colour. Visible light waves consist of different wavelengths. These wavelengths range from 700 nm (nanometer) at the red end of the spectrum to 400 nm at the violet end. White light is the combination of many different frequencies of visible light from all parts of the visible spectrum. The colour of an object or material is determined by the wavelengths it absorbs and those it reflects. An object has the colour of the wavelengths it reflects. Thus, the colour that we see is a result of the wavelengths that are reflected back to our eyes. The primary colours of light are red, green and blue. Mixing these colours in different proportions can make all the colours of the light that we see. There are basically three categories of colours, based on the colour wheel—primary, secondary and tertiary colours.

Colour Theory

Colour theory is a term used to describe the rules and guidelines regarding the use of colour in art and design.

Colour theory focuses on colour mixing and visual effects of a specific colour combination. Combining colours is both an art, as well as, a science. You might be aware that there are primary colours, secondary colours, and tertiary colours.

Primary colours are a set of colours that can be combined to make a useful range of colours. Red, blue and yellow are the primary colours, and form the base of every other colour. Primary colours can be mixed together to produce secondary colours.

There are many theories for harmony. However, there are three basic categories of colour theory that are logical and useful—the colour wheel, colour harmony, and the context of how colours are used. Colour harmony provides a visual interest and a sense of order.

Colour wheel

The colour wheel can be used to help remember primary and secondary colours. Tertiary colours are combinations of primary and secondary colours (Figure 1.1).

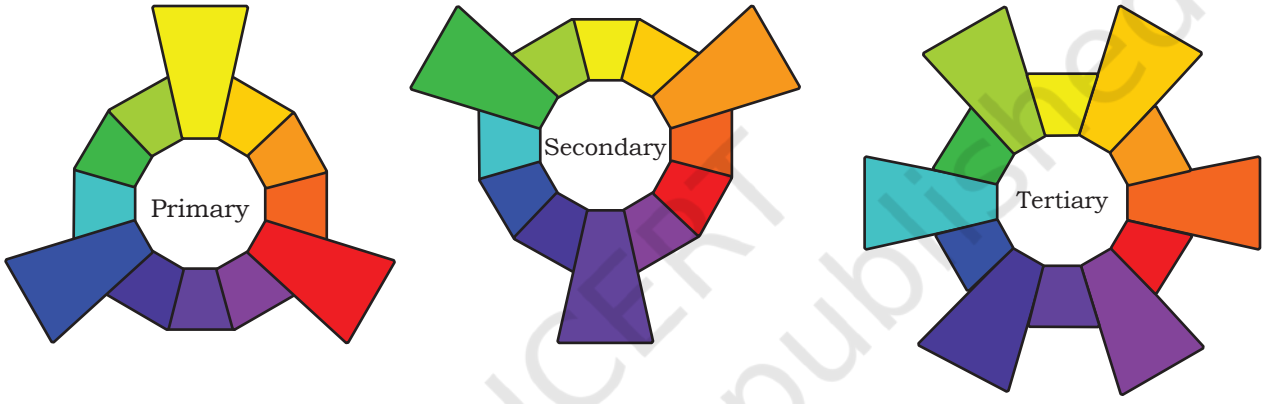


Fig. 1.1: Primary, Secondary and Tertiary Colours

As a Texturing Artist, an individual develops textures for the digital media, which could be in the form of 2D or 3D art that may be overlaid onto a polygon mesh to create a realistic 3D model. The Texturing Artist must understand how a particular colour behaves in relation to other colours and shapes, which is a complex part of the colour theory. By selecting the right colour from the colour wheel, the Texturing Artist can create an ambience of elegance, warmth or tranquility using cool or warm colours.

Colour harmony

Colour harmony refers to the property which is created through an aesthetically pleasing colour combinations.

Colour context

The relationship of values, saturations and the warmth or coolness of hues should be understood by the Texturing Artist, as these create differences in our perception of colour.

History of Colour Theory

The 'colour theory' principles were first written by Leone Battista Alberti (c.1435). Colour theory is a set of principles used to create harmonious colour combinations. A harmonious colour is the one that is next to another on the colour wheel or very close to it. For example, red is near rust, which is near terracotta. It guides us to the practical way of colour mixing.

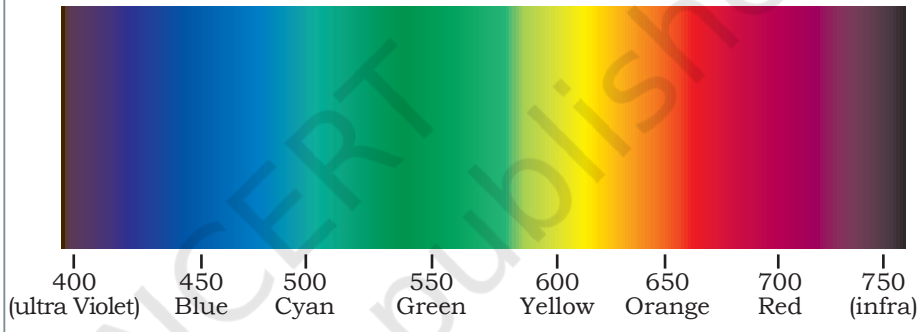


Fig. 1.2: Colour arrangement within the visible range of light

The first colour wheel was designed by Sir Isaac Newton in 1666. He worked successfully by splitting white sunlight into six different colour beams, namely red, orange, yellow, green, cyan and blue (Figure 1.2). Then, he joined together the two ends of the colour spectrum to show the natural progression of colours. Newton had associated colours with the note of a musical scale.

A century later, Johann Wolfgang von Goethe worked on the psychological effects of colours. He noticed that blue gives a psychological feeling of coolness and yellow gives a warming effect. According to the frequency of different colours, colours are arranged within the visible range of light. Goethe, later, created a colour wheel, which depicted the psychological effect of each colour. He bifurcated

all colours into two groups —'plus side' (from red through orange to yellow) and 'minus side' (from green through violet to blue). Excitement and cheerfulness were placed in the area of plus side colours, whereas, weakness and unsettled feelings were associated with the minus side. The current form of colour theory was developed by Swiss colour and art theorist Johannes Itten, who taught at the School of Applied Arts in Weimar, Germany.

The 'colour chords' were developed by Itten (Figure 1.3), who also modified the colour wheel. Itten's colour wheel is based on the primary colours — red, yellow and blue and it includes 12 hues of the same.

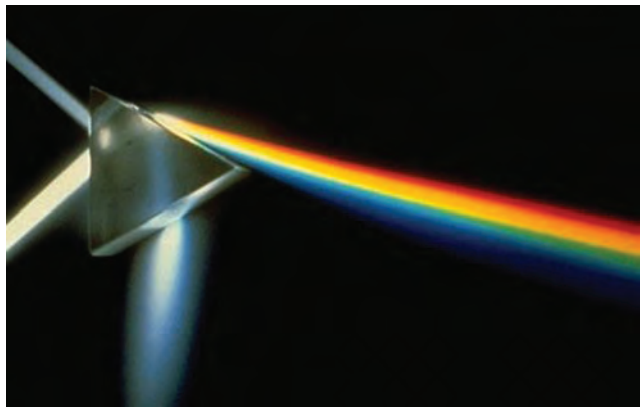


Fig. 1.3: A view of colour chords

Basic Terms Related to Colour Theory

Hue, saturation and value are the three components of a colour.

Hue

It is one of the main properties of a colour, which permits a colour to be classified as red, yellow, green, blue, or an intermediate colour between any contiguous pair of these colours (Figure 1.4 and 1.5).

Saturation

Saturation in colour theory can be defined as the purity of a colour. Hundred per cent saturation is the maximum purity limit of a colour (Figure 1.4).

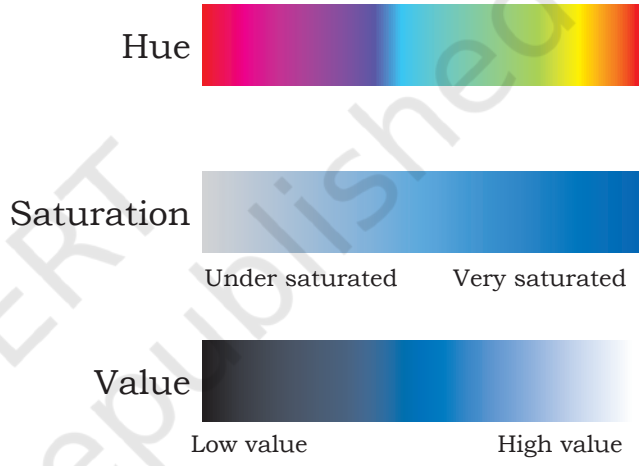


Fig. 1.4: A view of hue, saturation and value

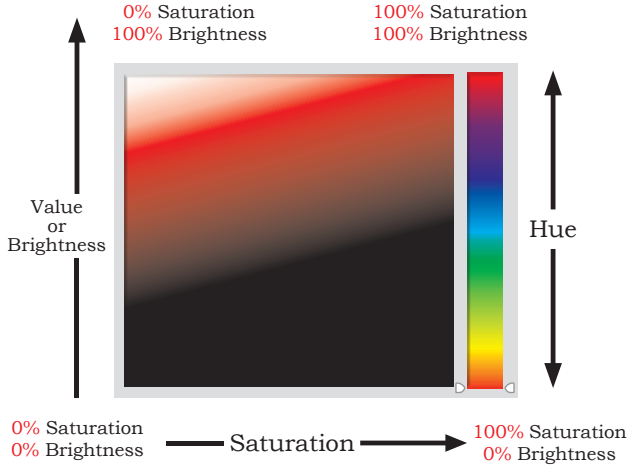


Fig. 1.5: Colour palette of Adobe Photoshop, showing hue, saturation and brightness graph

Value

The colour value is the brightness or lightness of a colour (Figure 1.4 and 1.5).

Tint

Tint can be achieved by adding white to any hue.

Tone

Tone can be achieved by adding grey to any hue.

Fig. 1.6: Colour palette of Adobe Photoshop showing tint, shade and tones from white to hue, black to hue and grey to hue, respectively

Tints — adding white to a pure hue

Shades — adding black to a pure hue

Tones — adding grey to a pure hue

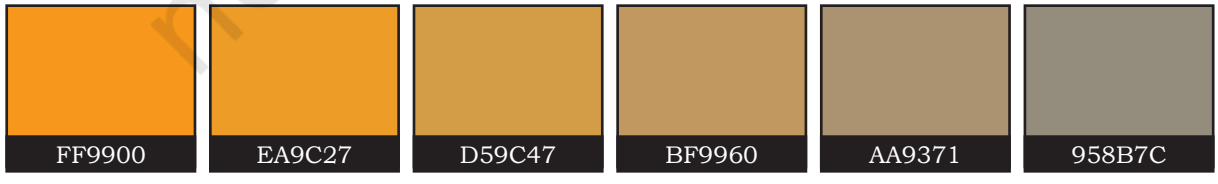


Fig. 1.7: Colour Palette of Adobe Photoshop showing tint, shade and tone

Shade

Shade can be achieved by adding black to any hue. (Figure 1.6 and 1.7)

Practical Exercises

Activity 1

Creating a colour wheel with red, green and blue colours.

Material required

Cardboard, water colours, brush, water and colour mixing palette

Procedure

- Create a circular disc of a cardboard or a white sheet.
- Divide this disc into three equal parts with a pencil and scale, and paint each part with red, green and blue, respectively.
- Insert a stick having a pointed tip, or a sharpened pencil in the centre of the coloured disc.
- Now, spin this disc with the help of the stick or pencil.
- Observe the colour that the circular disc shows when rotated.
- Write down the colours that you saw, while spinning the disc.

Activity 2

Creating a colour wheel with cyan, magenta, yellow and black

Material required

Cardboard, colours, brush, water and colour mixing palette

Procedure

- Cut a white paper into a circular disc.
- Divide the disc into four equal parts, with a pencil and scale.
- Now, paint each part with cyan, magenta, yellow and black, respectively.
- Insert a stick having a pointed tip or a sharpened pencil in the centre of the coloured disc.
- Now, spin this disc with the help of the stick or pencil.
- Observe the colour that the circular disc shows when rotated.
- Write down the colours that you saw while spinning the disc.

NOTES

Check Your Progress

A. Fill in the Blanks

1. The property that permits a colour to be classified as red, yellow, green, blue or an intermediate colour between any contiguous pair of these colours is known as _____.
2. The purity of colour is known as _____.
3. The colour _____ is the brightness or lightness of colour.
4. Tints are obtained by adding _____ to a pure hue.
5. Shades are obtained by adding _____ to a pure hue.
6. Tones are obtained by adding_____ to a pure hue.
7. A colour theory can be broken down into three parts—colour _____, colour harmony and colour context.

What have you learnt?

On the completion of this Session, you will be able to:

- describe the basic colour theory principles.
- explain the meaning of terms related to colour theory.

SESSION 2: COLOUR WHEEL

A colour wheel or colour circle is an abstract illustrative organisation of colour hues around a circle that shows the relationship between primary, secondary and complementary colours. Colour wheel or colour circle was developed by Sir Isaac Newton by taking the colour spectrum and bending it into a circle. If you follow the colour wheel, you will find the same order of the colour spectrum—red, orange, yellow, green, blue, indigo (blue-violet), and violet.

Most colour wheels are based on three primary colours, three secondary colours and the six intermediates known as tertiary colours.

According to the colour theory, harmonious colour combinations use any two colours, which are opposite to each other on the colour wheel. Any three colours are equally spaced around this colour wheel forming a triangle.

Types of Colour Wheel

Depending on different mediums of using colour, colour wheel can be categorised into the following two types.

Artist colour wheel

The Artist colour wheel is the chart which is generally used for mixing colours for painting and artwork (Figure 1.8).

Fig. 1.8: Artist colour wheel

Technical colour wheel

Technical colour wheel is used to work with any technical device like electronic display and printers (Figure 1.9). It can be categorised into the following two types:

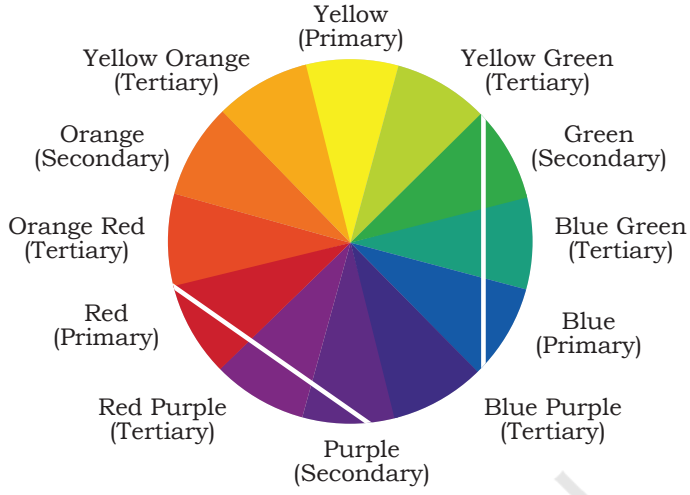
Digital colour wheel

Mixing colours digitally is not the same as mixing them physically, therefore, it is important to understand digital colour mixing. Screens use an additive colour model (the additive primary colours are Red, Green, and Blue i.e., RGB) rather than the reflective colour model. Television, cameras, scanners and computer monitors are based on the additive system of colour, where red, green and blue light projected together yield white colour. Digitally storing an image requires that it should be broken down into a grid of tiny pixels.

Print media colour wheel

Print media creates colour by subtracting or absorbing certain wavelengths of colour while reflecting other wavelengths back to the viewer. This phenomenon is called subtractive colour model. It uses Cyan, Magenta and Yellow (CMY) pigments or dyes to subtract portions of white light illuminating an object to produce other colours. Traditionally, the primary colours used in subtractive process were red, yellow and blue, as these were the colours that Painters used to mix to get all the other hues. The subtractive colour system involves colourants and reflected light. Colour paintings, colour photography and colour printing processes use the subtractive process to reproduce colour.

(a)



(b)

Fig. 1.9: Technical colour wheel (a) and (b)

Types of Colours

The colour wheel is made up of three types of colours—primary, secondary and tertiary. Let us now try to understand the three types of colours and their formation.

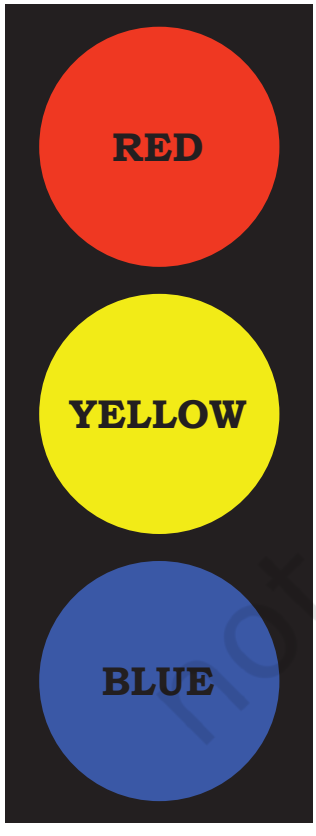


Fig. 1.10: Primary colours

Primary colours

Primary colours are the basic colours on the colour wheel. These are called so because no two colours can be mixed to create a 'primary colour'. All other colours found on the colour wheel can be created by mixing the primary colours (Figure 1.10). The three primary colours of artistic colour wheel are Red, Yellow and Blue (RYB).

Secondary colours

Secondary colours are created by mixing equal parts of any two primary colours. The secondary colours are orange, green and purple.

Red + Yellow = Orange
Yellow + Blue = Green
Blue + Red = Violet (purple)

Tertiary colours

A tertiary colour is made by mixing one primary colour and the adjacent secondary colour. Such colours are created by mixing equal parts of a primary and

secondary colour. There are six tertiary colours, namely red-purple, red-orange, blue-green, yellow-green, blue-purple, and yellow-orange.

Practical Exercises

Activity

Mixing two colours to generate a third colour

Material required

Poster colours (red, yellow and blue), colour mixing palette, water and drawing sheets

Procedure

- Mix the following colours in equal proportion to generate a third colour:
  1. Red and yellow
  2. Yellow and blue
  3. Blue and red
- Write a note on the new colours generated.

Check Your Progress

A. Fill in the Blanks

1. A colour wheel shows the relationship between _____, secondary and complementary colours.
2. Colour wheel can be categorised into _____ and technical colour wheel.
3. Technical colour wheel can be categorised into _____ and print media colour wheel.
4. Mixing red and yellow gives _____.
5. Mixing yellow and blue gives _____.
6. Mixing red and blue gives _____.
7. In RYB artistic colour wheel, R stands for _____, Y for _____and B for _____.

B. Subjective Questions

1. What are the two types of technical colour wheel? Write a short note on each of them.
2. Write a short note on the following:
   (i) Primary colours
   (ii) Secondary colours
   (iii) Tertiary colours

What have you learnt?

On the completion of this Session, you will be able to:

- differentiate between primary and secondary colours.
- differentiate between secondary and tertiary colours.
- mix primary colours to prepare secondary and tertiary colours.
- create a colour wheel from primary colours.
- distinguish between artistic and technical colour wheel.

SESSION 3: DIGITAL COLOUR WHEEL

You have learnt in the previous session that a digital colour wheel, also called as 'RGB colour model' is an 'additive colour model'. In this model, Red, Green, and Blue light are added together in various proportions to reproduce a broad spectrum of colours. The model derives its name from the first letter of the three additive primary colours—Red, Green and Blue.

The RGB colour model is used to represent and display images in electronic display devices, such as television, projector, and monitor. It is also used in digital photography. The typical RGB output devices are colour television, monitor, multimedia projector and mobile phone display, which use either TFT (Thin Film Transistor), LCD (Liquid Crystal Display), LED (Light Emitting Diode), OLED (Organic Light Emitting Diode) or Plasma Technology and RGB input devices, which include video cameras, image scanners and digital cameras. Colour printers, on the other hand, are not RGB devices but subtractive colour devices, typically CMYK [Cyan Magenta Yellow Key (Black)] colour model (Figure 1.11).

To form a colour with RGB, three coloured light beams (red, green and blue) must be superimposed (for example, by emission from a black screen, or by reflection from a white screen). Each of the three beams is called a component of that colour, and each can have an arbitrary intensity, from 'fully off' to 'fully on' in the mixture. The RGB model is an additive colour model, in which the three light beams are added together and wavelengths of the light spectra are added to make the final spectrum of the colours.

Zero intensity for each component gives the darkest colour, and full intensity of each gives a white. The quality of white depends on the nature of primary light sources, but if they are properly balanced, the result is neutral white. When the intensity of all component colours is the same, the result is a shade of grey, which is darker or lighter, depending on the intensity. When the intensities are different, the result is a colourised hue, more or less saturated, depending on the difference of the strongest and weakest intensities of the primary colours employed.

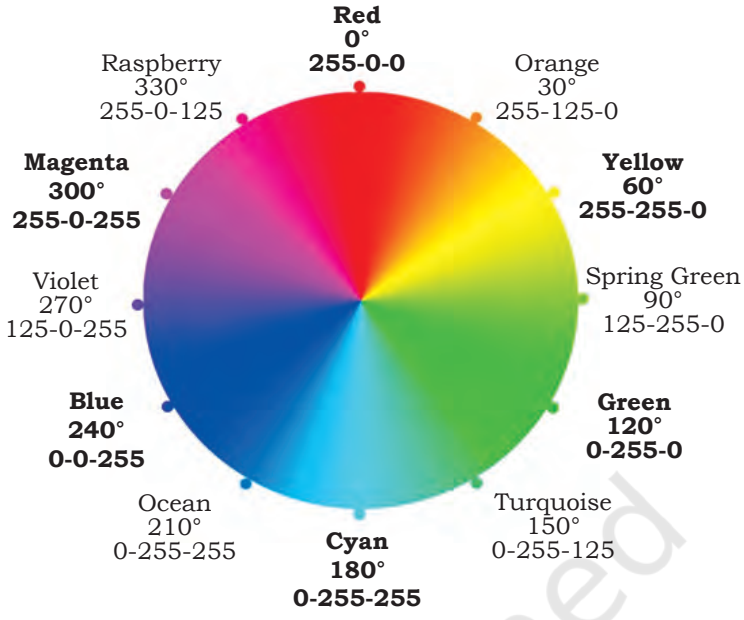


Fig. 1.11: RGB colour wheel

When one of the components has the strongest intensity, the colour is a hue near that primary colour (reddish, greenish or bluish). When two components have the same strong intensity, then the colour is a hue of a secondary colour (a shade of cyan, magenta or yellow). A secondary colour is formed by mixing two primary colours of equal intensity. Cyan is formed by adding green and blue, magenta with red and blue, and yellow with red and green. Every secondary colour is the complement of one primary colour. When a primary and its complementary secondary colours are added together, the result is white. Cyan complements red, magenta, green, yellow and blue (Figure 1.12).

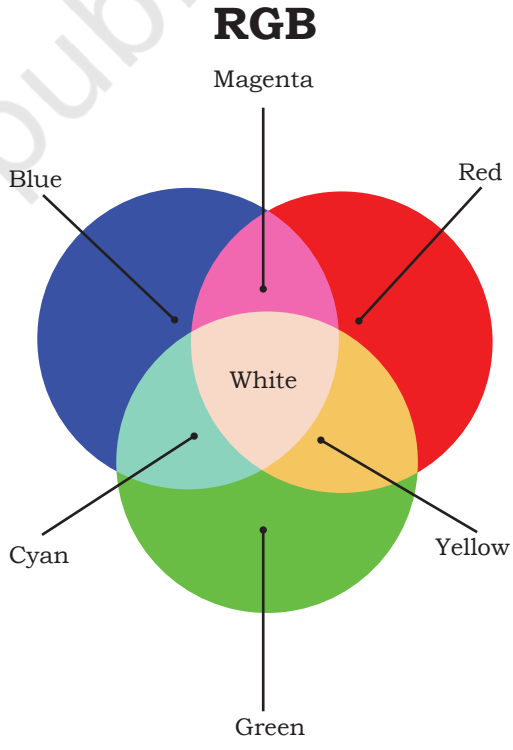


Fig. 1.12: RGB colour model

A digital image created in RGB mode stores each colour value in an '8 Bits Channel'. Hence, red value is stored in an 8 Bits Channel, green in a separate 8 Bits Channel, and blue in yet another 8 Bits Channel. Hence, the RGB image has 8 Bits × 3 Channels = 24 Bits image. This image will have 2^{24} colour = 16.78 million colour shades (true colour image).

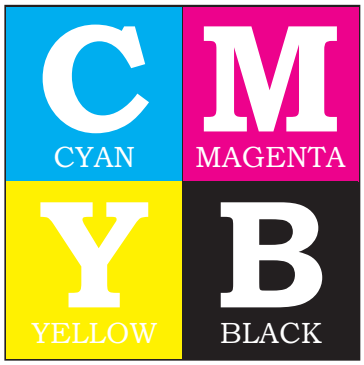


Fig. 1.13: CMYK colour model

Print Media Colour Wheel

- Primary colours for print media colour wheels are cyan, magenta and yellow.
- Digital colour wheels are often called CMYK model (Figure 1.13).
- CMYK colour model is a subtractive colour model.

The CMYK colour model (a four colour process model) is a subtractive colour model used in colour printing. It is used to describe the colour printing process. CMYK refers to the four colour inks used in printing, which are — cyan, magenta, yellow and key (black) (Figure 1.14).

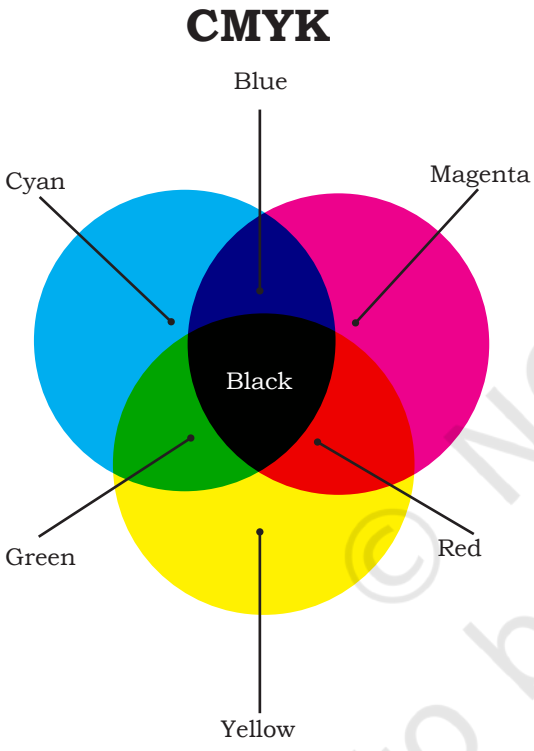


Fig.1.14: Subtractive colours or CMYK colour model

The 'K' in CMYK represents 'Key' because in four-colour printing, cyan, magenta and yellow printing plates are carefully 'keyed' or aligned with the 'key' of the black key plate (Figure 1.14). The 'K' in CMYK stands for Key, which denotes 'black'. The reason for not using the 'B' of 'black' is that this letter represents 'blue' in the RGB model, which was developed earlier. CMY being the complementary (subtractive) colours, which when mixed together must theoretically generate 'black' (absence of all colours). The 'black' generated by mixing cyan, magenta and yellow inks is not exactly black, it generates a 'muddy brown' colour. Hence, four-colour printing uses the extra fourth colour pigment, i.e., black ink, to create a pure black colour.

A digital image created for the print media in CMYK mode stores each colour value in an 8 Bits channel. Hence, cyan colour value is stored in an 8 Bits channel; magenta is stored in a separate 8 Bits channel, yellow in another 8 Bits channel, and black in yet another 8 Bits channel. Hence, a CMYK image has 8 Bits × 4 Channels = 32 Bits Image.

Another type of 32 Bits image is RGB + α-Channel image. An α-Channel saves the transparent background of that image in an 8 Bits channel. Hence, it has 24 Bits of RGB and 8 Bits of α-Channel, thereby, creating a 32

Bits image. These types of images with α-Channel are used in videos and 3D animation. The alpha channel stores transparency information. It is extremely useful for compositing digital images together.

Practical Exercises

Activity

Understanding colour mixing

Material required

White light LED torch, translucent plastic papers (gelatin paper) of red, green and blue colours

Procedure

- Cover red, green and blue translucent plastic sheets (gelatin paper) over the white LED torchlight.
- Now, go to a dark room or switch off the lights and mix each colour with the other, and see the output or resultant colour generated on the wall due to mixing of the coloured beams of light from the torch. If you mix all the three colours (RGB), you get pure white light. The more light you add, the brighter the colour mix becomes.
- Note down the colours formed.

Check Your Progress

A. Fill in the Blanks

1. The main purpose of RGB colour model is for representation and display of images in _____ media.
2. Input devices, such as video camera, image scanner and digital camera use _____colour wheel.
3. Primary colours for print media colour wheel are cyan, magenta, _____ and black.

B. Subjective Questions

1. Write a short note on RGB colour model.
2. Write a short note on CMYK colour model.

What have you learnt?

On the completion of this Session, you will be able to:

- describe the RGB model.
- select colours from the colour wheel as per the requirement.

NOTES

Session 4: RGB Display Mechanism

In the previous sessions, you have learnt that common application of the RGB colour model is the display of colours on a Cathode Ray Tube (CRT), Liquid Crystal Display (LCD), plasma display, or Organic Light Emitting Diode (OLED) display, such as television and computer monitor. You have also learnt that digital storage of an image requires that it should be broken down into a grid of tiny pixels.

Pixel

Pixel is the basic or fundamental unit of an image. One pixel has only one colour information. However, each pixel is made up of three different colour components, i.e., red, green and blue in different percentages. The value of the pixel at any point denotes the intensity of image at that location, and that is also known as grey level. In an 8 bits grey scale image, the value of the pixel is between 0 and 255. The value 0 means absence of light. It means that 0 denotes dark, which means that whenever a pixel has a value of 0, black colour would be formed at that point.

The value of a pixel at any point corresponds to the intensity of the light photons striking at that point. Each pixel stores a value proportional to the light intensity at that particular location. A digital colour image pixel is just numbers representing an RGB data value (Red, Green, Blue).

A cathode ray tube consists of three parts: the electron gun assembly, the phosphor viewing surface and the glass envelope. Each phosphor layer is responsible for one colour. The phosphors are deposited in the form of very small dots in a repeated pattern across the screen— red, green, blue and so on. It can produce a maximum of four to five colours. The red, green and blue phosphor are coated one behind the other in layers. If a low speed beam strikes the CRT, only the red coloured phosphorus is activated, a slightly accelerated beam would activate both red and green and a much more activated one would add the blue component also. It works on the principle

of combining the basic colours— Red, Green and Blue (RGB).

Pixel Resolution

You must have heard about a high and low resolution photo. A '300 DPI photo' is sometimes referred to as a high resolution photo. But a high resolution photo generally means a high pixel per inch (usually 300 or greater) when printed. Low resolution pictures are of less than 300 DPI. Thus, the more pixels per each inch, the better quality print you will get when you print an image. Resolution is a numerical digit by which the quality of an image can be measured. It is calculated as the number of pixels present per inch of an image. It can be defined in many ways, such as pixel resolution, spatial resolution, temporal resolution, and spectral resolution.

Each pixel on the screen is built by driving three small and close, yet separated RGB light sources. At a general viewing distance, the separate sources are indistinguishable, which is tricky to our eye and show a given solid colour. All pixels arranged together in a rectangular screen surface conforms the colour image.

In pixel resolution, the term resolution refers to the total number of count of pixels in a digital image. For example, if an image has A rows and B columns, then its resolution can be defined as A × B. Pixel resolution can be defined with a set of two numbers. The first number is the width of the picture, or the pixels across columns, and the second number is height of the picture, or the pixels across its width. We can say that the higher the pixel resolution, the higher is the quality of the image.

A digital camera can capture data based on the mega-pixel ability of its charge-coupled device (CCD). A digital camera has a sensor that converts light into electrical charges. The image sensor employed by most digital cameras is a charge coupled device. An 8 mega-pixels digital camera shoots at approximately 3264 × 2448 pixels. Monitor resolution is measured strictly by pixel width and height. Some common settings are 1280 × 1024, 1920 × 1080 or 2880 × 1800.

Practical Exercises

Activity 1

Understanding photo scan resolution

Material required

Colour image scanner, Adobe Photoshop, a colour or black and white laser printer

Procedure

- Scan a colour photo printed on a magazine in 50 DPI (dots per inch, which technically means printer dots per inch) and 600 DPI mode of the scanner.
- Now, take a printout from a colour or black and white printer, and observe the blurriness or sharpness of the picture.
- Compare it with the original magazine photo.
- Write down your observations in your notebook.

Activity 2

Understanding the working of CRT monitor

Material required

A computer with Internet connection

Procedure

- Surf the Internet and search for 'How CRT monitor works'.
- Study the diagram of CRT on internet.
- Draw the diagram showing the colour electron beams in a CRT monitor.

Check Your Progress

A. Fill in the Blanks

1. Pixel is the basic or fundamental unit of an _____.
2. A single pixel has _____colour information.
3. Resolution is a _____digit by which the quality of an image is measured.
4. Resolution is calculated as the number of _____ present per inch of the image.

B. Subjective Questions

1. Write a short note on pixel.
2. What is pixel resolution?

What have you learnt?

On the completion of this Session, you will be able to:

- describe the meaning of 'pixel'.
- differentiate between high and low resolution.

Session 5: Colour Schemes

Colour schemes are logical combinations of colours on the colour wheel. The colour scheme is used to create an aesthetic feeling of style and appeal on an image. Colour harmony is the procedure of creating colour schemes, depending on how they look together.

Monochromatic Colour Scheme

'Monochromatic' means one (mono) colour (chroma). Hence, a monochromatic colour scheme is made up of hues or shades of one colour. The monochromatic colour scheme uses variations in lightness and saturation of a single colour. This scheme looks clean and elegant. Monochromatic colours go well together, producing a soothing effect. It is easy on the eyes, especially blue or green hues. You can use it to establish an overall mood (Figure 1.15).

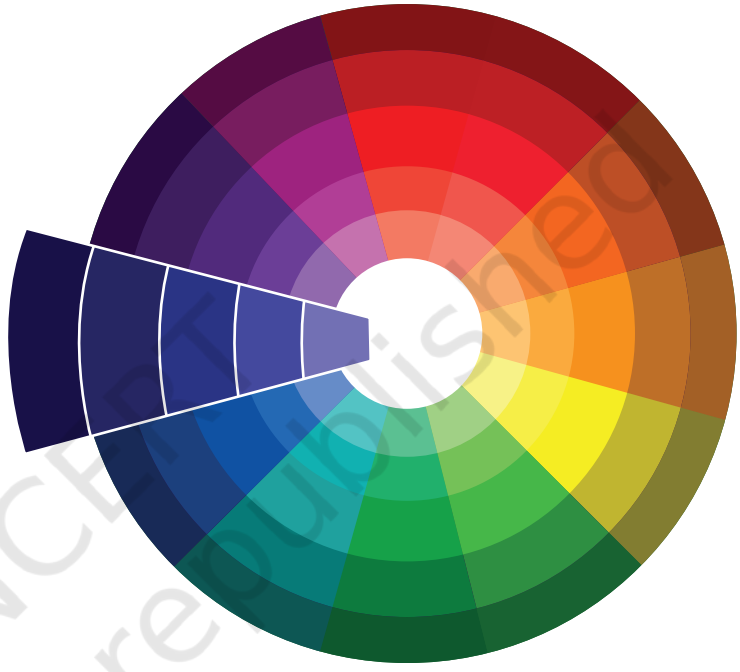


Fig. 1.15: A view of monochromatic colour scheme

The primary colours can be integrated with neutral colours, such as black, white or grey. The monochromatic scheme is easy to manage, and always looks balanced and visually appealing. However, when using this scheme, it can be difficult to highlight the most important elements. This scheme lacks colour contrast. It is not as vibrant as the complementary scheme.

Every colour has its own meaning.

Johann Wolfgang von Goethe

Analogous Colour Scheme

The analogous colour scheme uses colours that are adjacent to each other on the colour wheel. One colour is used as a dominant colour, while others are used to enrich the scheme. The analogous colour scheme is similar to monochromatic colour scheme, but offers more tones. It is advisable to avoid using too many hues in the analogous scheme as this may ruin the harmony.

Avoid combining warm and cool colours in this scheme as they can destroy the present analogous situation. Examples: Blue, blue-green, green, yellow-green, red, red-purple, purple, blue-purple.

Fig. 1.16: Analogous colour scheme

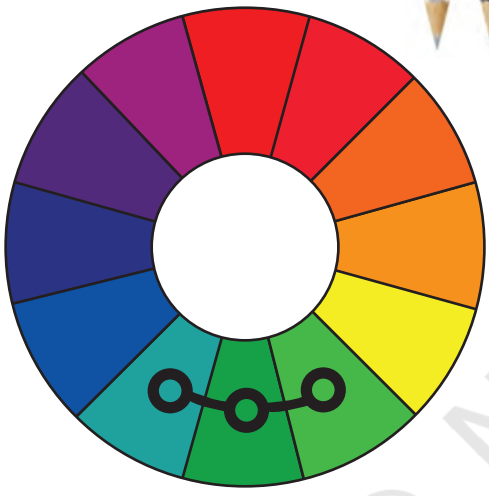


Fig. 1.17: Placement of warm colour against cool in complementary colour scheme

Complementary Colour Scheme

The complementary colour scheme consists of two colours that are opposite to each other on the colour wheel. For example, red and green are complementary colours, another example is blue and orange. This scheme looks best when you place a warm colour against a cool colour (Figure 1.17), such as cyan, which is a complement of red, can be made by mixing equal amounts of green and blue colour.

This scheme is intrinsically high-contrast. When using the complementary scheme, it is important to choose a dominant colour and use its complementary colour for accents.

By using one colour for the background and its complementary colour (Figure 1.18) to highlight the important elements, you will get colour dominance combined with sharp colour contrast.

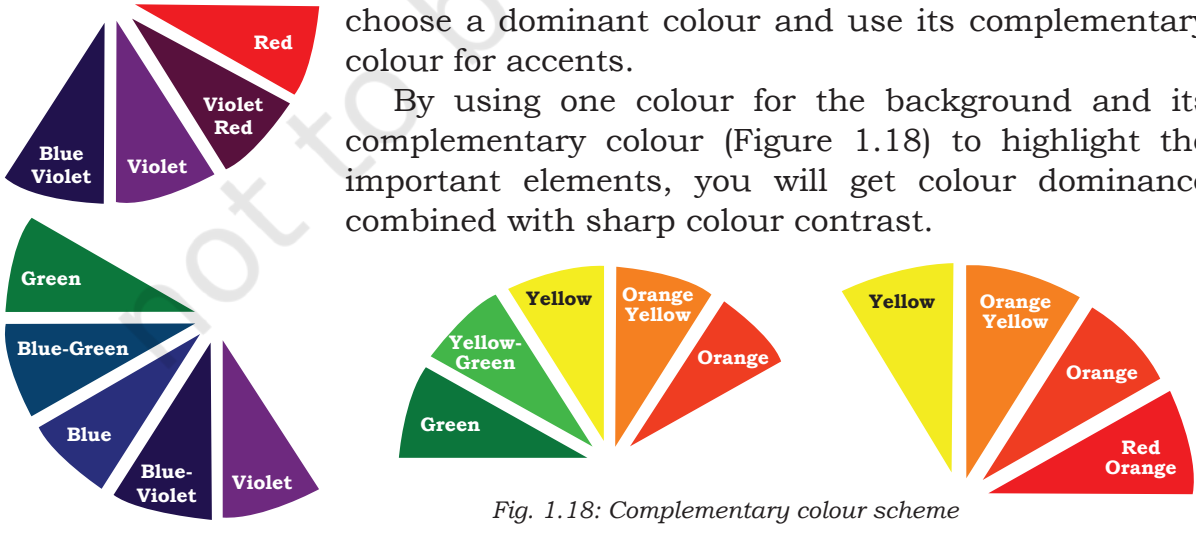


Fig. 1.18: Complementary colour scheme

The complementary colour scheme offers stronger contrast than any other colour scheme and draws maximum attention. This scheme is harder to balance than monochromatic and analogous schemes, especially when de-saturated (less pure) warm colours are used (Figure 1.19).

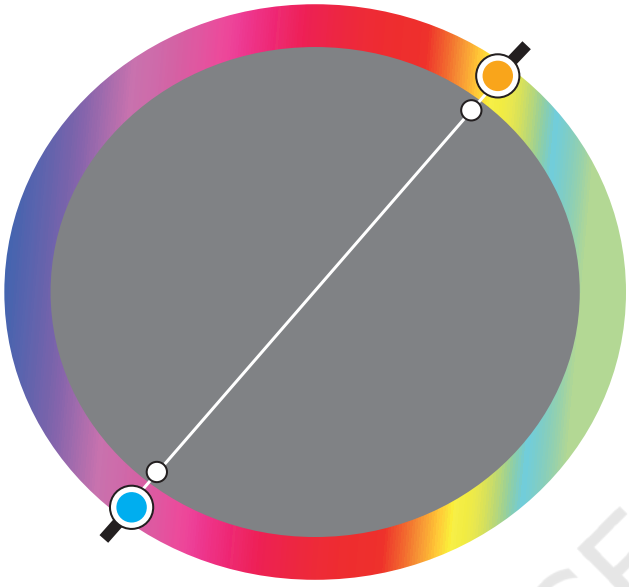


Fig. 1.19: De-saturated colour scheme

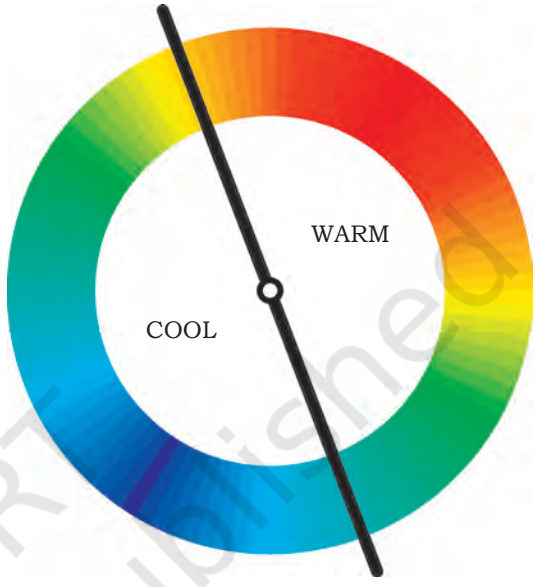


Fig. 1.20: Warm and cool colours

Warm and Cool Colours

Warm colours are made of a combination of red, yellow and orange. As the name indicates, they tend to make you think of sunlight and heat. Warm colours are vivid and energetic and tend to advance in space (Fig. 1.20). Examples are red, yellow and orange.

Cool colours are associated with cool things and give a calm and soothing feeling. Cool colours remind us of water and sky. Examples are blue, purple and green.

White, black and grey are considered to be neutral colours.

Practical Exercises

Activity 1

Creating different shades of cool colours

Material required

Adobe Photoshop

Procedure

- Create five overlapping circles having different shades of cool colours (blue or green tones).
- Create a JPG file and view the same in full screen mode in Adobe Photoshop.
- Write down the feeling you had while observing the circles.
- Does the image give you peace of mind?
- Perform a similar activity for warm colours and note down your observations.

Check Your Progress

A. Fill in the Blanks

1. A colour scheme, which consists of two colours that are opposite to each other on the colour wheel, is known as _____colour scheme.
2. The scheme which offers stronger _____ than any other colour scheme and draws maximum attention is known as complementary colour scheme.
3. When colours are made with orange, red, yellow and a combination of them, these colours are called _____colours.
4. When colours, such as blue, green and light purple are used for mixing purpose, then they are known as _____colours.

B. Subjective Questions

1. Differentiate between monochromatic, analogous and complementary colour schemes.
2. Write a short note on cool and warm colours.

What have you learnt?

On the completion of this Session, you will be able to:

- distinguish between monochromatic, analogous and complementary colour schemes.
- describe the advantages and limitations of various colour schemes.
- create colour schemes as per the requirement.

Chapter 2

Digital Photography and Pre-production

There are three parts in any type of film production process, these are— pre-production, production and post-production.

Pre-production

In the pre-production process, you have to define the message that you would like to convey to the audience, create a story to convey the message, decide your budget, decide your locations for video shooting, determine your video length, decide the characters, determine the equipment you need, and plan the timing of the film. Skipping any of these aspects will cause serious problems later in the production process.

Pre-production in film-making, is the process in which after writing the concept or developing an idea, a story is developed into a script. In a live video film, the script is followed by screenplay writing. The screenplay is followed by cinematography (video shooting) of the script. This sequence of activities falls in the pre-production phase.

In case of an animation film, the development of a storyboard (also called storyboarding or storyboard making) is the pre-production process after scriptwriting. This is followed by animatic design and Voice Over Recording (VOR). If it is a verbal film

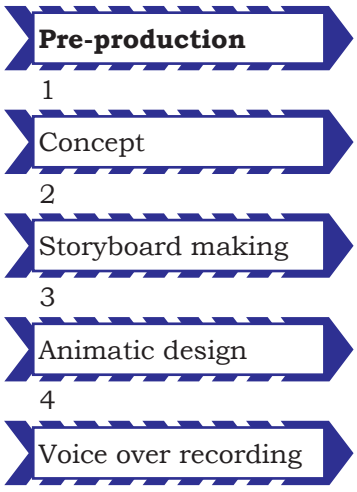


Fig 2.1: Pre-production stages

(dialogue-based animation film), then VOR is done, else storyboard making is the last stage of pre-production. The VOR helps the animator to animate exactly what is required by the script. This is opposite to video film production, where we can shoot the actual footage, which may be 3–4 times the duration of the actual film length. It is important to note that pre-production is the most important process for success in planning a film (Figure 2.1).

Session 1: Camera Angles and Movements

Camera angles and camera movements are combined to create different shots or scenes. A camera is placed in relation to the subject (object to be filmed) in such a way that the viewer perceives the subject and best elaborates the script or storyboard.

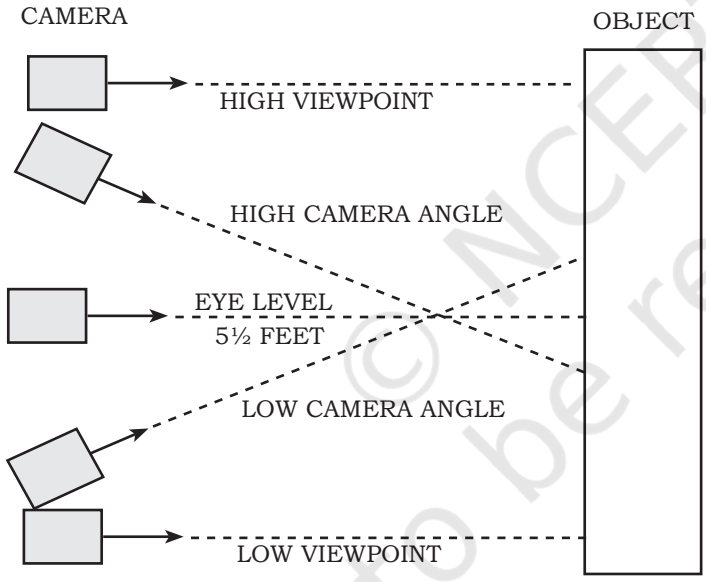


Fig. 2.2: Camera angles

Types of Camera Shots

Camera shots indicating subject size can be divided into Long, Medium and Close.

Long shots (wide shots) show the subject from a distance, emphasising place and location, while a Close shot shows the details of the subject or character. Medium shots place emphasis on the subject, while still showing some of the surrounding environment.

Shots indicating placement of camera in relation to the subject can be categorised into high, low, eye level, bird's-eye view, or worm's-eye view.

A 'viewpoint' is the actual distance and angle from which the camera views and records the subject. It includes the camera's eye level, and point of view shot (Figure 2.2).

In a High-angle (HA) shot, the camera is at a higher level than the subject and is looking down upon it. The high-angle shot can make the subject look smaller. While

a low-angle (LA) shot is taken from a lower height than the subject to make it look threatening, the background of a low angle shot will tend to be just sky or ceiling, with the lack of much detail for viewers. The added height of the object may create a feeling of fear or insecurity in the viewer, who is psychologically dominated by this figure on the screen.

In an Eye level (EL) shot, the camera is placed at the same level of the height as the eyes of the characters in the frame. The camera will be placed at approximately 5–5½ feet from the ground. The shot has little to no psychological effect on the viewer. This shot is taken when the camera is at the level of the subject, or looking straight on to it.

The Bird's-eye view shot shows a scene from the top, looking down directly on the subject below. Familiar objects viewed from this angle might seem totally unrecognisable at first (umbrellas in a crowd, dancers' legs and heads). People can be made to look insignificant or ant-like (of smaller significance). Sir Alfred Joseph Hitchcock, an English film director and producer, and his admirers were fond of this style of shot (which created a feeling of suspense). Hitchcock is regarded as one of the most influential filmmakers in the history of cinema.

Camera Movements

A director of the film uses various camera shots for telling a story— as a series of cuts, going from one shot to another. There are seven basic methods of camera movements.

Pan

It is a camera movement, in which a scene is shot with horizontal movement. The camera is placed on a tripod, which is fixed, i.e., a stationary axis point, as the camera is turned, following a moving object, which is kept in the middle of the composed frame (Figure 2.3).

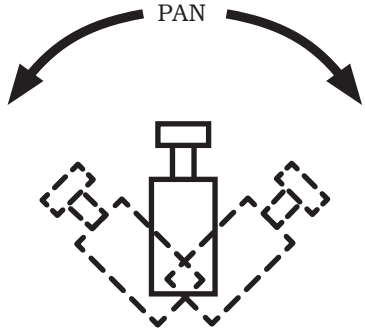


Fig. 2.3: Camera pan angles

Tilt

A movement, wherein a scene is shot vertically up and down, similar to a horizontal 'pan' (Figure 2.4).

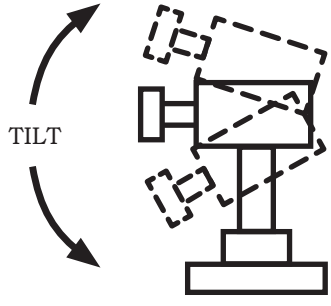


Fig. 2.4: Camera tilt angles

Dolly shots

Dolly shot involves laying a track for the camera which follows the object, hence it is also known as 'tracking' shot. Thus, sometimes it is also called as 'tracking' or 'trucking' shots (tracking the moving object). The camera is placed on a moving vehicle and moves parallel to the action, often following a moving figure or object.

It is, therefore, a shot taken from a moving dolly (a platform with a set of wheels). The camera can be mounted on a car, plane, or even a shopping trolley, or revolving wheelchair. Dolly shot may be a way of recording movement, the journey of a character, or moving in a direction from a long shot to a close-up of an object or subject, which may, gradually, focus on the audience or a particular object or character (Figure 2.5). When the camera moves towards the subject, it is known as 'dolly in.0', and when it moves away from the subject, it is known as 'dolly out.0'.

Fig. 2.5: Dolly shot

Crane shots

It is a moving shot taken from a crane (a mechanical arm which carries both camera and camera operators). A crane (or 'jimmy jib') is a large heavy equipment (Figure 2.6), which is used for moving the camera at very high or very low level, without the camera-person going closer to the object— the whole arm of the jimmy jib can move up, down, left, right, driving in on action, or moving diagonally out of it. The camera-person and

camera are counter-balanced by a heavy weight, and a jib operator needs to take care of the safety of self and others while handling the equipment.

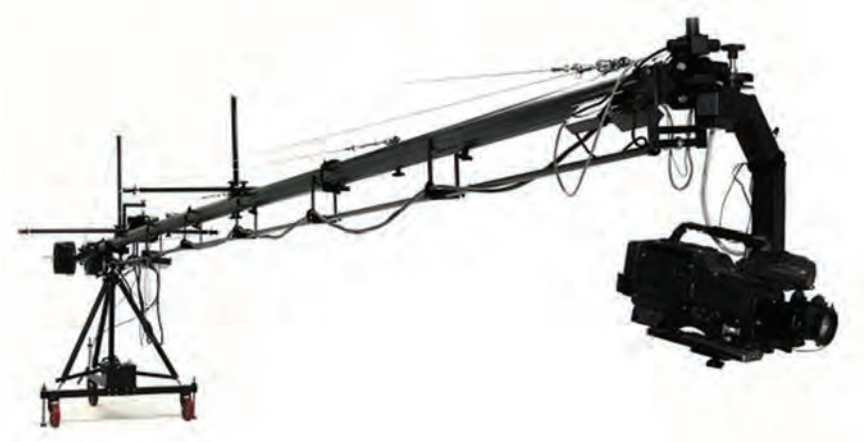


Fig. 2.6: A camera with a crane

Aerial shot

An aerial shot is a shot taken from a flying object such as, helicopter or a drone camera (Figure 2.7).

Fig. 2.7: A drone with a camera for taking aerial shots

Handheld shots

In handheld shot, the camera is held in the camera operator's hands, as opposed to being mounted on a tripod. They can make the audience feel as though they are actually part of a scene, rather than observing it from a detached far away position.

Common Photography Terms

Some of the common photography terms related to camera are given below.

Zoom Lens

A zoom lens has a mechanism that changes the magnification of an image in a camera. While a prime lens (also known as fixed lens) has a fixed focal length, a zoom lens has a variable focal length. Zoom lenses have two specifications that represents two extremes of the zoom range. For example, 70–200 mm range means

Fig. 2.8: Types of zoom lenses

that the lens may act as a 70 mm focal length lens, a 200 mm focal length lens and everything in-between will have variable aperture ranges. It is the photographer who can get a 'close-up' shot while being at some distance from the subject. Zoom lens can make an object appear closer or farther, either quickly (a smash zoom) or slowly, without moving the camera even an inch, thus, saving time and hassle. Zoom lenses are extensively used by directors, who try to give the impression of movement and excitement in a scene while it actually does not exist. One must use zoom lenses with caution and on a tripod to avoid hazy pictures (Figure 2.8).

Aperture

Aperture is the size of the opening in lens (Figure 2.9). Think of the lens as a window—a wide open window that lets in more light, while a little open (largely closed) window lets in less light. A wide open aperture will allow more light to fall on an image for a brighter photo, while a smaller aperture lets in less light.

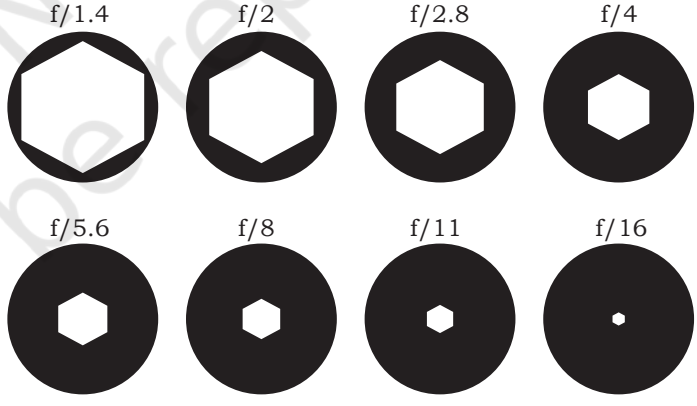


Fig. 2.9: Aperture size

A diaphragm of a camera consists of overlapping metal blades (the iris) that open and close to change the size of the opening, which is required for controlling the aperture and depth of field of an image.

Aperture is measured in f-stops. The aperture of a lens is the diameter of the open circle or diaphragm inside a lens. This diameter is expressed as f-number, such as f/1.4 or f/16. The lower the f-number, the wider the aperture. The wider the aperture, the more light gets into the sensor. A small f-stop like f/1.8 means

a wide opening, while a large f-stop like f/22 is a very narrow opening. Aperture is one of the three camera settings that determines an image exposure, or how light or dark it is. Aperture also affects how much of the image is in focus—wide apertures result in creamy, unfocused background, while narrow ones keep the image sharp.

Aspect ratio

It is the ratio of the projected image's width to its height. A 1:1 ratio means that an image's width and height are equal, thus creating a square. A 6×4 inch image has an aspect ratio of 3:2, which is there in 35 mm Film DSLR Cameras and Smartphones. A 4:3 ratio is used for television displays, computer monitors, and digital cameras. The 16:9 ratio is mostly seen on presentation slides, computer monitors, or widescreen HDTVs (Figure 2.10).

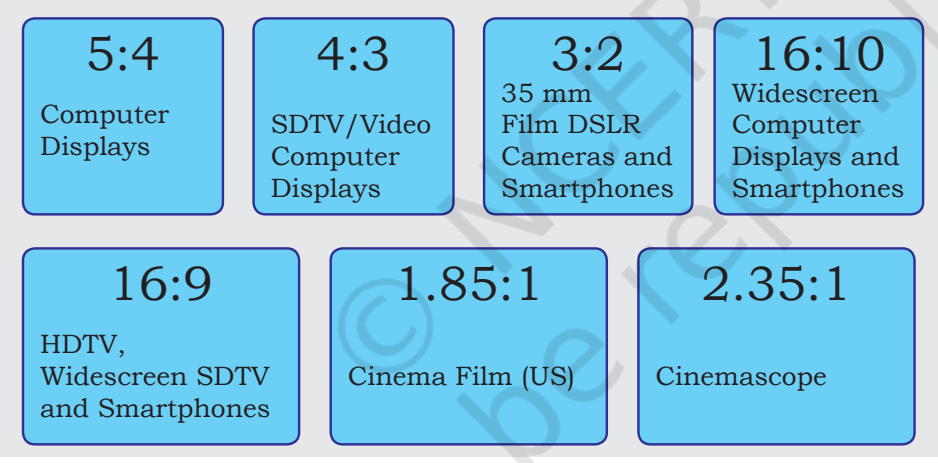


Fig. 2.10: Aspect ratio in photography

Burst mode

You can take photos one at a time, or can turn the burst mode on and the camera will continue snapping photos as long as you hold the button down, or until the buffer is full. Burst speed differs based on what camera you own, some are faster than others. It depends on how fast it occurs and it is written in 'fps' or frames (pictures) per second (Figure 2.11).

Fig 2.11: An example of burst mode

Depth of field (DoF)

Depth of field refers to how much of an image is in focus. The camera will focus on one distance, but there is a range of distance in front and behind that point that stays sharp—this is known as depth of field. Portraits often have a soft, unfocused background—this is a shallow depth of field. Landscapes, on the other hand, often have more of the image in focus—this is a large depth of field (Figure 2.12).

Fig. 2.12: Depth of field

Digital and optical

Digital and optical are important terms to understand when shopping for a new camera. Digital means the effect achieved through software, and not the physical parts of a camera. Optical is always better than digital. These terms are, usually, used when referring to zoom (in a compact camera), as well as image stabilisation (Figure 2.13).

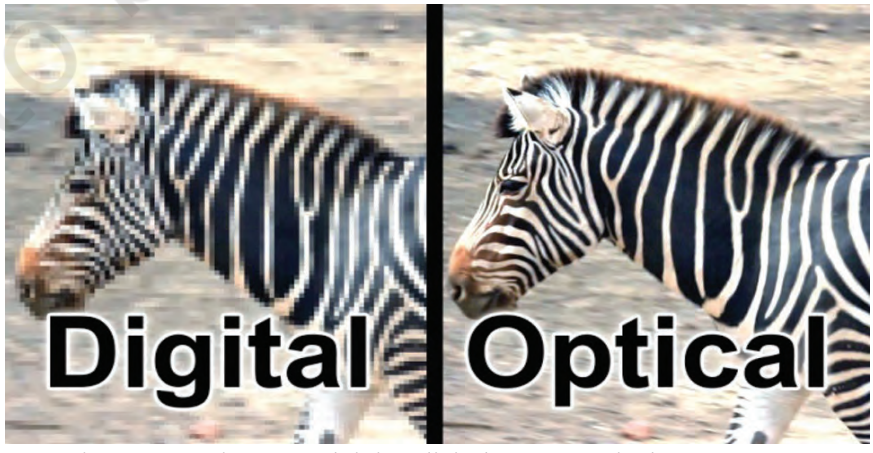


Fig. 2.13: A picture explaining digital versus optical zoom concept

Exposure

An image is created when the camera sensor (or film strip) is exposed to light. Exposure is how light or dark an image is. A dark photo is considered underexposed or not exposed to enough light. A light photo is overexposed or exposed to too much light. Exposure is mainly controlled through aperture and shutter speed. The shutter speed or exposure time is the length of time when the digital sensor in the camera is exposed to light. It is also the time when a camera shutter is open while taking a photograph. It is indicated as f-stop (Figure 2.14). Aperture controls the depth-of-field, which is what is in focus in the picture. Aperture can be used to draw attention to one subject by blurring the background with a wide aperture (Figure 2.15).

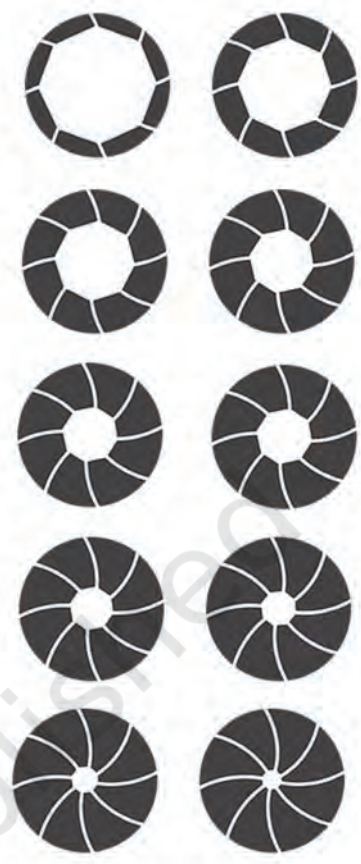


Fig. 2.14: Wide to narrow aperture

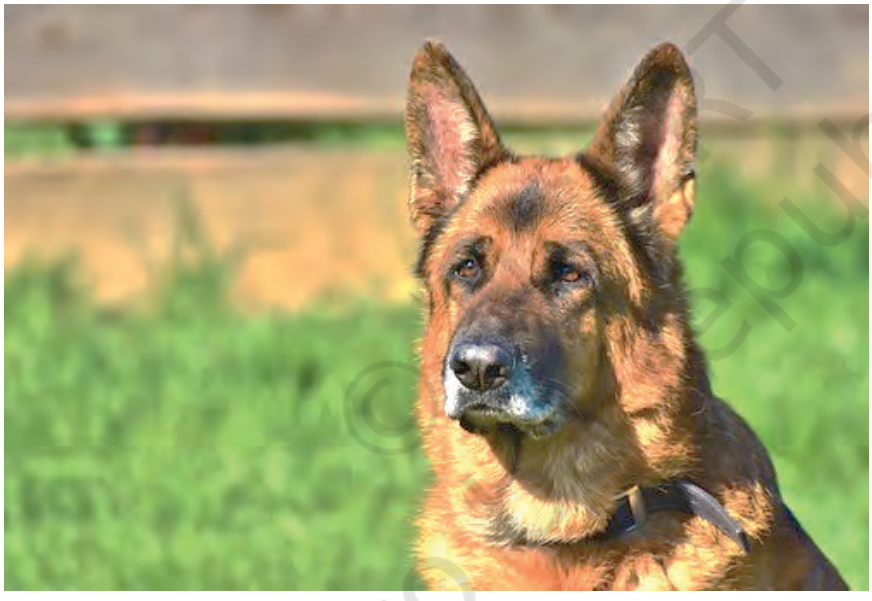


Fig. 2.15: Use of aperture to draw attention to one subject

Exposure compensation

Exposure compensation is a way to tell the camera that you would like the exposure to be lighter or darker. It is measured in stops. A single stop represents doubling of the amount of light hitting the sensor. Exposure compensation gives you the ability to change the shutter speed while staying at the same aperture you have originally set. In Aperture (A) Priority mode, exposure

compensation changes the shutter speed, whereas in Shutter (S) Priority mode, exposure compensation changes the size of your aperture. In Programme (P) mode, exposure compensation changes the shutter speed (Figure 2.16).

Fig. 2.16: Exposure compensation

Exposure bracketing

In exposure bracketing, the camera is set to take multiple pictures in a row, with the first at normal exposure, the next one underexposed, and the final one overexposed (Figure 2.17).

Fig. 2.17: Exposure bracketing

Focus

When your eyes focus on a closer object, the objects far away will appear blurry. 'Focus', a common photography term, has the same meaning. Something that is in focus is sharp, while an object that is out-of-focus, is not sharp. Different focus areas determine if the camera is focusing on multiple points or one user-selected point. An image that is completely sharp is said to be in-focus. An image that's completely blurry is said to be unfocused. The icon usually used for focus is shown in Figure 2.18.

Fig. 2.18: Icon of Focus

Histogram

A histogram is a graph that shows frequency of anything. Usually histogram have bars that represent frequency of occurring of data in the whole data set. The image is made up of millions of pixels and each pixel has a value representing its colour. The pixel's brightness is derived from this value. A histogram is a graph, which you can see on your camera, and it tells you about the distribution of light in an image. The scale of the histogram goes from left to right i.e. from 0% brightness (black) to 100% brightness (white). A histogram has two axis— the *x* axis and the *y* axis. The *x* axis contains the event, the frequency of which you have to count, and the *y* axis contains frequency.

The different heights of bar show different frequency of the occurrence of data. The *x* axis shows the grey level intensities and the *y* axis shows the frequency of these intensities. If the chart peaks towards the left, the image has a lot of dark hues. If it peaks to the right, the image has a lot of light hues. If those peaks are cut off at the edges, the image is underexposed (on the

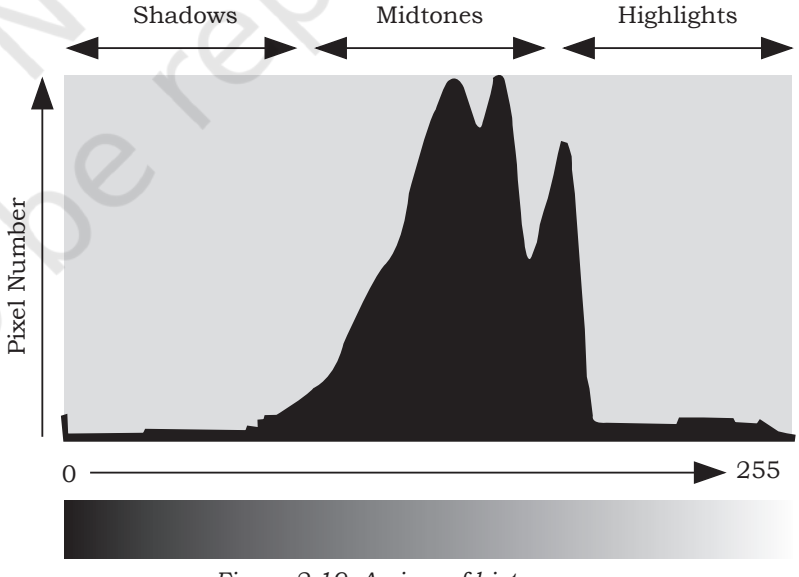


Figure 2.19: A view of histogram

Fig. 2.20: Hot shoe

left edge) or overexposed (on the right edge). It is, therefore, used in adjusting the contrast of an image and equalise an image (Figure 2.19). A histogram is something that the beginners must learn after understanding manual modes.

Hot shoe

Hot shoe (Figure 2.20) is the slot at the top of a camera for attaching hot shoe flash or other accessories. The flash unit creates a circuit between the shoe and the contacts. Once the circuit is complete, the flash will fire as the shutter is pressed.

ISO (International Organisation for Standardisation)

In digital photography, ISO measures the sensitivity of the image sensor or film inside the camera. This measure of sensitivity is expressed as ISO speed. The ISO speed of film or digital camera sensors is derived from standards adopted by the International Organisation for Standardisation. For example, an ISO of 100 means the camera is not very sensitive for shooting in daylight. An ISO of 3200 means the camera is very sensitive to light. Therefore, a camera with higher ISO can be used for getting shots in low light. The trade-off is that, images at high ISOs appear to be grainy and have less detail. ISO is balanced with aperture and shutter speed to get a proper exposure.

Cameras have different range of ISO values that you can use. A common set of ISOs are as follows:

- ISO 100 (low ISO)
- ISO 200
- ISO 400
- ISO 800
- ISO 1600
- ISO 3200
- ISO 6400 (high ISO)

Long exposure

Long exposure refers to an image exposed to light for a long time or the one that uses a long shutter speed. This technique is useful for shooting still objects in low light. Long exposure night photography can produce better results.

Manual mode

Manual mode allows a photographer to set the exposure instead of having the camera do it automatically. In manual mode, you choose the aperture, shutter speed and ISO, and those choices affect how light or dark an image will be. Semi-manual modes include aperture priority (where you only choose the aperture), shutter priority (where you only choose the shutter speed) and programmed auto (where you choose a combination of aperture and shutter speed together instead of setting them individually). Manual mode thus allows you to select an aperture value and shutter speed value manually.

Image noise

Image noise is a random variation of brightness or colour information in images. Images will show more noise in the shadow areas than in lighter parts. Images taken at high ISOs have a lot of noise, so it is best to use the lowest ISO. There are softwares which can be used for noise reduction.

RAW

RAW is a file type and is considered as the best form of image file, since it does not process the picture, leaving total control of editing to the user. RAW file size is much larger than jpeg files, but is smaller than tif files.

Rule of thirds

'Rule of thirds' is a compositional rule, which is applied by imagining that the image is divided into three parts, both horizontally and vertically. Often the most interesting compositions result in placing the subject on one of the intersections of those imaginary lines,

Fig. 2.21: Application of Rule of Thirds

instead in the centre of the photo. It is one of the most well-known rules of photography as it forms the basis for balanced and creative shots (Figure 2.21).

Shutter speed

Shutter is that part of the camera, which opens and closes to allow light in and take a picture. Shutter speed refers to how long the shutter stays open. Shutter speed is typically measured in fractions of a second. The longer the shutter stays open, the more the light is let in. But anything that moves while the shutter is open will become blur, and if the entire camera moves while the shutter is open, the whole image will be blurry. That is why, tripods are necessary for longer shutter speeds.

Shutter release

It is the push button that you press on the camera to take a picture. When the button is pressed, the shutter of the camera is released, so that it opens to capture a picture, and then closes, allowing an exposure time as determined by the shutter speed setting.

Time lapse

Time lapse is a video created by stitching several photos of the same thing taken at different times together. Time lapse is not to be confused with long exposure, which is a single image with long shutter speed.

Fig. 2.22: Viewfinder

Viewfinder

It is the hole from where one looks through to take a picture. Some digital cameras do not have this and have a screen instead. But all Digital Single Lens Reflex Cameras (DSLRs) and most mirror-less cameras use viewfinders (Figure 2.22).

White balance

Your eyes automatically adjust to different light sources but a camera cannot do that. That is why, sometimes, when you take an image, it looks blue or yellow. White balance is a camera setting that adjusts the colour balance of light (Figure 2.23). All digital cameras have an auto white balance setting that analyses the colours in a scene and neutralises them automatically. But like any automatic setting, it is not always accurate. This is why cameras also offer manual white balance presets that you can choose to match the conditions. You can use a pre-set based on what light you are shooting in, like daylight or tungsten.

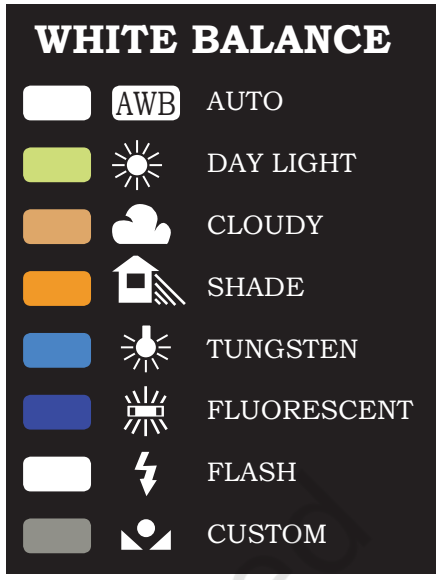


Fig. 2.23: White balance settings

Practical Exercises

Activity 1

Understanding camera angles

Material required

DSLR Camera

Procedure

- Click photos with different camera angles using a DSLR camera and observe the differences.
- To begin with you may click horizontal or landscape photos, vertical or portrait photos, etc.
- Now try the different camera angles, such as high level, low level, bird's eye view and eye level.
- Make a note of your observations and include the photos in your portfolio.

Check Your Progress

A. Fill in the Blanks

1. A _____ shot is one in which the camera is physically at a higher level than the subject.
2. A _____ shot is taken from a lower level than the subject and has the power to make the subject look powerful or threatening.

3. An _____ shot is taken at the level of the subject. Here, the camera looks straight at the subject.
4. The _____ view shot shows a scene from the top level, looking down directly on the subject below.
5. A _____ shot makes the object clicked seem smaller and less significant.
6. In _____ camera movement, a scene is shot with horizontal movement.
7. In _____ camera movement, a scene is shot vertically up and down, similar to a horizontal pan.
8. In _____ shot, the camera moves alongside the subject it is recording.
9. A _____ lens has a mechanism that changes the magnification of an image.
10. Aperture is the _____ of the opening in the lens.
11. Depth of field is a term in photography that refers to how much of the image is in _____.
12. _____ is how light or dark an image is.
13. _____ shoe is the slot at the top of a camera for adding accessories.
14. The ISO determines how sensitive the camera is to _____.
15. A long exposure is an image that has been exposed to light for a long time or uses a long _____ speed.

B. Subjective Questions

1. Write short notes on the following:
   (a) Aperture
   (b) Exposure
   (c) Focus
   (d) Depth of field
2. What is the difference between crane shot and aerial shot?

What have you learnt?

On the completion of this Session, you will be able to:

- describe the pre-production steps;
- identify the various types of camera shots and camera movements;
- describe the purpose of Zoom lens;
- explain aspect ratio in photography; and
- describe the meaning of various terms related to exposure in photography.

Session 2: Pre-production

Notes

Pre-production is a phase that involves development of ideas and planning prior to the process of production. In an action movie, it is the period before the filming actually starts. In an animation film, it is the period before real animation takes place.

The success of a project lies in 'planning'. This Session gives an overview of the different steps involved in the pre-production process and how each step helps to develop a roadmap on which to base the further production stages. Although there is a general sequence of events in pre-production, it is normal for various stages to be revisited more than once. Having the insight, discipline, and patience to recognise and make changes when appropriate, is a key quality for anyone working on animation.

Storyboard

A 'storyboard' is a sequence of drawings that is used to help communicate ideas and messages. It includes a series of drawings and pictures with some directions and dialogues. It describes the events and scenes, often accompanied by text notes, describing what is occurring in the scene. Storyboards may also include lighting and camera movements to describe the frame in detail. The idea of storyboarding was developed at the Walt Disney Studio during the early 1930s. The first complete storyboards were created for the 1933 Disney short movie 'Three Little Pigs' (*The Story of Walt Disney*, Henry Holt, 1956).

A film storyboard is a series of frames with drawings in the sequence of events taking place in the film. It helps film directors and cinematographers to visualise the scenes and find basic requirements and potential problems before the shooting of the film. A detailed storyboard may also help in estimating the cost of the overall production of the film.

Character Design

Character design includes developing the appearance and features of characters in an animation (Figure 2.24). Often, an actual model is produced using modeling

clay in order to get a better idea of the appearance of a character.

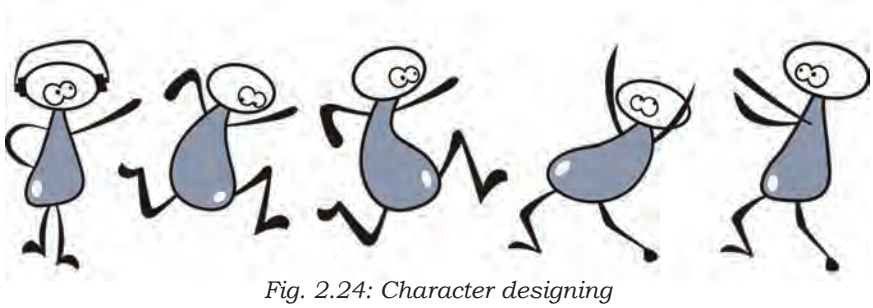


Fig. 2.24: Character designing

Model sheets

Model sheets are drawings of posed cartoon or comic spip characters that are created to provide a reference template for production of art or comic book or video. 'Model sheets' are produced to help animators work on the appearance of characters. These sheets help animators to understand the character details. 'Character line-up sheets' are also produced to compare the scale of the characters against one another.

Expression sheets

Expression sheets serves as a guide for the facial expressions of a character, such as smile, laugh, sad, shocked, startled, sleepy, alert, thoughtful and concerned (Figure 2.25).

Fig. 2.25: Expression sheet

Animatics

Animatics are used for pre-visualising the film before the actual production starts. You may consider it as storyboards that are brought to life using animation and sound. It is made up of individual frames taken from the storyboard. Each frame depicts a certain key point

of a scene or movie, which is accompanied by audio, sound effects and music.

Practical Exercise

Activity 1

Make a storyboard.

Material Required

Storyboard sheets or chart papers, thumbnail sheets, board, writing material.

Procedure

- Make a list of the main events of the story.
- Arrange them in the order in which the story will be told through the storyboard.
- Draw or pick scenes that show the plot developing from start to finish. Scenes could be about plot twists, showing different settings, character development, etc.
- Show the turning points of the scenes as it brings about curiosity amongst the learners.
- Write a description of what each cell will show so that it can be converted into dialogue. You might want to have a cell that shows a conversation between two characters. You can show characters fighting, smiling, or moving. Show the background behind the characters.
- Also mention the composition for each cell, which may include lighting, colour palette, etc. Props (objects in the frame) and special effects may also be included.
- You may also mention the angle from which the camera will be shooting (high, low, dolly shot, wide shot, tracking shot, etc.)
- Show your storyboard to the teacher and take feedback for improvement.
- You may use the pictures given below to start your storyboard.

Check Your Progress

A. Fill in the Blanks

1. Pre-production is a phase that involves further developing of ideas and planning prior to the process of _____.
2. A _____ is a sequence of drawings that is used to help visualise the animation and to communicate ideas clearly.
3. A _____ contains key events and scene changes in the animation, and is often accompanied by text notes, describing what is occurring in a scene, such as camera movements.
4. Character _____ involves developing the appearance and features of characters in an animation.
5. _____ sheets are produced to help animators work on the appearance of characters.
6. An animatic is a timed moving version of the _____.

B. Match the Columns

Column A	Column B
1. Storyboarding	(a) It is a timed moving version of the storyboard, made up of individual frames taken from the storyboard.
2. Model sheets	(b) These are precisely drawn groups of pictures that show all of the possible expressions that a character can make.
3. Animatics	(c) It is a sequence of illustrations and images for the purpose of visualising animation or a motion picture.

C. Subjective Questions

1. Write a short note on character design and animatic.
2. Differentiate between storyboard and animatic.

What have you learnt?

On the completion of this Session, you will be able to:

- demonstrate the knowledge of the process of pre-production.
- describe the importance of storyboard in pre-production process.
- identify the elements of a story.
- generate ideas for drawing characters for a storyboard.

Chapter 3

Drawing and Painting using Adobe Photoshop

Adobe Photoshop is a computer application software used to edit and manipulate digital images. It helps in creating and manipulating documents and files using various elements, such as panels, bars and windows. An arrangement of these elements is called a 'workspace'. On starting an Adobe Creative Suite component, the default workspace is seen, which can be customised for the tasks to be performed there. For instance, you can create one workspace for editing and another for viewing, save them and switch between them as you work. You can restore the default workspace at any time by choosing the default option on the 'Window > Workspace' menu.

Texture painting tools are a means of adding the final finishing details. The brushes are intuitive, customisable and have the potential for producing realistic 3D models. Even the default brush sets included in the software package offer a variety of high-quality textures. These tools work together and allow one to paint textures directly from an external image onto one's model.

The 'Tool' panel (called the 'tool palette' in Photoshop) contains tools for creating and editing images, artwork, page elements, and so on. Related tools are grouped together.

The 'Control' panel (called the 'option bar' in Photoshop) displays options for the currently selected tool.

On starting Photoshop, the 'tool palette' appears on the left of the screen. Some tools in the palette have options that appear in the context-sensitive option bar. These include tools that one can use for typing, selecting, painting, drawing, sampling, editing, moving, annotating and viewing images. Other tools allow one to change the foreground and background colours, go to Adobe online and work in different modes.

Digital painting is a way of creating an art object digitally. It is a technique for making digital art on computer. It refers to a computer graphics software that uses a virtual canvas and a virtual painting box of brushes, colours and other supplies. The virtual box contains many instruments that do not exist outside the computer, and give a digital artwork a different look and feel from an artwork that is made using the traditional way.

SESSION 1: INTRODUCTION TO ADOBE PHOTOSHOP

Adobe Photoshop can be used to create images from editing and manipulation of the existing images. Photoshop skills are useful and can help in doing jobs related to animation. The common features of the Adobe Photoshop are workspace, layers, smart objects, blend modes, selection techniques, filters and many other necessary features that you would be using.

When you first open Photoshop, you have a blank working space with various menus. Let us now look at some of the important features of an Adobe Photoshop that you can use to edit the image.

- **Menu bar** (seen horizontally at the top of the screen) shows the File, Edit, Image, Save as and other menus that give you access to a variety of commands, adjustments, and panels.
- **Options bar** (underneath the menu bar) displays options for the tool you are currently working with.
- **Tools panel** (on the left of the screen) contains tools for editing images and creating artwork. You can access related tools in a group by clicking and holding a tool in the panel.

- **Panels** (on the right) include Colour, Layers, Properties, and other panels that contain a variety of controls for working with images.
- **Document window** (in the middle) displays the file you are currently working on.

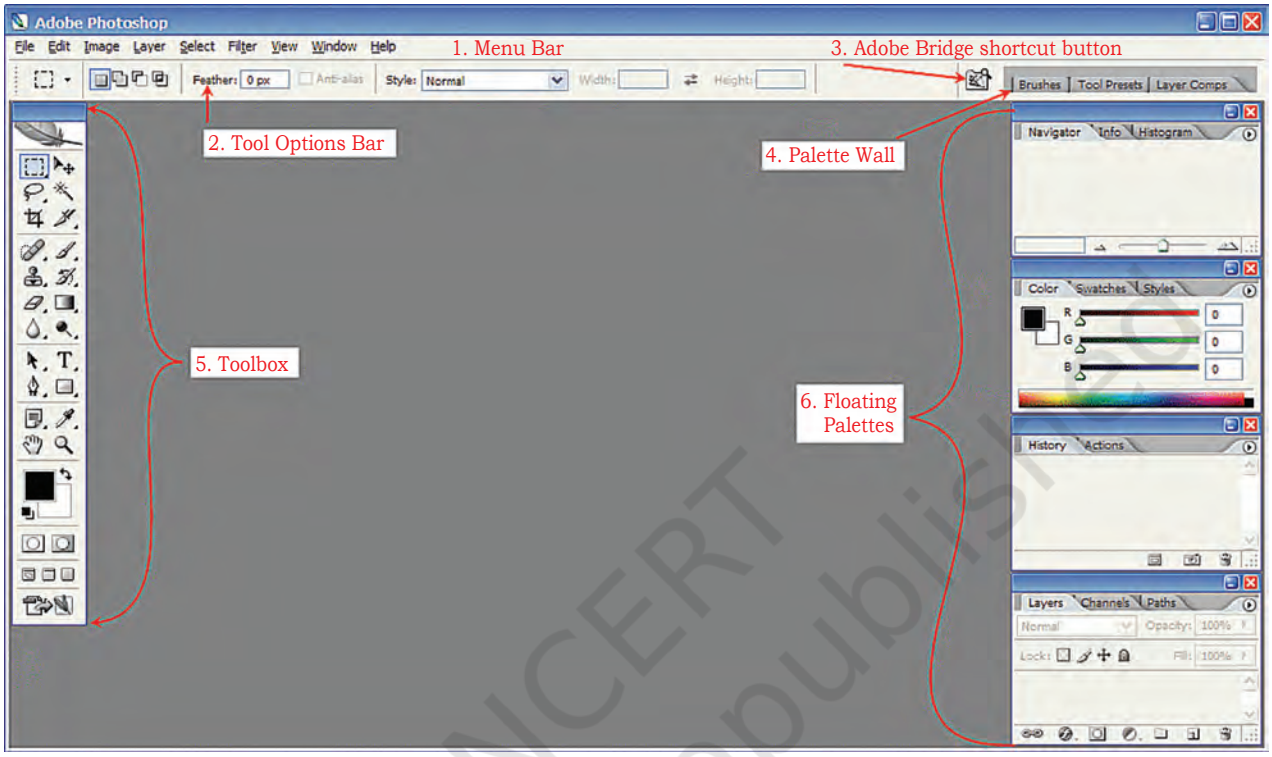


Fig. 3.1: Features of Adobe Photoshop

Open Images or Create New Images

Once the programme starts, one needs to open an existing file or create a new file in order to create an image. This can be done by clicking at the menu bar and selecting New option or pressing Control key and N together.

In the menu bar, choose File > Open to open an existing image.

In the menu bar, choose File > New to create a new image.

Saving a File

You can save your image in Photoshop (.psd) format. Saving in JPEG (.jpg) or PNG (.png) format will save it as a standard image file that can be shared and opened by other programmes.

Save image: Choose **File > Save** or **File > Save As.**
Close image: Choose **File > Close.**

Choose Dimension

One of the several options available is for setting the dimensions of one's canvas or work area. You can use preset size (such as 8.5"×11", A-4 size), custom size (using the height and width controls), or clipboard option (which will set the canvas size to the default dimension stored in one's computer).

Choose Resolution

One may want to set a resolution for an image, based on how one intends to use it. The resolution determines how many pixels will be in one square inch of the image. The more the number of pixels in an inch, the more detailed the image will be.

A higher number of pixels per inch will result in a larger image and file size. Larger files will require larger amount of memory to process the data or image. These files will also take longer time to upload or download.

The standard resolution for websites is about 72 pixels per inch, while the standard print resolution is about 300 pixels per inch. One can set the resolution the way one wants but the user must be aware that using a resolution less than 300 for print will make an image look less sharp and blurred. Using a resolution above 72 pixels per inch on the web will make the image take longer to upload or download.

Choose Colour Mode

Depending on the type of output media (print, display or electronic media), the colour mode of an image will need to be changed. This determines how the colours will be calculated and displayed. This is a setting which can be changed after the image has been created.

You have already learnt that RGB (Red, Green and Blue) is the mostly used colour mode. It is appropriate for images that will be viewed on computer. Since it uses 8 Bits channel individually to store the colour value

associated with every pixel, an RGB image is a 24 Bits image, i.e., 8 Bits × 3 channels (of RGB) = 24 Bits image.

CMYK (Cyan, Magenta, Yellow and Black) is another common colour mode. It is best used for images that will be printed as this mode is used by printers to render colours to images. Since it uses 8 Bits channel individually to store the colour value associated with every pixel, a CMYK image is a 32 Bits image, i.e., 8 Bits × 4 channel (of CMYK) = 32 Bits image.

An exception to this is colour printing from a digital printing lab (photo printing lab). This printing machine works on the RGB mode. Hence, to take colour print from a digital photo lab, we need to create our graphics in RGB mode only. A colour laser printer, offset printing machine and flex printing machine prints in the CMYK colour mode.

Grayscale is the third most common option. Grayscale images range from black to white with many shades of grey in between. It is useful only for creating images which will be printed in the grayscale. It uses only two colours — black and white. A bit is basically a binary on-off switch. And each bit in binary is analogous to a 'stop' when we talk about light measure. Each stop of light you add to your scene doubles the amount of light, and so with each bit you add to a number you get twice the total number of potential values. 1 bit is 2 values, and is pure black and white, 2 bit is 4 values; black, white and a couple of shades of grey, 3 bit is 8 values, 4 bit is 16, and so on. By the time we reach 8-bit, we have 256 values ($2^8 = 256$) i.e., shades of grey colour ranging from black to white.

With any colour mode, the higher the number of bits, the more is the number of colour shades that will be displayed. Bit depth or colour depth specifies how much colour information is available for each pixel in an image. With high colour depth or colour bit, we get more visually appealing features like gradient and transparencies. Increasing the bits will also increase the file size. Therefore, use a higher number of bits only

when necessary. Table 3.1 shows the number of colours or colour shades available and their common names.

Table 3.1

Bit Colour	No. of colours	Resolution or Common Name for Video Display Mode
1	2	Monochrome
2	4	Colour Graphics Adapter (CGA)
4	16	Enhanced Graphics Adapter (EGA)
8	256	Video Graphics Array (VGA)
16	65,536	Extended Graphics Array XGA, high colour
24	16,777,216	Super VGA (SVGA, true colour)
32	16,777,216 + transparency	Red, Green, Blue, Alpha (RGBA)
48	281 trillion	

Choose Background

Start with a transparent background, as it will make it easier to achieve most effects. Create every other image on a separate layer above the background.

Practical Exercises

Activity 1

Understanding the size of RGB image in Adobe Photoshop

Material required

Computer, Adobe Photoshop software

Procedure

- Create digital graphics in Adobe Photoshop by opening a canvas of 1024 × 768 pixels; resolution: 150 pixels per inch; Colour mode: RGB.
- Import three images from 'clipart' gallery and mix these images and create a JPG file. View the file size in Windows Explorer.
- Write down the file size of this RGB graphics file with JPG file format in Kilo Byte (KB) or Mega Byte (MB).

Activity 2

Understanding the size of CMYK image in Adobe Photoshop

Material required

Computer, Adobe Photoshop software

Procedure

- Create digital graphics in Adobe Photoshop by opening a canvas of 1024 × 768 pixels; resolution: 150 pixels per inch; Colour mode: CMYK.
- Import three images from 'clipart' gallery, and mix these images and create a JPG file.
- View the file size in Windows Explorer.
- Write down the file size of this CMYK graphics file with JPG file format in Kilo Byte (KB) or Mega Byte (MB).
- Which file do you find larger— RGB Mode graphics file or CMYK mode graphics file?

(Note: The CMYK mode graphics file will be larger in size as compared to RGB mode file as CMYK is a 32 Bits image with 4 colour channels of 8 Bits each (4 × 8 Bits = 32 Bits image), while the RGB mode graphics file is a 24 Bits image with 3 colour channels of 8 Bits each (3 × 8 Bits = 24 Bits image).

Check Your Progress

A. Match the Columns

Column A	Column B
1. 24 Bits image	(a) RGB
2. 32 Bits image	(b) True colour
3. 24 Bits colour	(c) High colour
4. 16 Bits colour	(d) CMYK

What have you learnt?

On the completion of this Session, you will be able to:

- demonstrate the basic knowledge of the application of software for creating images.
- open a new file in Adobe Photoshop.
- choose dimension, resolution, colour mode and background in Adobe Photoshop.

Session 2: Drawing and Painting Tools

Adobe Photoshop provides tools for painting and editing the image colour. The Brush tool and the Pencil tool works like traditional drawing tools applying colour with brush strokes. The Brush tool supports a number of different brush tips that you can choose from the Tool Options panel. Eraser tool, Blur tool, and Smudge tool modify the existing colours in the image.

When you start Photoshop, the Toolbar, or the Tools panel appears on the left of the screen.

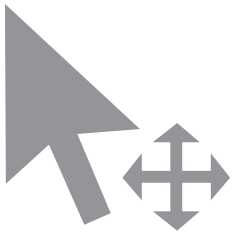


Fig. 3.2: Icon for Move tool

Toolbar

The Toolbar (also known as the Toolbox or the Tools panel) is the place which holds tools for making selection, cropping an image, editing and retouching, and much more. Let us now learn about the uses and applications of some of the tools.

Move tool (Keyboard: V)

The move tool lets the user move objects in a given layer around the Photoshop canvas. To use it, click anywhere on the canvas and drag. As you drag, the layer will move with the mouse. The move tool icon is shown in Figure 3.2.

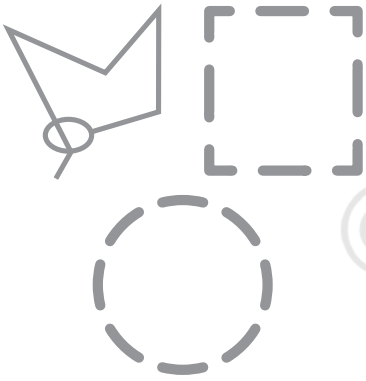


Fig. 3.3: Icons for marquee

Marquee (Keyboard: M)

Marquee lets the user select a part of the canvas in a specific shape. By default, one gets a rectangular or a perfect square shape, if one presses Shift key while selecting. However, one can also select in the shape of an ellipse or a circle pressing the Shift key while selecting. The icons used for marquee are shown in Figure 3.3.

Fig. 3.4: Icon for Lasso

Lasso (Keyboard: L)

Lasso is a free-form selection tool that lets the user drag around the canvas and select anything the lasso area covers. By this tool, one can have access to polygonal and magnetic lasso. Polygonal lasso lets the user select by clicking around on the canvas and creating points, while magnetic lasso works the same way as the regular lasso, but it tries to detect edges for the user and automatically snaps to them. The icon for lasso is shown in Figure 3.4.

Magic wand (Keyboard: W)

The magic wand tool allows you to select an area of an image based on its colour. This tool can be used to remove backgrounds from photos. The icon for magic wand is shown in Figure 3.5.

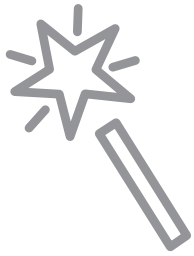


Fig. 3.5: Icon for magic wand

Crop tool (Keyboard: C)

The crop tool is used to crop pictures. You can specify the exact size and constrain the crop tool to those proportions, or can just crop the picture to any size you please. The icon for crop tool is shown in Figure 3.6.

Fig. 3.6: Icon for crop tool

Eyedropper (Keyboard: I)

The eyedropper tool lets the user click on any part of the canvas and take a sample of a colour and drop it at a specific point. The eyedropper will change the foreground colour to the colour it samples from the canvas.

The icon for eyedropper is shown in Figure 3.7.

Fig. 3.7: Icon for eyedropper

Healing brush (Keyboard: J)

The healing brush lets one take the sample from a part of a photograph and uses it to paint over another part. Once the user is done, Photoshop will examine the surrounding areas and try to blend what the user has painted in with the rest of the picture. The icon for healing brush is shown in Figure 3.8.

Fig. 3.8: Icon for healing brush

Paintbrush and pencil (Keyboard: B)

Paintbrush is a tool that resembles a paintbrush. The pencil tool resembles a pencil. The paintbrush, however, can be set to different kinds of brushes. One can paint using standard paintbrush and airbrush styles, or even with leaves and other shapes. The icon for paintbrush is shown in Figure 3.9.

Fig. 3.9: Icon for paintbrush

Fig. 3.10: Icon for clone stamp

Clone stamp (Keyboard: S)

The clone stamp tool allows the user to duplicate a part of an image. It involves setting a sampling point in the image which is used as a reference to create a new cloned area. Like healing brush, clone stamp lets the user sample a part of a photograph and use it to paint over another part.

The icon for clone stamp is shown in Figure 3.10.

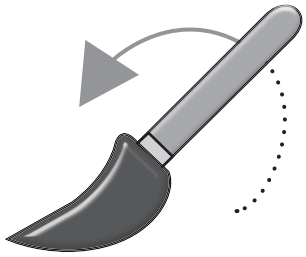


Fig.3.11: Icon for history brush

History brush (Keyboard: Y)

History brush lets one paint back in time. Photoshop keeps track of all the moves that the user makes (50 by default). The History Brush allows you to restore parts of an image to an earlier history state by painting over them. Say, you brightened up the entire photo but wanted to make a certain area look like it did before you brightened it, so you can use the history brush and paint that area to get the previous darkness. The icon for history brush is shown in Figure 3.11.

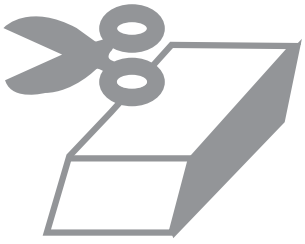


Fig. 3.12: Icon for eraser tool

Eraser tool (Keyboard: E)

The eraser tool changes pixels to either the background colour, or to transparent. It erases pixels as you drag it across the image. The background eraser tool allows you to remove the background colour from an image or layer. The magic eraser tool erases all the colours within a set tolerance. The icon for eraser tool is shown in Figure 3.12.

Fig. 3.13: Icon for paint bucket tool

Paint bucket tool and gradient tools (Keyboard: G)

The paint bucket tool lets one fill in a specific area with the current foreground colour. The gradient tool will, by default, create a gradient that blends the foreground and background tool colour. The icon for paint bucket tool is shown in Figure 3.13.

Fig. 3.14: Icons for blur, sharpen and smudge tools

Blur, Sharpen and Smudge tools (Keyboard: None)

All three tools act like paintbrushes, but each has a different impact on a picture. The 'Blur' tool will blur the area where you paint, the 'Sharpen' tool will sharpen it, and 'Smudge' tool will smudge the area all around the

canvas. The Smudge tool is useful in drawing, creating nicely blended colours, and creating wisps and smoke that you can add to photos. The icons for blur, sharpen and smudge tools are shown in Figure 3.14.

Dodge, Burn and Sponge tools (Keyboard: O)

The Burn, Dodge and Sponge tools are paintbrush-like tools that manipulate light and colour intensity. The Burn tool can make areas in your photo darker. The Dodge tool can make them lighter. The Sponge tool can saturate or de-saturate colour in the area you paint with it. These are all useful tools for photo touch-ups. The icons for dodge, burn and sponge tools are shown in Figure 3.15.

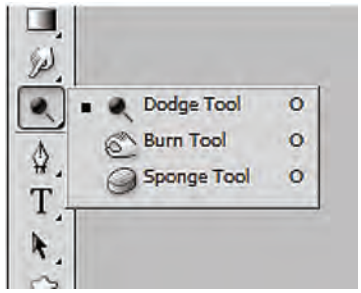


Fig. 3.15: Icons for dodge, burn and sponge tools

Pen tool (Keyboard: P)

The pen tool is used as a path creator. It is required for designing, selecting smooth surfaces or preparing layouts. The pen tool is used for drawing vector graphics. The icon for pen tool is shown in Figure 3.16.

Fig. 3.16 : Icon for pen tool

Type tool (Keyboard: T)

The type tool allows one to type horizontally. Tools hidden beneath the horizontal type tool will let one type vertically, and also create horizontal and vertical text masks. The icon for type tool is shown in Figure 3.17

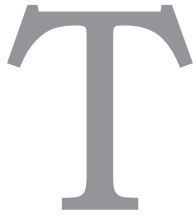


Fig. 3.17 Icon for type tool

Path tool (Keyboard: A)

A path is a line that goes from one point to another. A path tool is used to create a path. The path tool creates paths and shapes which can be duplicated and manipulated to create complex selections, masks and objects. The icon for path tool is shown in Figure 3.18.

Fig. 3.18: Icon for path tool

Shape tool (Keyboard: U)

The shape tool lets the user create vector rectangles, rounded rectangles, circles, polygons, lines and custom shapes. This tool is useful when designing or creating shape masks for photos. The icon for shape tool is shown in Figure 3.19.

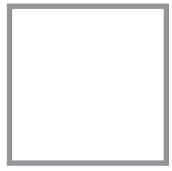


Fig. 3.19: Icon for shape tool

Fig. 3.20: Icons for 3D tools

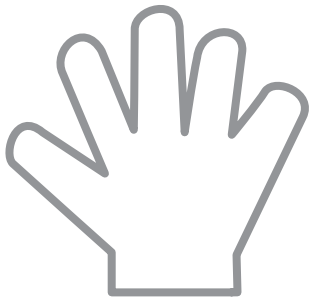


Fig. 3.21 Icon for hand tool

Fig. 3.22 Icon for zoom tool

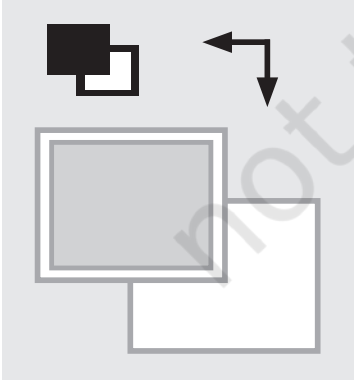


Fig. 3.23: Icon for colour selection tool

3D tools

3D tools are used to rotate, roll, drag, slide and scale 3D objects. Photoshop allows creating and editing of 3D images using 3D tools. The icons for rotate, roll, drag, slide and scale tools are shown in Figure 3.20.

Hand tool (Keyboard: H)

The hand tool allows the user to click and drag around the Photoshop canvas. If the entire canvas fits on the screen, this tool would not do anything. It is for navigating around when the user zooms in, or when a picture is too big to fit on the screen such that only a part of the picture can be seen. This tool helps drag the portions of the picture that need to be seen on the visibility area. The icon for hand tool is shown in Figure 3.21.

Zoom tool (Keyboard: Z)

Zoom tool lets the user zoom in and out of the Photoshop canvas by clicking on a given area. By default, the zoom tool lets one zoom in. To zoom out, hold down the option key and use the zoom tool as one normally would do. The icon for hand tool is shown in Figure 3.22.

Colour selection tools

These tools let one manage the colours being used. The colour on the top is the foreground colour, and the one at the back is the background colour. The foreground colour is what the brushes will use. The two smaller icons on the top are shortcut functions. The left one, showing a black square on a white square will set the foreground and background colours to the default (Keyboard: D). The double-headed curved arrow will swap the foreground and background colours (Keyboard: X). Clicking on either the foreground or background colour will bring up a colour picker, so that the user can set them precisely to what one wants. The icon for colour selection tool is shown in Figure 3.23.

Palettes

Palettes are group of tools used to edit and manipulate an image. These can be seen on the right side of the

screen, when one opens Adobe Photoshop. Palettes include tools palette, options palette, layers palette, adjustment palette, colour palette, and history palette. These can be shown or hidden by using the Window menu and selecting the palette one wish to reveal. They make it easy to navigate through the document, make or add layer adjustments and switch modes. The icon for palettes is shown in Figure 3.24.

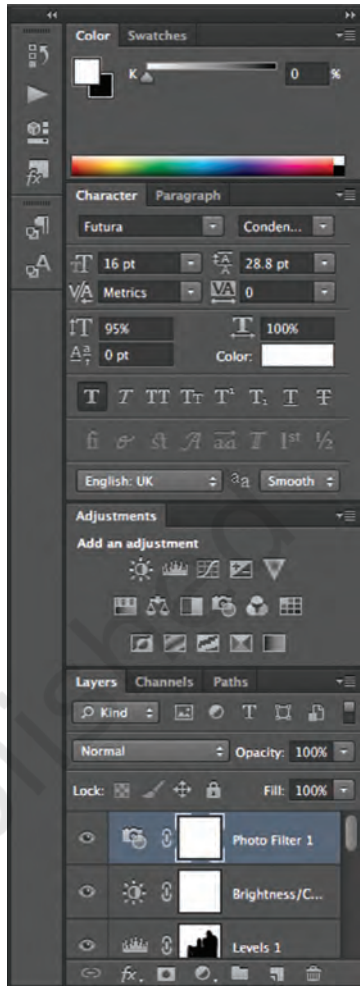


Fig. 3.24: Icon for palettes

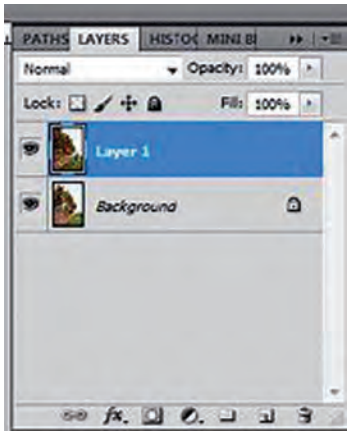


Fig. 3.25: Icon for Layers Palette

Layers Palette

The layers palette is the control panel for layers in Photoshop. Layers are like stacks of transparent papers placed one above the other. Layers can be placed one on top of another, and moved around by clicking on the layer name and dragging the mouse up or down. You can use the layer palette to hide, view, rearrange, delete, rename, and merge layers. The icon for layers palette is shown in Figure 3.25.

Adjustments Panel

Adjustments panel is where one can easily create and edit adjustment layers. Adjustment layers are non-destructive image alterations that affect all layers below them, and can easily be turned on and off. Their most common use is for colour correction (level and curve adjustments), but there are many kinds of adjustments one can perform that can dramatically alter the look of an image. The icon for adjustments panel is shown in Figure 3.26.

Fig. 3.26: Icon for Adjustments Panel

Colour Channels

The colour channels palette allows one to look at specific colours that make a picture. If one is in RGB mode, one will get red, green and blue colours. These colour channels will differ if one is in a

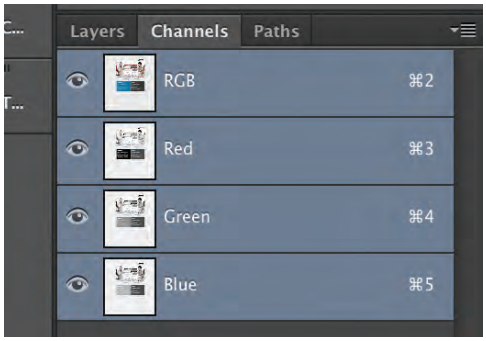


Fig. 3.27: Icon for Colour Channels

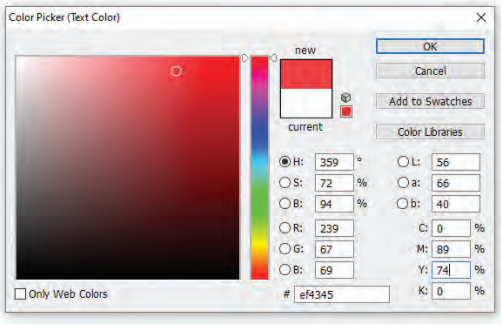


Fig. 3.28: Icon for Colour Picker

Fig. 3.29: Icon for Colour Swatches Palette

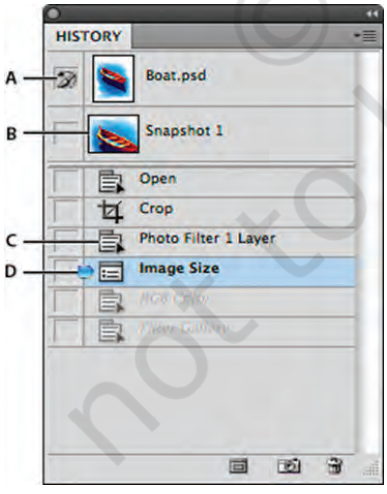


Fig. 3.30: Icon for History Palette

A— sets the source for the history brush
B— Thumbnail of a snapshot
C— History state
D— History state slider

different colour space (such as CMYK). When one chooses a specific colour, an image will be shown in different versions of black and white. This is because each colour channel is simply monochromatic, representing light in each channel. Switching between these channels is useful for making colour channel-specific touch-ups, overall contrast enhancements, and also for converting a photo into black and white. The icon for colour channels is shown in Figure 3.27.

Colour Picker

This palette lets one easily alter the foreground and background colours using sliders. The icon for colour picker is shown in Figure 3.28.

Colour Swatches Palette

Colour swatches show a large variety of colours, tints, gradients, and patterns. The colour swatches palette is a set of pre-defined colours one can choose from. One can compare colours and try different combinations. The icon for colour swatches palette is shown in Figure 3.29.

History Palette

The history palette allows one to go back in time to undo previous alterations. The standard undo command (in the edit menu) will toggle between undoing and redoing the latest action performed on an image. The history panel is where one can go back much further (50 actions by default). The icon for history palette is shown in Figure 3.30.

Text and Paragraph Palette

The text and paragraph palette allows the user to make all sorts of adjustments to a text created with the Type tool. These options are similar to what one finds in word processing but one can also specify things like character width and spacing, which are more useful in design. The icon for text and paragraph palette is shown in Figure 3.31.

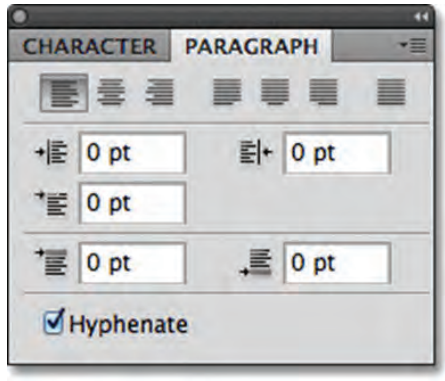


Fig. 3.31: Icon for Text and Paragraph Palette

Menu Bar

The menu bar is used to open and save files, adjust the canvas size, access some of the editing tools, open and close various windows, and more. The menu bar consists of ten menus, namely—File, Edit, Image, Layer, Type, Select, Filter, View, Window, and Help. Each of those main menus has additional sub-menus. The icon for menu bar is shown in Figure 3.32.

Let us now look at each of these menus.

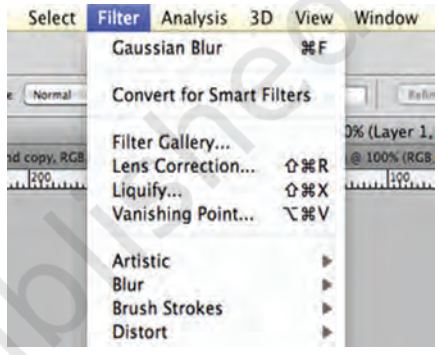


Fig. 3.32: Icon for Menu Bar

File

Just like any word processing software, file menu in Photoshop is used for making new files, opening existing ones, saving files, and printing. To see the File menu, press the Alt and F keys simultaneously. Using the Open Recent option under the File menu, you can access the 10 most recently opened files.

Edit

Using the Edit menu, you can cut, copy, paste, and also do, undo or redo a recent action. It is mainly used to transform layers and set colour spaces.

Image

Using the Image menu, you can change the mode of the whole canvas, between modes like RGB colour, grayscale, CMYK colour, multichannel and duotone. A sub-menu of Image menus, called as Adjustments, lets you access various tools for changing the image's brightness, contrast, levels, exposure, vibrancies, hue,

saturation and colour balance. In Image menu, you will also find Photo Filter, Channel Mixer, and Colour Lookup tools. There are other options, such as Auto Tone, Auto Contrast, Auto Colour, Image size, Canvas size, Crop and Trim available with image menu.

Layer

Using this menu, you can create new layers, duplicate the existing ones, delete and rename layers. One has options for creating layer masks, adjustment layers, and fill layers. One can also use it to create and edit smart objects, or export their contents to a file or replace the contents with that of another smart object. You can group and hide layers, lock layers, arrange layers behind or in front of other ones, link and merge layers, and flatten the image to automatically merge all the layers.

Type

Type menu helps you to manipulate the text on the canvas. The first option lets you show or hide the character, character styles, paragraph, and paragraph style panels. Using the type menu, one can create work paths, convert a text layer to a shape, rasterise the text layer to make it an image, warp the text, change the font preview size, and change language options.

Rasterisation refers to the task of taking an image described in vector graphics format, and converting into a raster image.

Select

Using the Select menu, one can select all the layers and deselect everything from this menu. The Refine Edge tool in this menu is used to change the edge of a selection. The Grow option in this menu can automatically increase the selection to nearby pixels to effectively increase the overall selection area.

Filter

Photoshop Filters can blur, sharpen, distort and alter an image. You can use filter menu to preview artistic, brush stroke, distort, sketch, texture and other built-in filters.

View

The View menu includes tools that enable a ruler and create guides that one can follow for precise positioning, and change over to full screen mode. It provides for different ways of looking at the images. One can zoom in or zoom out to show the actual pixel size, and also zoom as per the print size.

Window

Window menu is used to selectively show or hide windows and arrange workspace. It can be used to toggle windows of Actions, Adjustments, Brush, Channels, Colour, History, Layers, Notes, Paths, Timeline and Tools.

Help

The Help menu allows to search information about the specific functions and solutions in Photoshop.

Brush and Tool Presets in Photoshop

One can save a set of brush options as a preset in order to quickly access brush characteristics that one would like to use frequently. Photoshop includes several sample brush presets (Figure 3.33). One can start with these presets and modify them to produce new effects. Many original brush presets are available for download on the web.

One can quickly choose presets from the 'brush preset' picker in the options bar, which allows one to temporarily modify the size of a brush preset.

One needs to save tool presets when one wants to store customised brush tip characteristics along with settings from the options bar, such as opacity, flow and colour.

Brush Tip Options

The brush tip options control how the colour is applied. One can apply colour gradually with soft edges, large brush strokes, various brush dynamics, different blending properties and different shapes. One can apply a texture or simulate spraying paint with an airbrush. One can use the Brush panel to set brush tip options.

Paint Tool Options

Modes

Modes set the method for blending the colour one paints with the underlying existing pixels. The available modes change with the currently selected tool. Paint modes are similar to layer blending modes.

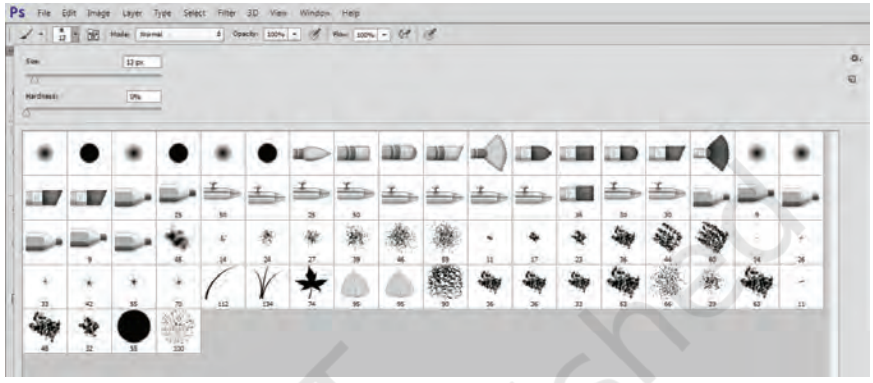


Fig. 3.33: A view of brush tip tool options in brush presets in Adobe Photoshop

Opacity

Opacity determines how we 'see-through' the contents of the layer. 100 per cent opacity means that the layer is completely opaque, and anything painted on the layer will completely hide whatever is beneath it. Reducing the opacity allows the layer(s) under it to show through (Figure 3.34). As one paints over an area, the opacity does not exceed the set level no matter how many times one moves the pointer over the area, until one releases the mouse button. If one strokes over the area again, one applies additional colour, equivalent to the set opacity.

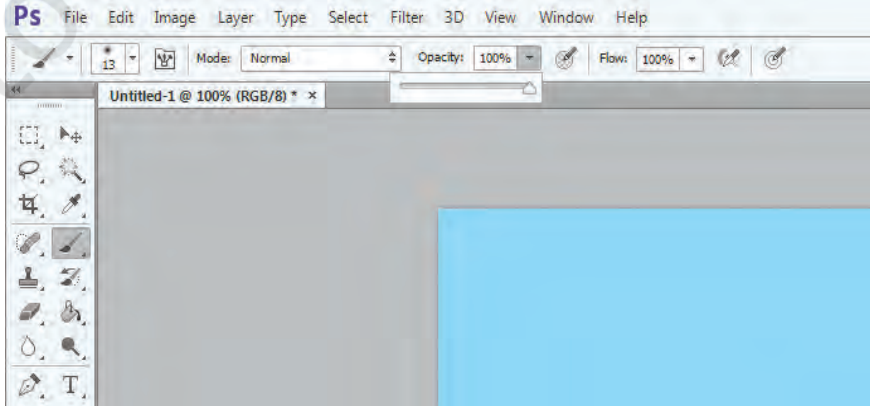


Fig. 3.34: A view of brush tool with opacity option in Adobe Photoshop

Flow

Flow sets the rate at which colour is applied as one moves the pointer over an area (Figure 3.35). As one paints an area, while holding down the mouse button, the amount of colour builds up based on the flow rate. For example, if one sets the opacity to 33 and the flow also to 33 per cent, each time one moves over an area, its colour moves 33 per cent towards the brush colour. The total will not exceed 33 per cent opacity unless one releases the mouse button and strokes over the area again.

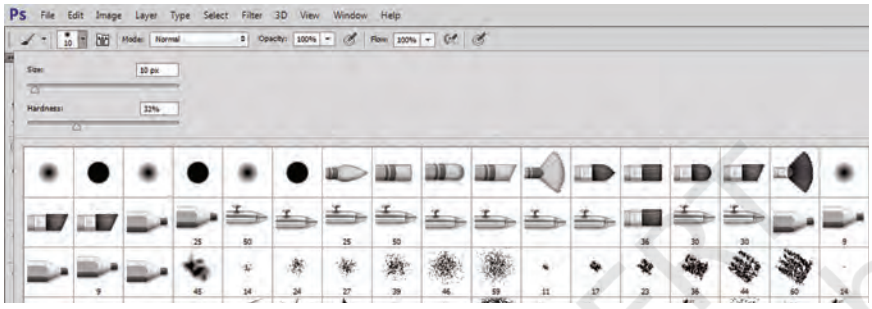


Fig. 3.35: A view of brush tool with flow option in Adobe Photoshop

Graphic Design Basics in Photoshop

There are three kinds of graphics that we generally work on in Adobe Photoshop software. These are as follows:

(i) Vector graphics
(ii) Raster graphics
(iii) Scalable vector graphics

Vector graphics

Vector graphics is the creation of digital images through a sequence of commands that place lines and shapes in a given two-dimensional or three-dimensional space. If you enlarge a vector graphic, the mathematical formula stays the same, rendering the same visual graphic irrespective of the size. Thus, vector graphics can be scaled to any size without losing quality. A vector file is also called as geometric file, and it is easier to modify than raster image file. Vector programmes are best for creating logos, drawings, illustrations and technical drawings.

Raster graphics

Raster graphics or bitmap image is a dot matrix data structure, representing, generally, a rectangular grid of pixels, or points of colour. Raster images, which are made of pixels, are created with pixel-based programmes or captured with a camera or scanner. A raster image has a specific number of pixels; therefore, if you enlarge the image file without changing the number of pixels, the image will look blur. Raster programmes are best for editing photos and creating continuous tone images with soft colour blends.

A vector image can be converted into a raster graphic image, which maps bits directly to a display space. The vector image can be converted to a raster image file prior to its display so that it can be ported between systems.

Scalable vector graphics

Scalable Vector Graphics is an XML (Extensible Markup Language) based vector image format for two-dimensional graphics, with support for interactivity and animation. SVG images can be created and edited with any text editor, as well as, drawing software.

Selecting Cursor Preference

The painting tools have three possible cursors: standard cursor (icon from the toolbox), cross hair (denoted with symbol '+'), and a cursor that matches the size and shape of the currently selected brush tip.

(1) Choose Edit> Preferences> Cursors (Windows) or Photoshop> Preferences> Cursors (Mac OS).

(2) Select the desired cursors in both the Painting Cursor area and the Other Cursor area. The sample cursors change to reflect your choices. For a Brush Tip cursor, choose a size and include a cross hair in the cursor.

- Normal Brush Tip restricts the cursor size to areas of the brush stroke that have 50 per cent or more opacity.
- Full Size Brush Tip sizes the cursor to the entire area affected by the brush stroke. For

soft brushes, this produces a larger cursor size than the normal setting to include areas of the brush stroke with lighter opacity.

Practical Exercises

Activity 1

Using brush tool in Adobe Photoshop

Material required

Computer, Adobe Photoshop software

Procedure

- Create digital graphics on a blank canvas of 800 × 600 pixels with a resolution of 150 pixels per inch. The background must be white. Click on the brush tool and create five different strokes with brush hardness of 32 per cent and with the given size of brushes — 10, 20, 30, 40 and 50.
- Now, observe and compare these five different strokes on the digital canvas.
- Click on the Brush Tool and create five different strokes of red colour with brush hardness of 32 per cent, and with five different size of brushes — 5, 25, 45, 65 and 85.

Choose a foreground colour.

- Select the Brush or Pencil tool. The Brush tool creates soft, as well as, hard strokes of a colour. The Pencil tool creates only hard-edged lines.
- Choose a brush from the Brush Presets panel.
- Set tool options for mode and opacity in the options bar.

Do one or more of the following:

- Click and drag in the image to paint.
- To draw a straight line, click at a starting point in the image. Press the Shift key and click at an ending point.
- When using the Brush tool as an airbrush, press the mouse button without dragging to build up colour.
- Now, observe and compare these five different strokes on the digital canvas.

Check Your Progress

A. Fill in the Blanks

1. Vector graphics is the creation of digital images through a sequence of commands that place _____ and shapes in a given two-dimensional or three-dimensional space.

2. A _____ graphics or bitmap image is a dot matrix data structure, representing a generally rectangular grid of pixels, or points of colour, viewable via a monitor, paper or other display medium.
3. Scalable _____ graphics is an XML-based vector image format for two-dimensional graphics with support for interactivity and animation.
4. The Brush and _____ tool work like traditional drawing tools applying colour with brush strokes.
5. The _____ tool helps in moving objects in a given layer around the Adobe Photoshop canvas.
6. The _____ tool helps in selecting a part of the canvas in a specific shape.
7. The _____ is a free-form selection tool that lets you drag around the canvas.
8. The colour _____ palette is a set of pre-defined colours.

B. Subjective question

1. Describe the functions of any five drawing and painting tools of Adobe Photoshop.

What Have You Learnt?

On completion of this session, you will be able to:

- differentiate between various kinds of graphics.
- demonstrate the use of tools for painting and editing image colour.
- create a digital graphic using appropriate tools for editing and painting image.

SESSION 3: BLENDING MODES

Blending Mode

Blending mode, as specified in the options bar, controls how pixels in the image are affected by a painting or editing tool. The majority of blend modes have keyboard shortcuts.

- The base colour is the original colour in the image.
- The blend colour is the colour being applied with the painting or editing tool.
- The result colour is the new colour formed from the blend.

Normal Dissolve	Normal
Darken Multiply Colour Burn Linear Burn	Darken
Lighten Screen Colour Dodge Linear Dodge (Add)	Lighten
Overlay Soft Light Hard Light Vivid Light Linear Light Pin Light Hard Mix	Contrast
Difference Exclusion	Inversion
Subtract Divide	Cancellation
Hue Saturations Colour Luminosity	Component

Fig. 3.36: Blend mode groups

	Shift + Alt + Option+
Normal	N
Dissolve	I
Darken	K
Multiply	M
Colour Burn	B
Linear Burn	A
Lighten	G
Screen	S
Colour Dodge	D
Linear Dodge (Add)	W
Overlay	O
Soft Light	F
Hard Light	H
Vivid Light	V
Linear Light	J
Pin Light	Z
Hard Mix	L
Difference	E
Exclusion	X
Hue	U
Saturation	T
Colour	C
Luminosity	Y

Fig. 3.37: Keyboard shortcuts to blend modes in Adobe Photoshop (Windows)

Normal

It is a blending mode that edits or paints each pixel to make it the resultant colour. In the case of a painting tool, the blend colour will completely coat the base colour, whereas in the case of an edit tool, the edit value will completely override the existing colour.

In the case of a painting tool, the blend colour will completely coat the base colour. In case of an edit tool,

Fig. 3.38: Use of normal mode

the edit value will completely override the existing colour. This is the default mode. Normal mode is called 'threshold' when one is working with a bitmapped or indexed-colour image (Figure 3.38).

Dissolve

'Dissolve' is used to edit or paint each pixel to bring out the resultant colour. However, the resultant colour is a random replacement of the pixels with the base or blend colour, depending on the opacity at any pixel location (Fig 3.39). This mode can be seen only on a layer with an opacity setting of less than 100 per cent.

Fig. 3.39: Use of dissolve blending mode

Behind

'Behind' mode edits or paints only on the transparent part of a layer. This mode works only in layers with Lock Transparency deselected and is analogous to painting on the back of transparent areas on a sheet of acetate.

Darken

Pixels lighter than the blend colour are replaced, and those darker than the blend colour do not change.

Multiply

It is a blending mode that looks at the colour information in each channel and multiplies the base colour by the blend colour. The resultant colour is always a darker colour. Multiplying any colour with black produces black. Multiplying any colour with white leaves the colour unchanged. When you are painting with a colour other than black or white, successive strokes with a painting tool produce progressively darker colours. The effect is similar to drawing on the image with multiple marking pens (Figure 3.40).

Fig. 3.40: Use of multiply blending mode

Colour Burn

It is a blending mode that looks at the colour information in each channel and darkens the base colour to reflect the blend colour by increasing the contrast between the two. Blending with white produces no change.

Linear Burn

Linear burn mode looks at the colour information in each channel and darkens the base colour to reflect the blend colour by decreasing the brightness. Blending with white produces no change.

Lighten

It looks at the colour information in each channel and selects the base or blend colour—whichever is lighter—as the resultant colour. Pixels darker than the blend colour are replaced, and pixels lighter than the blend colour do not change.

Screen

The Screen looks at each channel's colour information and multiplies the inverse of the blend and base colours. The resultant colour is always a lighter colour. Screening with black would not change the colour. Screening with white produces white. The effect is similar to projecting multiple photographic slides on top of each other.

Colour Dodge

The 'colour dodge' mode looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Linear Dodge

It looks at the colour information in each channel and brightens the base colour to reflect the blend colour by increasing the brightness. Blending with black produces no change.

Overlay

Overlay multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing

pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced but mixed with the blend colour to reflect the lightness or darkness of the original colour (Figure 3.41).

Fig. 3.41: Use of overlay blending mode

Soft Light

This blending mode darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source) is lighter than 50% grey, the image is lightened as if it were dodged. If the blend colour is darker than 50 per cent grey, the image is darkened.

Hard Light

Hard light blending modes multiply or screen the colours, depending on the blend colour. The effect is similar to shining a harsh spotlight on the image. If the blend colour (light source) is lighter than 50 per cent grey, the image is lightened, as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50 per cent grey, the image

Fig. 3.42: Use of hard light blending mode

is darkened, as if it were multiplied. This is useful for adding shadows to an image (Figure 3.42).

Vivid Light

The 'vivid light' mode burns or dodges the colours by increasing or decreasing the contrast, depending on the blend colour. If the blend colour (light source) is lighter than 50 per cent grey, the image is lightened by decreasing the contrast. If the blend colour is darker than 50 per cent grey, the image is darkened by increasing the contrast.

Linear Light

The linear light mode burns or dodges the colours by decreasing or increasing the brightness, depending on the blend colour. If the blend colour (light source) is lighter than 50 per cent grey, the image is lightened by increasing the brightness. If the blend colour is darker than 50 per cent grey, the image is darkened by decreasing the brightness.

Pin Light

It replaces the colours, depending on the blend colour. If the blend colour (light source) is lighter than 50 per cent grey, pixels darker than the blend colour are

replaced, and pixels lighter than the blend colour do not change. If the blend colour is darker than 50 per cent grey, pixels lighter than the blend colour are replaced, and pixels darker than the blend colour do not change. This is useful for adding special effects to an image (Figure 3.43).

Fig. 3.43: Use of pin light blending mode

Hard Mix

The 'hard mix' mode adds red, green and blue channel values of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if less than 255, then the value of 0 is recieved. Therefore, all blended pixels have red, green and blue channel values of either 0 or 255. This changes all pixels to primary additive colours (red, green or blue), white or black.

Practical Exercises

Activity 1

Understanding blending mode

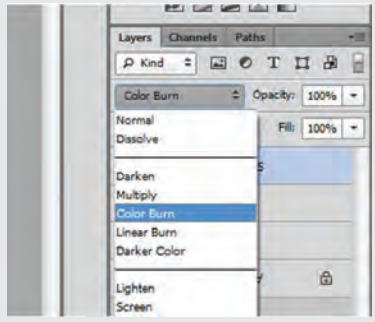
Material required

Computer, Adobe Photoshop software

Procedure

- Create a digital graphic on a blank canvas of size 800 × 600 pixels, Resolution: 150 pixels per inch with white background.

- Import two different photographs and resize them to overlap with each other in two different layers.
- Now, select the topmost layer and change the blending mode of this layer to Colour Burn.
- Now, observe the difference in the blending of these two different images in the same file. We have changed the blending mode of the topmost layer.



- Now, you can export this file to JPG format to be used in either MS PowerPoint as background graphics or taking out a digital printout.

Activity 2

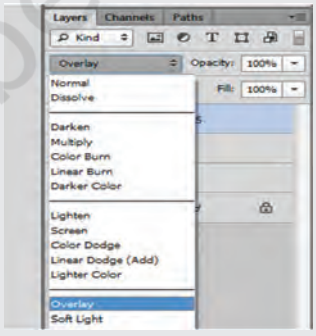
Understanding the difference between blending mode and overlay mode

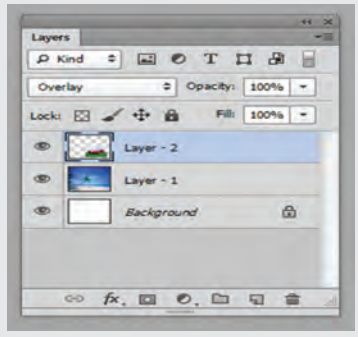
Material required

Computer, Adobe Photoshop software

Procedure

- Create a digital graphics on a blank canvas of size 800 × 600 pixels, Resolution: 150 pixels per inch with white background.
- Import two different photographs and resize them to overlap with each other in two different layers.
- Now, select the topmost layer and change the Blending Mode of this layer to Overlay Mode.





- Now, observe the difference in the blending of these two images in the same file. We have changed the Blending Mode of the topmost layer.
- Now, export this file to JPG format to be used in either MS PowerPoint as background graphics or take out a digital printout.

Check Your Progress

A. Match the Columns

Column A	Column B
1. It darkens or lightens the colour depending on the blend colour. The effect is similar to shining a diffused spotlight on an image.	(a) Vivid light
2. Multiplies or screens the colours, depending on the blend colour. The effect is similar to shining a harsh spotlight on the image.	(b) Hard light
3. Burns or dodges the colours by increasing or decreasing the contrast, depending on the blend colour.	(c) Soft light
4. Burns or dodges the colours by decreasing or increasing the brightness, depending on the blend colour.	(d) Linear light

B. Subjective Questions

1. Explain the following modes of blending.
   (a) Dissolve
   (b) Darken
   (c) Colour burn
   (d) Linear burn
   (e) Screen
2. Describe the use and application of blending modes.

What Have You Learnt?

On completion of this session, you will be able to:

- demonstrate the knowledge of different blending modes.

Session 4: Colour Modes

The colour mode or image mode determines how colours combine, based on the number of channels. Different colour modes result in different levels of colour detail and file size. Use CMYK colour mode for images in a full colour print brochure, and RGB colour mode for images in web or E-mail. The various colour modes are given hereby.

1. Bitmap
2. Grayscale
3. Duotone
4. Indexed colour
5. RGB
6. CMYK colour
7. Lab colour
8. Multichannel

Bitmap Mode

A Bitmap is an image where each pixel is either black or white (no shades in between). Bitmap images can be compressed making the file size very small, despite having a lot of pixels. It is useful for printing or archiving paper documents. The bitmap colour mode has a bit depth of 1, hence also called bitmapped 1-bit images.

You can convert a colour image into bitmap through the following steps:

- First, convert your image into the grayscale colour mode.
- On top Menu, click on Image >> Mode >>Grayscale
- Now click 'OK' in 'Discard Colour Information?' dialog box.
- Your image will get converted to grayscale.
- Now go to the top Menu again, click on Image >> Mode >> Bitmap
- Your image will get converted to Bitmap.

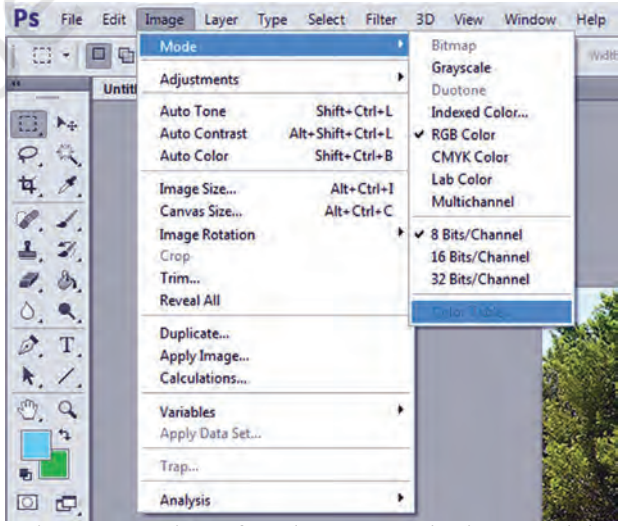


Fig. 3.44: A view of mode menu under image tab in Adobe Photoshop

Grayscale Mode

Grayscale mode uses different shades of grey in an image. In an 8 bits image, there can be up to 256 shades of grey. Every pixel of a grayscale image has a brightness value ranging from 0 (black) to 255 (white). In a 16 and 32 bits image, the number of shades is much greater than that in an 8 bits image.

Grayscale values can also be measured as percentages of black ink coverage (0 per cent is equal to white, 100 per cent is equal to black).

Grayscale mode uses the range defined by the workspace setting that one specifies in the Colour Settings dialog box. You can convert the image into grayscale through the following steps:

On top Menu, click on Image >> Mode >> Grayscale.

Duotone

Monotone means a single colour, duotone means two-colour, tritone is three-colour and quadtone is four-colour. An image can be converted to Duotone through the following steps:

Image menu >> Mode >>Grayscale>> OK. Again, go to Image menu >> Mode >> Duotone. Select a Preset and Type. Click OK.

Indexed Colour

Indexed colour mode produces 8 bits image files with up to 256 colours. When converting to indexed colour, Photoshop builds a colour lookup table (CLUT), which stores and indexes the colours in the image. If a colour in the original image does not appear in the table, the programme chooses the closest one or uses dithering to simulate the colour using available colours. Although its palette of colours is limited, indexed colour can reduce the file size and yet maintain the visual quality needed for multimedia presentations, web pages, etc. For extensive editing, one needs to convert the existing image temporarily into RGB mode.

Indexed colour files can be saved in Photoshop, BMP, DICOM (Digital Imaging and Communications in Medicine), GIF, Photoshop EPS, Large Document

Format (PSB), PCX, Photoshop PDF, Photoshop Raw, Photoshop 2.0, PICT, PNG, Targa, or TIFF formats.

RGB

Photoshop RGB colour mode uses the RGB (Red, Green and Blue) model, assigning an intensity value to each pixel. In an 8 bits per channel image, the intensity value ranges from 0 (black) to 255 (white) for each of the RGB components. For example, a bright red colour has an R value of 246, G of 20 and B of 50. When the values of all three components are equal, the result is a shade of neutral grey. When the values of all components are 255, the result is white. When the values are 0, the result is black.

RGB images use three colours or channels to reproduce colours on screen. In 8 bits per channel image, the three channels translate to 24 (8 bits × 3 channels) bits of colour information per pixel. With 24 bits images, the three channels can reproduce up to 16.7 million colours per pixel.

Although RGB is the standard colour model, the exact range of colours represented can vary, depending on the application or display device. The RGB colour mode in Adobe Photoshop varies according to the workspace setting that is specified in the Colour Settings dialog box. You can convert an image to RGB colour through the following steps:

Image menu >> Mode >> RGB Colour.

CMYK Colour Mode

In the CMYK mode, each pixel is assigned a percentage value for each of the process inks. The lightest (highlight) colours are assigned small percentages of process ink colours, while darker (shadow) colours have higher percentages. For example, a bright red might contain 2 per cent cyan, 93 per cent magenta, 90 per cent yellow, and 0 per cent black. In CMYK images, white colour is generated when all the four components have values of 0 per cent.

One needs to use the CMYK mode when preparing an image to be printed using process colours. Converting an RGB image into CMYK creates colour separation.

If one starts with an RGB image, it is best to edit first in RGB, and then, convert it into CMYK at the end of the editing process. In RGB mode, one can use the 'Proof Setup' command to simulate the effects of CMYK conversion without changing the actual image data. One can also use CMYK mode to work directly with CMYK images scanned or imported from high-end systems. Although CMYK is a standard colour model, the exact range of colours represented can vary, depending on the press and printing conditions. The CMYK colour mode in Photoshop varies according to the workspace setting that one specifies in the Colour Settings dialog box. You can convert an image to CMYK by the following steps:

Click on Image menu>> click on Mode>> click CMYK. Then, click on the OK button to convert the image to CMYK colour mode.

Lab Colour

The Lab colour mode is a combination of three components i.e., 'L' for lightness and 'a' and 'b' are the axis components. The lightness ranges from 0 to 100, whereas the 'a' component (green-red axis), and the 'b' component (blue-yellow axis) ranges from +127 to –128. You can convert an image to lab colour through the following steps:

Go to Image menu > click on it. Next, select Mode >> click on Lab Colour.

Multichannel

The Multichannel colour mode gives 256 shades of grey in each channel. It is used for specialised printing. You can convert an image to multichannel through the following steps:

Image menu >> Mode >> Multichannel.

Practical Exercises

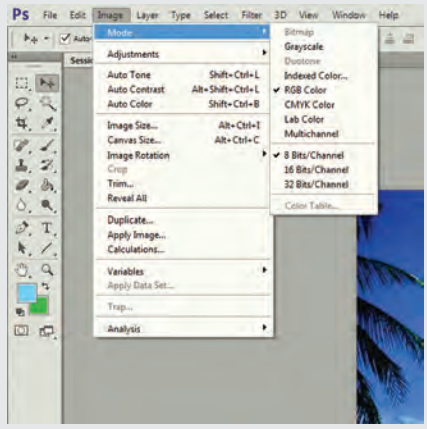
Activity 1

Understanding grayscale mode

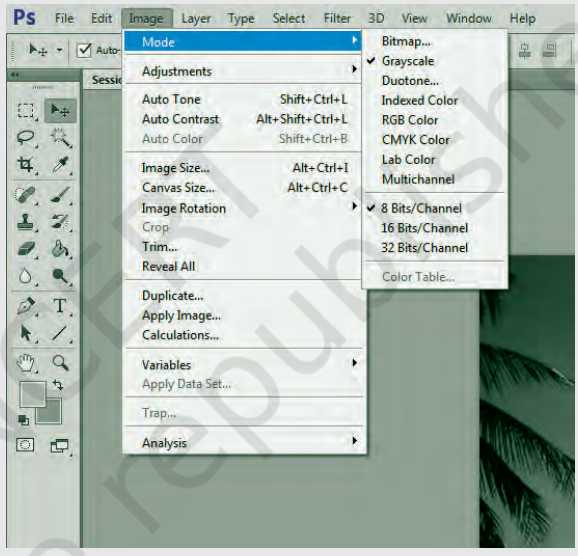
Material required

Computer, Adobe Photoshop software

Procedure



- Create a digital graphic on a blank canvas of size 800×600 pixels, Resolution: 150 pixels/inch, white background and RGB default colour mode.
- Import two different photographs and resize them to overlap. Use different tools to develop a creative design. Now, go to Main Menu > Image > Mode and select Grayscale colour mode.



- Now you can export this file to JPG or take out a digital printout, at it is now using 8 Bit Grayscale colour mode and the file size will be small.

Activity 2

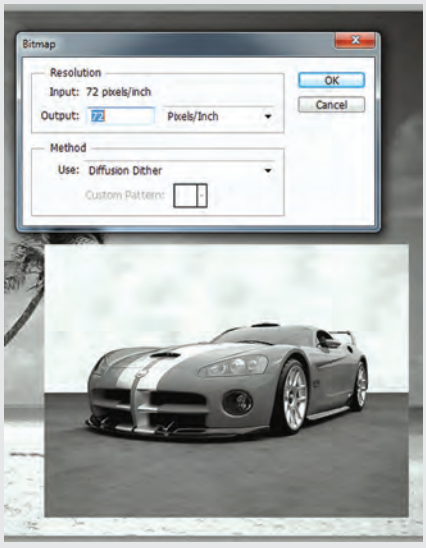
Understanding Bitmap colour mode

Material required

Adobe Photoshop software

Procedure

- Use the same graphics file, which is now in grayscale colour mode. You will see that the previously disabled Bitmap colour mode is now enabled.
- Go to main menu > Image > Mode and select Bitmap colour mode.



- Select 72 pixels per inch.
- Now, export this file to JPG format to be used in either MS PowerPoint as background graphics or take out a digital printout. This is now using 1 Bit image with only two colours, i.e., either black or white dots as seen in the output of the graphics file.

Check Your Progress

A. Multiple Choice Questions

1. RGB mode can display _____.
   (a) millions of colours
   (b) 256 colours
   (c) 256 grey shades
   (d) four printed colours
2. CMYK has _____.
   (a) millions of colours
   (b) 256 colours
   (c) 256 grey shades
   (d) four printed colours
3. Indexed mode has up to _____.
   (a) millions of colours
   (b) 256 colours
   (c) 256 grey shades
   (d) four printed colours

4. Grayscale mode can have up to _____.
   (a) millions of colours
   (b) 256 colours
   (c) 256 grey shades
   (d) four printed colours

B. Subjective Questions

1. Differentiate between grayscale mode and indexed colour mode.
2. Write short notes on the following:
   (a) RGB colour mode
   (b) CMYK colour mode
   (c) Grayscale mode
   (d) Bitmap mode
   (e) Indexed colour mode

What Have You Learnt?

On completion of this session, you will be able to:

- select the image using RGB, CMYK, Index, grayscale and Bitmap mode.

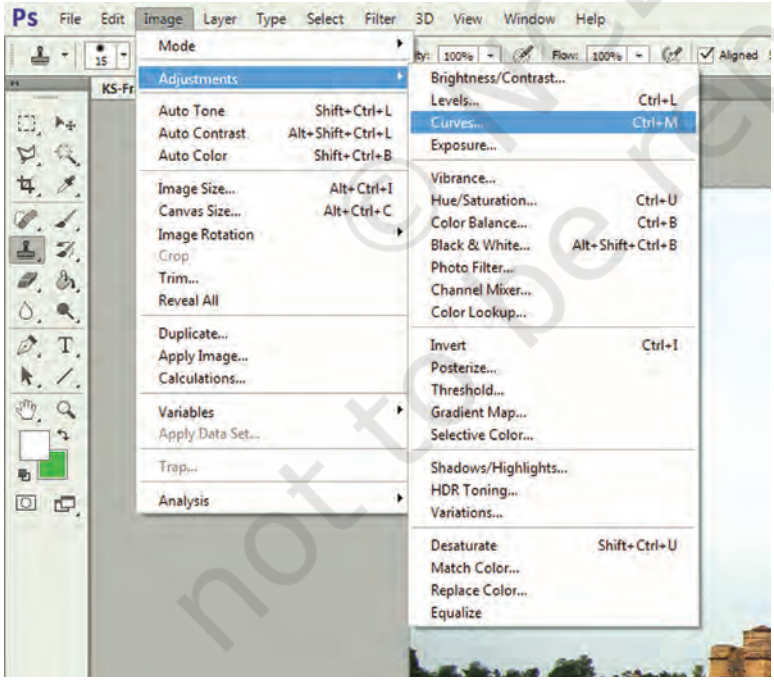


Fig. 3.45: Adjustment menu in Image tab

Session 5: Image Adjustment and Colour Correction

An adjustment layer can be used to increase the brightness or contrast of a photograph without altering the original photo. When an adjustment layer is added to an image, a new layer will appear over the image and Properties panel specific to the type of adjustment selected will pop up. The Properties panel allows to modify the adjustment layer, which in turn will modify the image. To use an adjustment layer, click on its icon in the Adjustment Layers panel.

Expanding an individual property reveals a graphical control such as a slider or dial. You can then dial in the effect you want in the Properties panel. The controls for each adjustment layer are different and specific to its purpose. The major colour correction tools are as follows:

1. Brightness
2. Contrast
3. Levels
4. Curves
5. Exposure
6. Vibrance
7. Hue or Saturation
8. Colour balance

Brightness and Contrast

The brightness and contrast adjustment lets the user make simple adjustments to the tonal range of an image. Moving the brightness slider to the right increases tonal values and expands image highlights. Moving the slider to the left decreases tonal values and expands shadows. The contrast slider expands or shrinks the overall range of tonal values in the image (Figure 3.46).

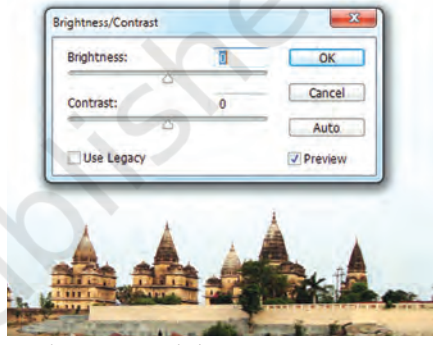


Fig. 3.46: Brightness or contrast adjustment

Let us now try to adjust the brightness and contrast.

- In the menu bar, select Image > Adjustments > Brightness/Contrast.
- Adjust the Brightness slider to change the overall brightness of the image. Adjust the Contrast slider to increase or decrease image contrast.
- Click OK.

The adjustments will appear only on the selected layer.

In normal mode, brightness or contrast applies proportionate adjustments to the image layer. When 'Use Legacy' option is selected, Brightness/Contrast simply shifts all pixel values to a higher or lower level. Since this can cause clipping or loss of image detail in highlight or shadow areas, using Brightness/Contrast in Legacy mode is not recommended for photographic images. However, it can be useful for editing masks or scientific imagery.

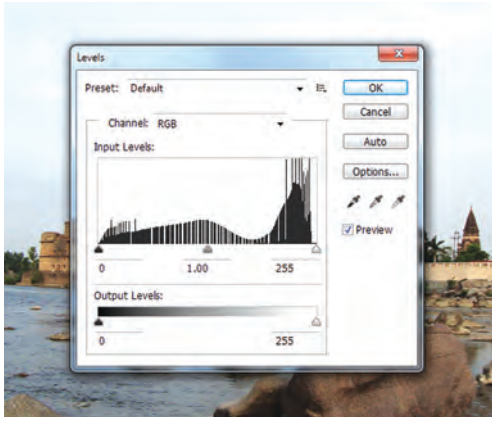


Fig. 3.47: Level adjustments

Input and Output Levels

When we use the levels adjustment layer, we can see two main sliders in the settings: the first, with a histogram, is called 'input levels'. The input level black and white determines what value of input is pure black and what value is pure white. The black slider specifies which input values should be black. Anything to the left of the slider is going to be black. Similarly with the white slider, one has to specify the threshold of input data that should be treated as white. The middle slider is your midpoint. Input levels are adjustments to the levels that are coming into the system. Whereas, output levels are adjustments to levels going out of the system. The output level black and white determines what colour should be used for the black point and white point of the final image. By default, the Output sliders are at Level 0, where the pixels are black, and at Level 255, where the pixels are white (Fig. 3.47).

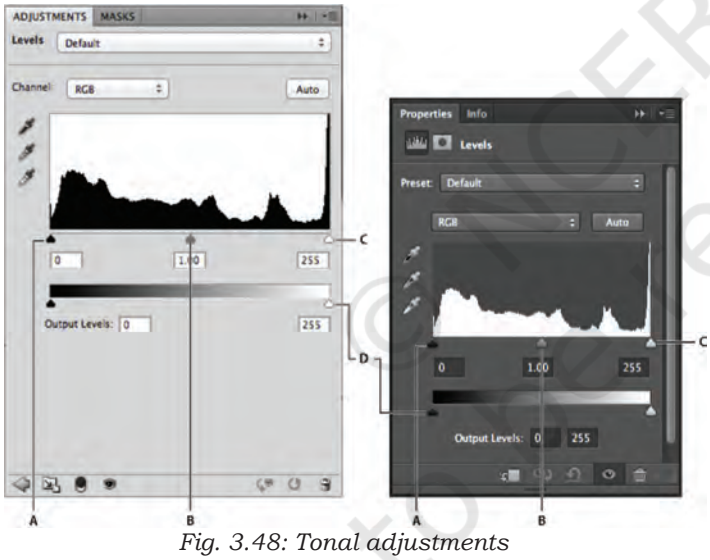


Fig. 3.48: Tonal adjustments

A— shadows,
B— midtones,
C— highlights,
D— Output level sliders

With the Output sliders in the default positions, moving the black input slider maps the pixel value to Level 0 and moving the white point slider maps the pixel value to Level 255. The remaining levels are redistributed between Levels 0 and 255. This redistribution increases the tonal range of the image, in effect increasing the overall contrast of the image. The Level adjustments are used to correct the tonal range and colour balance of an image by adjusting intensity levels of image shadows, midtones, and highlights. The Levels histogram is a visual guide for adjusting the image key tones (Figure 3.48).

A. Shadows
B. Midtones
C. Highlights
D. Output level sliders

Hue or Saturation

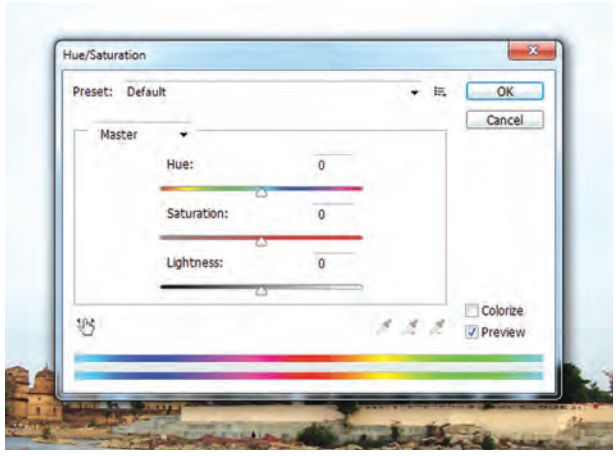


Fig. 3.49: Hue or saturation adjustment window

You have learnt earlier that hue is the colour in the image, saturation is the intensity, or richness of that colour, and the lightness controls the brightness value. The Hue or Saturation Command in Photoshop enables you to adjust the colours in your image based on their hue, saturation, and lightness. The Hue or Saturation icon can be found in the Adjustments panel. This adjustment is especially good for fine-tuning colours in a CMYK image (Fig. 3.49).

- Let us now try to adjust the hue or saturation. Choose Layer > New Adjustment Layer > Hue or Saturation. Click OK in the New Layer dialog box.
- In the Properties panel, choose from the menu to the right of On-image adjustment tool.
- Choose Master to adjust all colours at once.
- Choose one of the other preset colour ranges listed for the colour you want to adjust. To modify the colour range, see the range of colours adjusted using Hue or Saturation.
- Choose Hue or Saturation preset from the Preset menu.

To change the Hue, enter a value or drag the slider until you are satisfied with the colours. The values displayed in the box reflect the number of degrees of rotation around the wheel from the original colour of the pixel. A positive value indicates clockwise rotation; a negative value indicates counter-clockwise rotation. Values can range from –180 to +180 (Figure 3.50).

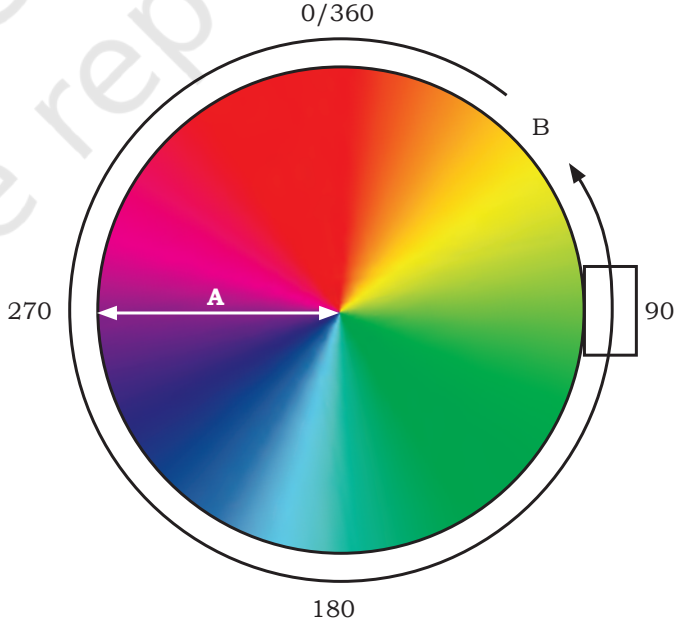


Fig. 3.50: Hue and Saturation points in colour wheel, where A is Saturation and B is Hue

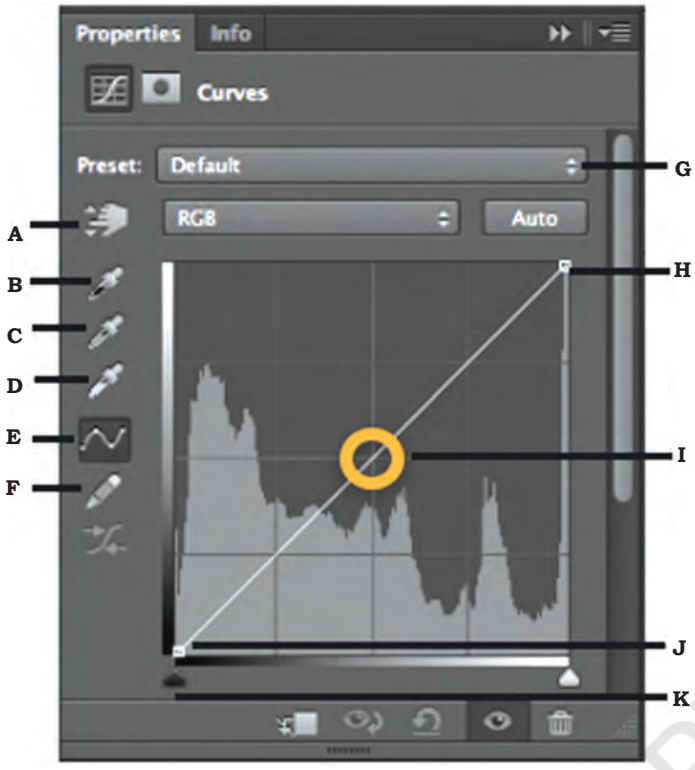


Fig. 3.51: Curves options in properties panel — A. On-image adjustment tool; B. Sample in image to set black point; C. Sample in image to set gray point; D. Sample in image to set white point; E. Edit points to modify the curve; F. Draw to modify the curve; G. Curves preset menu; H. Set black point; I. Set gray point; J. Set white point; K. Show clipping.

Curves adjustment

In the Curves adjustment, you adjust points throughout an image's tonal range. You can see the curves adjustment dialog box when you choose Layer > New Adjustment Layer > Curves (Figure 3.51).

The standard curve is actually a straight line running diagonally across the grid from the bottom left to the top right of the chart. This straight line, by default, means 'no adjustment at all'. The horizontal axis of the graph represents the input levels (original image values), and the vertical axis represents the output levels (new adjusted values).

When adjusting an RGB image, the upper-right area of the graph represents the highlights and the lower-left area represents the shadows. One can adjust the Curve line in a couple of ways. One option is to click and drag on the line in an upward or downward direction to adjust the pixels of that tone in the photo. Another adjustment that you can perform using this technique is to drag the line into what is referred to as a shallow S-curve.

As you add control points to the line and move them, the shape of the curve changes, reflecting your image adjustments. The steeper sections of the curve represent areas of higher contrast while flatter sections represent areas of lower contrast. The Curves adjustment can also be applied to CMYK, Lab colour, or Grayscale images.

Adjust Image colour and Tone with Curves

— Open the 'Colour and Tone' dialog box and apply the 'Curves' command.

— A dialog box will appear allowing you to adjust the image tone by editing the graph.

— Moving a point in the—(a) top portion of the curve adjusts the highlights, (b) centre of the curve adjusts the midtones, and (c) bottom section of the curve adjusts the shadows.
— To darken highlights, move a point near the top of the curve downward.
— Moving a point either down or to the right maps the Input value to a lower Output value, and the image darkens.
— To lighten the shadows, move a point near the bottom of the curve upward.
— Moving a point either up or to the left maps a lower Input value to a higher Output value, and the image becomes light (Figure 3.52).
— Click 'OK' to apply the correction.

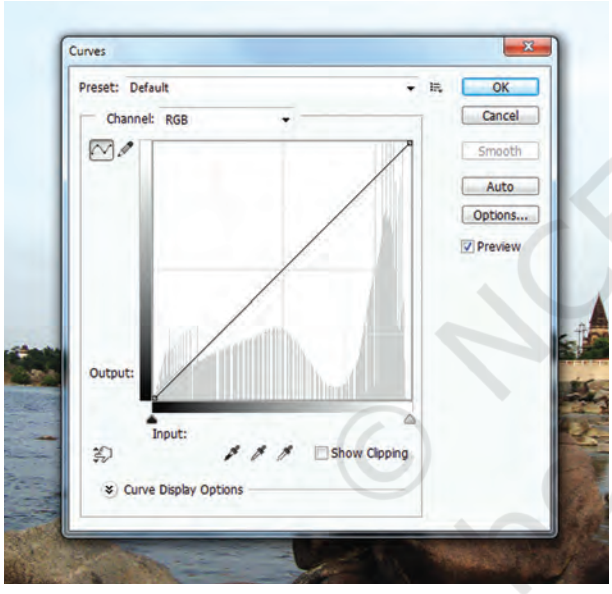


Fig. 3.52: Curves adjustments

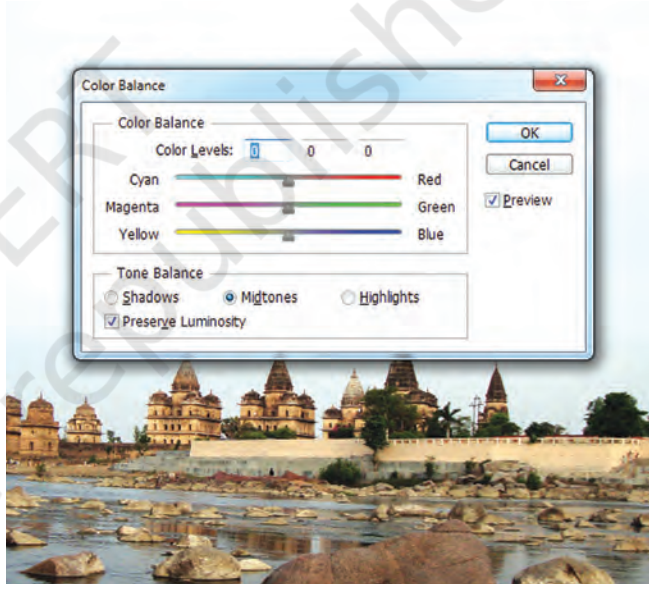


Fig. 3.53: A view of colour balance window

Colour balance

The 'colour balance' command changes the overall mixture of colours in an image for generalised colour correction (Figure 3.53). The logic of this tool is based on RGB colour model.

For colour balancing, click on the Colour Balance icon in the Adjustments panel.

Choose Layer > New Adjustment Layer > Colour Balance.

Practical Exercises

Activity 1

Creating a digital graphics with Colour Balance Adjustment.

Material required

Computer, Adobe Photoshop software

Procedure

Step 1: Open a blank canvas of size 800 × 600 pixels, Resolution: 150 pixels per inch, and white background.

Step 2: Import a colour photo (of a scene or portrait photo).

Step 3: Go to Image > Adjustments > Colour Balance

Step 4: Make sure that the composite channel is selected in the channels panel. This command is available only when you are viewing the composite channel.

Step 5: Do one of the following:

- Click on the Colour Balance icon in the Adjustments panel.
- Choose Layer > New Adjustment Layer > Colour Balance.
- One can also choose Image > Adjustments > Colour Balance. However, one must keep in mind that this method makes direct adjustments to the image layer and discards image information.
- In the Properties panel, select Shadows, Midtones, or Highlights to select the tonal range in which the user wants to focus the changes. Select Preserve Luminosity to prevent changing the luminosity values in the image while changing the colour. This option maintains the tonal balance in the image. Drag a slider towards a colour that the user wants to increase in the image; drag the slider away from the colour that you want to decrease in the image. The values above the colour bars show the colour changes for red, green and blue channels (For Lab images, the values are for the A and B channels.) Values can range from –100 to +100.

Step 6: Select OK and save the output to JPG file format and the original PSD File. View this developed JPG file in Windows photo viewer software.

Activity 2

Creating a digital graphics with partial grey colour and partial RGB colour.

Material required

Adobe Photoshop Software

Procedure

Step 1: Open a blank canvas of size 800 × 600 pixels, Resolution: 150 pixels per inch and White Background.
Step 2: Import a colour photo (of a scene or portrait)
Step 3: Select a portion of this image using the Selection tool.
Step 4: Go to Image > Adjustments > Select Hue or Saturation
Step 5: Reduce the Saturation Control Slider to –100.
Step 6: Deselect the de-saturated portion of the image and save the output to JPG file format and the Original PSD File. View this developed JPG file in Windows Photo Viewer Software.

Check Your Progress

A. Fill in the Blanks

1. The _____ command in Adobe Photoshop enables you to adjust the colours in your image, based on their hue.
2. The colour _____ command changes the overall mixture of colours.
3. When adjusting an RGB image, the upper-right area of the graph represents the highlights and the lower-left area represents the _____.

B. Subjective Questions

1. Describe the functions of the following combination of keys:
   (a) Ctrl + m
   (b) Ctrl + u
   (c) Ctrl + l
   (d) Ctrl + b
   (e) Ctrl + z

What Have You Learnt?

On completion of this session, you will be able to:

- demonstrate the use of different correction tools for image preparation;
- adjust the brightness, contrast and saturation of the image.

SESSION 6: DIGITAL MATTE PAINTING

Digital painting is a method of doing an artwork on a system. It is a way of portraying our ideas and thoughts on the screen by adapting traditional painting mediums

like oil, ink, water colour, etc. Photoshop produces raster paintings. These paintings usually resembles a real painting made with real brushes and paint, thus they look more realistic than a vector painting or illustration. A digital painting maker tries to mimic the physical objects or people in their own virtual manner using virtual brushes and colours. Making use of photo textures can be a great way to enhance our artwork in Adobe Photoshop and make it look more realistic. Photo textures are actually a part of pictures and photographs and we can use them to add texture to our artwork using blending modes. Texture brushes can be used to add realistic details in our artwork. Also we can make our own brushes and can also find the brushes online.

Matte Painting

Matte painting is a creative technique that filmmakers use to create backgrounds for scenes that cannot or do not exist in real life. It is an old technique in the visual effects industry. It is a painted representation of a large landscape that allows filmmakers to create the illusion of an environment that does not exist. It combines several techniques including 3D, photo manipulation, painting as well as retouching techniques in order to achieve quality result. Mattes are used to combine foreground image with the background image. The output depends on the skill level of the artists and technicians involved in matte painting.

Fig. 3.54: Step 1 for creating Digital Matte Painting (https://www.digitalartsonline.co.uk/tutorials/photoshop/fantasy-digital-matte-painting/?pn=2).

Steps for creating Digital Matte Painting

Before starting the matte painting scene, make a rough sketch of the world that you would like to create. You can refer to some images that could help you in your matte painting for colour correction and for the Depth of Field (DoF). You also need to decide the size of your painting. The range of the painting's dimensions would depend on its intended use.

Step 1

- Open a new document by going to File > New and create a blank canvas of 5,700 × 3,900 pixels.
- Click and drag the photograph into the new document. Place the photo in the centre of the canvas, and then move it to the bottom right.
- Search the photo of Machu Pichhu using Google Image search and download the same (Figure 3.54).

Step 2

- Use the Photoshop Eraser tool to remove the photograph's sky area and then create a new layer named 'Outlines' above the photograph. We will now start extending the original plate.
- Select a soft standard brush of about 30 pixels and start drawing in the general outline of the new scenery that the user is going to add.

Step 3

- Now that we have the general outlines of our new image, we can start painting in a bit more detail.
- Always begin with the element that is the furthest (usually, sky).
- Select the 'Background' layer and create a new layer named 'Sky'. While still in brush mode, hold down Alt key to turn the cursor into a colour eyedropper and select the grey/blue colour of the background mountains in the photograph.
- Now, use this colour to block in the sky (Figure 3.56).

Step 4

- Add some storm clouds to the sky and establish the light source. Use a variety of different sized soft brushes and light

Fig. 3.55: Step 2 for creating digital Matte Painting

Fig. 3.56: Step 3 for creating Digital Matte Painting

Fig. 3.57: Step 4 for creating Digital Matte Painting

Fig. 3.58: Step 5 for creating Digital Matte Painting

Fig. 3.59: Step 6 for creating Digital Matte Painting

Fig. 3.60: Step 7 for creating Digital Matte Painting

pen pressure to slowly build up the layers of stormy clouds. Also, add the sunbeam to give a more realistic look (Figure 3.57).

Step 5

- Ensure the 'Sky' layer is still selected and create a new layer called 'Right mountain'.
- Use the same technique that you used for creating the sky. This can be done by picking the colour of the right-hand mountain on the photograph and then blocking in that colour on your extension (Figure 3.58).
- Add few more details to the mountain by picking various shades from the original photograph by applying it to your new layer.
- The sky and landscape extensions are all your imagination, but you can also use reference photographs.

Step 6

- Select 'Layer 1' (the layer that is the original photograph), and now create a new layer named 'Right Foreground Mountain' (Figure 3.59).
- Repeat Step 6, but add little more detail. Use the original photograph as the colour palette in order to keep a uniform and balanced colour scheme all along the picture.

Step 7

- Now, create a new layer and name it 'Left Foreground Mountain'.
- Paint rough details as in the previous step.
- Once done, select 'Layer 1' again and create a new layer named 'Middle-Ground' (Figure 3.60).

Step 8

- We will now add the final creations over the original plate, which includes the waterfall and another small peak towards the background of the ruins.
- Once done, delete the 'Outlines' layer. The rough layout must look similar to the screen capture. This sketch will give a strong feel of what exactly the final composition will look like, displaying the elements, such as colour, lighting and perspective view.
- In the next step, we will start to render our matte in more detail and try to give the painted area more of a photo-realistic look (Figure 3.61).

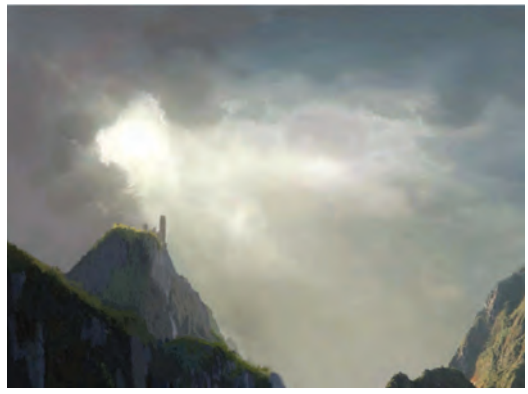


Fig. 3.61: Step 8 for creating Digital Matte Painting

Step 9

- We will start with the sky again. Select the 'Sky' layer and with a variety of different sized brushes, build up the layers of cloud. One can always find a large-sized photograph and paste it in, retouching it a bit with some brushwork (Figure 3.62).
- Make use of adjustment layers and colour overlays placed over your sky layer, to view changes without affecting your working layer.

Fig. 3.62: Step 9 for creating digital Matte Painting

Step 10

- Now, we have painted in some distant mountains beneath the sky to give the painting more depth. They are just flat colour silhouettes with some highlights added to the edges (Figure 3.63).
- Once the sky is done, go to Filter > Noise > Add Noise and add a bit of Gaussian Noise to help it match the 'film' grain of the original plate.

Fig. 3.63: Step 10 for creating digital Matte Painting

Practical Exercises

Activity 1

Cropping and cleaning images

Material required
Computer, Adobe Photoshop software

Procedure

- Select an image, for example rocks, trees, houses of high sharpness and detailed quality (to be used later as foreground image in Matte Painting).
- Crop and clean the image, in accordance with the requirement of a large Matte Painting scene.
- Select the second image, for example ocean coast, river bank, forest with lesser sharpness, or detail to act as mid-ground image of a large Matte Painting scene.
- Crop and clean the image, in accordance with the requirement of a large Matte Painting scene.

Activity 2

Mixing foreground and background image for a matte painting

Material required
Computer, Adobe Photoshop software

Procedure

Create a single Matte Painting scene of size 1920 × 1080 pixels, Colour Mode: RGB, Resolution: 150 pixels/inch, by using masking and mixing tools of Adobe Photoshop to create:

- Foreground image (with full detail and sharpness)
- Import and mix the mid-ground image (with lesser detail and sharpness) and place it behind the foreground image.
- Now, import the background image in this same mixed single Matte Painting file and mix it with the third image, which is almost a blurred image like blue or evening sky or out-of-focus background like a mountain range, sea or ocean water or large river water).

Activity 3

Given below are certain steps for digital Matte Painting. Arrange them in sequence.

1. Use the photoshop eraser tool to remove the photograph's sky, and then, create a new layer.
2. Add some storm clouds to the sky and establish the light source. One can use a variety of different sized soft brushes.

3. Ensure that the sky layer is still selected and create a new layer called 'right mountain'.
4. One can create a new layer and name it 'left foreground mountain'. Paint in the rough details as in the previous step.
5. Select 'Layer 1' (the layer that is the original photograph) and create a new layer, which can be named 'right foreground mountain'.
6. Open a new document by Group to File > New and create a blank canvas of 5700 × 3900 pixels.
7. Now, we have the general outline of our new image and we can start painting in more detail. Always begin with the element that is the furthest (usually, the sky).

Check Your Progress

A. Fill in the Blanks

1. A painted representation of a landscape or distant location that allows a filmmaker to create the illusion of an environment that is not present at the filming location is known as _____ painting.
2. _____ paintings made through the Adobe Photoshop usually resemble a real painting made with real brushes and paint and they look more realistic than a vector painting or illustration.

B. Subjective Questions

1. What is 'matte painting'?
2. Describe the steps of matte painting in Adobe Photoshop.

Session 7: Frame Composition

Frame composition is a guideline, which can be applied in many situations to enhance the impact of a scene. These guidelines will help the students to take more compelling photographs, lending them a natural balance, focusing attention to the important parts of the scene, or leading the viewer's point of view.

Once familiar with these composition tips, one will be surprised at how universal these compositions are. One can identify them everywhere and find it easy to see why some photos look more attractive while others look like simple snapshots.

Rule of Thirds

Rule of Thirds is not any rule, but a guideline intended to help when the user is uncertain regarding the placement of elements in a scene, or when the user is framing the picture. As we have studied about the Rule of Thirds in Chapter 2, the whole image is divided into nine equal segments by two vertical and two horizontal lines. It implies that one must position the most important elements in a photo or scene along these lines, or at points where they intersect. By doing so, it will add balance to the photo (Figure 3.64).

Fig. 3.64: A view explaining how the temple and horizon are aligned along the lines in Rule of Thirds

Balancing Elements

Photographs contain one or more subjects. Placing your main subject off-center, as with the rule of thirds, creates a more interesting photo. However, it can leave a void in the scene which can make it feel empty. Therefore, you should balance the 'weight' of your subject by including another object of lesser importance to fill this space. This is called as balance in photography. There are two types of balance in photography: (i) formal balance, also called symmetrical balance, the one in which images are repeated symmetrically on each side of a given point, and (ii) informal balance, also called asymmetrical balance, the one in which one or more dissimilar elements are balanced on each side of a given point.

Leading Lines

When we look at a photo, our eyes are naturally drawn along lines. Lines in the composition can affect the way we see an image, pulling us into the picture or towards the subject in the scene. There are many different types of lines namely straight, diagonal, curvy, zigzag, radial, etc., and each can be used to enhance the composition of photo (Figure 3.65).

Fig. 3.65: Lines on the road in this photo draws one's eye through the scene with the single point vanishing view

Symmetry and Patterns

Symmetry refers to a sense of harmonious and beautiful proportion and balance. We are surrounded by different types of symmetries and patterns — both natural and man-made. These can be used to define and draw the focus of the viewer to the subject. They can be used as eye-catching compositions; particularly in situations where they are not expected (Figure 3.66).

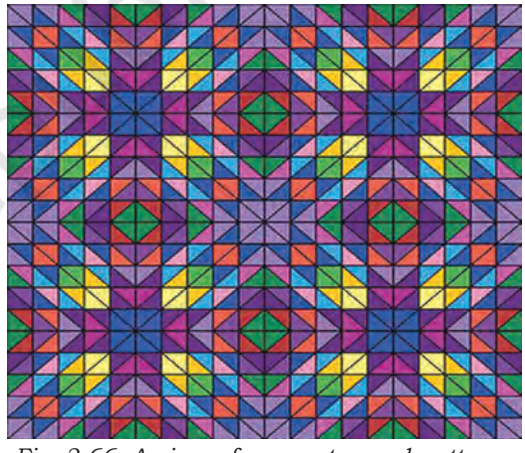


Fig. 3.66: A view of symmetry and patterns

Viewpoint

Before photographing the object or subject, take time to think about the location from where you will shoot. The photographer's viewpoint has immense impact on the composition of the photo clicked, and thus, can largely affect the message that the shot conveys. Instead of just shooting from the eye level, consider photographing from a height, at the ground level, at the side, back, far away,

Fig. 3.67: Viewpoint chosen here creates an interesting perspective

Fig. 3.68: Depth of a scene —Rock, Yacht, Boat and Ocean

Fig. 3.69: Framing

Fig. 3.70: Cropping

very close and so on. Changing the viewpoint is a great way to enhance a composition (Figure 3.67).

Depth

As you might be aware that photography is a 2D (two-dimensional) medium, we have to choose our composition carefully so as to convey the sense of depth as present in the actual scene. One can create depth in a photo by including distinct objects in the foreground, middle ground and background. Another useful composition technique is overlapping, where we deliberately partially obscure one object with another. The human eye naturally identifies these three layers and mentally separates them, creating an image with greater depth (Figure 3.68).

Framing

Framing in photography is the presentation of visual elements in an image, especially the placement of the subject in relation to other objects. It refers to using elements of a scene to create a frame within a frame. Adding a focal point through framing, shows the viewer exactly where to look (Figure 3.69).

Cropping

Cropping is the removal of unwanted outer areas from a photograph or an image. By cropping close to the subject, one can eliminate the background, ensuring the subject gets the viewer's attention (Figure 3.70).

Follow the given steps to crop an image:

- Select the Crop Tool on the Toolbar.
- Select an area of the image to retain (just the same as making a normal selection).
- When you release the mouse button, the area to be retained is highlighted.
- You can move or transform the crop area by dragging the selection or the selection handles.
- Press Enter key to perform the crop.
- You can combine cropping and resizing in the same operation, using the options in options bar.

Experimentation

Photography is a creative and most expressive art form. Experimentation in photography is often described as using alternative techniques to photograph a subject. A photographer who does experimental photography uses techniques that are not common with the usual photography or digital photography. The most common experimental photography is photomontage (Figure 3.71). This technique involves the act of combining pieces of photographs and using different types of graphic materials. Another form is performance art photography, which combines photography and performance art (Figure 3.72).

Fig. 3.71: Photomontage

Fig. 3.72: Performance Art Photography

Practical Exercises

Activity 1

Taking photographs from different viewpoints

Material required

DSLR Camera

Procedure

- You can change your elevation. Kneel down and take a photo or hold the camera above your head and shoot down on your subject.
- You can move right or left while clicking the subject.
- You can go aside your subject or behind them or even get closer or further away.
- You can at times roll diagonally from right or left.
- Notice how the background shifts and the viewpoint changes.
- You will notice that changes in viewpoint can add a deeper meaning or feeling to an image.

Activity 2

Creating compositions from different angles

Material required

Computer, Adobe Photoshop software

Procedure

- Create a digital graphic with a blank canvas of size 800 × 600 pixels, Resolution: 150 pixels/ inch, white background and RGB default colour mode.
- Import one digital photograph, resize by scaling it and creating a new composition from wide angle shot to mid-shot, thereby forming a new composition.
- Save the file in JPG format to compare it with its previous composition.

Activity 3

Applying Rule of Thirds to an image

Material required

Computer, Adobe Photoshop software

Procedure

- Create a digital graphics with a blank canvas of size 800 × 600 pixels, resolution: 150 pixels/inch, white background and RGB default colour mode.

- Import a digital photograph with a landscape and sky or any other image of your choice.
- Use the Rule of Thirds and create a new composition.
- Save the file in JPG format.

Check Your Progress

A. Fill in the blanks

1. Rule of Thirds is not any rule, but it is a guideline intended to help you when you are uncertain as to the placement of elements in a _____ or when you are framing the picture.
2. In Rule of Thirds, the whole image is divided into _____ equal segments by two vertical and two horizontal lines.
3. The two types of balance in photography are _____balance and informal balance.
4. Informal balance, also called as _____ balance is the one in which one or more dissimilar elements are balancing on each side of a given point.
5. Symmetry refers to a sense of harmonious and beautiful proportion and _____.
6. Cropping is the removal of _____ outer areas from a photograph or an image.
7. Photomontage is the technique that involves the act of combining pieces of photographs and using different types of _____ materials.

B. Subjective Questions

1. Write short notes on the following:
   (a) Rule of thirds
   (b) Symmetry and patterns
   (c) Leading lines

What have you learnt?

On completion of this Session, you will be able to:

- describe the rule of thirds and its applications;
- differentiate between the formal and informal balancing in photography;
- explain the meaning and purpose of viewpoint, symmetry, depth and framing in photography; and
- crop an image in Photoshop using Crop Tool.

NOTES

Chapter 4

Lighting for Photography

Lighting plays an important role in how we view objects. The texture and depth of an object shows variation, as the intensity and type of light changes. Special effects in animation depend significantly on lighting, as it changes the way the object is presented with the help of tones, contrast and hues. Lighting is the work of a separate department in a big animation studio. However, as a Texturing Artist, an individual must know how to create mood and visual shaping through lighting. Specific lighting scenarios, including character lighting, environment lighting and lighting an animated sequence must be mastered by those aspiring to become a Texturing Artist.

Session 1: Effective Lighting for Photography

You have learned about camera angles and camera movements. Here, you will be learning about the basics of photography, including its principles. The brightest light comes from the Sun, which is a white light source and generates sharp-edged shadows. The second source of light is the blue sky. As a result, it has soft shadows (which are completely masked by the direct light coming from the Sun). Smaller the source of light, the harder the shadows.

Lighting is deliberately used to attain an aesthetic objective. Some of the objectives which are attained with lighting are as follows:

- Establishing a setting
- Setting a visual style
- Creating visual interest
- Enhancing or creating the mood of a scene
- Directing the eye
- Creating the illusion of depth
- Creating the illusion of volume
- Revealing the substance and qualities of materials
- Maintaining continuity
- Integrating visual elements

Sources of Light for Photography

Natural light refers to sunlight or daylight, while artificial light refers to all kinds of light sources, including fluorescent lights, electric lights, flash, and so on. Factors, like time of the day, weather, location and air pollution affects the use of natural light for photography.

The best infrared photographs therefore tend to be captured in direct sunlight. There are four main sources of artificial light for photography—

(i) Incandescent: This lighting ranges from the common light bulb to large tungsten 'hot lights' used in the studio. They are warm in colour and temperature, as compared with natural daylight. Halogen bulbs are colder and produce a light that is blue in colour, while tungsten bulbs, being hotter, produce light with a reddish hue.

(ii) Fluorescent

(iii) Light Emitting Diode (LED)

(iv) Studio strobe: Strobe lighting is probably the most common used artificial lighting in photography. Strobe lighting is not suitable for video, as the duration of the flash is too short.

Fluorescent lamp is a mercury lamp that uses fluorescence to deliver visible light. It comes in a wide variety of colour temperatures.

LED is a semiconductor device that emits visible light when an electric current passes through it. The output of LED can range from red to blue-violet.

Choice of Type of Light

The choice of the type of light to be used, depends on the type of photography, the subject, and the desired

effect. Hard light produces well-defined, dark shadows and tends to originate from a single light source, which is usually either small or located far away. Hard light can be used to create images with sharp contrast and highlights, emphasising the shape and texture. It can be used to enhance the 3D effect of an image and in general, to create dramatic effects. Soft light, on the other hand, produces either soft shadows or no shadows at all. It can be generated from several light sources, by diffusing light using some kind of barrier or by reflecting light from different surfaces so that the subject is hit by the light from various angles. The action of reflecting light essentially turns the reflector into a secondary light source. All kinds of things can be used as reflectors, whether shooting indoors or outdoors. These include professional photo light reflectors or just sheets of paper.

The narrower the source, the harder the light. A broad light source lessens shadows, reduces contrast and suppresses texture. The farther the source, the harder the light.

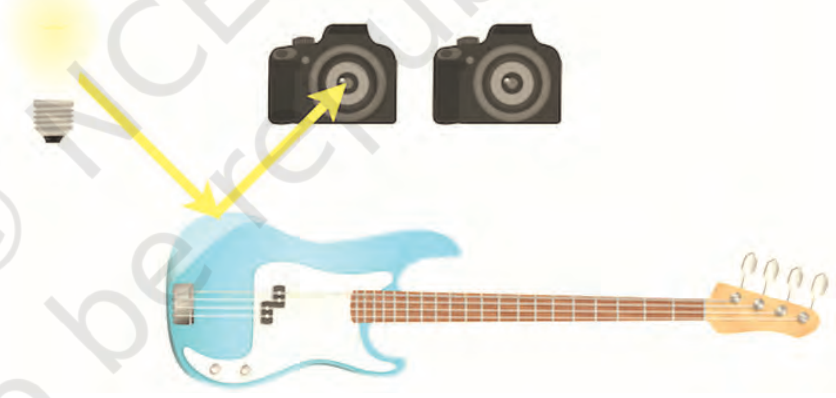


Fig. 4.1: Phase angle

Angle of Light

The angle of light should be taken into careful consideration for creating a specific effect. The angle from the light source (e.g., the sun) to the object or subject and then to the camera is called the 'phase angle'. The angle of incidence of the light source (e.g., the sun) on an object or the subject along with the phase angle sets the shading. The larger-scale shading is important from the point of view of showing the form. The smaller-scale shading is

important for showing texture. The various phase angles have been summarised in the table given below:

Angle of light (degrees)	Position of light	Example
0	Front, with no shadows	Sun is behind your back
45	Front, with small shadows	———
90	Side	Sun is on your side
135	Side and back	Transmitted light from subjects
180	Back	Transmitted light and diffracted light

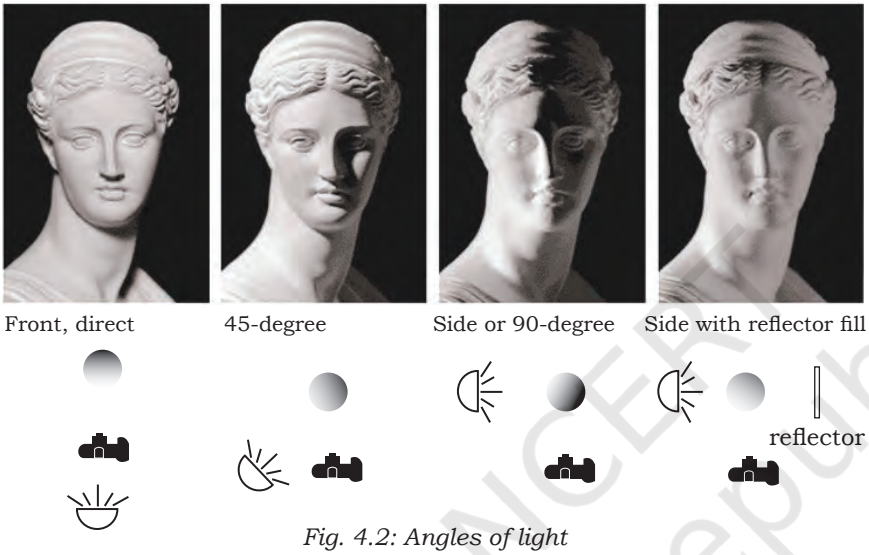


Fig. 4.2: Angles of light

Bounced Light

When light hits a surface, it either bounces back or is absorbed by it. For example, the colour of the wood is enhanced by the fact that light of the same colour is reflecting onto it. The result is that the coloured light and the underlying surface combine to create a glowing and saturated version of the wood's existing colour. Direct flash is harsh, but if you use bounce flash, it re-directs the light to bounce off an object and back to the subject. Soft light tends to wrap around objects, projecting diffused shadows with soft edges.

High key images

High key photography uses unnaturally bright lighting to blow out most or all harsh shadows in an image. It

generally involves using extra lights. High key lighting is often soft and the detail is generally low. High key lighting can be seen in fog and snow, where even shadows are light due to the amount of reflected light bouncing around.

Fig. 4.3: High key image

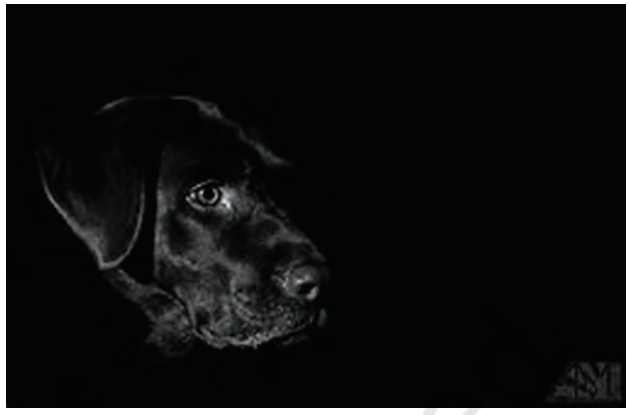


Fig. 4.4: Low key image

Low key images

Low key images have very little light in them. A low key image contains predominantly dark tones and colours.

White Balance

Each source of light possesses a different colour temperature. A digital camera can measure the colours in the red, green, and blue light of the spectrum. Since different sources of light have different colour hues, a picture taken with a normal white balance under artificial lighting conditions transmits the low heat to the camera's sensor. A light having higher colour temperature will have more blue light or larger Kelvin value, as compared to lower light, which has a smaller Kelvin value. An image taken under tungsten bulb without adjusting the digital camera for white balance produces a dull orange shade. An image taken under the fluorescent lighting produces a brighter bluish cast. By adjusting the white balance setting of your digital camera, you can alter the required light or temperature to produce the most accurate colours in a digital image. The pre-set modes for white balance settings are as follows:

Auto — It helps in adjusting the white balance automatically according to the different lighting conditions.

Tungsten — It is used for light under a little bulb, and it is often used while shooting indoors.
Fluorescent — It is used for getting brighter and warmer shots while compensating for the cool shade of fluorescent light.
Daylight — It is for the normal daylight setting while shooting outdoors.
Cloudy — It is ideal for shooting on a cloudy day. This is because it warms up the subject and surroundings and allows you to capture better shots.
Flash — It is required when inadequate lighting is available.
Shade — This mode generally produces cooler or bluer pictures.

Practical Exercises

Activity 1

Creating a scene with light bounce and shadows

Material required

Computer, Adobe Photoshop software

Procedure

- Create a digital graphic with a blank canvas of size 800 × 600 pixels; Resolution: 150 pixels/inch; White background and RGB default colour mode. Import any Digital Photograph, resize by scaling it and create a scene. Now, apply various highlighting and image enhancing techniques and create a scene with:
  1. Light bounces (from the solid wall, building, reflecting surface)
  2. Prominent shadows (of a building or tree).
- Save the file in JPG and PSD format to compare it with the previous composition.

Activity 2

Creating a scene with high and low key

Material required

Computer, Adobe Photoshop software

Procedure

- Create a digital graphic with a blank canvas of size 800 × 600 pixels, Resolution: 150 pixels/inch, White background and RGB default colour mode

NOTES

- Import any one digital photograph, resize by scaling it and create a scene. Now, apply various lighting, image editing techniques and create a scene with:
  1. **High key**
  2. Some portion (background or sky) with **low key setting**
- Save the file in JPG and PSD format to compare it with its previous composition.

Check Your Progress

A. Fill in the Blanks

1. Red light has a _____ wavelength compared to blue light.
2. The Sun's light glows red at sunset because the _____ wavelength blue colour gets lost due to scattering.
3. An object which is having _____ colour will reflect all wavelengths equally when light hits the surface.
4. An object which is having _____ colour will absorb all light when light hits the surface.
5. When white light hits a red surface, the _____ and _____ lights are absorbed and red light is reflected.
6. Radiance is, usually, a subtle effect and a great deal of _____ is required to make it apparent.

B. Subjective Questions

1. Explain in brief, the following terms related with colours:
   (a) High Key
   (b) Low Key
2. Why is the sky blue?

What Have You Learnt?

On completion of this Session, you will be able to:

- describe the basic qualities of light (intensity, contrast, direction and diffusion).
- demonstrate the use of different types of lighting effects on images.
- identify different types of light and settings for photography.
- differentiate between high key and low key images.

Answer Key

Unit 1: Colour Theory

Session 1: Principles of Colour Theory

A. Fill in the blanks

1. Hue
2. Saturation
3. Value
4. white
5. black
6. grey
7. wheel

Session 2: Colour Wheel

A. Fill in the blanks

1. primary
2. Artist colour wheel
3. Digital
4. orange
5. green
6. violet
7. red, yellow, blue

Session 3: Digital Colour Wheel

A. Fill in the blanks

1. electronic
2. RGB
3. yellow

Session 4: RGB Display Mechanism

A. Fill in the blanks

1. image
2. one
3. numerical
4. pixels

Session 5: Colour Schemes

A. Fill in the blanks

1. complementary
2. contrast
3. warm
4. cool

Unit 2: Digital Photography and Pre-production

Session 1: Camera Angles and Movements

A. Fill in the blanks

1. high-angle
2. low-angle
3. eye-level
4. bird's eye
5. high-angle
6. Pan
7. Tilt
8. Dolly
9. Zoom
10. size
11. focus
12. Exposure
13. Hot
14. light
15. shutter

Session 2: Pre-production

A. Fill in the blanks

1. production
2. storyboard
3. storyboard
4. design
5. Model
6. storyboard

B. Match the Columns

1. (c) 2. (b) 3. (a)

Unit 3: Drawing and Painting using Adobe Photoshop

Session 1: Introduction to Adobe Photoshop

A. Match the columns

1. (a) 2. (d) 3. (b) 4. (c)

Session 2: Drawing and Painting Tools

A. Fill in the blanks

1. lines
2. raster
3. vector
4. pencil
5. Move

6. Marquee
7. Lasso
8. swatches

Session 3: Blending Modes

A. Match the columns

1. (c) 2. (b) 3. (a) 4. (d)

Session 4: Colour Modes

A. Multiple Choice questions

1. (a) 2. (d) 3. (b) 4. (c)

Session 5: Image Adjustment and Colour Correction

A. Fill in the blanks

1. saturation
2. balance
3. shadows

Session 6: Digital Matte Painting

A. Fill in the blanks

1. Matte
2. Raster

Session 7: Frame Composition

A. Fill in the blanks

1. scene
2. nine
3. formal
4. asymmetrical
5. balance
6. unwanted
7. graphic

Unit 4: Lighting for Photography

Session 1: Effective Lighting for Photography

A. Fill in the blanks

1. longer
2. shorter
3. white
4. black
5. blue, green
6. light

NOTES

Glossary

2D map: *Two-dimensional map consists of either a bitmap or a procedural map. Texture coordinates are essential for mounting a 2D map on 3D model.*

2-sided polygon: *A polygon that has a front and a back, and is 2-sided. A 2-sided polygon has two normal surfaces, facing the opposite directions. For example, a playing card.*

3D map: *Three-dimensional map is either built from multiple layers of bitmaps or generated in three dimensions with a procedural texture.*

3D object: *The most common 3D objects are geometric objects, which can be classified according to whether they are polygon meshes, surfaces, curves, implicit objects or nulls.*

Additive opacity: *The type of opacity that adds background colour to the material's colour of the transparent object.*

Alpha channel: *One of the four channels (or components) of information that make up every pixel in an image. There are three channels for red, green and blue (RGB) and one alpha channel.*

Ambient light: *It is the light that is already present in a scene, before any additional lighting is added.*

Ambient map: *This allows manipulation of the ambient component of an object's reflection-illumination model. Usually, the ambient component is given a value near that of the diffuse component.*

Angle of view: *The viewable field covered by a lens, measured in degrees.*

Animation: *The process of creating a progressively altering image that gives the appearance of continuous motion.*

Aperture: *The opening size of a camera lens. The greater the aperture, the smaller the depth of field and the greater the amount of light entering the lens.*

Aspect ratio: *A description of the proportion of an image by comparing its width to its height.*

AVI: *Audio Video Interleave is a popular file format that combines video and audio.*

Axis of motion: *In 3D space, the axis that an object follows during movement.*

Axis of rotation: *In 3D space, the axis around which an object rotates is called an axis of rotation.*

Bit: *The building blocks of computer data. It has either the value of 1 or 0.*

Bitmap: *It is a grid where each individual square is a pixel that contains colour information.*

Blending: *The mixing of two (or more) textures into one final texture that is displayed in rendering.*

Byte: *It is equal to 8 bits. Multiples of bytes make the terms kilobyte (1024 bytes), megabytes (1024 kilobytes) and gigabyte (1024 megabytes).*

Camera: *It is an optical instrument used to record images. A digital camera is a hardware device that takes photographs and stores the image as data on a memory card.*

Centre point: *A point that represents the centre of an object. The centre point of a polygon is where the line representing the normal comes out from.*

Compositing: *The process of combining multiple elements shot separately (still images, movie clips) into a final image or sequence to give an impression that they were all shot at the same time.*

Depth of field: *The total distance on either side of the point of focus, which when viewed from an appropriate distance, appears sharp in the final print.*

Dimension: *A measure of spatial extent, especially width, height or length.*

Dots per inch, DPI: *This refers to the number of dots that exist within each inch of a bitmapped image.*

Field of view: *It is the open observable area that a person can see through one's eyes or via an optical device.*

Frame: *A frame in photography is a static image, which when followed by other static images sequentially gives the illusion of motion.*

Framing: *In photography, it refers to the technique of drawing focus to the subject in the photo by blocking other parts of the image with some image in the scene.*

Frame rate: *It is expressed as Frames per Second (FPS). It is the amount of individual video frames that a camera captures per second.*

Hue: *The position of a colour in the spectrum that describes the tone or tint of a colour, such as red, yellow, or blue.*

JPEG (Joint Photographic Experts Group): *A widely accepted, international standard for compression of colour images.*

Layer: *It is a portion of a scene. Each layer consists of an object or multiple objects that can be edited separately from the rest of the objects in a scene. In photoshop, layers act as pieces of images stacked on each other.*

Layout: *The art or process of arranging printed or graphic matter on a page.*

Luminance: *The black and white information (brightness, sharpness, and contrast) encoded in a colour. The amount of luminance contained in a colour is directly proportional to the amount of light intensity.*

Model sheets: *These are also used for reference in 3D modelling. It is, usually, used as reference material so as to allow proper proportions in 3D modelling.*

Opacity: *Opacity is the state of a body that makes it impervious to the rays of light.*

Plane: *Plane refers to a two-dimensional (i.e., flat and level) surface. Imagine a plane as a piece of glass that is infinitely large but has no depth.*

Polygon: *A geometric shape in one or many planes. Polygonal modelling consists of using many faces to create the shape.*

Primary colours: *There are three primary colours of light —red, green and blue (RGB).*

Raster image: *also called bitmap graphics, a type of digital image that uses tiny rectangular pixels, or picture elements, arranged in a grid formation to represent an image. (Britannica)*

RGB colour model: *It is an additive color model in which red, green, and blue light are added together in various ways to reproduce a broad array of colours.*