WEB APPLICATION

CLASS XII

STUDENT HANDBOOK

CENTRAL BOARD OF SECONDARY EDUCATION

SHIKSHA KENDRA, 2, COMMUNITY CENTRE,PREET VIHAR, DELHI - 110092

WEB APPLICATION

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STUDENT HANDBOOK

JOB ROLE-WEB DEVELOPER

CENTRAL BOARD OF SECONDARY EDUCATION

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भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक सम्पूर्ण [1]प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,
विचार, अभिव्यक्ति, विश्वास, धर्म
और उपासना की स्वतंत्रता,
प्रतिष्ठा और अवसर की समता
प्राप्त कराने के लिए
तथा उन सब में व्यक्ति की गरिमा
[2]और राष्ट्र की एकता और अखंडता
सुनिश्चित करने वाली बंधुता बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई॰ को एतद्द्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

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1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से "प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य" के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से "राष्ट्र की एकता" के स्थान पर प्रतिस्थापित।

भाग 4 क

मूल कर्त्तव्य

51 क. मूल कर्त्तव्य – भारत के प्रत्येक नागरिक का यह कर्त्तव्य होगा कि वह –

(क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;

(ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;

(ग) भारत की प्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण रखे;

(घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;

(ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करे जो स्त्रियों के सम्मान के विरुद्ध हैं;

(च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व समझे और उसका परिरक्षण करे;

(छ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणी मात्र के प्रति दयाभाव रखे;

(ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;

(झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;

(ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई उंचाइयों को छू ले;

[1](ट) यदि माता-पिता या संरक्षक है, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य के लिये शिक्षा के अवसर प्रदान करे।

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1. संविधान (छयासीवां संशोधन) अधिनियम, 2002 की धारा 4 द्वारा प्रतिस्थापित।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a [1]**SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the[2] unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "unity of the Nation" (w.e.f. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV A

FUNDAMENTAL DUTIES

ARTICLE 51A

Fundamental Duties - It shall be the duty of every citizen of India-

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;

[1](k) who is a parent or guardian to provide opportunities for education to his/her child or, as the case may be, ward between age of 6 and 14 years.

1. Subs. by the Constitution (Eighty - Sixth Amendment) Act, 2002

Preface

In this era of constant innovation where the digital revolution continues to reshape our world, creating limitless opportunities in technology-driven fields, web applications form the backbone of online interactions, enabling businesses, communities, and individuals to connect, share, and grow. The increasing reliance on digital platforms has fuelled an ever-growing demand for skilled professionals who can design, develop, and secure these systems.

With industries rapidly adopting Artificial Intelligence (AI), cloud computing, and data-driven decision-making, the role of web developers and designers has never been more critical. Today's professionals must not only understand how the web works but also anticipate future trends and adapt to evolving technologies. This need for agility and expertise has made web development an essential skill set for the modern workforce.

Aligned with the National Skills Qualification Framework (NSQF), this Web Applications course has been developed by CBSE to provide students with a strong foundation in programming, graphic design, cybersecurity, and emerging digital trends. Aligned with industry requirements, this curriculum ensures that students gain both theoretical knowledge and practical experience in creating intuitive, secure, and visually compelling web solutions.

This handbook serves as a valuable resource, guiding students through key concepts and hands-on projects that enhance problem-solving abilities and creative thinking. By mastering tools like JavaScript, Canva, and Adobe Express, and understanding the fundamentals of cybersecurity and data protection, learners will be well-prepared for careers in web development, digital marketing, UI/UX design, and beyond.

The future belongs to those who can innovate and adapt. As you navigate this course, embrace the challenges and possibilities that come with it. The web is a constantly evolving landscape—one where your creativity and skills can shape the next digital breakthrough.

Chairman, CBSE

Acknowledgements

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Chairperson, Central Board of Secondary Education

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WEB APPLICATIONS (SUBJECT CODE-803)
TABLE OF CONTENTS
CLASS XII

PRACTICAL MARKS DISTRIBUTION

CLASS XII

WEB APPLICATIONS (803)

Details	Marks Distribution
For Project Work 1. Create a video using either Canva or Adobe Express 2. Do any one of the following on the topic "**Cyber Security**." • Create a Presentation • Create an E-poster • Create a hand-made poster	10 Marks
For Practical File 1. Write 4 programs using Functions 2. Write 4 programs using String methods 3. Write 4 programs using Array methods 4. Write 4 programs using Math methods 5. Write 2 programs using Event Handling	10 marks
Viva-Voce	5 marks
Practical (Hands on) • 2 JavaScript programs • Create a video using Canva/Adobe Express	15 Marks

Learning Objectives

Chapter 1: Emerging Trends

After studying this unit, the students will be able to:

- Compare and contrast Internet of Things (IoT) and Industrial Internet of Things (IIoT)
- Classify the different types of Operating Systems and their use. Compare System and Application software.
- Identify Cloud Computing and Edge Computing
- Describe Artificial Intelligence (AI) and Machine Learning (ML)
- Discuss the importance of Digital Marketing and its Career Opportunities
- Recognize and explain the importance of Social Media Etiquettes

Chapter 2: JavaScript Part 2

After studying this unit, the students will be able to:

- Use the syntax of JavaScript.
- Identify JavaScript variables, data types, and operators.
- Explain the concept of Conditional programming and the use of iterative programming.
- Illustrate with examples the basic concepts of functions and objects.
- Explain, code and test the String, Array and Math Objects and some of their methods.
- Code and test user interactions with web pages through event handling.

Chapter 3: Graphic Designing Using Canva and Adobe Express

After studying this unit, the students will be able to:

- Explain the importance of Graphic Designing.
- Use the Canva Editor and Toolbars.
- Use Canva to create a design using a Template and from a blank version.
- Perform splitting ,cutting and trimming of video clips in Canva.
- Add transitions and audio tracks.

- Use some Artificial Intelligence tools in Canva.
- Use Adobe Express and its Toolbars.
- Create a design in Adobe Express using a Template and from a blank version.
- Perform splitting, cutting and trimming of video clips in Adobe Express

Chapter 4: Cyber Safety and Security

After studying this unit, the students will be able to:

- Identify the different types of digital footprints , understand how they are created and their long-term consequences
- Develop strategies for managing digital footprint
- Explain the concept of data privacy and identify the rights individuals have regarding their personal data. Develop strategies to protect data privacy
- Define data security and its importance in the digital age. Identify common data security threats and the data security measures that can be taken.
- Discuss the importance of intellectual property laws for creators.
- Outline the concept of plagiarism and its ethical implications and the importance of proper citation in academic work.
- Define copyright and the rights it grants creators.
- Identify works protected by copyright.
- Define trademarks and their purpose in brand protection.
- Define patents and understand the protection they offer for inventions.
- Identify different types of cybercrimes and their impact on individuals and the society as a whole
- Explain the importance of cyber laws in regulating online activity.
- Identify key Indian cyber laws and understand their legal implications

CHAPTER 1
Emerging Trends

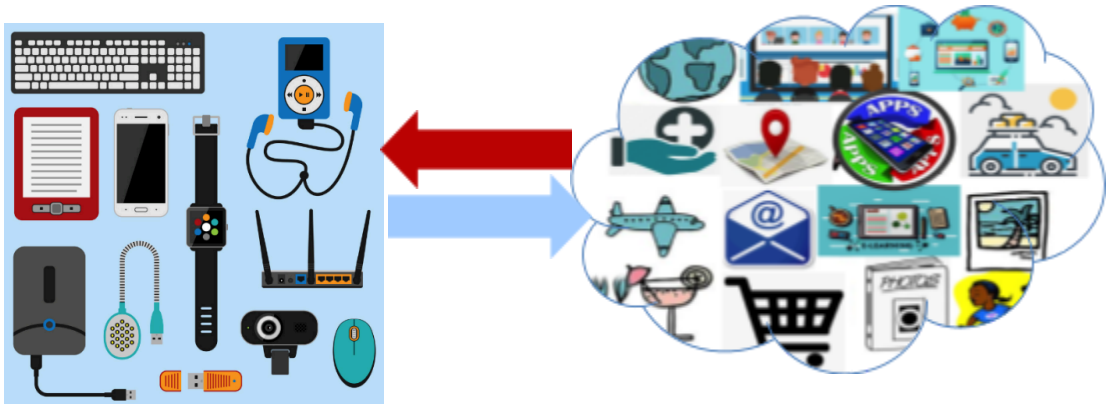
Topics covered

1.1 Internet of Things (IoT)
1.2 Types of Operating Systems
1.3 Cloud Computing and Edge Computing
1.4 Artificial Intelligence(AI) and Machine Learning(ML)
1.5 Digital Marketing and Its Career Opportunities
1.6 Social Media Etiquettes

1.1 Internet of Things (IoT)

The internet-connected devices we use to perform services and processes that support our way of life is called '**The Internet of Things (IoT)'**. All objects or things that are embedded with electronics, software, sensors and network connectivity that enables and allows these objects to collect and exchange data are collectively called the Internet of Things.

With Cloud computing and storage becoming easily accessible, it has added to the success of IoT, which can be considered the front end of the services offered by Cloud.
Cloud computing provides several advantages to IoT, allowing users to perform normal computing tasks using services delivered entirely over the Internet.

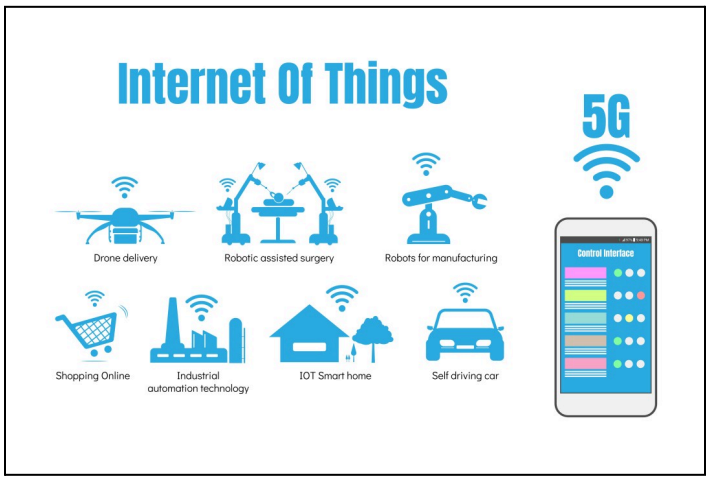


Growth of Internet of Things (IoT): The growth of IoT and the rapid development of associated technologies have created a widespread connection of "things." This has led to the production of large amounts of data, which needs to be stored, processed and

accessed. While IoT is exciting on its own, the real innovation will come from combining it with cloud computing.

History of IoT devices

- 1982- Vending machine
- 1990-Toaster
- 1999-IOT (Kevin Ashton)
- 2000-LG Smart Fridge
- 2004-Smart Watch
- 2007-Smart iPhone
- 2009-Car Testing
- 2011-Smart TV
- 2013-Google Lens
- 2014-Amazon Echo
- 2015-Tesla autopilot



Advantages of IoT

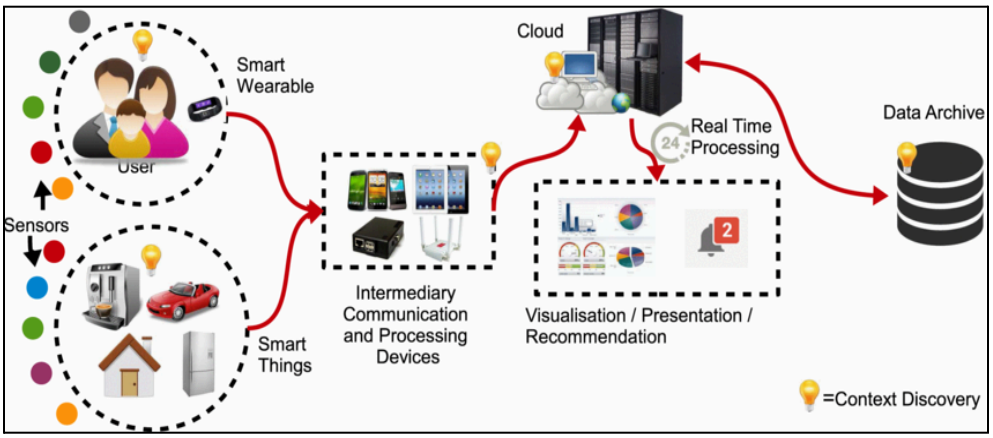
- Improved efficiency and automation of tasks.
- Increased convenience and accessibility of information.
- Greater ability to gather and analyze data.
- Improved decision-making.
- Cost savings.

Disadvantages of IoT

- Security concerns and potential for hacking or data breaches.
- Privacy issues related to the collection and use of personal data.
- Dependence on technology and potential for system failures.
- Limited battery life on some devices.
- Concerns about job displacement due to automation.

Some of the examples of IoT devices:

Autonomous Vehicles	**Fingerprint Time Clocks**	**Glucose Monitors**
Smart Glasses	**Smart Lighting**	**Smart Locks**
Smartphones	**Smart Refrigerators**	**Robots**
Smart Speakers	**Smart TVs**	**Wearables**



1.1.2 Industrial Internet of Things (IIoT)

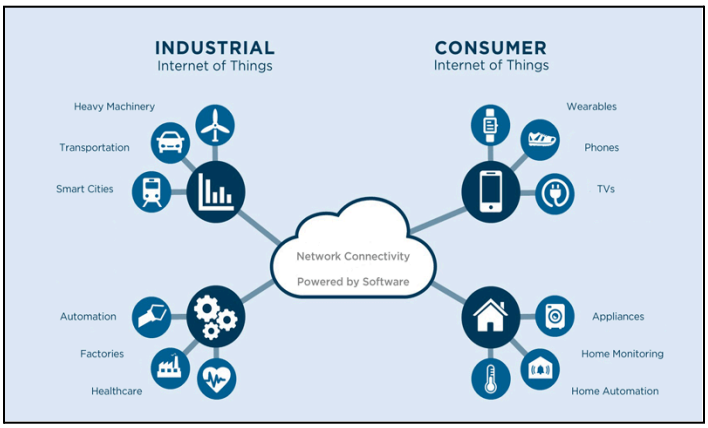
The industrial internet of things, or IIoT, is a term used to describe the application of internet of things (IoT) technology in industrial settings. It encompasses the integration of advanced sensors, software, and machinery with internet connectivity to collect, analyze, and act upon vast amounts of data. This data-driven approach enables real-time decision-making and predictive analytics, leading to improved operational efficiency, reduced costs, and improved product quality. With IIoT, you can monitor equipment performance, predict failures, optimize logistics, improve product quality, and more. It's about creating a smarter, more efficient, and more profitable industrial operation.

Difference between IoT and IIoT:

IoT	IIoT
IoT, or internet of things, is a broader term that refers to the interconnected network of devices, vehicles, appliances, and more, that communicate and exchange data via the internet. It covers a wide range of applications, from smart homes and wearable technology to connected cars and smart cities.	IIoT is a subset of IoT that specifically deals with industrial applications. It's focused on enhancing industrial processes and operations through data-driven insights. It's about improving efficiency, productivity, and safety in industries such as manufacturing, energy, and transportation.

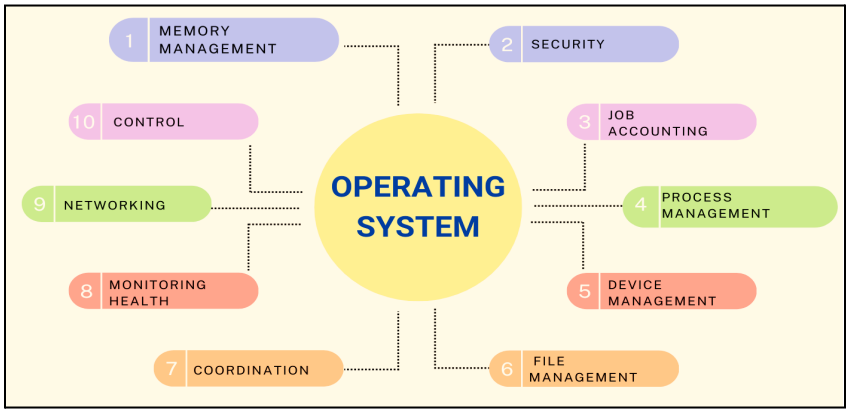
Some applications of IIoT:

- Smart Manufacturing and Factory
- Energy and Utilities
- Transportation and Logistics
- Healthcare



1.2 Types of Operating Systems

An **Operating System** (OS) is an interface between a user and computer system. It is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers. The Operating System provides the user with an interface that makes any application attractive and user-friendly. It is one of the most important parts of the system and hence it is present in every device. For example: laptops, desktops, mobile phones, voice assistants etc.



Examples of Operating Systems

1. **Windows** (GUI-based, PC)
2. **GNU/Linux** (Personal, Workstations)
3. **MacOS** (Macintosh), used for Apple's personal computers and workstations (MacBook, iMac).
4. **Android** (Google's Operating System for smartphones/tablets/smartwatches)
5. **iOS** (Apple's OS for iPhone, iPad, and iPod Touch)

Important functions of an Operating System

1. **Memory Management**

The operating system manages the computer's primary memory and provides mechanisms for optimizing memory usage. For example: It allocates the memory when a process requests it to do so and deallocates the memory when a process no longer needs it or has been terminated.

2. **Processor Management**

Every software that runs on a computer is a process. The operating system is responsible for starting, stopping, and managing processes and programs. It also controls the scheduling of processes and allocates resources to them. When more than one process runs on the system the OS decides how and when a process will use the CPU. Hence, the name is also CPU Scheduling.

3. **Device Management**

The operating system manages input/output devices such as printers, keyboards, mice, and displays. It provides the necessary drivers and interfaces to enable communication between the devices and the computer.

4. **File Management**

The operating system is responsible for organizing and managing the file system, including the creation, deletion, and manipulation of files and directories.

5. **Network Management**

The operating system provides networking capabilities such as establishing and managing network connections, handling network protocols, and sharing resources such as printers and files over a network.

6. **Backup and Recovery**

The operating system provides mechanisms for backing up data and recovering it in case of system failures or errors.

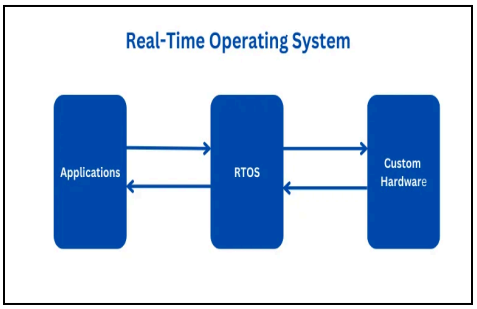
Advantages of Operating System

1. **User-friendliness:** The main objective of an operating system is to provide the user ease of use. The operating system provides the user a friendly interface, which they can use to operate a computer system. The graphical user interface of the operating system dramatically improves the user-friendliness of the operating system.
2. **Resource Sharing:** The operating system helps in resource management, hence it controls all the resources. The operating system allocates and deallocates resources given to different processes and this allows effective sharing of resources amongst the processes running through the operating system. For example sharing printers, plotters, speakers etc.
3. **Data Protection:** The operating system protects the data from unauthorized manipulation. The operating system enforces this through access control. Also, the operating system saves the data of different users present in the same system by effectively partitioning the data.
4. **Multitasking:** The operating system allows multiple programs to run in the computer system simultaneously. It is made possible by virtual memory and preemptive job scheduling. The operating system makes it possible to run different programs together by efficiently sharing resources.

Types of Operating Systems

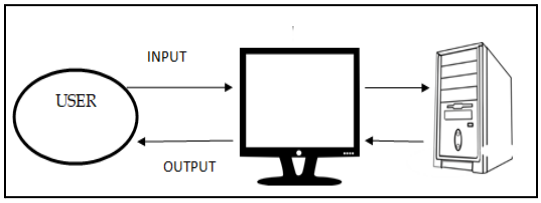
- **Real Time Operating system**

The term "real-time system" refers to any information processing system with hardware and software components that perform real-time application functions and can respond to events within predictable and specific time constraints. Common examples of real-time systems include air traffic control systems, process control systems, and autonomous driving systems.



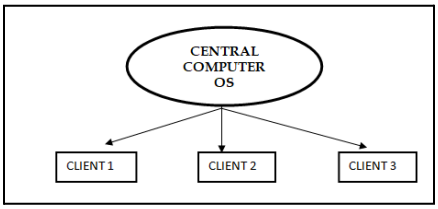
- **Single-User Operating Systems**

They are designed to support a single user at a time. Examples include Microsoft Windows for personal computers and Apple macOS.



- **Multi-User Operating Systems**

They are designed to support multiple users simultaneously. Examples include Linux and Unix.



- **Mobile Operating System**

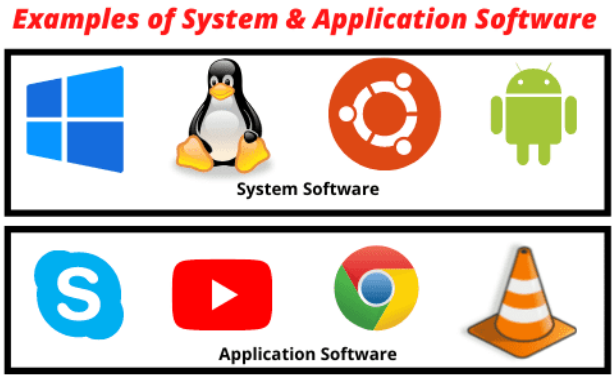
Mobile Operating system is the software that is designed to run on devices like mobile phones and tablets instead of computers. These types of operating systems are generally designed to be lightweight, energy-efficient so that they can run on lower specification devices easily.

Examples of Mobile Operating system: **Android OS, Blackberry OS, iPhone OS / iOS, Symbian OS, Windows Mobile OS**

Difference between Application Software and System Software:

System Software	Application Software
This acts as an interface between the system and the applications	This is designed directly from the user perspective
These are responsible for the working of the system.	They have minimum involvement in the processing and functioning of the computer device
It is the platform that allows the various application software to run on the system	These are independent applications which can be download and installed in the system
The system software is installed at the time of installing the operating system. A computer device cannot work without its presence.	The application software can be installed as and when the user requires them

Examples for System Software include Android, Mac Operating system, MS Windows, etc.	Examples of Application Software include Word Processor, games, media player, etc.



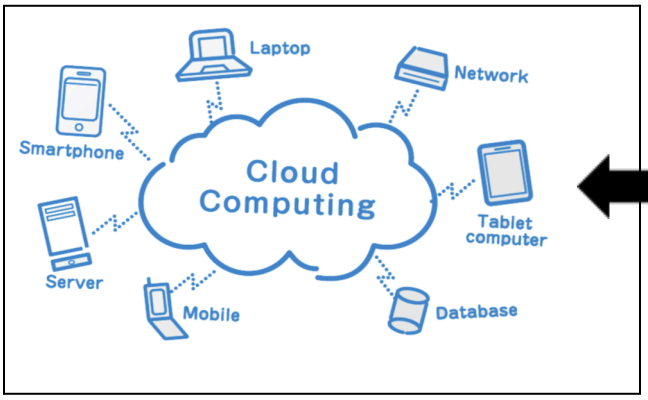
1.3 Cloud Computing and Edge Computing

Cloud Computing

Although the term Cloud computing has been around for a long time, it was in 2006 when the CEO of Google Schmidt introduced the term at an industry conference. It gained more popularity when companies such as Amazon, Microsoft, and IBM started promoting cloud-computing efforts as well.

Cloud computing are services provided over the Internet or the Cloud in terms of servers, storage, databases, networking, software, analytics, intelligence and many more.

This is the availability of resources on demand, the most common one being data storage and computing power, without direct and active management by the user which can lead to faster innovation, flexible resources and scalability.



Cloud computing are services provided over the Internet or the Cloud in terms of servers, storage, databases, networking, software, analytics, intelligence and many more.

Cloud Smart Storage Providers

- **Google Drive** 

Google launched this service on April 24, 2012. It allows users to store files on their servers, synchronize files across devices, and share files, with offline capabilities for Windows and macOS computers, smartphones and tablets. This is a very useful service, and expands your ability to store files beyond the limits of your hard drive. With this file storage and synchronization service developed by Google, you need not worry about keeping data stored locally on secondary devices. Google Drive gives its users 15 gigabytes of free storage through Google One. It also offers 100 gigabytes, 200 gigabytes, 2 terabytes, 10 terabytes, 20 terabytes, and 30 terabytes offered through optional paid plans.

- **Dropbox** 

In 2007, two MIT students created a startup and called it Dropbox, this is a cloud storage service that enables users to store files securely and access them from anywhere using an internet connection. It also has features to help with file synchronization, sharing and collaboration. It is easy to use and dependable

- **OneDrive** 

First launched in August 2007, Microsoft's popular file hosting and synchronization service as part of its suite of Office Online services is OneDrive. Users can store files and personal data like Windows settings or BitLocker recovery keys in the Cloud. It allows users to share files and synchronize files across all kinds of devices such as smartphones, computers, laptops, tablets, and even gaming consoles. This will enable users to upload Microsoft Office documents directly to OneDrive which offers 5 GB of storage space free of charge, with 50 GB, 1 TB, and 5 TB storage options available either separately or with Office 365 subscriptions.

- **iCloud** 

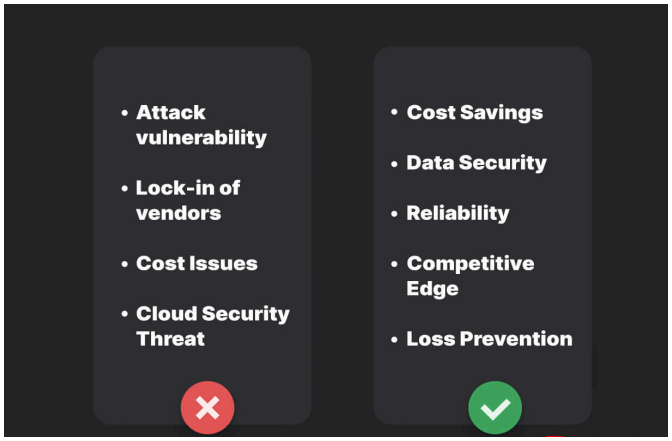
On October 12, 2012, Apple Inc. launched its cloud storage and cloud computing service iCloud and the service now has millions of users. iCloud users can store data such as documents, photos, and music on remote servers. They can also download it to iOS, macOS or Windows devices, to share and send data to other users. It is also very useful in managing their Apple devices if lost or stolen.

Benefits of Cloud Computing

1. **Faster time to market:** Cloud computing supports new innovations by making it easy to test new ideas and design new applications without hardware limitations or slow procurement processes.
2. **Scalability and flexibility:** We can quickly scale resources and storage up to meet business demands without having to invest in physical infrastructure. Companies don't need to pay for or build the infrastructure needed to support their highest load levels.
3. **Cost savings:** Whatever cloud service model you choose, you only pay for the resources you actually use.
4. **Better collaboration:** Cloud storage enables you to make data available anywhere you are, anytime you need it. Instead of being tied to a location or specific device, people can access data from anywhere in the world from any device—as long as they have an internet connection.
5. **Advanced security:** Cloud computing can actually strengthen your security because of the depth of security features, automatic maintenance, and centralized management.

Limitations of cloud computing

1. **Internet Connectivity:** In cloud computing, every information (image, audio, video, etc.) is stored on the cloud, and we can access this information by using the Internet connection.
2. **Vendor lock-in:** Organizations may face problems when transferring their services from one vendor to another. As different vendors provide different platforms, that can cause difficulty moving from one cloud to another.
3. **Security:** The cloud service providers implement the best security standards to store important information. While sending the data on the cloud, there may be a chance that your organization's information is hacked by Hackers if the security standards are compromised by the cloud service providers.

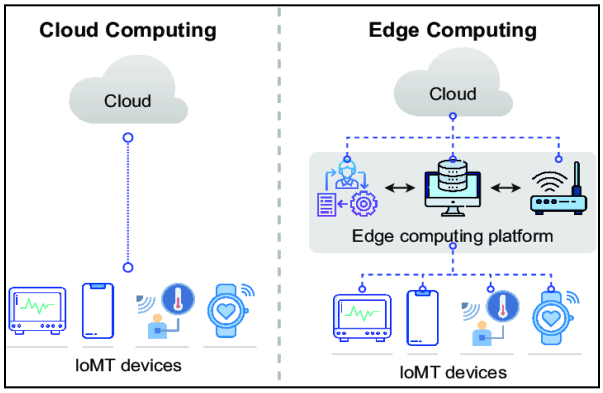


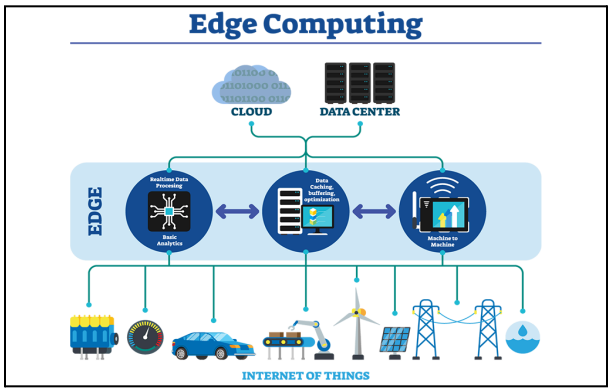
Edge Computing

Edge Computing is already in use all around us – from the wearable on your wrist to the computers parsing intersection traffic flow. Other examples include smart utility grid analysis, safety monitoring of oil rigs, streaming video optimization, and drone-enabled crop management. Edge computing is data analysis that takes place on a device in real-time. It is about processing data locally, and cloud computing is about processing data in a data center or public cloud.

Edge computing is the practice of capturing, storing, processing and analyzing data near the client, where the data is generated, instead of in a centralized data-processing warehouse.

The main difference between edge computing and cloud computing is responsiveness. Edge computing is ideal for processing data in real-time, while cloud computing is better suited for processing voluminous information that is not time-sensitive. These computing platforms have individual and joint applications in a wide variety of futuristic scenarios. Together, edge and cloud computing will help shape a new computing paradigm for enterprises across industries.





IoMT-Internet of Medical Things (IoMT) devices are smart medical devices that use a secure network to share data between patients, clinicians, and medical devices.

1.4 Artificial Intelligence (AI) and Machine Learning (ML)

Artificial Intelligence

In simplest terms Artificial Intelligence is the intelligence demonstrated by a machine. It is different from human intelligence which involves consciousness and emotionality. Artificial Intelligence is used to create machines that mimic important cognitive functions such as "learning" and "problem solving" that are often associated with the human mind.

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving. The ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a specific goal.

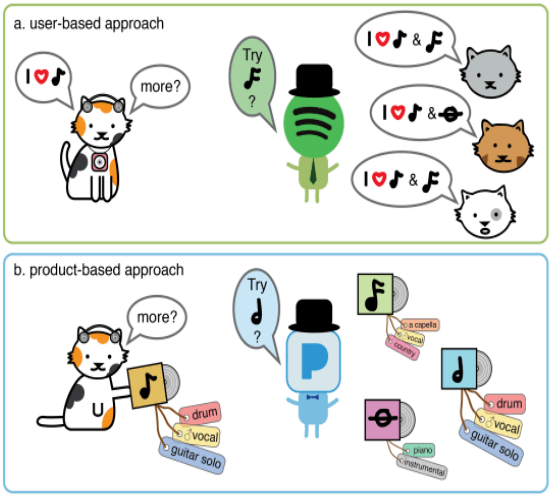
Some common applications of Artificial Intelligence are

- Google Maps
- Facial Detection and Recognition
- Autocorrection and text editors
- Recommendations based on search

Machine Learning

Have you noticed targeted advertisements chasing you online, after you look at some product or service and online recommendation offers from Amazon and Netflix? That is Machine Learning happening in your everyday life. Machine learning is so pervasive today that you probably use it dozens of times a day without knowing it. There are growing volumes and varieties of available data, computational processing that is cheaper and more powerful, and affordable data storage thanks to cloud storage facilities. These facilities and services can power algorithms which can produce models quickly and automatically. These models can analyze bigger, more complex data and deliver faster, more accurate results – even on a very large scale. Better models can help organizations identify profitable opportunities or avoid unknown risks.

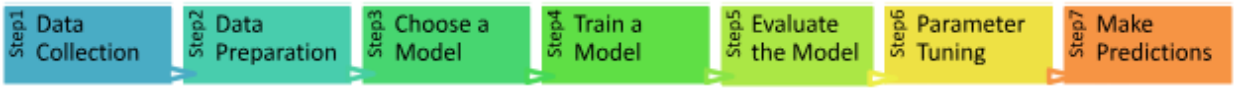
Machine Learning (ML) is a method of data analysis using computer algorithms that automates analytical model building.
It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.



Some Applications of Machine Learning:

- Self-driving cars,
- Practical speech recognition
- Effective web search
- Deep understanding of the human genome

The 7 basic steps in Machine Learning are:



Difference between Artificial Intelligence and Machine Learning

Although Artificial Intelligence and Machine Learning are the parts of computer science that are correlated with each other. Although these are two related technologies and sometimes people use them as a synonym for each other, but the two are different in many ways:

Artificial Intelligence	Machine Learning
This technology enables a machine to simulate human behavior.	This is a branch of AI which allows a machine to automatically learn from past data without programming explicitly.
AI is used to make a smart computer system like humans to solve complex problems.	ML helps machines to learn from data so that they can give accurate output.
Creating an intelligent system that can perform various complex tasks is the goal	Creating machines that can perform only those specific tasks for which they are trained is the goal.
Maximizing the chances of success is the focus	Accuracy and patterns are the focus
Siri, customer support using chatbots, Online game playing, expert systems and intelligent humanoid robot are some applications of AI	Google search algorithms, online recommender system, Facebook tagging suggestions, etc. are some applications of ML
Categories of AI • Weak • General • Strong	Categories of learning in ML • Supervised learning • Unsupervised learning • Reinforcement learning

Reasoning, self-correction and learning	Self-correction and learning when introduced with new data.
Deals with unstructured, semi-structured, and structured data.	Deals with semi-structured and structured data.

1.5 Digital Marketing and its Career Opportunities

Digital marketing means using the digital channels to market products. It is also known as online marketing and it promotes brands and connects them to potential customers via the internet. Digital marketing can be done in various forms such as: Search engines, Websites, social media, Email, Mobile apps, Text messaging, Web-based advertising etc.

It is just like traditional offline marketing but in a digital space. It relies on consumer data to find a business's target audience and deliver the most relevant messaging possible.

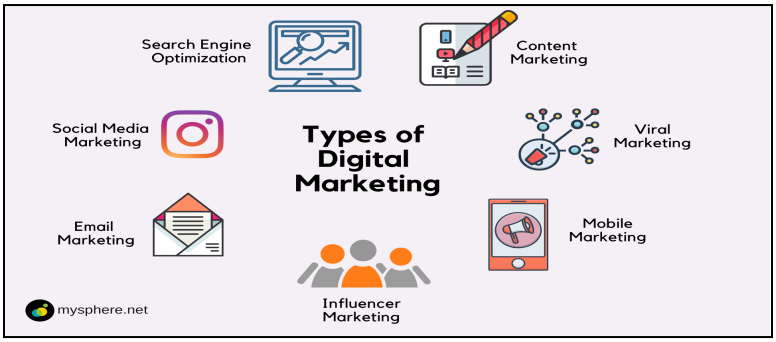
The benefits of digital marketing

1. Helps to reach a larger customer base with less effort regardless of the location. You can connect with customers on every side of the world, in multiple time zones, as easily as though you were taking out an ad in the local newspaper.
2. You can create social media accounts for free, and partner with an email service provider for a cheaper price. Traditional marketing channels like TV, radio, and print media typically have higher costs than digital channels. Digital channels remain on the internet for as long as you maintain them. People will continue to find your content again and again long after you've posted it.
3. Digital marketing comes with a host of analytics opportunities giving you plenty of valuable insight to help grow your business. It gives you both quantitative and qualitative information on your marketing.
4. Opportunity to engage with customers at various stages during the buying process. Acknowledge their key events like birthdays and anniversaries.

Some of the Career Opportunities that can be pursued in digital marketing are:

1. Digital marketing intern
2. Photographer
3. Social media specialist
4. Graphic Designer

5. Copywriter
6. Search Engine Optimization Specialist (SEO Specialist)
7. Marketing Analyst
8. Ecommerce Manager



1.6 Social Media Etiquettes

Etiquette means conventional requirements as to social behavior; properties of conduct as established in any class or community or for any occasion. Social media etiquette refers to the guidelines that individuals should use to preserve their reputation online. Basically, social media etiquette revolves around online guidelines to follow. The main goal behind netiquette or mannerisms on social media is to treat others with respect and take care of intellectual property rights and associated implications. Personal information, images, or videos of anyone should not be shared without consent or mentioning credits were due.

Some of the social media etiquettes for students to follow:

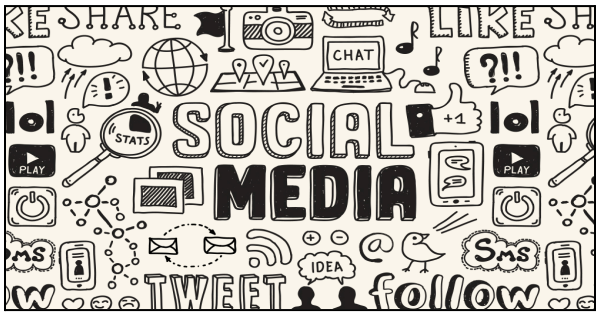
1. **Protect your Privacy:** Never share your personal information online. It includes your password, phone number, home address and email address. Disable the feature that reveals your location when you post something online. When you sign up for any social networking platforms, learn about their privacy settings. Adjust who can see your posts or photos, tag or mention you, and send you private messages. Use a strong password and do not use your personal information, like your birth date, seat number, phone number or a friend's name. Never use the same password in all your accounts. Enable the two-step identification when possible.
2. **Do Not Connect with Strangers:** Never connect with people you do not know in real life. You should accept requests only from people whom you know.
3. **Respect People's Privacy:** Respect other people's privacy the same way you would like them to handle your personal information. Ask for their permission before you share their photos or videos. Never write posts or comments that

include someone's personal information, like phone numbers, addresses or passwords.

4. **Be Careful of What you Share About Yourself:** Never share personal or confidential information online. This information includes full names, phone numbers, home or school addresses, birth dates etc. The reason is that everything you share online is permanent forever. Nothing gets deleted.
5. **Avoid Cyberbullying:** Sometimes posts become harsher than face-to-face communication. Harassing or teasing others on social media is known as cyberbullying. Avoid cyberbullying as there are strict cyber laws against it.
6. **Avoid Spamming:** Do not send repeated texts to your friends several times. Allow them some time to respond.
7. **To Post or Not to Post:** Handle what you share online wisely. Think carefully about your words and pictures before you share anything on social media. If you see there is something offensive or is considered inappropriate or rude, do not share it at all.

Spread of Rumors on Social Media

Social networking sites or social media is a platform open to all and there is no regulation or self- checking mechanism there. So, on one hand it is useful in getting information quickly, on the other hand it is prone to misuse by unscrupulous elements of society for their hidden agenda. In recent times, it has been seen that social media is blamed increasingly in every social disharmony. Rumors spread very fast on social media and by the time its authenticity is checked, it has already caused much damage to the social fabric. Rumors can create division on communal lines and some groups can gain political mileage. Rumors spread through social media can have devastating consequences such as depression, hostilities, enmities and even riots.



Exercise

I. Multiple Choice Questions

1. Which of the following statements is true about Artificial Intelligence?

   a. AI is any machine that exhibits traits associated with a human mind such as learning and problem-solving.
   b. AI is the ability of a machine to rationalize and take actions that have the best chance of achieving a specific goal.
   c. Artificial Intelligence is used to create machines that mimic important cognitive functions
   d. All of the above

2. Which of these is not an application of Artificial Intelligence?

   a. Plotting Graphs using data
   b. Google Maps
   c. Facial Detection and Recognition
   d. Autocorrection and text editors

3. Which of the following statements is NOT true about Machine Learning?

   a. It is a method of data analysis using computer algorithms that automates analytical model building
   b. Artificial Intelligence is a branch of Machine Learning
   c. There are 7 basic steps in Machine learning
   d. Deep understanding of the human genome

4. Which of the following is not a service provided by Cloud?

   a. Storage
   b. Databases
   c. Wi-fi
   d. Software

5. Which of these services allow users to store files on their servers, synchronize files across devices, and share files?
   a. Google Drive
   b. iCloud
   c. OneDrive
   d. All of these

6. Which of the following is not an operating system?
   a. Windows
   b. Linux
   c. Oracle
   d. DOS
7. The internet-connected devices we use to perform services and processes that support our way of life is called:
   a. Machine Learning
   b. Cloud Computing
   c. Internet of Things
   d. Artificial Intelligence

8. Which of the following is **NOT** an example of Application software?
   a. Android
   b. Photoshop
   c. MS-Word
   d. GIMP

9. The primary purpose of an operating system is:
   a. To make the most efficient use of the computer hardware
   b. To allow people to use the computer,
   c. To keep systems programmers employed
   d. To make computers easier to use

10. Which of the following is the correct depiction of Digital Marketing?
    a. E-mail Marketing
    b. Social Media Marketing
    c. Web Marketing
    d. All of the above

11. Which of the following is incorrect about digital marketing?
    a. Digital marketing can only be done offline
    b. Digital marketing cannot be done offline.
    c. Digital marketing requires electronic devices for promoting goods and services.
    d. In general, digital marketing can be understood as online marketing, web marketing, and email marketing.

12. In order to protect privacy and safety, you should:

    a. Use a pseudonym to protect your identity
    b. Refrain from posting any information about where you are
    c. Be cautious to not reveal personal and private details, especially concerning other people
    d. Don't worry about this - hackers and criminals don't use social media

13. Ways to try to stop cyberbullying include:

    a. Not replying to hurtful messages or posts.
    b. Reporting the bullying behavior to someone who can help, like a parent or teacher.
    c. Saving evidence of unwanted messages which can be used by a trusted adult or the police to help stop the cyberbullying behavior.
    d. All of the above

14. Some of the social media etiquettes that students should follow are:

    a. To Post or not to Post
    b. Respect others privacy
    c. Make a strong password
    d. All of the above

15. Career opportunities that **cannot** be pursued in digital marketing

    a. Influencer
    b. Content creator
    c. Chef
    d. Ecommerce Manager

II. Very Short Answer Questions

1. List some common applications of Artificial Intelligence and Machine Learning.

2. What is IoT? Give some examples of IoT devices.

3. What is an Operating system? Give some examples of OS used in mobile devices.

4. Differentiate between Application Software and System Software (any 4 points).
5. What is cloud computing?
6. Differentiate between AI and ML.
7. What is digital marketing? List some of the career options one can pursue in digital marketing.
8. Explain the terms: Artificial Intelligence and Machine Language.
9. Explain any 2 cloud storage providers.
10. Why is it harmful to spread rumors on social media?

III. Short Answer Questions

1. Mention any 2 advantages and disadvantages of IoT?
2. Explain any 3 advantages of the Operating system.
3. List four types of Operating Systems.
4. What are the benefits of digital marketing?
5. What is social media etiquette?

IV. Long Answer Questions

1. Explain any 4 functions of an Operating system.
2. What are the advantages and disadvantages of cloud computing?
3. Explain any 4 social media etiquettes that a student should follow.
4. What is IIoT? How is it different from IoT?
5. What is Edge computing? Write the difference between cloud computing and edge computing.

6. Komal Mehta was a student in a Delhi school who was stalked by a Facebook friend whom she unfriended months ago and with whom she had shared all her personal information. Which "social media etiquettes" was Komal lacking? How did the stalker know Komal's address? What measures should Komal take against this stalker?

7. Somebody uploads your photo without your knowledge on social media and writes a funny post about it. Can it be considered cyberbullying? Explain how?

CHAPTER 2
JavaScript Part 2

Topics Covered

Revision of JavaScript Class XI
2.1 Functions
2.2 Objects
2.3 Strings in JavaScript
2.4 String Methods
2.5 Arrays in JavaScript
2.6 Array Methods
2.7 Math Methods
2.8 Event Handling in JavaScript

Revision of JavaScript Class XI

Brief Introduction

JavaScript was developed in 1995 by Brendan Eich, a computer scientist and programmer at Netscape Communications Corporation.

It is an interpreted language that does not require compiling into machine language. It is executed by an interpreter that reads the source code and converts it into a form that is directly executed. The interpreter executes the code line by line. Any error that is found by the interpreter on any line of code, will stop the further execution of the program.

JavaScript can be implemented using **<script>… </script>** tags.

There are **three** different places in the HTML document where scripts can be used.

1. **Body of the page:** In this case when page is loaded in the browser then output is displayed as the part of the HTML document.
2. **Header of the page:** In this case code is written in the form of a function (groups of JavaScript statements but treated as a single unit and referred to in the other script in the same page).
3. **As external file:** In this case JavaScript code is written in another file having .js extension. This file is included in a script tag by specifying the file name.

Advantages of JavaScript

1. It is relatively easy to learn and use.
2. It can be used for client-side and server-side i.e. front end and back end.

3. It provides dynamism and interactivity on websites.
4. It runs on multiple platforms and devices. It is supported by all browsers.
5. There are many libraries, frameworks, and APIs available to facilitate tasks
6. It can create visually appealing web projects and to create drag & drop components like sliders etc. to make the website more professional.

Data Types

Data types in JavaScript define the data type that a variable can store. JavaScript supports different data types. JavaScript includes Primitive and Non-Primitive data types. The primitive data types in JavaScript include string, number, Boolean, undefined & null. The non-primitive data type includes the object, array and functions.

In JavaScript, NaN is short for "Not-a-Number", that is not a legal number.

Primitive Data Types

Numbers:

A number data type can be an integer, a floating-point value, an exponential value, a 'NaN' or 'Infinity'.

```
1. var a=250  // integer value
2. var b=25.5  // a number containing a decimal
3. var c = 10e4 //  an exponential value which evaluates to 10*10000;
```

There are special numeric values e.g. ***NaN*** *and* ***Infinity***. If a number is divided by 0, the resulting value is infinity.

```
1. 5/0;    // results in infinity
2. The type of infinity is a number
   typeof(5/0);   // returns number
```

A 'NaN' results when we try to perform an operation on a number with a non-numeric value

```
1. 'hi' * 5; // returns NaN
2. typeof(NaN);  // returns number
```

String:

The string data type in JavaScript can be any group of characters enclosed by a single or double-quotes.

To place a pair of quotes within a string, the two should be different.

```
1. var str1 = "This is a string1 "; // This is a string primitive type or string literal
2. var str2= 'This is a string2 ';
3. var str3 = 'This is a " string3 " within another string ';
```

Boolean:

The Boolean data type has only two values, true and false. It is mostly used to check a logical condition. Thus Booleans are logical data types which can be used for comparison of two variables or to check a condition. The true and false imply a 'yes' for 'true' and a 'no' for 'false'. When we check the data type of 'true' or 'false' using typeof operator, it returns a Boolean.

```
typeof(true) // This will return Boolean
typeof(false) // This will return Boolean
```

Let's see an example of comparison statement where the output is a Boolean:

```
var a =5;
var b=6;
a==b // This will return false
```

Undefined:

Undefined data type means a variable that is not defined. The variable is declared but doesn't contain any value. In the following example, the variable 'a' has been declared but hasn't been assigned a value yet.

```
var a;
document.write(a) // This will return undefined.
```

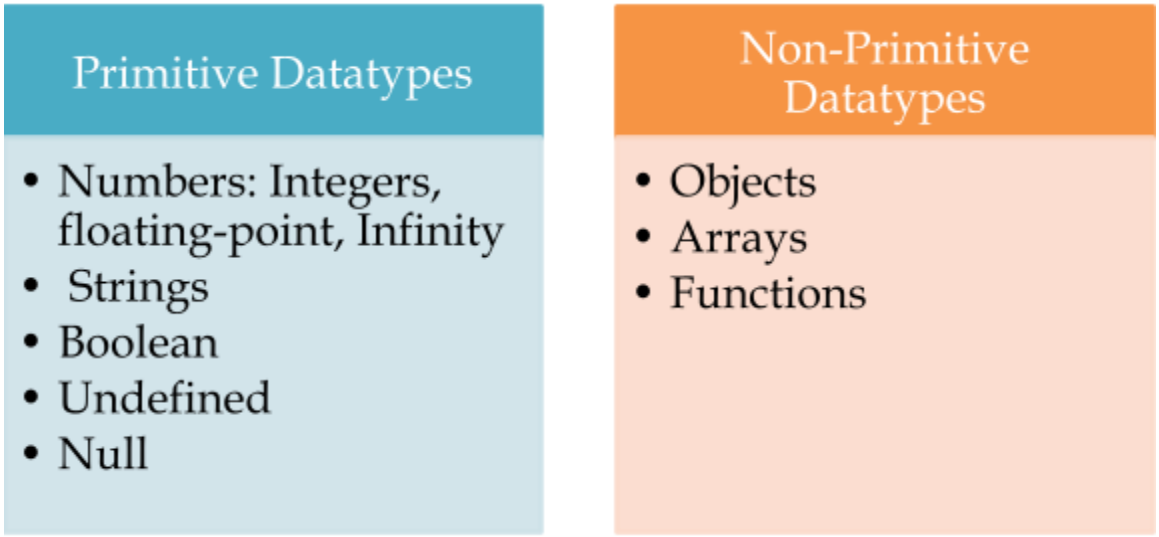
Null:

The Null in JavaScript is a data type that is represented by only one value, the 'null' itself. A null value means no value.

```
var a = null;
document.write(a)   // This gives output null
typeof(a)           //This will return object
```

Non-Primitive Data Types

These types of data type are complex in nature which consist of more than one component. Objects, arrays and functions are examples of composite data types. Object contains properties and methods; array contains a sequential list of elements and functions contains a collection of statements.



Variables

JavaScript variables are used to store data that can be changed later on. The variables can be thought of as named containers. You can place data into these containers and then refer to the data simply by naming the container. JavaScript variables must have unique names. These names are called Identifiers.

Variable Declaration and Initialization

1. Variables in JavaScript can be defined using the keyword **var (**in the newer versions of JavaScript the keyword **let** is also used)**.**
2. The equal to (=) sign is used to assign a value to a variable.
3. Users can either, separately declare the variable and then assign values to it or straight-away declare and initialize the variables.
4. JavaScript variables can store a value of any data type. For example, you can store a number, string, Boolean, object, etc. data type values in JavaScript variables.
5. The value and data type of a variable can change during the execution of a program and JavaScript takes care of it automatically.

JavaScript Variable Scope

- **Global Variables** − A global variable has global scope which means it can be defined anywhere in your JavaScript code.
- **Local Variables** − A local variable will be visible only within a function where it is defined. Function parameters are always local to that function.

In this book we use **var** keyword to declare variables
var *variablename= literal;*

JavaScript Literals

JavaScript Literals are the values that are assigned to a variable and depending on what literal we assign to a variable; its data type will be fixed. So a JavaScript Literal can be a numeric, string, floating-point value, an array , Boolean value or even an object.

Operators

In JavaScript, an **operator** is a symbol that performs an operation on one or more operands, such as variables or values, and returns a result.

Arithmetic Operators

There are following arithmetic operators supported by JavaScript language: assume variable **a** has value 10 and variable **b** has value 20 then:

Operator	Description	Example
+ (Addition)	Adds two operands	a + b will give 30
- (Subtraction)	Subtracts second operand from the first	a - b will give -10
* (Multiplication)	Multiplies both operands	a * b will give 200
/ (Division)	Divides numerator by denominator	b / a will give 2
% (Modulus)	Modulus operator gives the remainder after an integer division.	b % a will give 0
++ (Increment)	Increment operator, increases integer value by one	a++ will give 11
– (Decrement)	Decrement operator, decreases integer value by one	a-- will give 9
** (Exponent)	Can be used to give one value raised to power another value.	a**2 will give 10^2 or 100

Comparison Operators

There are following comparison operators supported by JavaScript language. Assume variable **a** has value 10 and variable **b** has value 20

Operator	Description	Example
== (Equal)	Checks if the values of two operands are equal or not, if yes then the condition becomes true.	(a == b) is false
!= (Not Equal)	Checks if the values of two operands are equal or not, if values are not equal then the condition becomes true.	(a != b) is true
> (Greater than)	Checks if the value of the left operand is greater than the value of right operand, if yes then the condition becomes true.	(a > b) is false
< (Less than)	Checks if the value of the left operand is less than the value of the right operand, if yes then the condition becomes true.	(a < b) is true
>= (Greater than or equal to)	Checks if the value of left operand is greater than or equal to the value of right operand, if yes then the condition becomes true.	(a >= b) is false
<= (Less than or equal to)	Checks if the value of left operand is less than or equal to the value of right operand, if yes then the condition becomes true.	(a <= b) is true

Comparison statements always return/output a Boolean value, that is true or false.

Logical Operators

There are following logical operators supported by JavaScript language.

Operator	Description	Example
&& (logical AND)	If both the operands are non-zero numbers then and returns/outputs the second number.	(10&&20) will output 20 (20&&10) will output 10

	For zero it returns 0. In other cases && gives true only if both conditions are true otherwise it gives false.	(10>9&&7<6) will output false (1<=5 && 2==2.0) will output true
|| (logical OR)	If both the operands are non-zero numbers then and returns/outputs the first number. If one of them is zero it returns the non-zero number. In other cases || gives false only if both conditions are false otherwise it gives true.	(10||20) will output 10 (20||10) will output 20 (45<=49||7<9) will output true (1>=5||2==2.7) will output false
! (logical NOT)	It is used to reverse the logical state of its operand. if a condition is true then logical not operator will make it false.	! (10>9&&7<6) will output true ! (45<=49||7<9) will output true

Assignment Operators: In JavaScript, an assignment operator is used to assign a value to a variable.

Operator	Description	Example
= (Simple Assignment)	Assigns values from the right-side operand to the left side operand.	z = x + y will assign the value of x + y into z
+= (Add and Assignment)	It adds the right operand to the left operand and assigns the result to the left operand.	z += x is equivalent to z = z + x
−= (Subtract and Assignment)	It subtracts the right operand from the left operand and assigns the result to the left operand.	z -= x is equivalent to z = z - x
*=(Multiply and Assignment)	It multiplies the right operand with the left operand and assigns the result to the left operand.	z *= x is equivalent to z = z * x
/= (Divide and Assignment)	It divides the left operand with the right operand and assigns the result to the left operand.	z /= x is equivalent to z = z / x

%=(Modules and Assignment)	It takes modulus using two operands and assigns the result to the left operand.	z %= x is equivalent to z = z % x

Conditional operator (? :)

The conditional operator is also called the ternary operator, containing the 3 parts. The first part contains the condition and executes the second part if the condition evaluates the true; Otherwise, it executes the third part.

Syntax

Condition ? First statement : Second statement

Parameters

- **Condition** − It is a conditional statement.
- **First Statement** − If the conditional statement evaluates true, First Statement will be executed.
- **Second Statement** − If the conditional statement evaluates false, the Second statement will be executed.

typeof operator

typeof in JavaScript is an operator that checks and returns the data type of the operand passed to it, the operand can be any array, string, number etc. whose type you want to find out.

```
<html>
<body>
<h3> Operator typeof in Javascript</h3>
<p id="demo"></p>
<script>
var x=[2,3.4,7,8.9]
var y="Hno #5643"
var z=45
var f=false
var d=null
var n
document.write("The datatype of x is: "+typeof(x)+"<br>");
document.write("The datatype of y is: "+typeof(y)+"<br>");
document.write("The datatype of z is: "+typeof(z)+"<br>");
document.write("The datatype of f is: "+typeof(f)+"<br>");
document.write("The datatype of d is: "+typeof(d)+"<br>");
document.write("The datatype of n is: "+typeof(n)+"<br>");
</script></body></html>
```

Operator typeof in Javascript

The datatype of x is: object
The datatype of y is: string
The datatype of z is: number
The datatype of f is: boolean
The datatype of d is: object
The datatype of n is: undefined

2.1 Functions

The function is one of the fundamental building blocks of JavaScript. A collection of statements that carry out an operation or calculate a value is called a JavaScript function. It's similar to a procedure, but to be considered a function, a process needs to

take an input, produce an output, and clearly show that the input and the result are related. They are useful because you can define the code once and use it many times. One can use the same code many times with different arguments, to produce different results.

Creating a Function

A function declaration consists of:

- The **function** keyword and the **function's name** come first in a function declaration. In function names, the same characters that are used for variables may also be used: underscores, dollar signs, digits, and letters.
- A list of the **arguments** for the function, enclosed in parentheses and separated by commas.
- Curly brackets { } surround the code that needs to be executed for the function.

Syntax of a function is:

```
function name(parameter1, parameter2, parameter3)
{
  // code to be executed
}
```

- Function parameters are listed between parenthesis ( ).
- Function arguments are the values that the function receives when it is called.
- The arguments (parameters) act as local variables within the function.

Example:

```
<script>
   function addNumbers(a, b)
  {
      return a + b;
   }
</script>
```

Naming a Function

While naming a function, it's important to follow these points:

- It is recommended that function names begin with an alphabet and be descriptive.
- It is not appropriate to use spaces or other special characters in function names.
- The reserved keywords in JavaScript should not be used in the names of functions.

For example valid function names can be addNumbers( ), changeCase( ) & invalid function names can be 123Sum( ), change Case( ) etc.

There are two types of functions in JavaScript

1. Built-in Functions
2. User Defined Functions

Built-in Functions:

The built-in functions are already defined in JavaScript. Some built-in functions are:

- prompt() : Built-in function to take user input as string
- parseInt( ): Built-in function to convert to an integer
- parseFloat( ): Built-in function to convert to a floating-point number
- isNaN( ): Built-in function to check if something is Not a Number. For a number it returns False, otherwise it returns true
- alert( ): Used to display data or a message in a box on the window.

User Defined Functions in JavaScript

The functions created by the user to perform a specific task are called **user defined functions**. In this the user will give:

- function name
- parameters written parenthesis
- code to define the function.

Number of parameters (also called arguments) is not fixed. You may have no parameters or as many as your function requires

Syntax of a JavaScript User Defined Function:

```
//defining the function
function func_name (parameter1, parameter2, parameter3)
 {
  // code to be executed
      return some_result                                    //return statement
}
func_name(arg1,arg2,arg3)                    //invoking the function
```

Example: Below is a function called **showUser** that shows a user's name after getting a String parameter containing the user's name:

```
<script>
```

```
  // Define the showUser function
  function showUser(username)
{
    document.write("User: " + username);
  }
  // Call the showUser function with the username "Rahul Kumar"
  showUser("Rahul Kumar");
</script>
```

Output will be:

```
User: Rahul Kumar
```

Invoking the Function/ Calling the Function

The code within the function runs when it is called or invoked after it has been defined. When a user-defined function is invoked, program control is passed to the called function. To call a function use the name of the function along with the ( ).

Example:

```
<script>
    // The greet() function defined
    function greet( )
     {
       document.write("Hello, World!");
      }

    // The greet( ) function called or invoked
    greet( );
</script>
```

The greet( ) function defined

The greet( ) function called or invoked

In this example the **greet( )** function is invoked immediately after its definition, but you can place the call to the function anywhere in the script.

Output will be:

```
Hello, World!
```

Using the keyword return in a function: When JavaScript encounters a return statement(which is the keyword **return** followed by a value or a variable), the function will terminate and return the value to the "caller" as the return value.

The return value may be stored in a variable when the function is called.

xyz = func_name(arg1,arg2,arg3)

The return value may be output by calling the function within the output statement.

document.write(func_name(arg1,arg2,arg3))

Example:

In this example, the **myJavaScriptFunction()** takes an integer parameter/argument. If the argument is less than 0, it returns "Number is negative" else it returns "Number is positive". Once a return statement is executed, the function stops executing and returns the control flow to the statement that invoked it.

```
<html>
<head><title>Functions</title></head>
<body>
<h3>Invoking a Function and Return Value</h3>
<script>

    // Define the JavaScript function

    function myJavaScriptFunction(num)
    {
      if (num < 0)
        {  return "Number is negative";   }
      else
        {  return "Number is positive";      }
    }
    // Invoke the JavaScript function and store the result
    var result = myJavaScriptFunction(5);

    // Print the result to the document
    document.write(result);
</script>
</body>
</html>
```

Whenever we have a return statement in a function, we must either store the result in a variable and output it or call the function inside an output statement. Otherwise we will not get any output.

Since the argument is 5, which is a positive number only the else statement will be returned.

Output:

Invoking a Function and Return Value

Number is positive

Invoking or calling a function multiple times

A function can be called multiple times within a program and each time we can pass different arguments to it. In the following example we will call the add( ) four times and each time we pass different values.

If the function has 2 parameters, we have to pass two values when calling the function and, in this case, the first value gets assigned to the first variable while the second value gets assigned to the second variable. If we do not pass a value the output will be NaN.

```
<html>
<head><title>Functions</title></head>
<body>
<h3>Invoking a Function and Return Value</h3>
<script>
function add(x, y)
{
 var total = x + y;
 return total;
 }
//When we call this function as follows:
document.write(add(12,13))

document.write("<br>")
//12 will be assigned to x and 13 will be assigned to y, output is 25

document.write(add())
document.write("<br>")
//output will be NaN because it can't perform addition on undefined

document.write(add(2,3,4))
document.write("<br>")
//outputs 5 because it added the first two arguments and 4 is ignored
//We can also call as follows:
 x=add(12.5,13.5)
document.write(x)
   //the output will be 26

</script>
</body>
</html>
```

Invoking or Calling the function first time

Invoking/Calling the function second time

Calling the function third time

Calling the function fourth time

Output will be:

Invoking a Function and Return Value

25
NaN
5
26

2.2 Objects

Objects are the fundamental blocks of JavaScript. They are used to

- store and organize data

- create reusable code
- create complex and powerful applications.

An object consists of Properties and Methods.

Properties have values and Methods are functions related to the Object that perform a task.

Let us consider Object as Car

Properties of a Car can be :

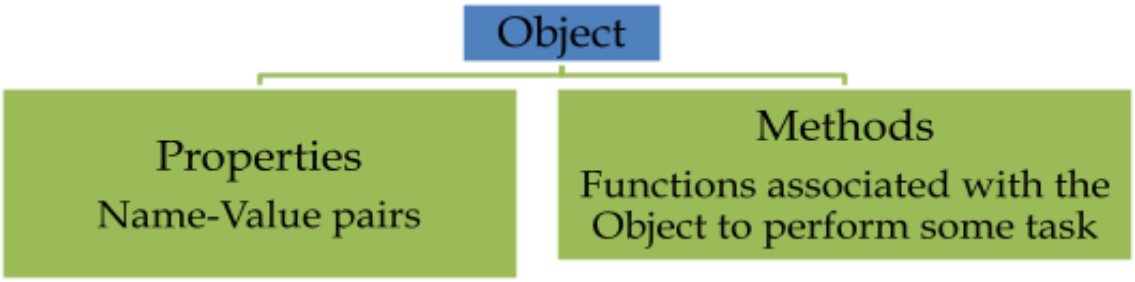
Colour=Yellow, Shape=Sports, Fuel=Electric

Methods of a Car can be:

Start, Accelerate, Stop but since these are functions that perform some task, we write these as Start( ), Accelerate( ), Stop( )

Objects are created using the **new keyword**, followed by the name of the object. For example, the following code creates a new object called myObject:

```
var myObject = new Object();
```



To **access an object property, use dot notation**: objectName.propertyName.

Car. Colour or Car.Shape

An object's property can be set using the **assignment operator**: objectName.propertyName = value.

Car.Shape= "Sedan"

To **remove a property** from an object, use the **delete** keyword:

delete objectName.propertyName.

In the example below we have an object person with three properties:

- Properties like **name**, **age** and **city** are accessed, modified, and deleted using dot notation.

```
<script>
      // Defining a new object
      var person = {
         name: "Priya",
         age: 30,
         city: "Mumbai",
               };
    // Access properties using dot notation
      document.write(person.name + "<br>");
  // Output: Priya
      document.write(person.age + "<br>");
  // Output: 30
</script>
```

2.3 Strings in JavaScript

Strings is a datatype used for storing text but in JavaScript it is also an Object with its own set of properties and methods.

Every String consists of characters which can be alphabets, numbers, other characters and space. Strings are written with single or double quotes.

Each of the characters in a string correspond to an index number, starting with 0. Every character of the string has a positive and negative index.

Left to Right

0	1	2	3	4	5	6	7	8	9	10
H	E	L	L	O		W	O	R	L	D
-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1

Right to Left

A string object consists of properties and methods.

String Property: In your syllabus there is only one String property that is Length

To find the length of a string, use the built-in length property:

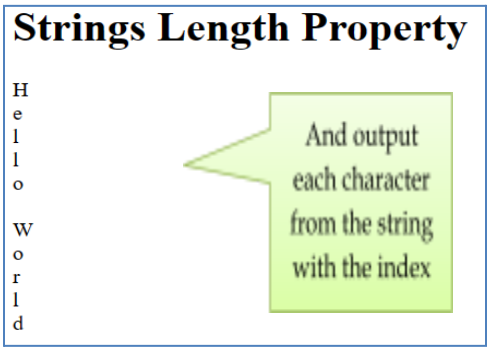
```
<script>
      var str = "Hello World";
      var len = str.length;
      alert("Length of the string 'Hello World': " + len);
</script>
```

Output:
Length of the string 'Hello World': 11

Example:
Using length of string with a for loop to output each character of a string.

```
<script>
var str="Hello World"
var len=str.length
for(i=0; i<len; i++)
{
        document.write(str[i],"<br>")
}
</script>
```

We can use the length property here



2.4 String Methods

Method	Description	Application on text = "Hello World"	Output
slice(x, y) slice(-x,-y) slice(x)	This method extracts a part of a string and returns the extracted part in a new string. The method takes 2 parameters- start index, and end index (end index is not included). It can also take a negative index.	text.slice(6,10); text.slice(-5,-2)	Worl Wor

	If you give single index it will extract from that index to the end		

substring(x, y)
substring(x)
	This method extracts a part of a string and it does not change the original string.
	The method takes 2 parameters- start index, and end index (end index is not included).
	Does not take a negative index.
	If you give a single index it will extract from that index to the end.
		text.substring(6, 9);
		
		text.substring(6);
			Wor
			
			World

replace(x, y)	Replaces first occurrences of the specified old character/word with the new character/word	text.replace('o', 'a')	Hella World
replaceAll(x,y)	Returns a new string with all values replaced	text.replaceAll("l","r")	Herro Worrd
match(string)	Returns the string if it matches exactly otherwise, it returns null (if we use document.write)	document.write(text.match("World")); document.write(text.match("world"));	World null
toUpperCase( )	Converts to uppercase	text.toUpperCase()	HELLO WORLD
toLowerCase()	Converts to lowercase	text.toLowerCase()	hello world

concat(str)	Concatenates the specified string str to the end of the original string
	We can join multiple strings too
		text.concat(" Java");
		
		text.concat(" to ","Java", "Script");
			Hello World Java
			
			Hello World to JavaScript

trim( )	Removes whitespace from both sides of a string.	var text = " Hello World "; var result = text.trim();	Hello World
charAt(n)	Returns the character at the specified index n	text.charAt(6)	W

Example:

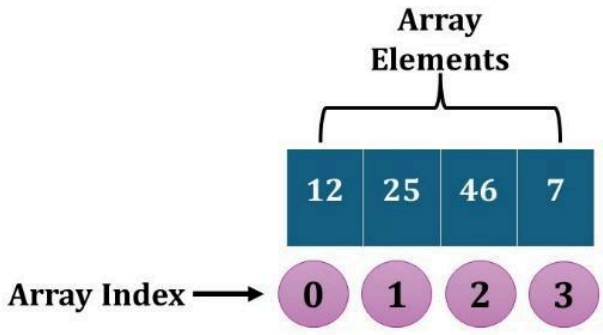
```
<script>
      var str = "Hello World";

// slice(): Extracts a section of a string and returns it as a new string
      var sliced = str.slice(2, 7);
      document.write("slice(): " + sliced + "<br>");
//Output  slice(): llo W


// substring(): Returns the characters in a string between two indexes into the string
      var substrLast = str.substring(2, 7);
      document.write("substring() from second-to-last: " + substrLast + "<br>");
 // Output: substring() from second-to-last: llo W

// replace(): Searches a string and replaces it with a new string.

      var replaced = str.replace("World", "Universe");
      document.write("replace(): " + replaced + "<br>");
// Output: replace(): Hello Universe

// replaceAll(): Replaces all occurrences of a string

      var replacedAll = str.replaceAll("o", "0");
      document.write("replaceAll(): " + replacedAll + "<br>");
// Output:  replaceAll():  Hell0 W0rld

  // match(): Searches a string to match and returns it  else returns null
```

```
var text = "He shook the book";
document.write(text.match("ook"),"<br>");
document.write(text.match("xyz"))
//Output: ook
          null

// toUpperCase(): Converts a string to uppercase letters

    var upperCase = str.toUpperCase();
    document.write("toUpperCase(): " + upperCase + "<br>");
// Output: toUpperCase(): HELLO WORLD

// toLowerCase(): Converts a string to lowercase letters
    var lowerCase = str.toLowerCase();
    document.write("toLowerCase(): " + lowerCase + "<br>");
// Output: toLowerCase():  hello world

// concat(): Joins two or more strings, and returns a new joined string
    var concatenated = str.concat(", how are you?");
    document.write("concat(): " + concatenated + "<br>");
// Output:  concat(): Hello World , how are you?

 // charAt(): Returns the character at a specified index (position) in a string
    var char = str.charAt(6);
    document.write("charAt(): " + char + "<br>");
// Output: charAt(): W
</script>
```

2.5 Arrays in JavaScript

Arrays are used to store multiple values of the same type. Array is like a container that can hold several items of data.

Arrays can hold various data types like numbers, strings, objects, and even other arrays. Arrays in JavaScript are zero-indexed i.e. the first element is accessed with an index 0, the second element with an index of 1, and so on.



There are two ways to create an Array:

Creating an Array using Array Literal:

Here we simply assign a variable to values written in **square bracket [ ],** separated with commas.

Example:

```
<script>
    // Using array literal
    var arrLiteral = [1, 2, 3, 4, 5];
    document.write("Array created with array literal: " + arrLiteral);
</script>
```

Output:

```
Array created with array literal: [1, 2, 3, 4, 5]
```

Creating Array using new keyword:

In this the keyword **new** with **Array( )** is used to create array.

Example:

```
<script>
  // Creating an array using the new keyword
  var arrInstance = new Array(1, 2, 3, 4, 5);
  document.write("Array created with instance of Array: " + arrInstance);
</script>
```

Output:

```
Array created with instance of Array: [1, 2, 3, 4, 5]
```

Accessing Elements of an Array

Any element in the array can be accessed using the index number. The index in the arrays starts with 0.

Accessing the First Element of an Array

The array indexing starts from 0, so we can access the first element of the array using the index number.

Accessing the Last Element of an Array

We can access the last array element using [array.length – 1] index number.

Modifying the Array Elements

Elements in an array can be modified by assigning a new value to their corresponding index.

Array Length

Get the length of an array using the length property.

```
<script>
      // Creating an array
      var myArray = [10, 20, 30, 40, 50];

      // Accessing the first element of the array
      var firstElement = myArray[0];
      document.write("First Element: " + firstElement + "<br>");

// Output: First Element: 10

      // Accessing the last element of the array
      var lastElement = myArray[myArray.length - 1];
       document.write("Last Element: " + lastElement + "<br>");
// Output: Last Element: 50

      // Modifying the third element of the array
      myArray[2] = 35;
      document.write("Modified Array: " + myArray + "<br>");
// Output: Modified Array: 10,20,35,40,50

      // Getting the length of the array
      var arrayLength = myArray.length;
      document.write("Array Length: " + arrayLength);
// Output: Array Length: 5
</script>
```

2.6 Array Methods

Taking an example of an array colors=['Red', 'Green', 'Blue', 'Yellow'];

Method	Description	Usage	Output
toString( )	Converts an array into a string of the array values separated by commas.	colors.toString();	Red,Green,Blue,Yellow
pop( )	Removes the last element in an array.	colors.pop();	Red, Green, Blue
push( )	Adds a new element at the end of the array.	colors.push('Purple');	Red, Green, Blue, Yellow, Purple
shift( )	Removes the first member from the array and "shifts" every subsequent element to a lower index.	colors.shift();	Green, Blue, Yellow
unshift( )	Adds a new element to an array (at the beginning), and "shifts" all other elements to a higher/larger index.	colors.unshift('Orange');	Orange, Red, Green, Blue, Yellow
join( )	Joins all array elements into a string.	colors.join('&');	Red&Green&Blue&Yellow
concat( )	Create a new array by merging (concatenating) existing arrays.	moreColors = ['Cyan', 'Magenta']; colors.concat(moreColors);	Red, Green, Blue, Yellow, Cyan, Magenta
slice( )	Gives back a new array that has a copy of the given array's part.	colors.slice(1, 3);	Green, Blue
reverse( )	Will change the original array by reversing the order of the elements in an array.	colors.reverse();	Yellow, Blue, Green, Red

sort( )	Sorts a string array in the ascending order alphabetically.	colors.sort();	Blue, Green, Red, Yellow

Example:

```
<script>
   // Creating an array
   var fruits = ['Apple', 'Banana', 'Cherry'];

   // Using toString() method
   document.write("Using toString(): " + fruits.toString() + "<br>");
   // Output: Using toString(): Apple,Banana,Cherry

   // Using pop() method
   var popped = fruits.pop();
   document.write("Using pop(): " + fruits + "<br>");
   // Output: Using pop(): Apple,Banana
   document.write("Popped element: " + popped + "<br>");
   // Output: Popped element: Cherry

   // Using push() method
   fruits.push('Date');
   document.write("Using push(): " + fruits + "<br>");
   // Output: Using push(): Apple,Banana,Date

   // Using shift() method
   var shifted = fruits.shift();
   document.write("Using shift(): " + fruits + "<br>");
   // Output: Using shift(): Banana,Date
  // Output: Using shift(): Apple
   document.write("Shifted element: " + shifted + "<br>");
   // Output: Shifted element: Apple

   // Using unshift() method
   fruits.unshift('Apricot');
   document.write("Using unshift(): " + fruits + "<br>");
   // Output: Using unshift(): Apricot,Banana,Date

   // Using join() method
   document.write("Using join(): " + fruits.join('-') + "<br>");
   // Output: Using join(): Apricot-Banana-Date
```

```
  // Using delete() method
  delete fruits[1];
  document.write("Using delete(): " + fruits + "<br>");
  // Output: Using delete(): Apricot, ,Date

  // Using concat() method
  var moreFruits = ['Fig', 'Grapes'];
  var allFruits = fruits.concat(moreFruits);
  document.write("Using concat(): " + allFruits + "<br>");
  // Output: Using concat(): Apricot, ,Date,Fig,Grapes

  // Using slice() method
  var slicedFruits = allFruits.slice(1, 4);
  document.write("Using slice(): " + slicedFruits + "<br>");
  // Output: Using slice(): ,Date,Fig

  // Sorting string arrays using sort() method
  var sortedFruits = allFruits.sort();
  document.write("Sorted array: " + sortedFruits + "<br>");
  // Output: Sorted array: ,Apricot,Date,Fig,Grapes

  // Sorting string arrays using reverse() method
  var reversedFruits = sortedFruits.reverse();
  document.write("Reversed array: " + reversedFruits + "<br>");
  // Output: Reversed array: Grapes,Fig,Date,Apricot,
</script>
```

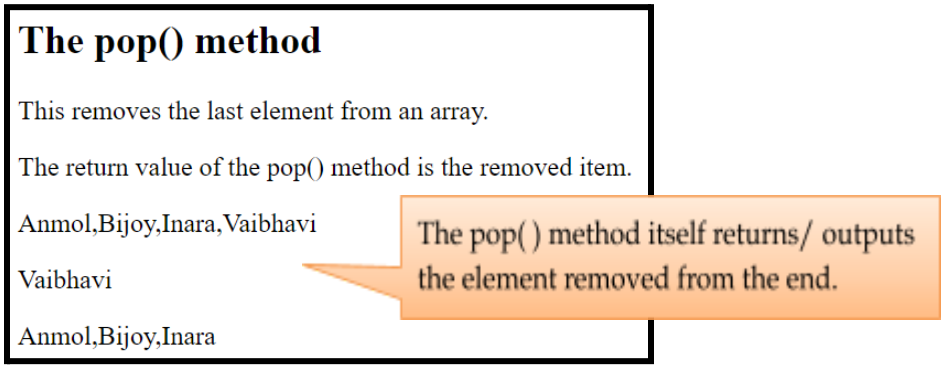
Some more examples:

The pop() method

This method removes the last element from an array. The return value of the pop() method is the removed item.

```
<!DOCTYPE html>
<html>
<body>
<h2>The pop() method</h2>
<p>This method removes the last element from an array.</p>
<p>The return value of the pop() method is the removed item.</p>
<p id="demo1"></p>
```

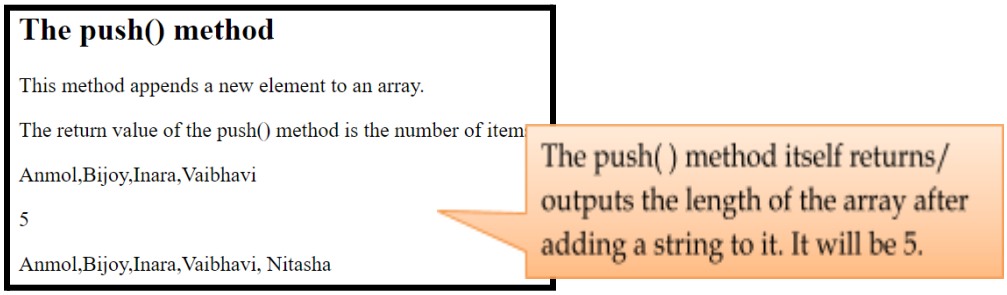
```
<p id="demo2"></p>
<p id="demo3"></p>
<script>
var Students = ["Anmol", "Bijoy", "Inara", "Vaibhavi"];
document.getElementById("demo1").innerHTML = Students;
document.getElementById("demo2").innerHTML =Students.pop();
document.getElementById("demo3").innerHTML =Students;
</script>
</body>
</html>
```



The push() method

This method appends a new element to the end of the array. The return value of the push() method is the number of items.

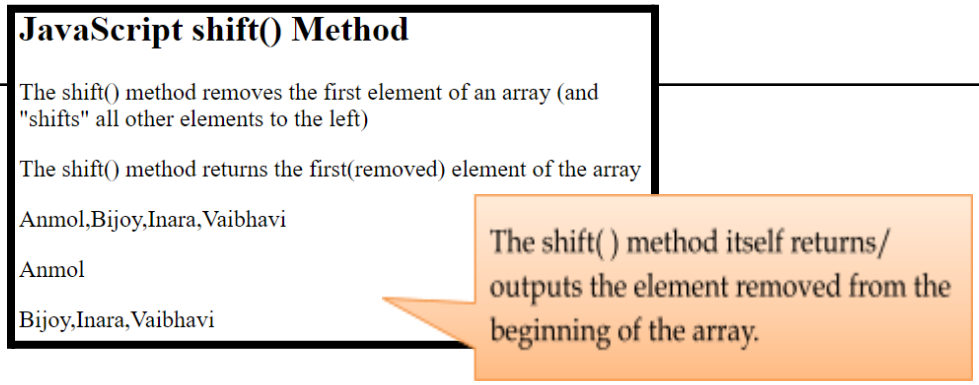
```
<!DOCTYPE html>
<html>
<body>
<h2>The push() method</h2>
<p>This method appends a new element to an array.</p>
<p>The return value of the push() method is the number of items.</p>
<p id="demo1"></p>
<p id="demo2"></p>
<p id="demo3"></p>
<script>
var Students = ["Anmol", "Bijoy", "Inara", "Vaibhavi"];
document.getElementById("demo1").innerHTML = Students;
document.getElementById("demo2").innerHTML =Students.push(" Nitasha");
document.getElementById("demo3").innerHTML =Students;
</script>
</body>
</html>
```



The shift() method

This method removes the first array element and "shifts" all other elements to a lower index. The shift() method is similar to the pop() method but here the element removed is the first one instead of the last and hence it is slower. It also returns the removed items.

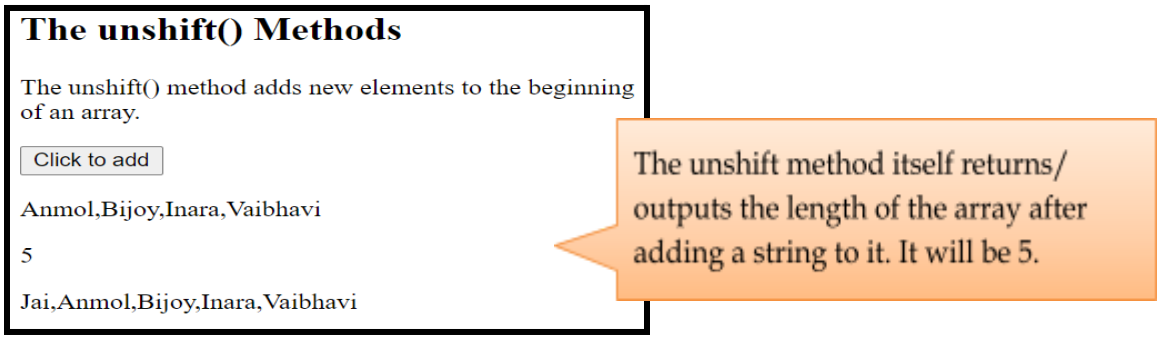
```
<!DOCTYPE html>
<html>
<body>
<h2>JavaScript shift() Method</h2>
<p>The shift() method removes the first element of an array (and "shifts" all other elements to the left)</p>
The shift() method returns the first(removed) element of the array
<p id="demo1"></p>
<p id="demo2"></p>
<p id="demo3"></p>
<script>
var Students = ["Anmol", "Bijoy", "Inara", "Vaibhavi"];
document.getElementById("demo1").innerHTML =Students;
document.getElementById("demo2").innerHTML =Students.shift();
document.getElementById("demo3").innerHTML =Students;
</script>
 </body>
</html>
```



The unshift() method

This adds a new element to an array (at the beginning), and "shifts" all other elements to a higher/larger index. The unshift() method is similar to the push() method but here the element added is the first one instead of the last and hence it is slower. It also returns the number of items in the array.

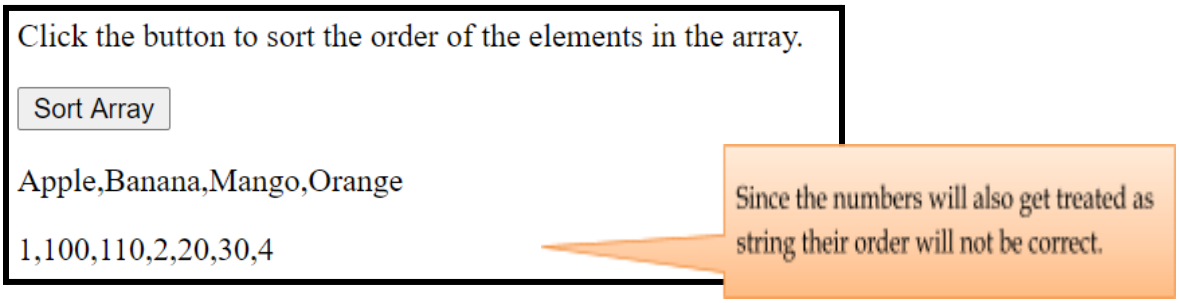
```
<!DOCTYPE html>
<html>
<body>
<h2>The unshift() Methods</h2>
<p>The unshift() method adds new elements to the beginning of an array.</p>
<p id="demo1"></p>
<p id="demo2"></p>
<p id="demo3"></p>
<script>
var Students = ["Anmol", "Bijoy", "Inara", "Vaibhavi"];
document.getElementById("demo1").innerHTML =Students;
document.getElementById("demo2").innerHTML =Students.unshift("Jai");
document.getElementById("demo3").innerHTML =Students;
</script>
</body><html>
```



The sort() method

This method sorts the items of an array. The sort order can be either alphabetic or numeric, in ascending (up) order. By default, the sort() method sorts the values as strings in alphabetical and ascending order. This works well for strings ("Apple" comes before "Banana"). However, if numbers are sorted as strings, "25" is bigger than "100", because "2" is bigger than "1". Because of this, the sort() method will produce an incorrect result when sorting numbers.

```
<!DOCTYPE html>
<html>
<body>
<p>Click the button to sort the order of the elements in the array.</p>
<button onclick="sort_arr()">Sort Array</button>
<p id="demo1"></p>
<p id="demo2"></p>
<script>
var fruits = ["Banana", "Orange", "Apple", "Mango"];
var num=[20,2,1,100,110,30,4]
document.getElementById("demo").innerHTML = fruits;
function sort_arr() {
  fruits.sort();
  document.getElementById("demo1").innerHTML = fruits;
  num.sort();
  document.getElementById("demo2").innerHTML = num;
}
</script>
</body>
</html>
```



The reverse() method

This method reverses the order of the elements in an array and changes the original array.

```
<!DOCTYPE html>
<html>
<body>
<p>Click the button to reverse the order of the elements in the array.</p>
<button onclick="rev_arr()">Reverse it</button>
<p id="demo1"></p>
<script>
var fruits = ["Banana", "Orange", "Apple", "Mango"];
```

```
function rev_arr() {
  fruits.reverse();
  document.getElementById("demo1").innerHTML = fruits;
  }
</script>
</body></html>
```

Click the button to reverse the order of the elements in the array.

Reverse it

Mango,Apple,Orange,Banana

Reverse Sorting an array

```
<!DOCTYPE html>
<html>
<body>
<p>Click the button to sort the order of the elements in the array in reverse order.</p>
<button onclick="sort_arr()">Reverse Sort Array</button>
<p id="demo1"></p>
<p id="demo2"></p>
<script>
var fruits = [" Banana", " Orange", " Apple", " Mango"];
var num=[20,2,1,100,110,30,4]
document.getElementById("demo").innerHTML = fruits;
function sort_arr() {
  fruits.sort();
  fruits.reverse();
  document.getElementById("demo1").innerHTML = fruits;
  num.sort();
  num.reverse();
  document.getElementById("demo2").innerHTML = num;
}
</script>
</body></html>
```

Click the button to sort the order of the elements in the array in reverse order.

Reverse Sort Array

Orange, Mango, Banana, Apple

4,30,20,2,110,100,1

2.7 Math Methods

Mathematical operations are carried out using the Math object. You can use Math as an object to call all of its methods and properties without having to create it.

Method	Description	Application	Output
Math.round(x)	Generates the value of the given number rounded to the nearest integer	Math.round(5.5);	6
		Math.round(5.49);	5
Math.ceil(x)	Generates the integer greater than or equal to the given number	Math.ceil(5.1);	6
		Math.ceil(5.9);	6
Math.floor(x)	Generates the integer smaller than or equal to the given number	Math.floor(5.1);	5
		Math.floor(5.9);	5
Math.pow(x, y)	Generates the value of x to the power y	Math.pow(2, 3);	8
Math.sqrt(x)	Generates the square root of x.	Math.sqrt(16);	4
Math.min()	Generates the smallest value among zero or more numbers	Math.min(5, -2, 8, 1, 2);	-2
Math.max()	Generates the biggest value among zero or more numbers	Math.max(5, -2, 8, 1, 2);	8
Math.random()	Generates the random, floating-point value between 0 (inclusive) and 1 (exclusive).	Math.random();	Random number between 0 and 1

Example:

See how a variable can be used to store the output statement.

```
<script>
    var z = document.getElementById('output')

// Math.round(x): Returns the value of a number rounded to the nearest integer
    z.innerHTML += "Math.round(4.4): " + Math.round(4.4) + "<br>";
    z.innerHTML += "Math.round(4.6): " + Math.round(4.6) + "<br>";

// Math.ceil(x): Returns the integer greater than or equal to a given number
    z.innerHTML += "Math.ceil(4.1): " + Math.ceil(4.1) + "<br>";
    z.innerHTML += "Math.ceil(4.9): " + Math.ceil(4.9) + "<br>";
```

```
// Math.floor(x): Returns the integer less than or equal to a given number
      z.innerHTML += "Math.floor(4.1): " + Math.floor(4.1) + "<br>";
      z.innerHTML += "Math.floor(4.9): " + Math.floor(4.9) + "<br>";
// Math.pow(x, y): Returns the base to the exponent power, that is,
base^exponent
      z.innerHTML += "Math.pow(3, 4): " + Math.pow(3, 4) + "<br>";
 // Math.sqrt(x): Returns the square root of a number
      z.innerHTML += "Math.sqrt(25): " + Math.sqrt(25) + "<br>";
// Math.min(): Returns the smallest of zero or more numbers
                z.innerHTML += "Math.min(3, 7, 2, 9, 1): " + Math.min(3, 7, 2, 9, 1) +
      "<br>";
// Math.max(): Returns the largest of zero or more numbers
     output.innerHTML += "Math.max(3, 7, 2, 9, 1): " + Math.max(3, 7, 2, 9, 1) +
     "<br>";
 // Math.random(): Returns a pseudo-random number between 0 and 1
      output.innerHTML += "Math.random( ): " + Math.random();
// Output: Random number between 0 and 1
</script>
```

2.8 Events

Events can take place whenever there is a change in the state of some object and reacting to events is known as event handling. JavaScript provides event handlers which are functions that are called upon when an event occurs.

For example, the onclick event is triggered when the user clicks on an element, and the onload event is triggered when the page is loaded.

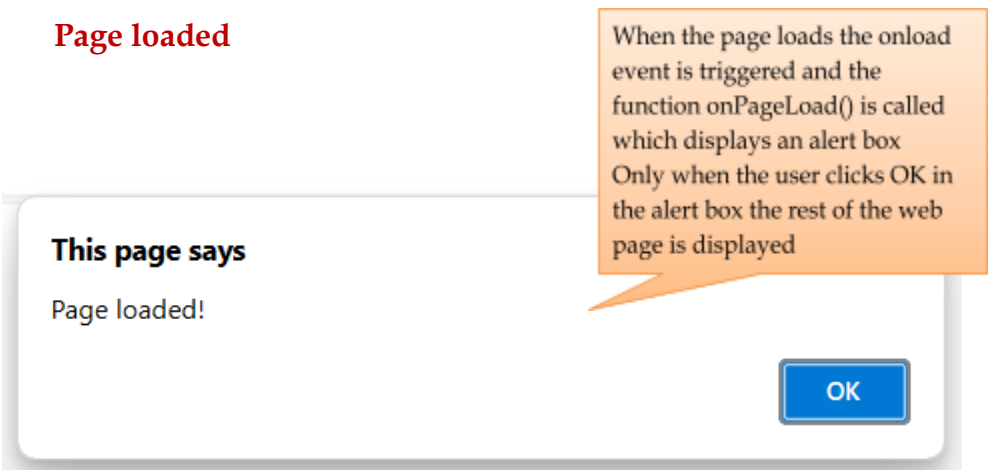
Event	Event Handler	Description
change	onchange	When an individual edits the form element's value.
click	onclick	Upon selecting an element with the mouse.
mouseover	onmouseover	When the mouse pointer comes over the element.
mouseout	onmouseout	When the mouse pointer leaves an element.
keydown	onkeydown	As soon as the user presses and releases any key on the keyboard.
load	onload	After the browser has finished loading the page.

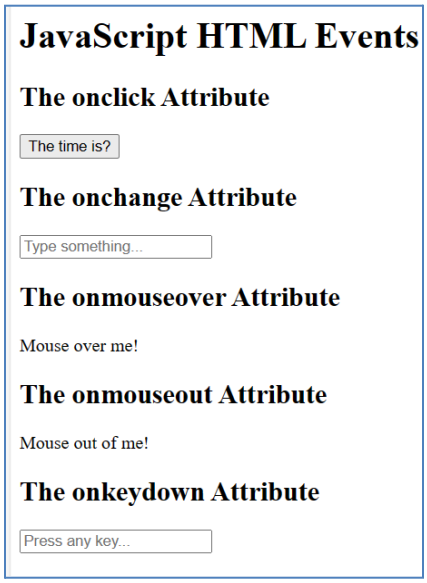
Example:

```
<!DOCTYPE html>
<html>
<head>
  <title>JavaScript Events</title>
</head>
<body onload="onPageLoad()">
<h1>JavaScript HTML Events</h1>
<h2>The onclick Event</h2>
<button onclick="showTime()">The time is?</button>

<p id="demo"></p>
<h2>The onchange Event</h2>
<input type="text" id="myInput" onchange="handleChange()" placeholder="Type
something...">

<h2>The onmouseover Event</h2>
<div id="mouseOverDiv" onmouseover="mouseOverFunction()">Mouse over me!</div>

<h2>The onmouseout Event</h2>
<div id="mouseOutDiv" onmouseout="mouseOutFunction()">Mouse out of me!</div>

<h2>The onkeydown Event</h2>
<input type="text" id="myKeyDownInput" onkeydown="keyDownFunction()"
placeholder="Press any key...">
<script>
  function onPageLoad()
{         alert('Page loaded!');    }
  function showTime()
{     document.getElementById('demo').innerHTML = Date();   }
function handleChange()
```

The Output is:

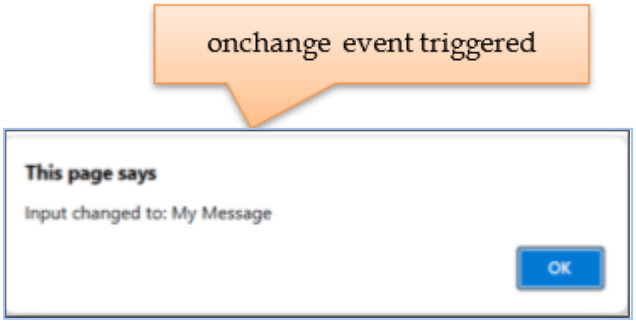
Page loaded



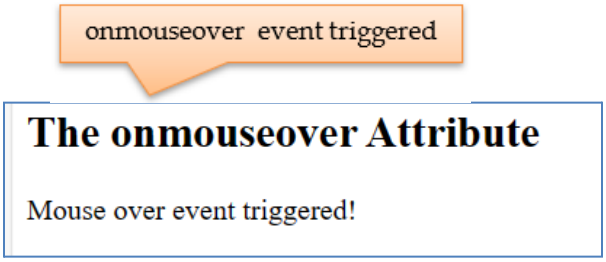

JavaScript HTML Events
The onclick Attribute
The time is?
The onchange Attribute
Type something...
The onmouseover Attribute
Mouse over me!
The onmouseout Attribute
Mouse out of me!
The onkeydown Attribute
Press any key...


onclick event triggered
The onclick Attribute
The time is?
Tue Mar 19 2024 17:34:35 GMT+0530 (India Standard Time)


The onchange Attribute
My Message


onchange event triggered
This page says
Input changed to: My Message
OK

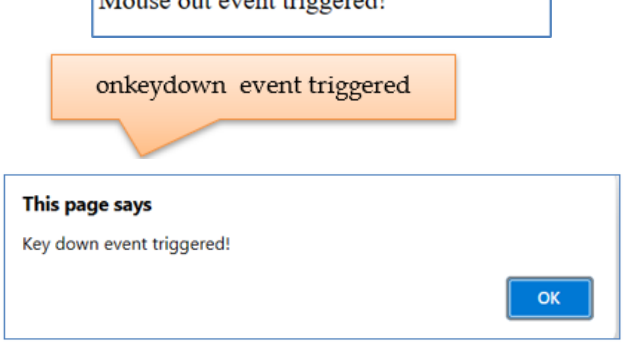

The onmouseover Attribute
Mouse over me!


onmouseover event triggered
The onmouseover Attribute
Mouse over event triggered!


The onmouseout Attribute
Mouse out of me!


onmouseout event triggered
The onmouseout Attribute
Mouse out event triggered!


The onkeydown Attribute
Press any key...


onkeydown event triggered
This page says
Key down event triggered!
OK

Exercise

I. Multiple Choice Questions

1. Which of the following statements is not true for JavaScript:
a. JavaScript is a compiled language.
b. In JavaScript an interpreter in the browser reads over the JavaScript code.
c. Any error found in the code, will stop the further execution of the program.
d. JavaScript can be implemented using **<script>… </script>** tags.

2. A script cannot be placed
a. In the body of the page
b. In the header of the page
c. In a file with extension .js
d. In a file with extension .css

3. Which of these in an advantages of JavaScript
a. It can be used for client-side and server-side i.e. front end and back end.
b. It runs on multiple platforms and devices.
c. It is supported by all browsers.
d. All of the above

4. Which of these is not a Primitive Data Type in JavaScript
a. Boolean
b. Undefined
c. Arrays
d. Strings

5. In JavaScript adding a number and a string will return
a. a string
b. a number
c. NaN
d. None of these

6. Which of the following cannot be a variable?
a. _new b. y24 c. Val d. 5g

7. Which of the following statements is not true for Variables in JavaScript
a. Variables in JavaScript can be defined using the keyword **var.**
b. The equal to (=) sign is used to assign a value to a variable.
c. We cannot assign null to a variable.
d. A variable can be undefined.

8. Which of the following is an Arithmetic operator?
a. += b. == c. - - d. *=

9. When we use a comparison operator the datatype of the output is always:
a. Integer
b. Boolean
c. NaN
d. Undefined

10. What will be the value returned by the following expression?
34 && -10
a. true b. false c. 34 d. -10

11. What will be the value returned by the following expression?
0 || -20
a. true b. false c. -20 d. 0

12. Which of the following statements is not true for function arguments/parameters?
a. Function parameters are listed between parenthesis ( ).
b. The number of function parameters is fixed.
c. Function arguments are the values that the function receives when it is called.
d. The arguments (parameters) act as local variables within the function.

13. In JavaScript, the definition of a function starts ____
a. with the return type, function keyword, function name and parentheses.
b. with the function keyword, function name and parentheses.
c. with the return type, function name and parenthesis.
d. with the function name, parenthesis and return type.

14. For the provided JavaScript code, which of the following is the correct output?

```
var values=[4,5,6,7]
varans=values.slice(1);
```

```
document.write(ans);
```

a. Error
b. 5, 6, 7
c. 4, 5, 6,
d. 4, 5, 6, 7

15. What will typeof(null) return/output?

a. object b. null c. undefined d. nothing

16. For the JavaScript code provided, which of the following is the correct output?

```
var values=["Three","Two","One"];
var ans=values.shift();
document.write(ans);
```

a. One
b. Three
c. Two
d. error

17. Of the following, which method of the Array object is used to extend an array by one or more members and return the array's new length?

a. splice()
b. unshift()
c. sort()
d. toString()

18. Out of all the built-in methods, which one is used for removing the last element from an array and return it?

a. pop()
b. last()
c. get()
d. shift()

19. Which event occurs when a webpage has finished loading the page?

a. onload
b. onready
c. onloaded
d. unload

20. The syntax for replaceAll( ) is_____.

a. string.replaceAll(searchValue, newValue)
b. string.replace(searchValue, newValue)

c. string.replaceall(searchValue, newValue)
d. None of the above

21. What will the following JavaScript code snippet output?

```
var x = "Hello, IncludeHelp!";
document.write( x.slice(-13,-1));
```

a. IncludeHelp!
b. IncludeHelp
c. ValueError
d. Hello,

22. What will the following JavaScript code snippet output?

```
var myArray = ['h', 'e', 'l', 'l', 'o'];
document.write(myArray[0]);
document.write(myArray[1]);
```

a. undefined b. he c. ValueError d. TypeError

23. What will the following JavaScript code output?

document.write(Math.ro und(117.5))

a. 117.5 b. 117 c. 118 d. 117.00

24. Which of the following cannot be an output for

document.write(Math.random()*10)

a. 8.49259898 b. 1.78925374 c. 0 d. 10

25. What happens when a user changes the content of a textbox in the following?

<input type="text" onchange="myFunction()">

a. The user enters the content in the text box.
b. The user gets a message to change the content.
c. The function myFunction( ) gets invoked.
d. The user cannot change the content.

II. List the Built-in function for each of the Following:

1. A function to take user input as string.
2. The function used to convert to an integer.

3. A function to convert to a floating-point number.
4. A function to check if something is Not a Number.
5. Used to display data or a message in a box on the window.

III. Write the events for the following:

1. As soon as the user presses and releases the key.
2. After the browser has finished loading the page.
3. When an individual edits the form element's value.
4. When the mouse pointer leaves an element.
5. Upon selecting an element with the mouse.
6. When the mouse pointer comes over the element.

IV. What will be the output of the following codes

1.

```
<!DOCTYPE html>
<html>
<body>
<h2>JavaScript Functions</h2>
<p id="demo1"></p>
<p id="demo2"></p>
<script>
var x=170
function myFunction()
{
  var x=45
  document.getElementById("demo1").innerHTML = x
}
document.getElementById("demo2").innerHTML = x +20
myFunction();
</script></body></html>
```

2.

```
<html
<body>
<script>
    lang1=['java','rust','ruby']
    lang2=['haskell','python']
    lang1=lang1.concat(lang2)
    lang1.sort()
    lang1.reverse()
    document.write(lang1)
</script>
</body> </html>
```

3.

```
<!DOCTYPE html>
<html>
<body>
<h2>JavaScript Functions</h2>
<p id="demo1"></p>
<p id="demo2"></p>
<script>
var x=55
var y=15
function myFunction()
{  var x=100
  var y=40
  x++
  return x+y   }
document.getElementById("demo2").innerHTML = x+y
document.getElementById("demo1").innerHTML =myFunction()
</script> </body> </html>
```

4.

```
<html
<body>
 <p id="Far"></p>
<p id="Cel"></p>
<script>
function toCelsius(temp)  {
  return (5/9) * (temp-32);
}
function toFarhenheit(temp)  {
  return (9/5) * temp+32;
}
document.getElementById("Far").innerHTML = toFarhenheit(18)
document.getElementById("Cel").innerHTML = toCelsius(32)
</script> </body>  </html>
```

5.

```
<html>
<body>
<script>
x=Math.max(66.7,81.9,-100.5)
y=Math.min(66.7,81.9,-100.5)
z=Math.ceil(x+y)
document.write(z)
</script>
</body></html>
```

6.

```
<html>
<body>
<script>
var y=0;
var p=parseInt(prompt("Enter a no."));
function checkprime(n) {
for(var x=2;x<n;x++)
{
if (n%x==0)
{
document.write ("The number is not prime"+"<br>");
y=1
break;
}}
if(y==0) {
document.write ("The number is prime"+"<br>");
}}
checkprime(16);
checkprime(23);
</script> </body></html>
```

V. What is the syntax or logical Error in the following codes? Rewrite the code with the correct syntax and underline the errors

1. A function to find whether the number is odd or even.

```
Function chknum(a)
{
if (n%2!=0)
{ document.write ("The number is even"+"<br>");}
else
{ document.write ("The number is odd"+"<br>"); }
}
```

2. A function to find the sum of 3 numbers

```
function sumfunc(a,b,c)
 {
        return A+b+c;
}
Var sum=SumFunc(6,4,3)

document.getElementById("demo1").innerHTML=Sum
```

3. A function to find the value of a number raised to power another number using the Math object method.

```
<script>
function powerFunction(p1, p2) {
  return Math.power(p1,p2);
}
document.write( powerfunction(4, 3))
</script>
```

4. A function to merge strings

```
<script>
function myFunction[ ] {
  var str1 = "Welcome ";
  var str2 = "to JavaScript ";
  var str3 = "String Object!";
  var res = str1.Concatenate(str2,str3);
  document.getElementById("demo").innerHTML = result;
}
</script>
```

5.Program to find a character in a string

```
<script>
var str = "Welcome to JavaScript";
document.getElementById("demo3").innerHTML = str.charat(11);
</script>
```

6. A function to change the case in a string.

```
<script>
function UpperStr() {
var str = "Changing String Objects";
var res = str.Touppercase();
document.getElementById("demo").innerHTML = res;
</script>
```

VI. Write the code for the following

1. Write a program with 2 functions to find simple or compound interest depending on user input, also take user input for principal, rate and time.
2. Write a program where a function MyFunc( ) it takes the user name and displays a message"

Hello *username* welcome to this page!

3. Write a program with a function to find the smallest out of 3 numbers.
4. Write a program with a function to take user input in kilograms and convert it to grams. [1 Kilogram=1000 grams]
5. Write a program with a function sortnum( ) to sort 3 numbers in ascending order.
6. Using a button call a function Pytha( ) and take the input for the sides then check whether a number is a Pythagorean Triplet or not.
7. Write a program with a function called through a button to ask user age and if the age is greater than 18, display the message "You are eligible" in a paragraph.

VII. Answer the Following Questions:

1. Give an example to explain the JavaScript functions and arrays.
2. Describe the JavaScript terms object methods and object properties.
3. Using two examples, describe the JavaScript event handler.
4. Create a JavaScript function that will delete the last element and show the name in uppercase from an array arr1 that was passed to it as an argument.
5. Differentiate between JavaScript's ceil and floor methods of the Math Object.
6. Declare a function 'stringsjava' in JavaScript to accept two strings arguments. The function should

a. Convert both the strings to lowercase
b. Search for string1 in string2 and display the string if found.
c. Replace all occurrences of letter 'I' with ' ! ' in string2.
d. Display the first character of string1.

7. Consider the following code:

var cars = ["Honda", "BMW", "Audi", "Porsche"];

Write command in JavaScript to :

a. add an item "Volvo " to the array cars in the last.
b. remove first element from the array.
c. display number of elements in the array.
d. add following array to an array "cars".

var person=["Rajan", "Yagya", "Munish"];

8. Consider the string "Life is Beautiful". Write a function 'mystring' that performs the following tasks:

a. Displays the length of the string
b. Displays the string after replacing space " " in the string with " * "
c. Find the position of the first occurrence of "if" and display it.

9. Given an array Classes=["AI", "ML", "DS", "Security", "RDBMS"]
What will be the output of the following?

a. document.write(Classes.pop( ))
b. document.write(Classes.push("NoSQL"))
c. document.write(Classes.unshift("Prompt", "UI")
d. Write the code to output array Classes in the paragraph with ID= "Class"

10. Given a string str='The return statement can be used to return a value at any time'
What will be the output of the following statements?

a. document.write(str.indexOf('return'))
b. document.write(str.match('to return'))
c. document.write(str.replace('value','output'))
d. document.write(str.substring(4,10))

CHAPTER 3
Graphic Designing using Canva and Adobe Express

Topics covered

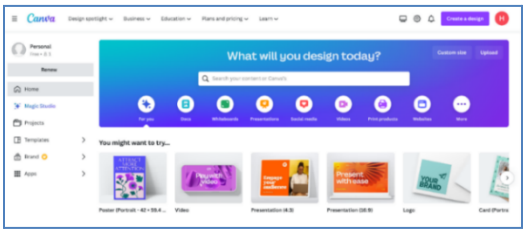
3.1 Graphic Designing and its Importance

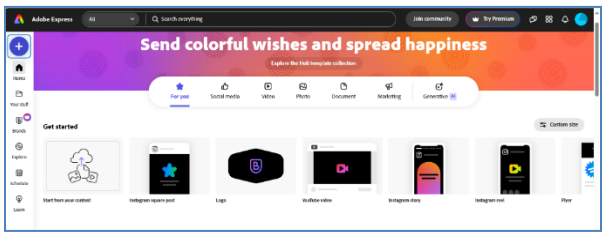
Graphic designing is the process of transforming any idea or content into a visually appealing, eye-catching form.

Graphic designing is used for:

- Print, Television or Social Media Advertising
- Creating Logos and Product Packaging for companies or organizations
- Social Media Content
- Media Campaigns for Movies and Music Videos
- Websites
- Posters, Brochures and Pamphlets
- Events such as product or business launch, weddings etc.

Due to the impactful and effective communication provided by graphic designers, they are much in demand. In this chapter we will be discussing two extremely popular graphic designing tools that will help you create beautiful visuals- Canva and Adobe Express

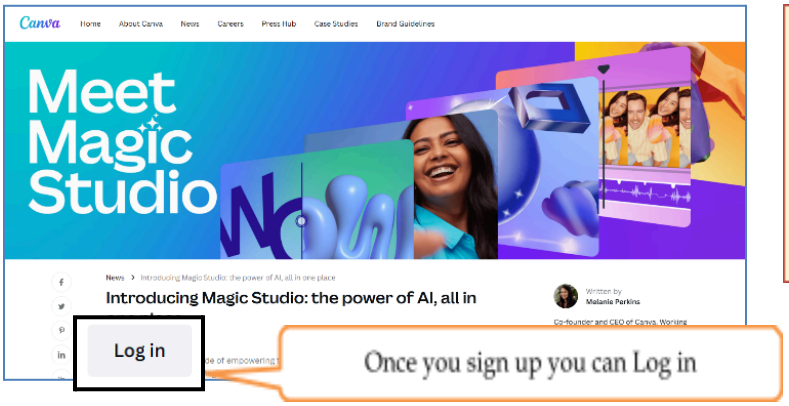




3.2 Introduction to Canva

Canva was founded in Perth, Australia, on 1st January 2013 by Melanie Perkins, Cliff Obrecht and Cameron Adams and in its first year, Canva had more than 750,000 users. In December 2019, Canva announced *Canva for Education*, a free product for schools and other educational institutions intended to facilitate collaboration between students and teachers.

On December 7, 2022, Canva launched Magic Write, which is the platform's AI-powered copywriting assistant. On March 22, 2023, Canva announced its new Assistant tool, which makes recommendations on graphics and styles that match the user's existing design. On January 11, 2024, Canva launched its own GPT in OpenAI's GPT Store.



With new versions and updates available, Canva/ Adobe Express keep adding/changing different features quite rapidly. Although the look and features available at the time of print of this book, may be different, please bear in mind that the basic functionality will be the same.

Advantages of Canva

Easy to Use: One of the main benefits of Canva is that it is very user-friendly. The platform provides a range of templates, graphics, and design elements that can be easily customized by users with little to no design experience.

Cost-Effective: Canva is a cost-effective solution for designing, as it provides a range of free templates and design elements that can be used to create high-quality materials. While some premium templates and elements do require payment, the cost is typically much lower than hiring a graphic designer or purchasing expensive design software.

Versatile: Canva is a versatile tool that can be used to create a wide range of materials, including posters, flyers, social media graphics, and presentations. This makes it a useful tool to use for a variety of purposes, from promoting events to creating instructional material.

Collaboration: Canva allows multiple users to collaborate on a single design, which is useful for any organization that needs to create materials as a team. This feature allows team members to work together on a single design, making the process more efficient and collaborative.

Work is Automatically Saved Online: Whenever you work in Canva your work gets saved and any changes made are also saved automatically, this way you can access your work anywhere you log in to your account.

Tips for Using Canva Effectively

Choose the Right Template: Canva provides a wide range of templates for different types of designs. It's important to choose a template that is appropriate for the purpose of the design, as this will make the design process easier and more efficient.

Customize Design Elements: While Canva provides a range of design elements, it's important to customize these elements to make the design unique and appropriate for your needs. Customizing fonts, colours, and images can help to create a more personalized and professional-looking design.

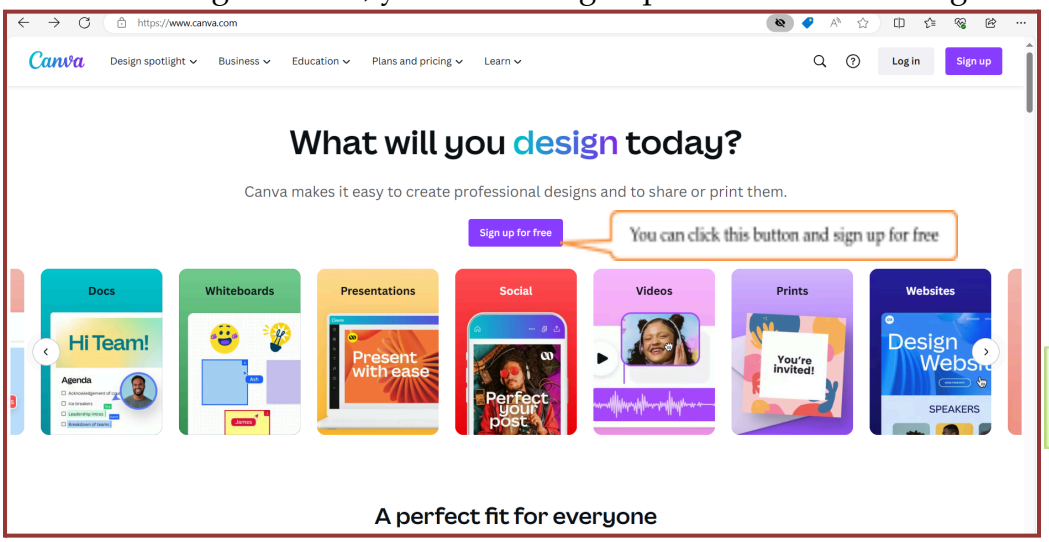
Keep it Simple: When designing it is important to keep the design simple and easy to read. Avoid using too many colours or fonts, as this can make the design look cluttered and confusing.

Use High-Quality Images: Using high-quality images is important for creating professional-looking designs. Canva provides a range of stock images that can be used for free or purchased, but it's important to choose images that are appropriate and of high quality.

3.3 How to Start Working in Canva

Canva does not require any installations on your PC, you can simply access it from **www.canva.com** and use it in your browser. After creating a design, it can be downloaded as the appropriate file type or immediately shared or printed.

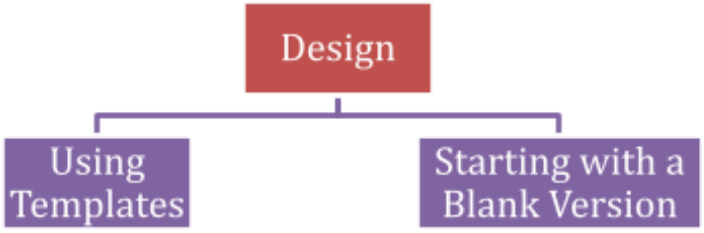
To start working in Canva, you need to sign up for free and then Log in.



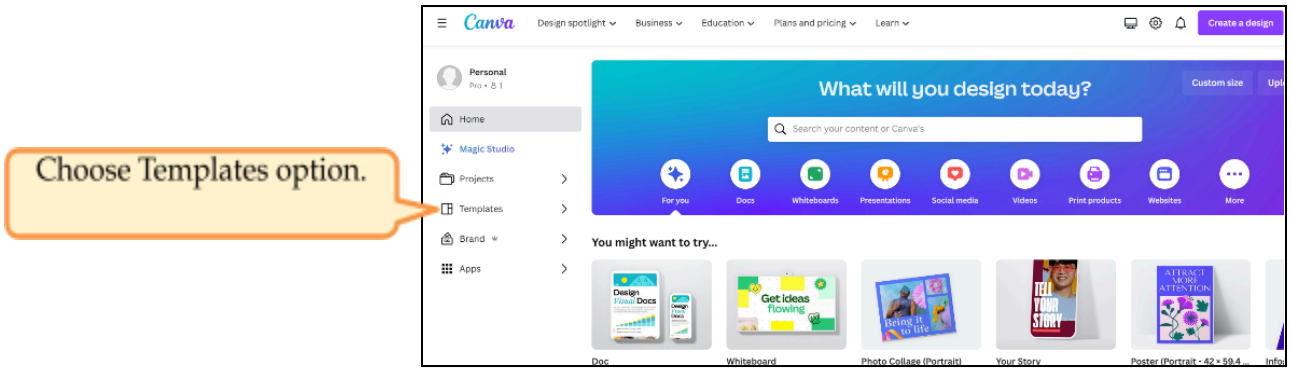
Scan the QR code to watch how to start

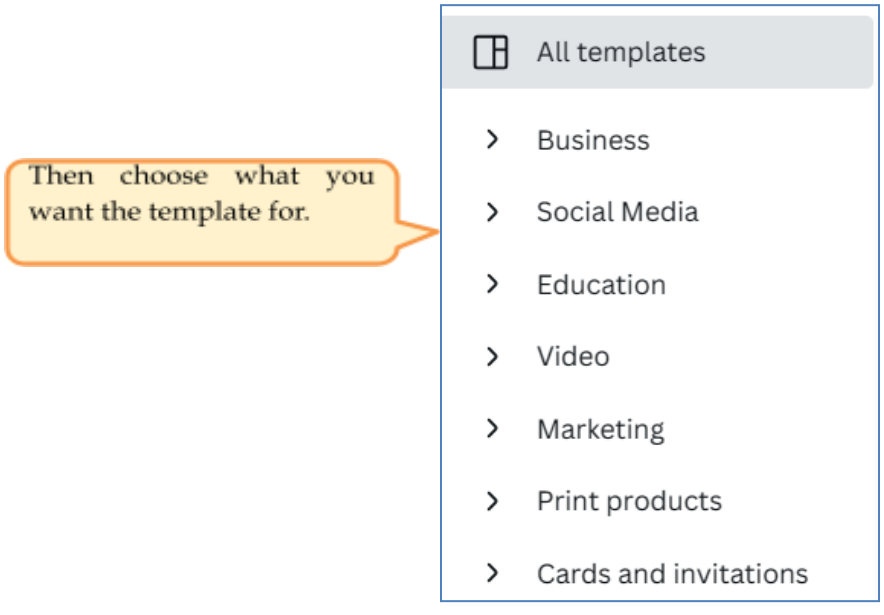
After giving your email ID while signing up, check your inbox for an email from Canva. Using the code or invitation in the email you can log in and launch Canva in your web browser. (https://www.canva.com/).

You may need the code from your email ID each time you log in.
Once logged in, you can start graphic designing in two ways:

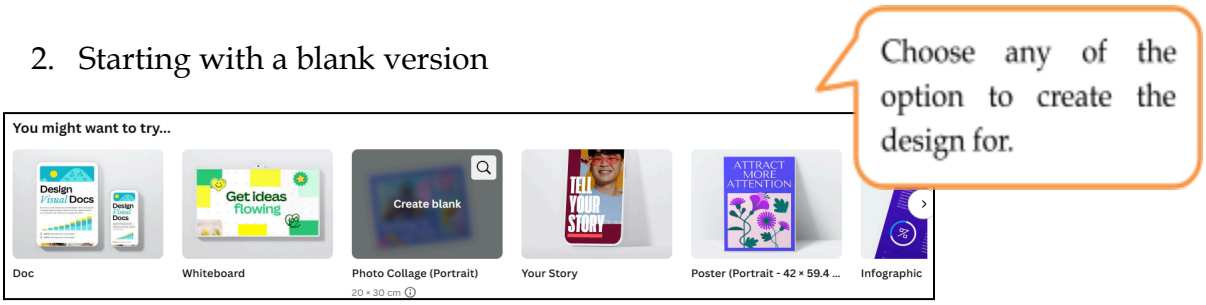


1. Using Templates



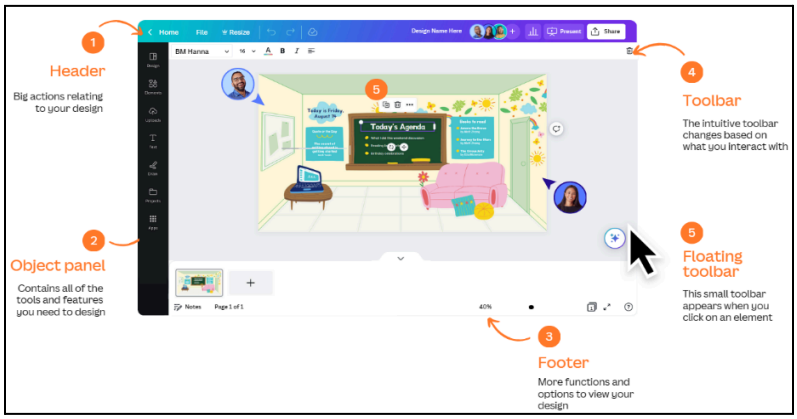


2. Starting with a blank version



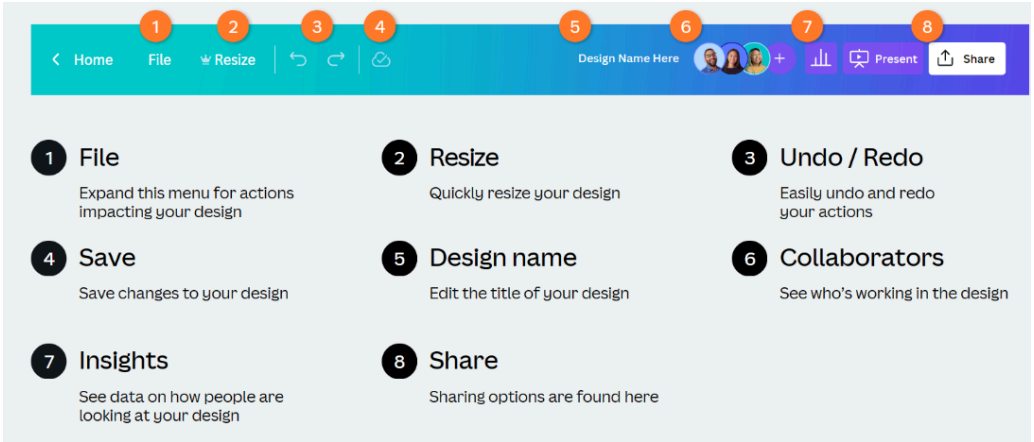
3.4 **The Canva Editor**

The main parts of the Canva editor window are given below:



Let us see each part of the Canva Editor Window:

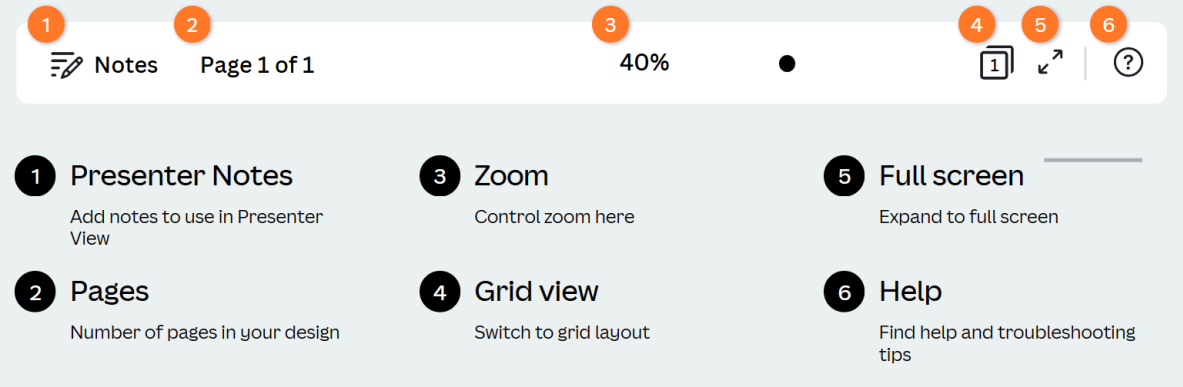
1. **Header:** The header has 8 main parts:



2. **Canva Object Panel:** This is the most used part of the Canva Editor, where all the backgrounds, audio, video and picture files available can be used or you can upload your own.

- **Design:** This provides ready-made templates, layouts and styles for your design.
- **Elements**: Select photos, frames, shapes, lines, backgrounds etc. to add to your design.
- **Uploads** : This allows you to upload your own elements such as images, videos, audios and graphics and save them in Canva. You can access them whenever you log into Canva.
- **Text**: When you select this option the text placeholder is available to add text. It also gives options to add a heading, a sub heading or body text. There are also font combinations available.
- **Draw:** You can use the tools for freehand drawing, underlines, highlighting and erasing.
- **Projects**: All of your designs, images, files, favorites, purchases, items shared with you, and folders are available here.
- **Apps**: This is a library of interesting and useful apps to help create outstanding designs. Some of these apps use AI for excellent results.

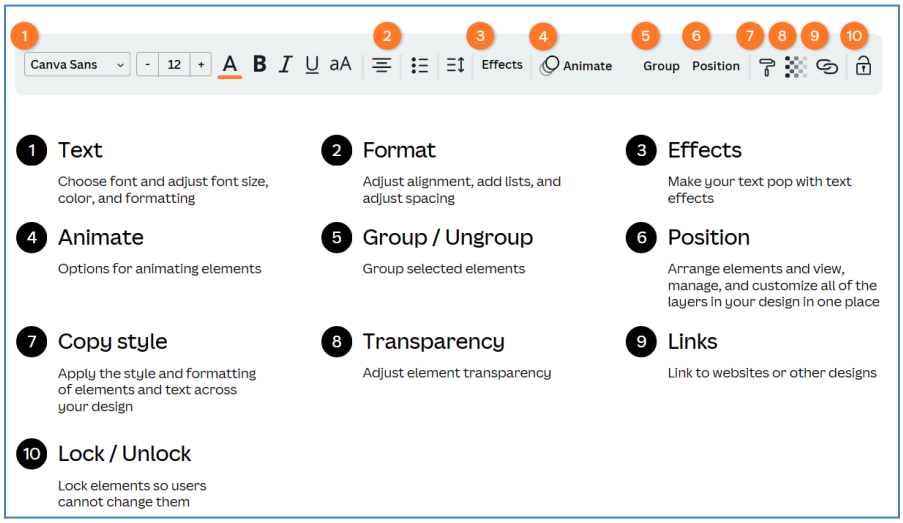
3. **Footer :** This part has the following 6 functions



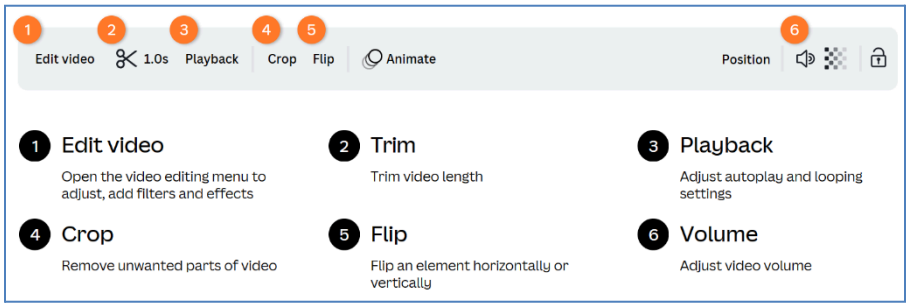
4. Toolbar: The toolbar gives us a variety of options to help with formatting any graphic design. The options on the toolbar will change according to the object you choose in your design.

Let us see some of these toolbars.

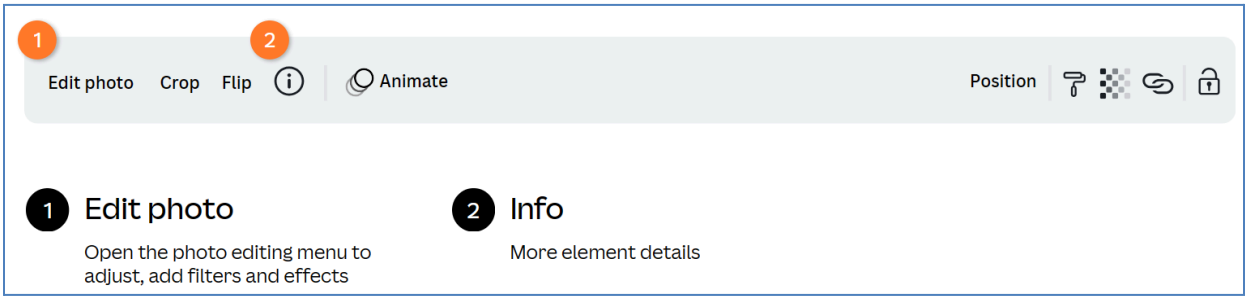
i) Text Toolbar: This toolbar comes up automatically when you choose text in the design.



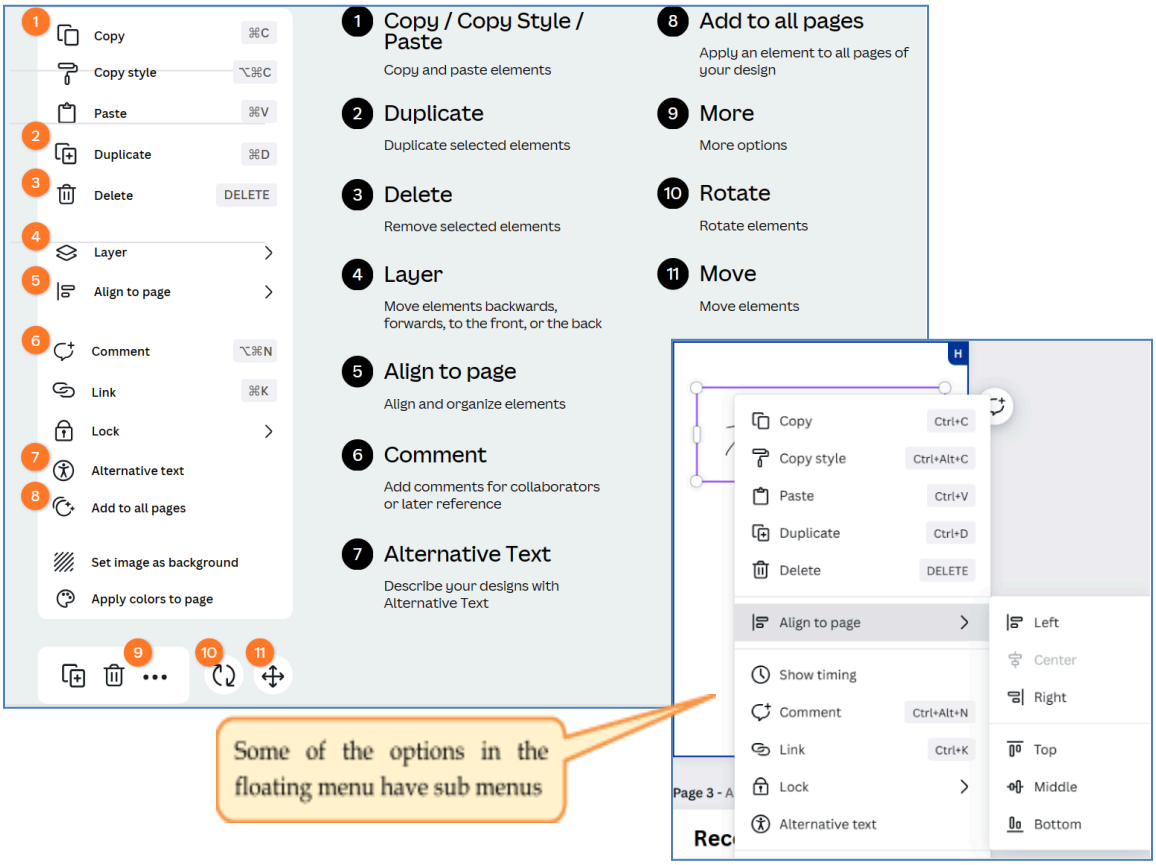
ii) Video Toolbar: This toolbar becomes visible whenever you choose video in the design.



iii) Photo Editor Toolbar: We can crop, rotate, animate and make a photo/picture transparent using this toolbar.

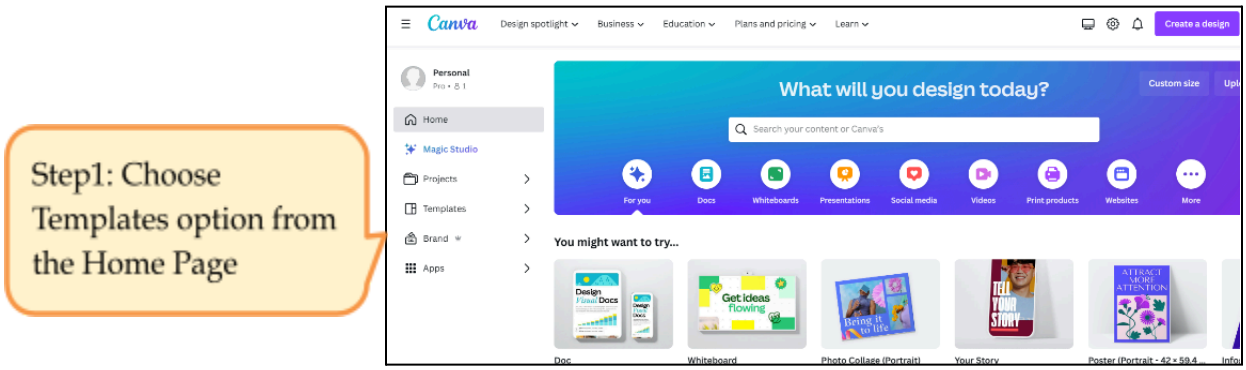


4. **Floating Toolbar:** This toolbar appears like a menu wherever we right click the mouse button on the page. The options available on this menu apply to any element of the design such as text, picture, video etc.

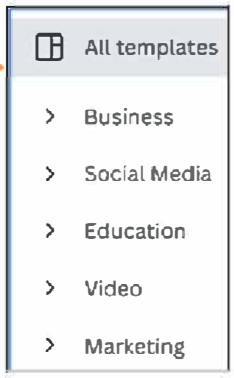


3.5 Creating a Poster using a Template

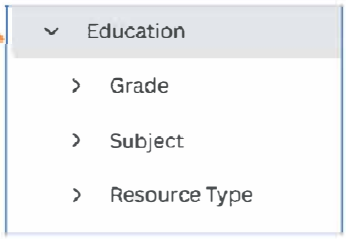
For creating a design using a Template, we have to click the Template option on the Home screen. We will look at the steps for creating a Poster, but the steps can be applied to any other design.



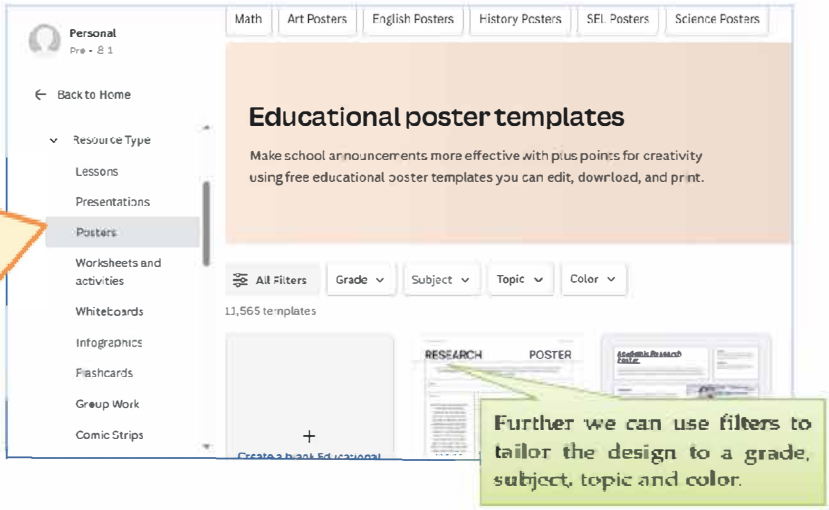
Step 2: Choose the category that you want the template for.



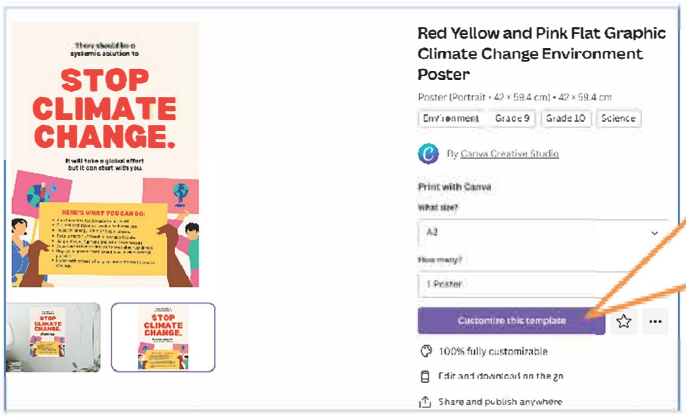
Step 3: Once we choose a category, pick the sub category, for example, you can pick the grade, subject or resource type in Education templates.



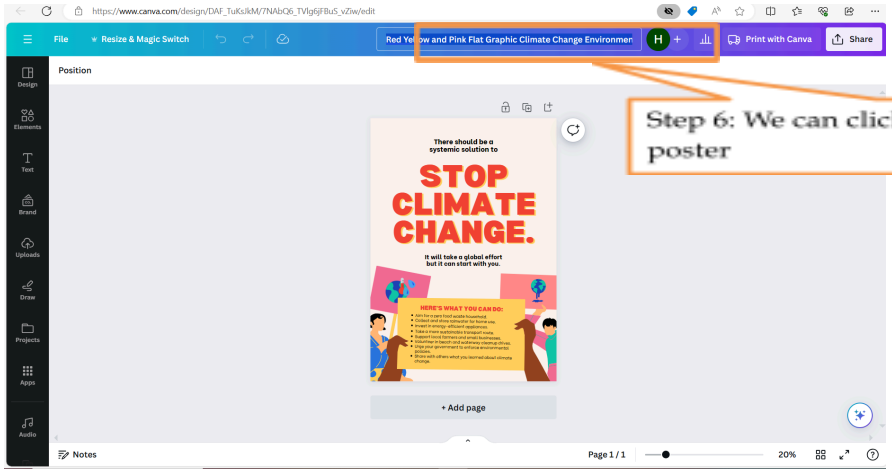
Step 4: After picking the sub-category, it is important to specify your requirement in it (in this case it is Poster).



Further we can use filters to tailor the design to a grade, subject, topic and color.



Step 5: We can specify the size of the design. Then we can customize it by clicking "Customize this template" button.



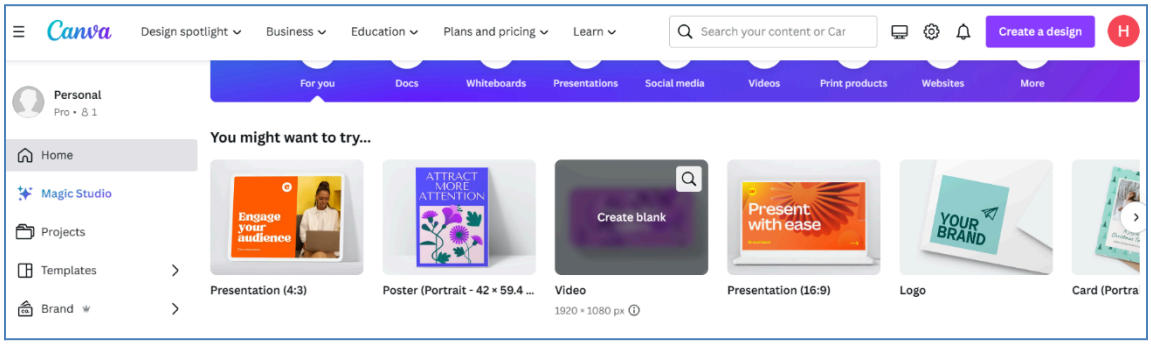
Step 7: Once you have a template according to your specific requirements, it is important to customize the elements to make the design unique and appropriate for your needs. Customizing fonts, colours, and images can help to create a more personalized and professional-looking design.

The design will be automatically saved in the projects folder and Canva saves your changes, much like Google Docs and Slides.

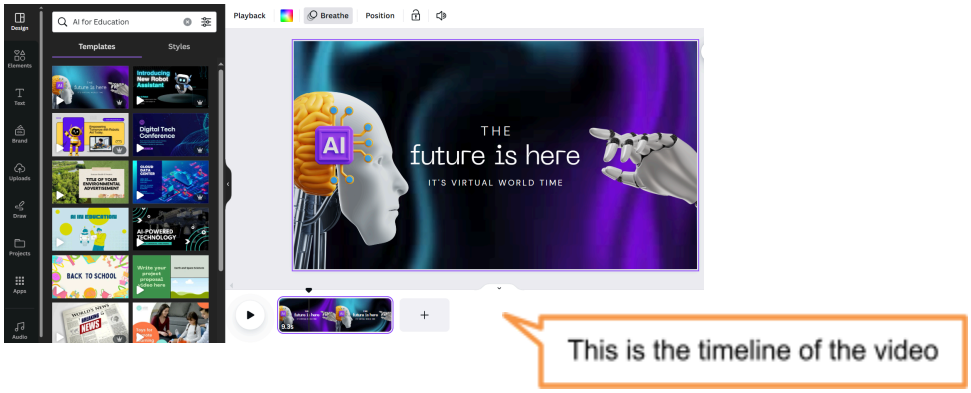
3.6 Creating and Editing a Video in Canva

For creating and editing a video in Canva, we can follow the steps (you are free to explore other ways of doing this):

Step 1: Start with a blank video

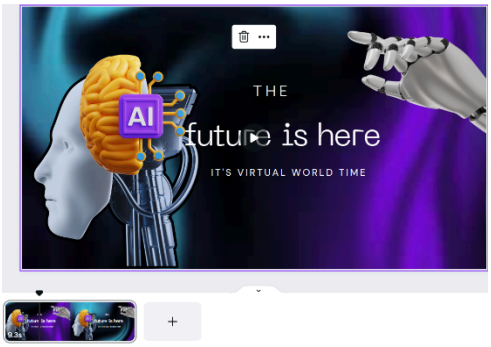


Step 2: Select a Template for your video by typing the topic in the search box, for example we search "AI for Education". Or upload a video file in Uploads and place it on the timeline.



Step 3: Make changes to the video to customize it according to your requirement, by doing any of the following:

- Adding a video, audio or image from the Uploads or Elements.
- Resizing, flipping or rotating text or pictures
- Adding text to the video
- Animating the pictures and videos.
- Using transitions
- Splitting or trimming the video

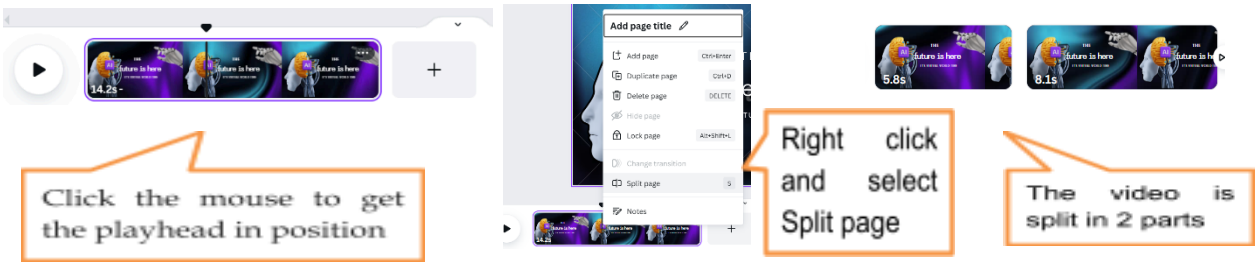


3.7 Splitting, Cutting, Trimming and Adding Transitions in a Video

Splitting: Making two clips from one video clip by using Split Page(a video clip is called a Page here)
Trimming: Removing parts of the video clip from either the beginning or the end.

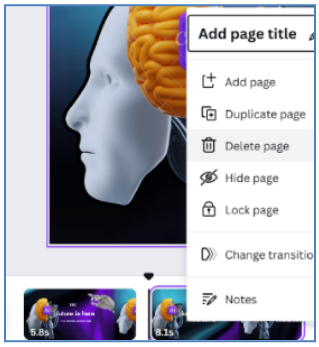
Splitting a video:

- Drag and drop your video onto the timeline.
- Place the mouse pointer over to the point in the timeline where you want to split the video and click to get the playhead in position
- Right-click and select Split page or press S on your keyboard.



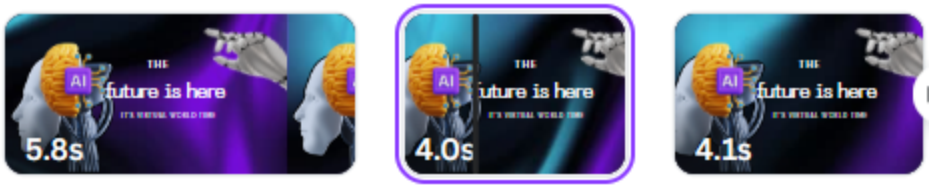
Cutting or removing part of a video:

- After splitting a video, we can select one of the parts and press delete key to delete that part of the video.

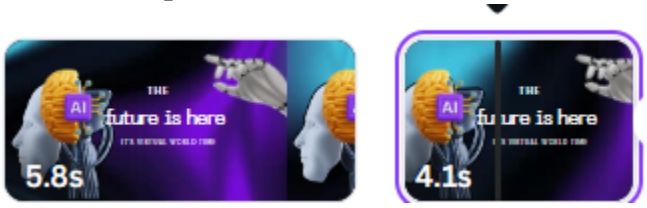


- To split a very short or specific part you can also split the video twice and remove a part of the video, for example:

In the following we have split the video twice, now after selecting the middle video we click delete key on the keyboard to remove the middle part.

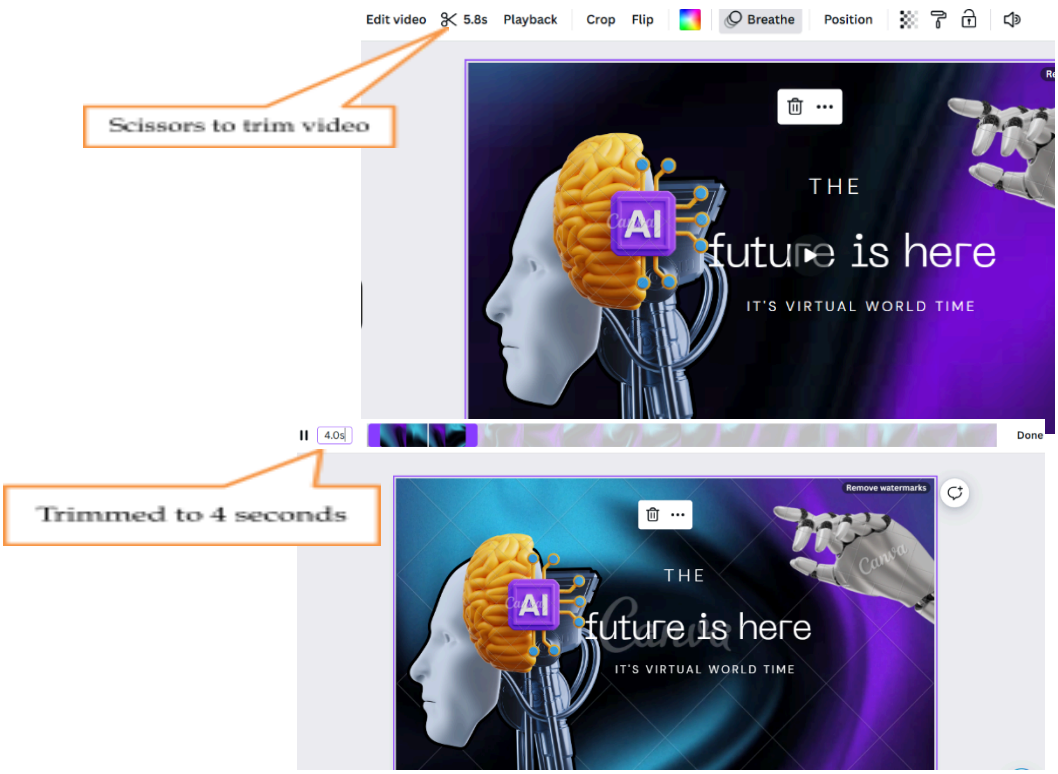


The middle part of the video is deleted



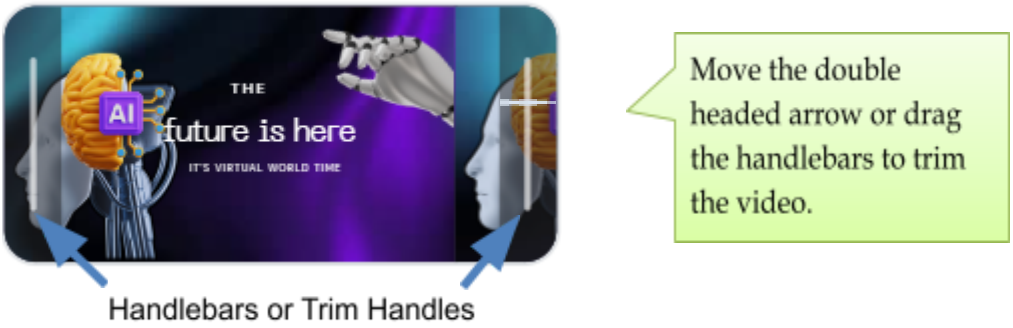
Trimming a video:

- On the timeline, click on the video you want to trim.
- On the toolbar above the editor, click the ✂ icon. You'll see highlighted and greyed out parts of your video above the editor.
- Drag any of the **sliders** on the ends of the highlighted part of the video to shorten or lengthen it.
- Click on **Done** to save.



Or

- Click the video on the timeline move the mouse over it until a double-headed arrow appears over the handlebars(also called trim handles)
- Drag the handlebars until you reach the desired video length or scene.



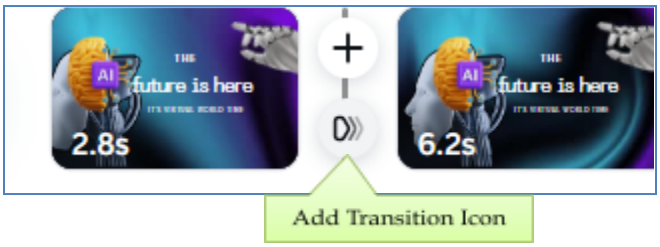
Difference between splitting, cutting and trimming a video

Split	When you split a video, you divide a video into two parts each time.
Cut/Remove	When you cut a video, you remove a part of a video or footage.
Trim	When you trim a video, you remove just the start or end of a video or footage. The trimmed video is hidden and not deleted.

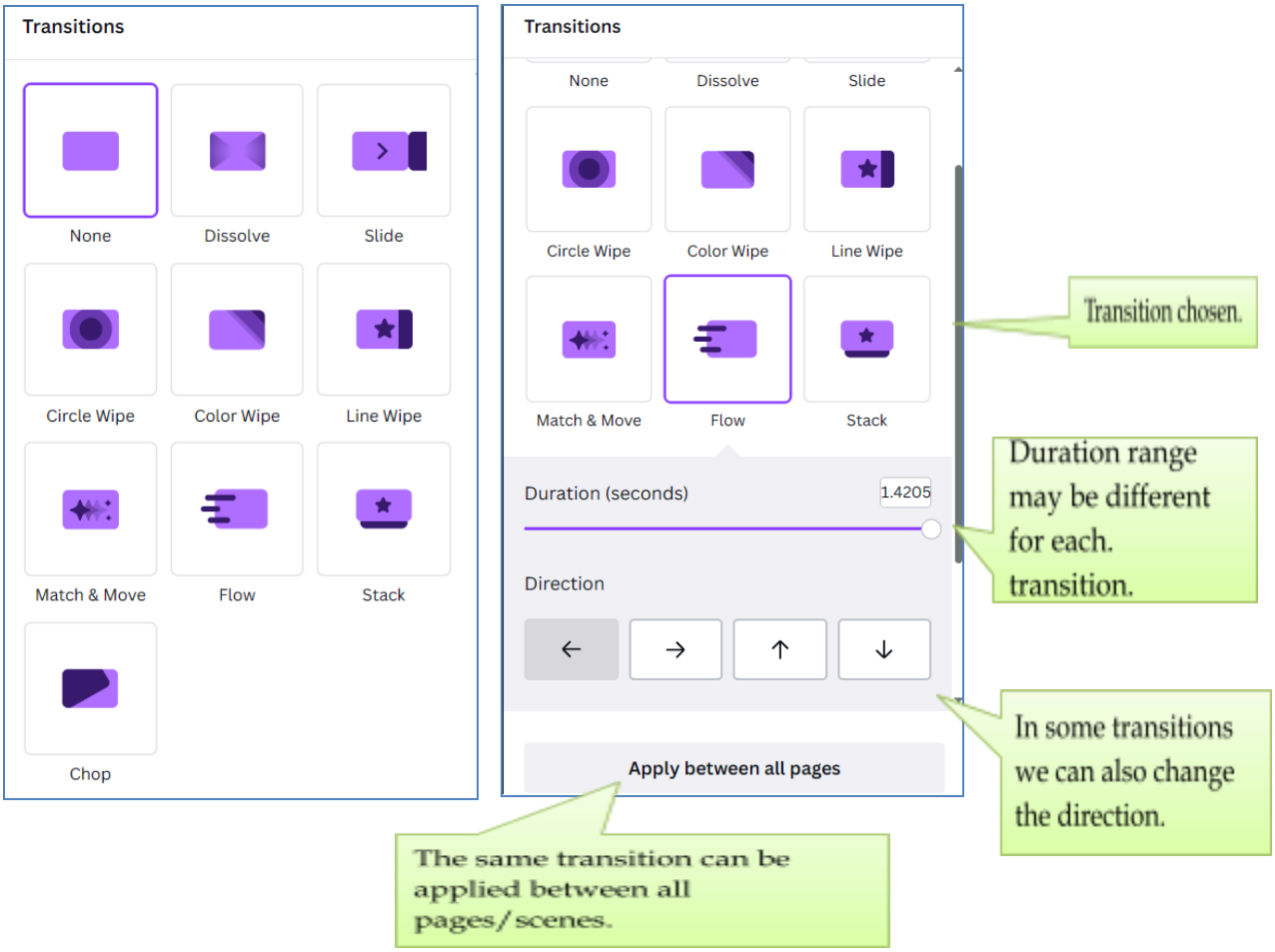
Adding transitions in a video

You can apply transitions to smoothen the flow of a video and to add a transition follow the steps:

- Click the plus icon between the spliced sections and select **Add Transition icon**.



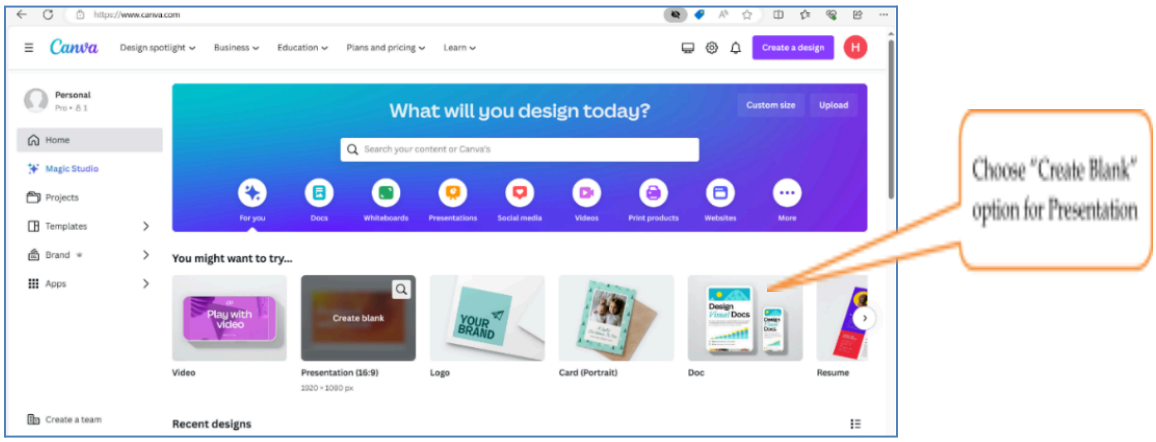
- On a side panel you get several transition options to choose from.
- Once you select a transition, you get further options like duration, direction and Apply between all pages(here pages is each video clip) to choose from.



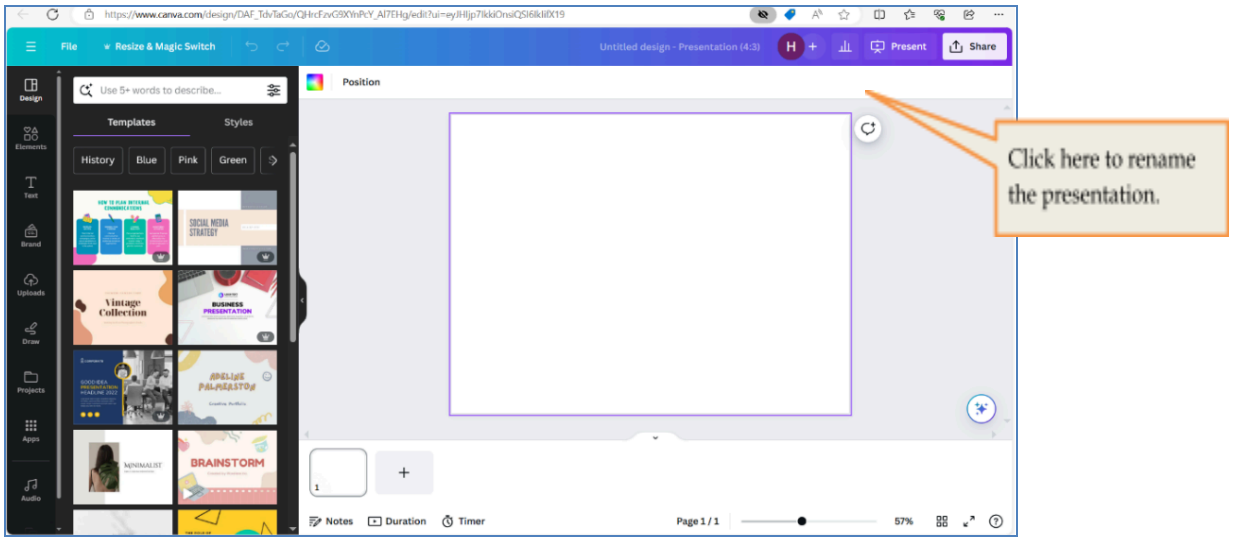
3.8 Creating a Presentation from a Blank Version

For creating an original design without using a template, we have to click the Blank option on the Home screen. We will look at the steps for creating a Presentation, but the steps can be applied to any other design.

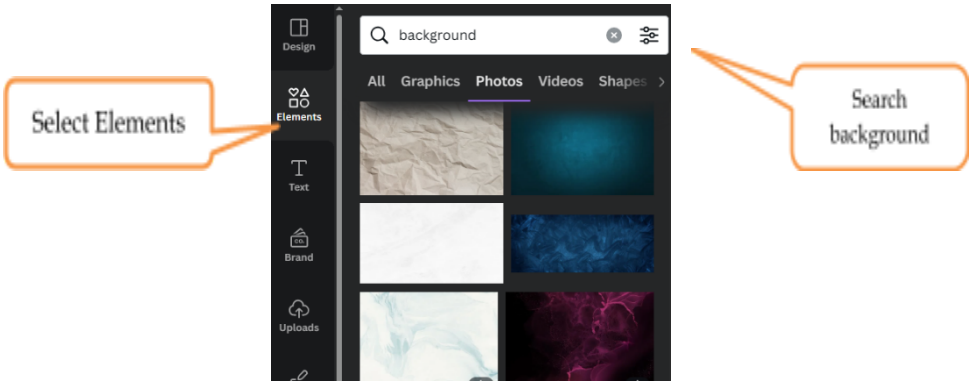
Step 1: Choose the design option from the home screen. Some of the available options are Video, Presentation, Logo, Card, Resume, Flyers, Poster etc. In this case we will create a presentation by choosing "Create Blank" .



Step 2: By default, the name of the presentation is "Untitled Design", we can change it by clicking and writing a new name.



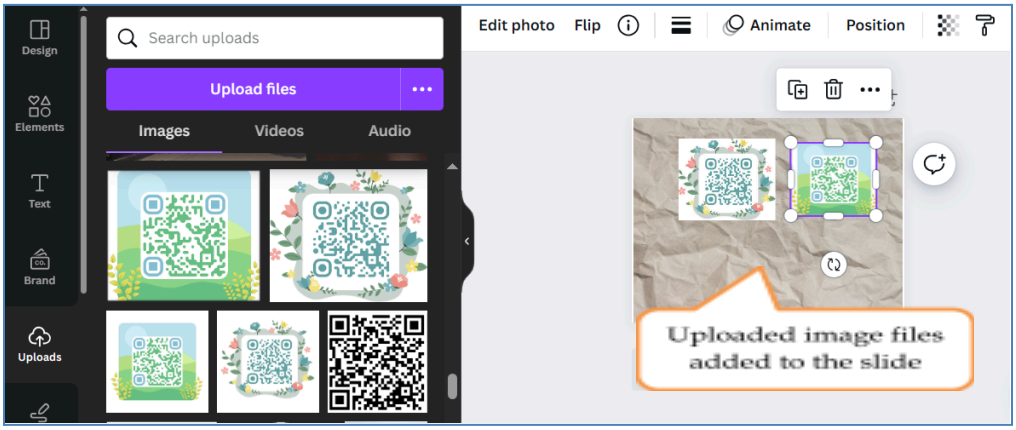
Step 3: We can add a background, photos or graphics or videos to the slide by clicking on Elements in the Object panel and type background in the search box. You can choose photos or videos as background.



Elements in the Object panel can be used to add the following in your presentation:

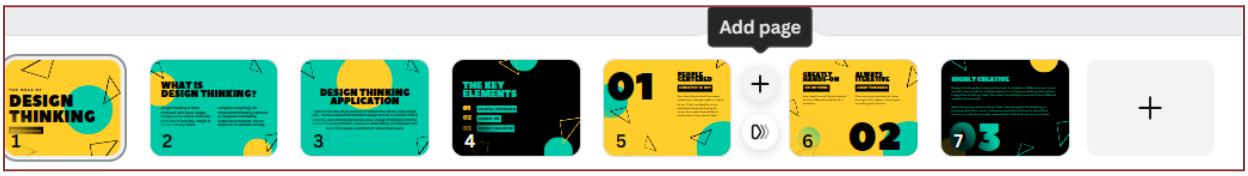
- Shapes
- Graphics
- Tables
- Photos
- Videos
- Audio
- Charts
- Frames

Step 4: Uploads in the Object panel can be used to upload image, video and audio files. These can then be selected and inserted in the presentation.



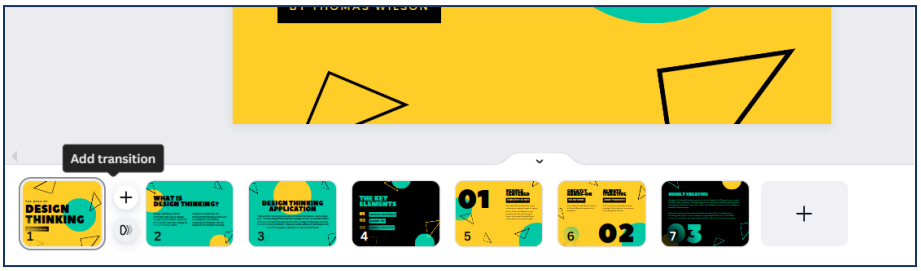
Adding a new slide

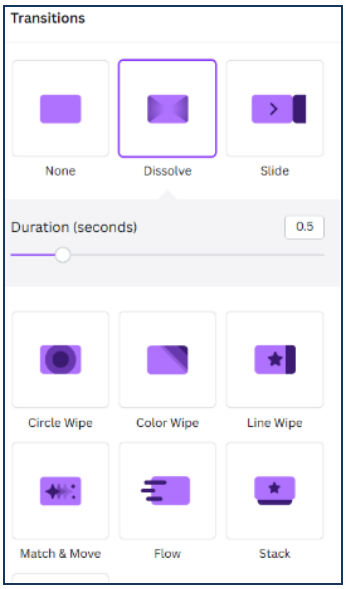
A new page can be added between two slides by clicking on the + sign or at the end.

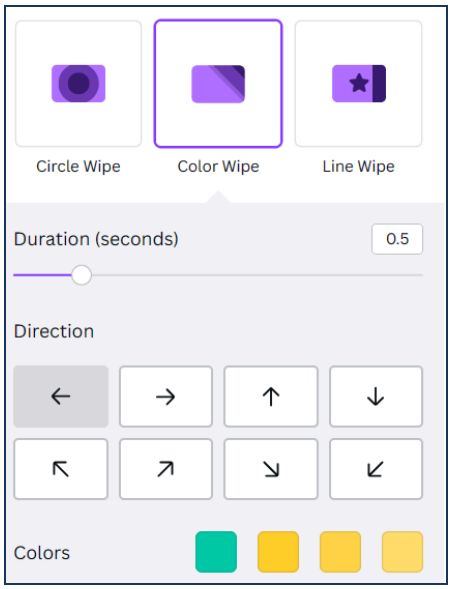


Adding Transitions

- Click **Add transition** icon
- To apply a transition, click on it from the options that appear on the side. Depending on which one you choose, more transition options will appear on the side panel.
- Use the **Duration (seconds)** slider to adjust the transition duration, or use the number box.
- Select the direction of your transition. These options depend on the transition style you select.



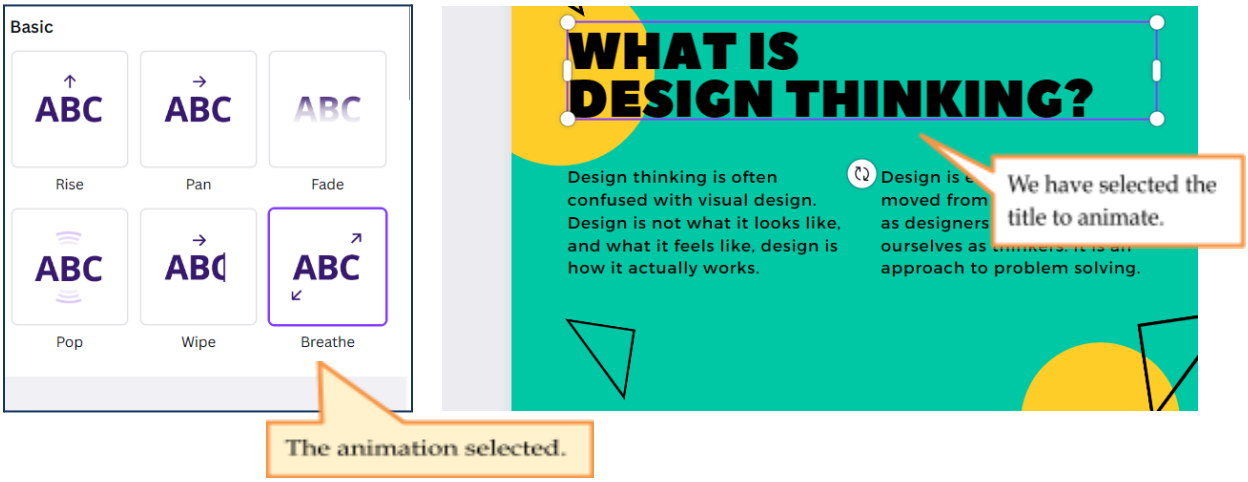




Applying Animations

- Click to select the page or element that you want to animate.
- On the toolbar above the editor, click on **Animate**. Animation options will show on the side panel.
- To apply an animation to your selected page, choose from the **Page Animations** tab.
- To apply an animation to your selected element, choose from the **Element Animations**, **Photo Animations**, or **Text Animations** tab. The available tabs will depend on your selected element.
- Choose between the different styles of animations and motion effects.

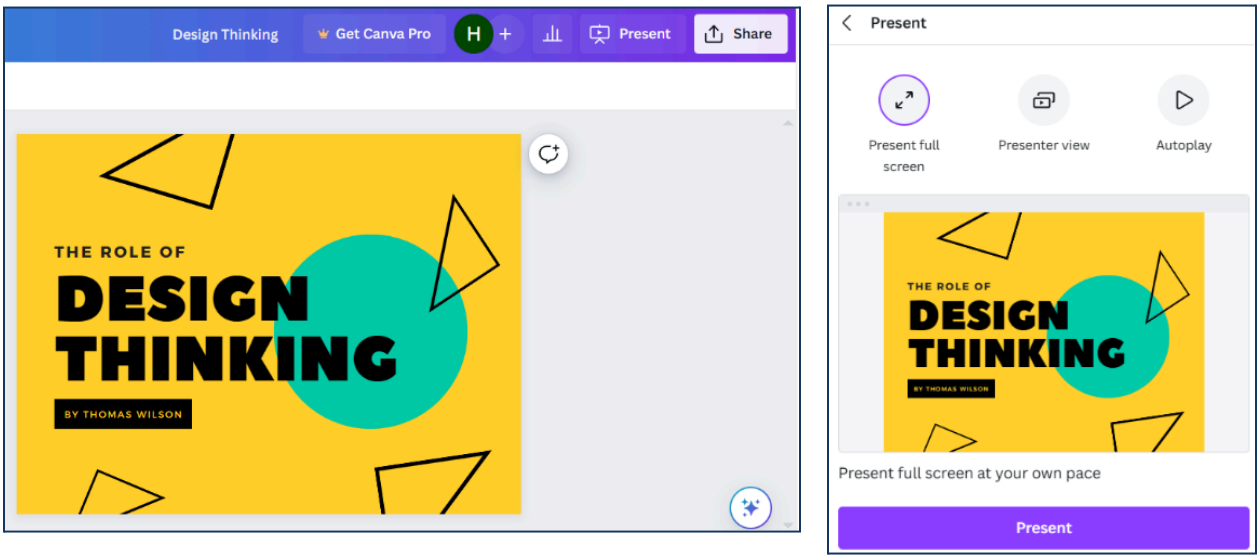
- To preview an animation, hover your mouse cursor on it.
- To apply an animation, click on it.



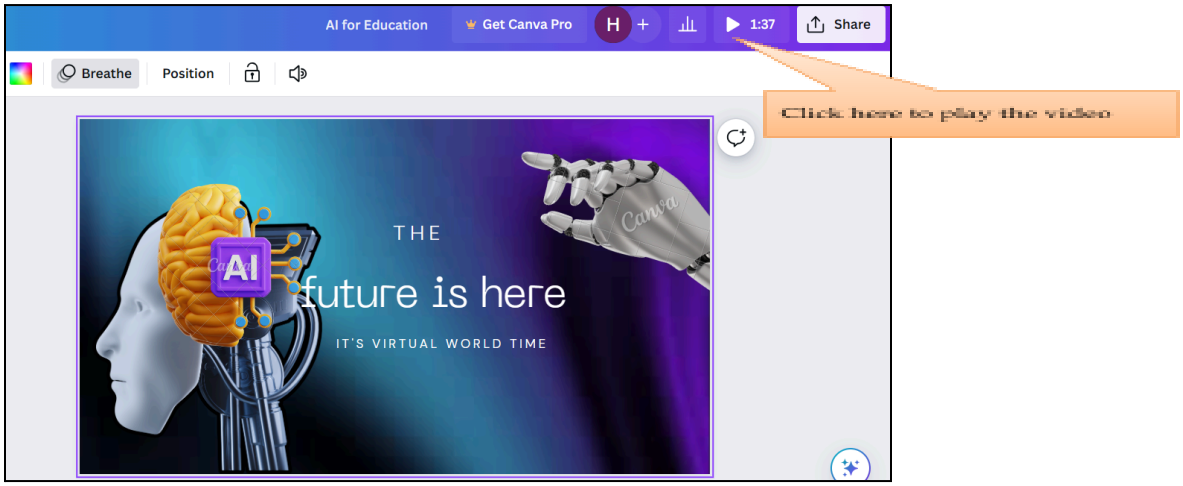
3.10 Ways to Present, Share and Download a Design

Presenting a Design

Depending on what the design is we can present it in the following ways:
A presentation can be presented in Full Screen, Presenter View or Autoplay.

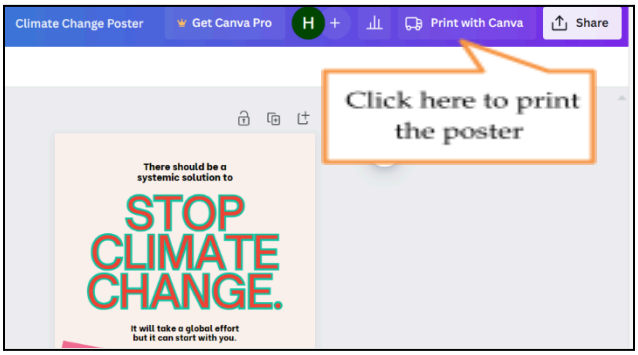


A video can be played in full screen mode



The poster can be printed

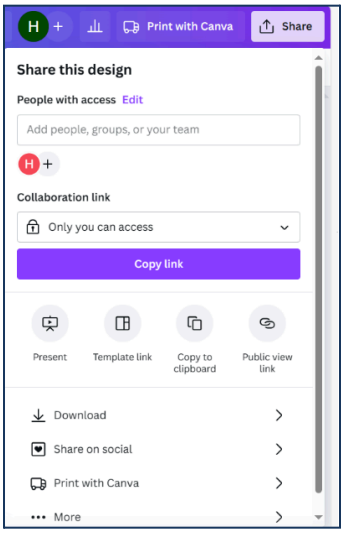
Once you select Print with Canva, you will get several options for size of the poster and number of copies. It will then ask for a payment for delivery of the hard copy of posters to your address.
Alternatively you can download and print the posters yourself.



Sharing a design in Canva

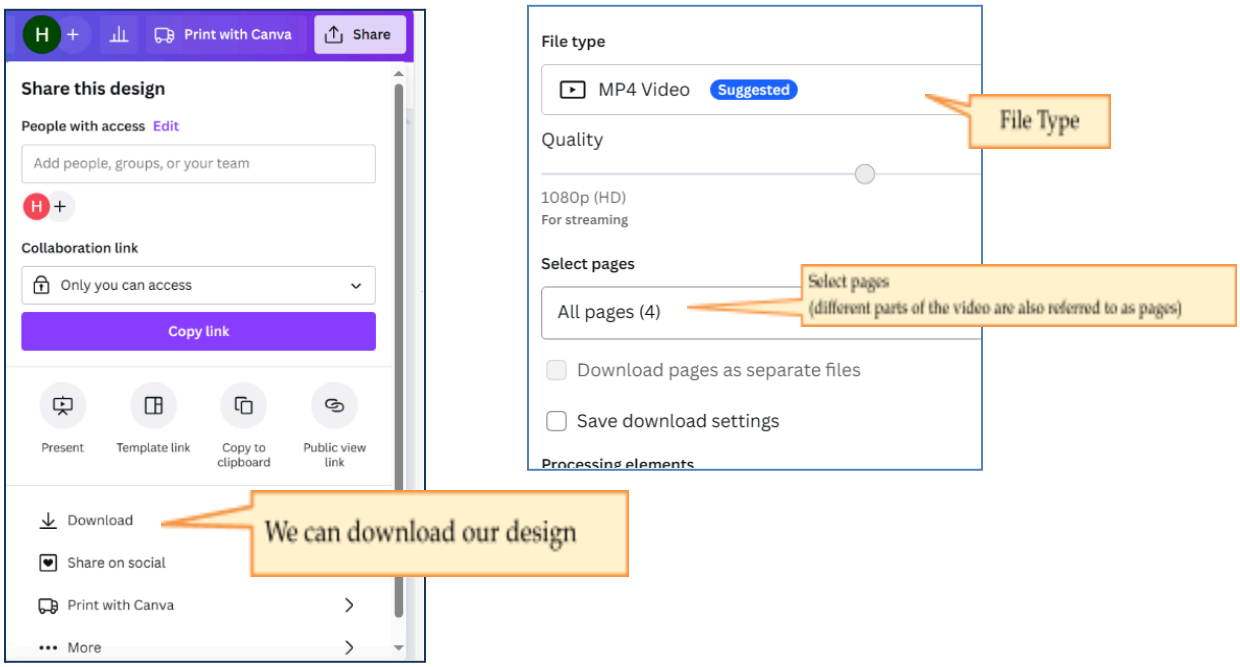
One of the best features of Canva is the Share feature where we can share our design by clicking the Share button.

- Open the design.
- Click Share from the menu bar above the editor.
- By giving the emails in People with access we can add other people to view, comment and edit our design.
- We can also provide a collaboration link for others to present or view our design.
- We can share the design on a social media site by choosing Share on social.



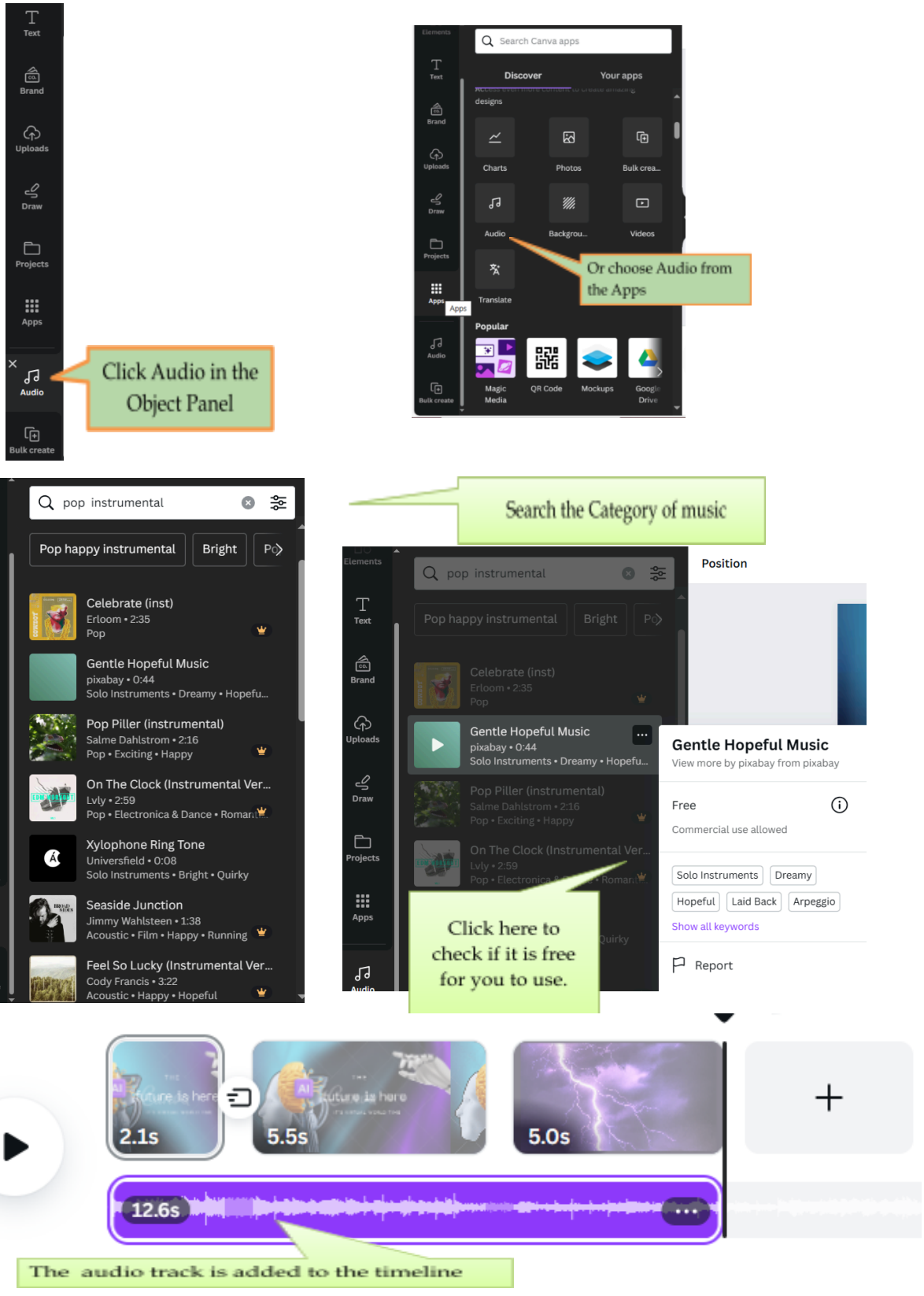
Downloading a design in Canva:

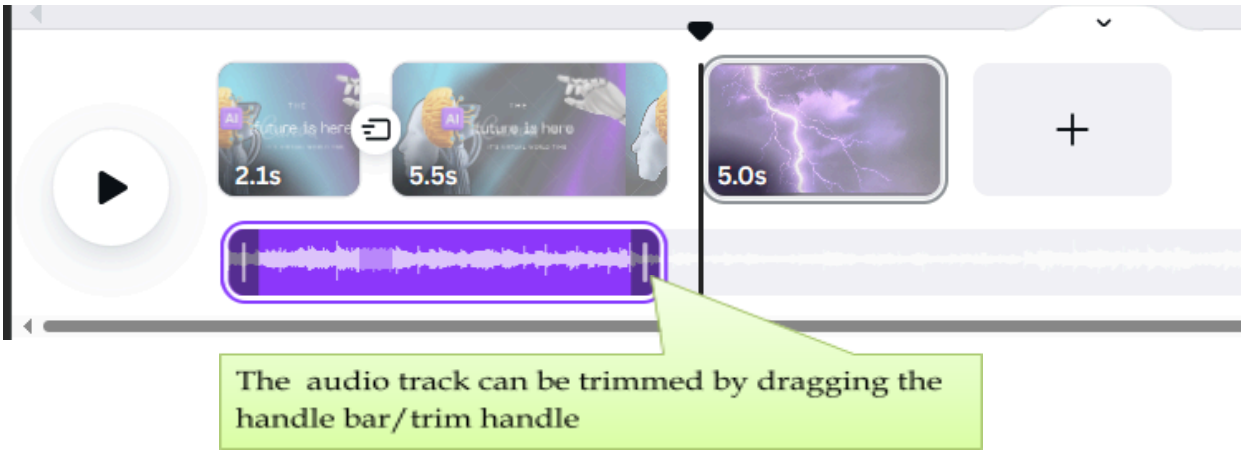
1. On the editor menu bar, click Share
2. Click **Download.**
3. On the dropdown, choose a file type for your download.
4. If your design has multiple pages, select the pages you want to download from the dropdown, and click **Done**.
5. Click **Download** again and save it to a folder on your device.

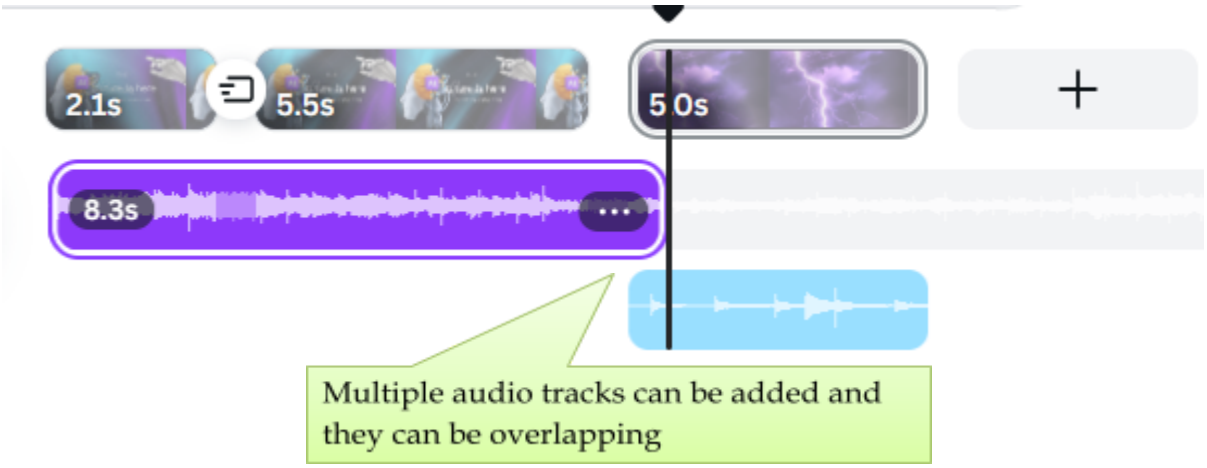


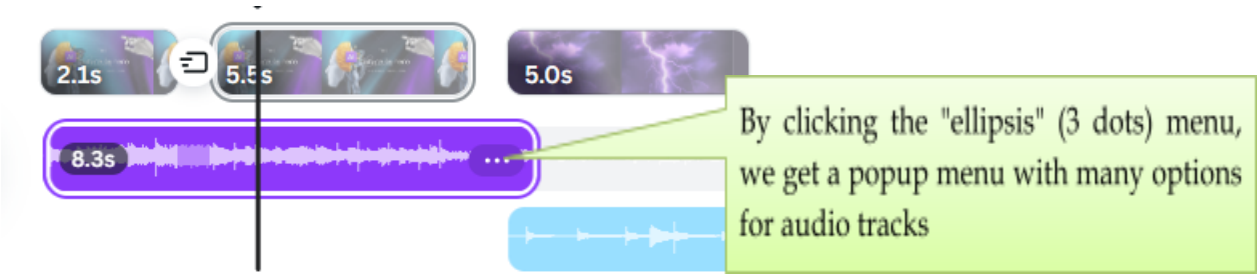
3.11 Adding audio to Videos and Presentations

- From the object panel, click the **Audio** tab If it's not there, click **Apps** to see it. You can also upload and use your own files. You can add and layer up to 50 audio tracks to your design.
- Scroll through the categories or use the **search bar**. Click **See all** next to each to browse all the options.
- Click on a track to add it to your design. It will get placed where your play head is on the timeline at the bottom of the editor.


Text
Brand
Uploads
Draw
Projects
Apps
Audio
Bulk create
Click Audio in the Object Panel
Search Canva apps
Discover
Your apps
designs
Charts
Photos
Bulk crea...
Audio
Backgrou...
Videos
Translate
Popular
Magic Media
QR Code
Mockups
Google Drive
Or choose Audio from the Apps
pop instrumental
Pop happy instrumental
Bright
Celebrate (inst)
Erloom • 2:35
Pop
Gentle Hopeful Music
pixabay • 0:44
Solo Instruments • Dreamy • Hopefu...
Pop Piller (instrumental)
Salme Dahlstrom • 2:16
Pop • Exciting • Happy
On The Clock (Instrumental Ver...
Lvly • 2:59
Xylophone Ring Tone
Universfield • 0:08
Solo Instruments • Bright • Quirky
Seaside Junction
Jimmy Wahlsteen • 1:38
Acoustic • Film • Happy • Running
Feel So Lucky (Instrumental Ver...
Cody Francis • 3:22
Acoustic • Happy • Hopeful
Search the Category of music
Position
Gentle Hopeful Music
View more by pixabay from pixabay
Free
Commercial use allowed
Solo Instruments
Dreamy
Hopeful
Laid Back
Arpeggio
Show all keywords
Report
Click here to check if it is free for you to use.
2.1s
5.5s
5.0s
12.6s
The audio track is added to the timeline



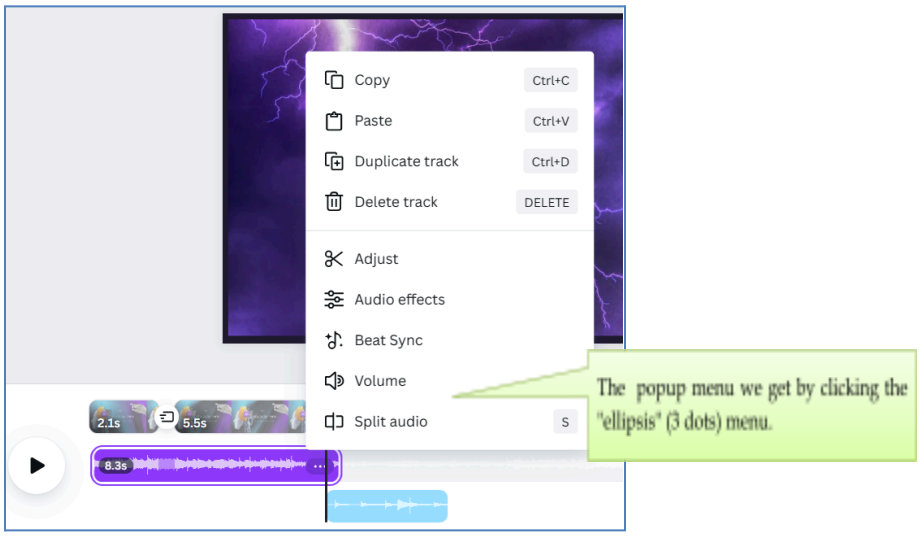




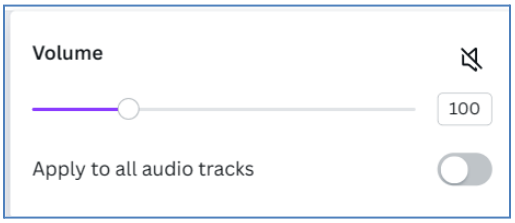
On the timeline when the playhead is in the audio track we can click the "ellipsis" menu to get many options for audio tracks:

- We can copy and paste audio tracks
- Duplicate tracks (includes length of track and volume settings)
- Delete the track
- Adjust the music to suit the video.

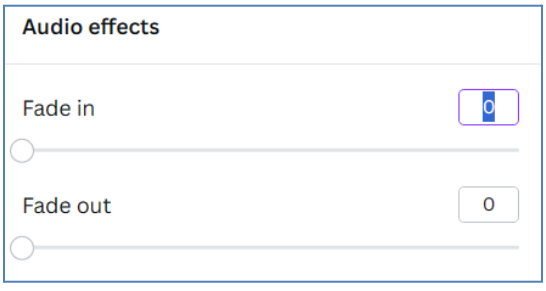
- Audio effects to fade in and fade out the music.
- Beat Sync uses AI technology to find the beats in a song. It then converts the beats into snap points on the audio track that can sync pages and other elements to the music.
- Volume settings for one track or all tracks
- Split audio and drag it to another part of the video.



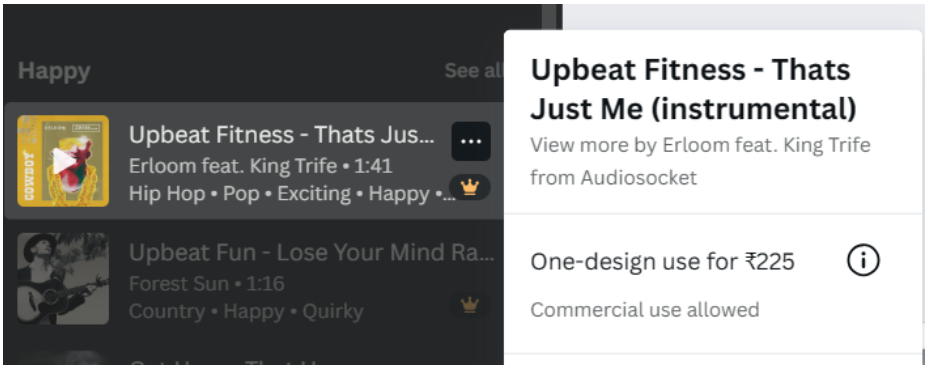
Adjusting the volume in a track or applying to all audio tracks.



Audio effects will help raise the volume up and down as per the requirement. The timings in seconds for the fade in and fade out audio effects can be fixed with sliders or mentioned in the box.

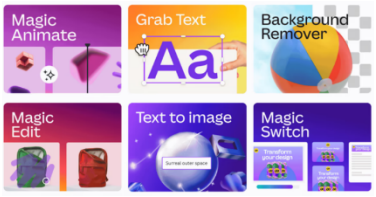


Premium audio tracks have a crown icon on the Audio tab in the editor and you can add a track to your design by purchasing it. If you are using the free version of Canva, each premium music purchase is for **one-time use**, which means you can only use the track in one design. If you want to use it again in another design, you need to purchase a new license.

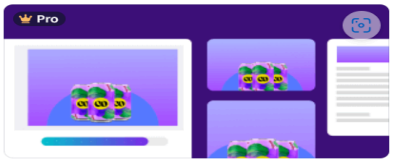


3.12 Canva and Artificial Intelligence(AI)

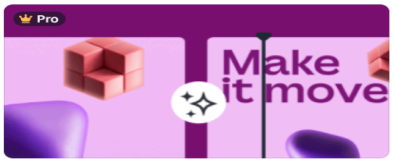
One of Canva's biggest advantages is that it is very easy to use and with the help of Artificial Intelligence or AI, Canva makes everything even easier and yet very creative. Canva's AI tools are conveniently grouped together within the software's "Magic Studio" section, which is prominently displayed in Canva's menu. Many of the tools—like Magic Switch and Magic Write—also show up in context as you interact with your design.



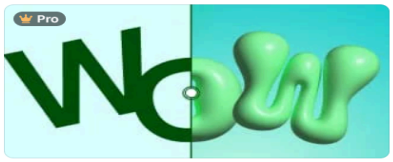
Users on Canva's free plan get access to some AI features, though there are usage caps. For example, free users may get a certain number of uses for Magic Write, while paid users get much more uses per month, similarly for most other features in Magic Studio. This is helpful because if you try Canva's AI features and find them helpful, you can upgrade to a paid plan.



Resize & Magic Switch
Effortlessly change the size and format of your designs



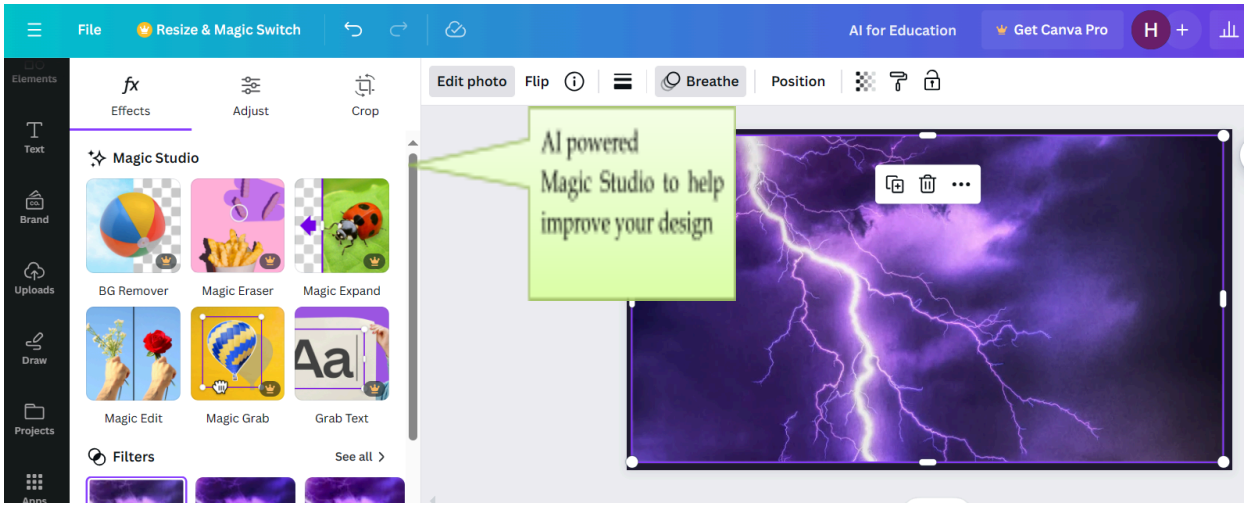
Magic Animate
Bring your designs to life with motion

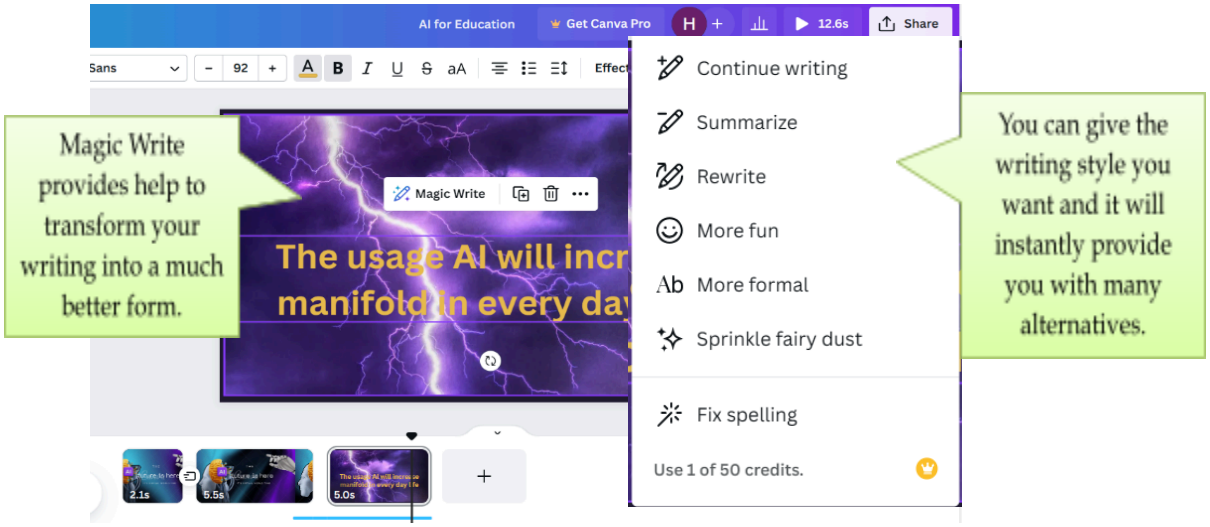


Magic Morph
Transform words and shapes with a simple written prompt

Some of Canva's new AI-powered tools include:

Magic Media	Used to turn text to video or images
Magic Eraser	Used to brush away unwanted details and distractions from your photos.
Magic Edit	Select a part of your image and add to, replace, or edit it with a short-written prompt. For example, select the dress in a picture and write formal suit to change the dress to a suit.
Magic Write	Helps you quickly reword sentences or paragraphs and summarize or expand your text.
Magic Design	You can provide a picture or a text prompt and this AI tool will transform it into a design which you can further customize.
Magic Animate	Automatically apply the perfect animations and transitions to your entire design.

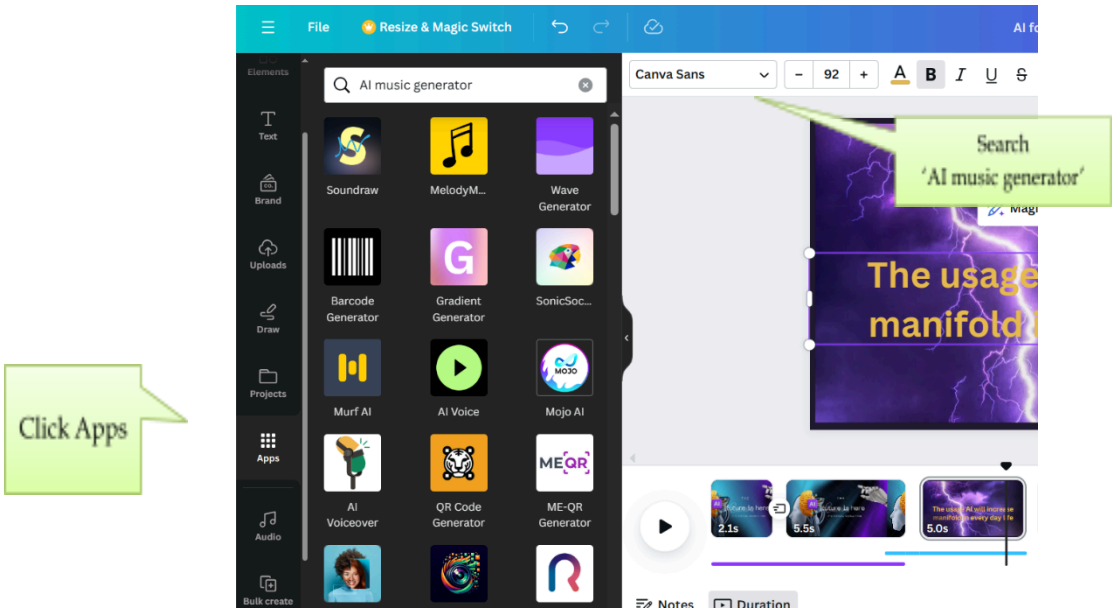


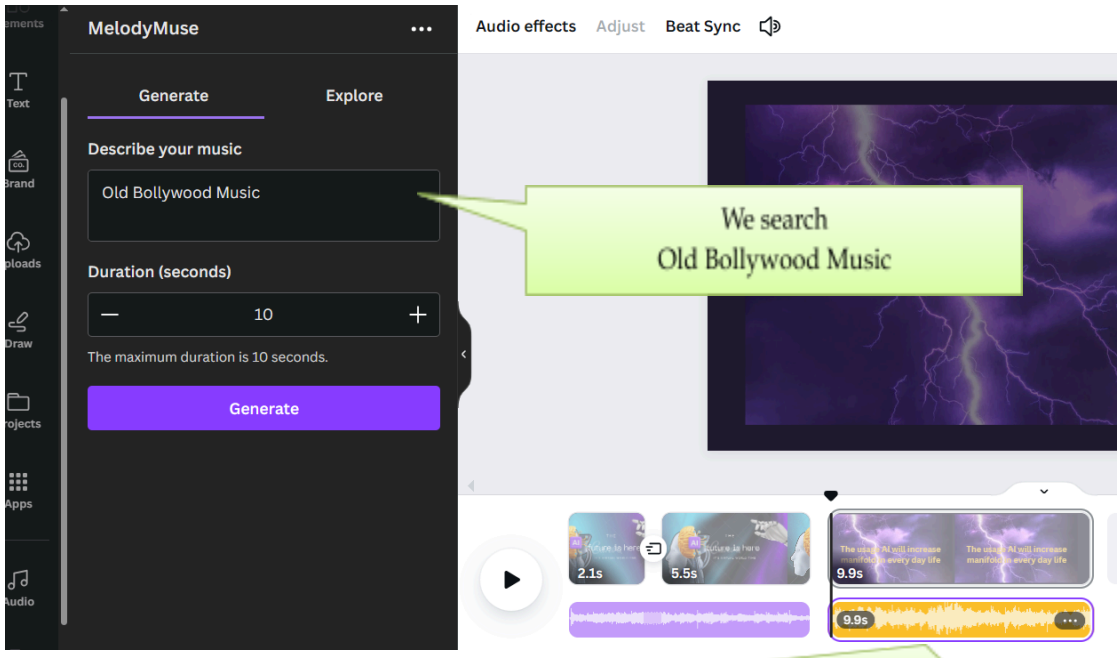


How to become a music composer using AI in Canva

Here's a fun activity for you to create original music using AI.

- Click Apps on the Object Panel
- Search AI music generator
- Choose any app
- Give a prompt for the music and set the time to 10 seconds.





3.13 Introduction to Adobe Express

Adobe Express, was earlier known as Adobe Spark and it is a content creation or graphic designing tool developed by Adobe Inc. It is an American software company with headquarters in San Jose, California.

Adobe Express was primarily designed for schools and nonprofits. As of September 2023, it allowed users to create branded content, such as flyers and logos, post social media content, and edit PDF documents with the help of artificial intelligence (AI) technology.

Advantages of using Adobe Express

- You can combine video clips, artwork, animations, and music to make videos with drag-and-drop ease.
- You can complete one-click tasks powered by Adobe Photo, design, video, and PDF tools.
- Generate extraordinary text effects and images instantly from just a description with Adobe Firefly generative AI.
- Create graphic designs faster with thousands of professionally designed templates, Adobe Stock photos, videos, music, and more.
- Collaborate and comment on files in real time with your team.

Adobe Express for Education

Adobe Express for Education including Adobe Express and Photoshop Express, is free for students and educators and is designed for educational content. Students and teachers can use Adobe Express to create photo essays, reports, student portfolios, newsletters, flyers, posters and more.

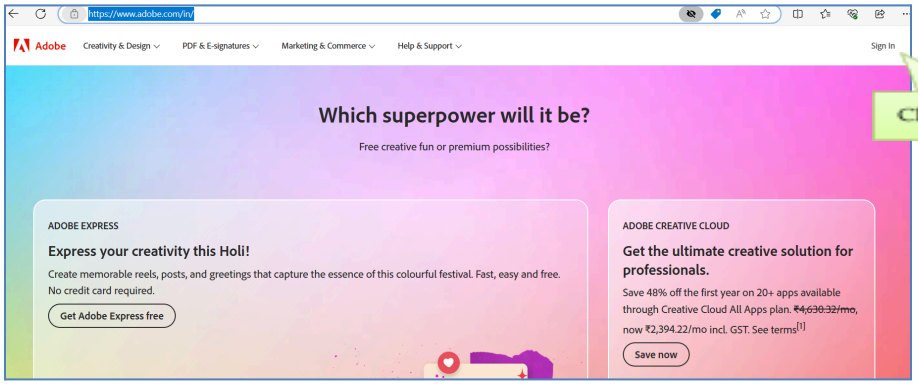
3.14 Getting Started in Adobe Express

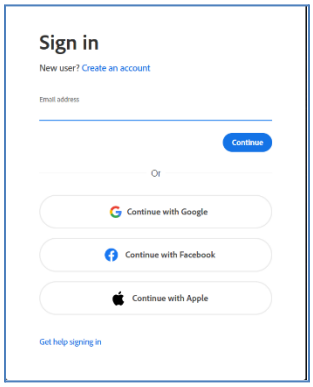
Adobe System Requirements

The minimum system and technical requirements for creating content using Adobe Express are:

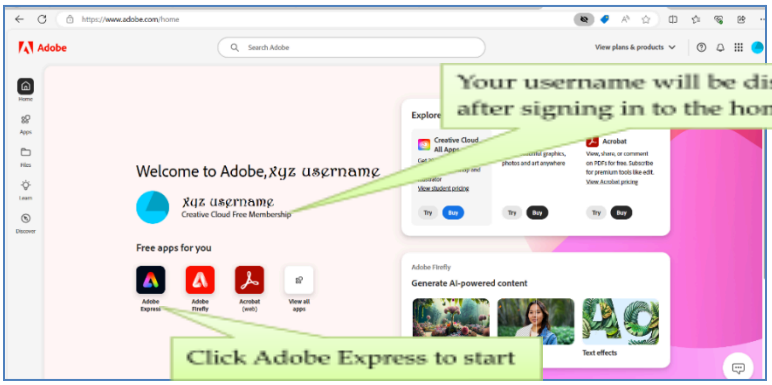
Operating Systems on the Web	**Windows:** Version 10 or later **macOS:** Version 11 or later **ChromeOS**
Operating Systems on the Mobile	iOS 14 or later, Android 9.0, Pie or later
Web browsers	**Google Chrome:** Version 100 and onwards **Microsoft Edge:** Version 107 and onwards **Safari:** Version 16 and onwards **Firefox:** Version 117 and onwards **Note:** JavaScript must be enabled
Memory requirements	Minimum 4GB memory

Go to https://www.adobe.com/in/



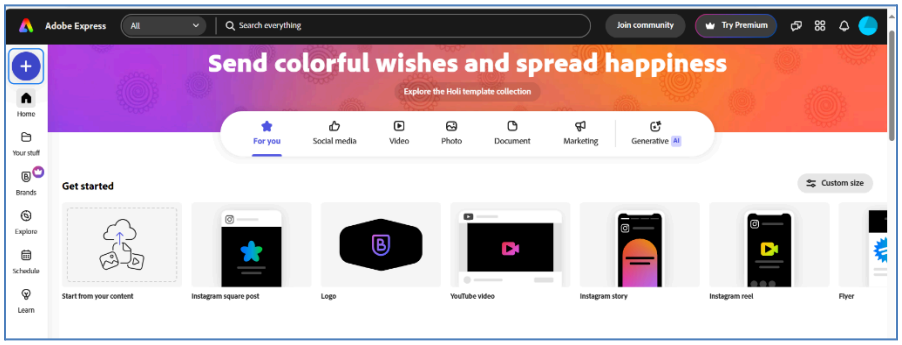


Click here to Create an account using an email ID

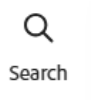
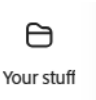
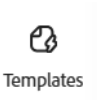
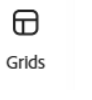
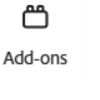


Did you Know?
Adobe is a brick or building material of sun-dried earth and straw in old Spanish. It is pronounced as अडोबी

Adobe Home Page

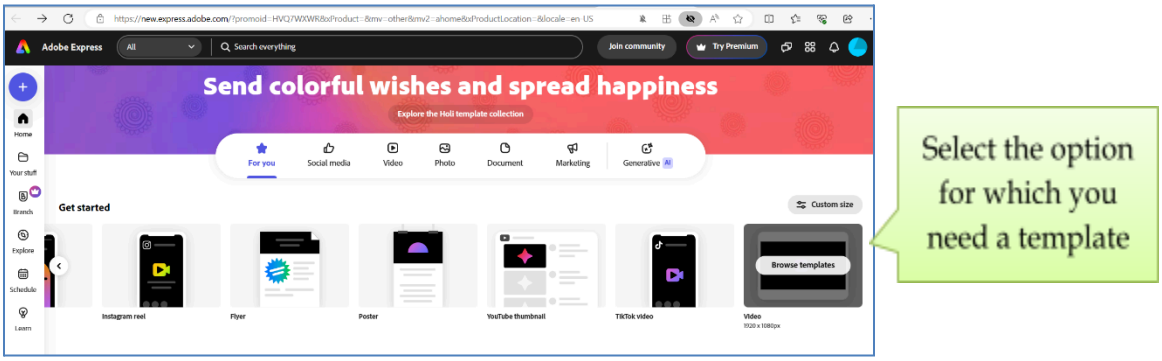


Adobe Express Left Panel:

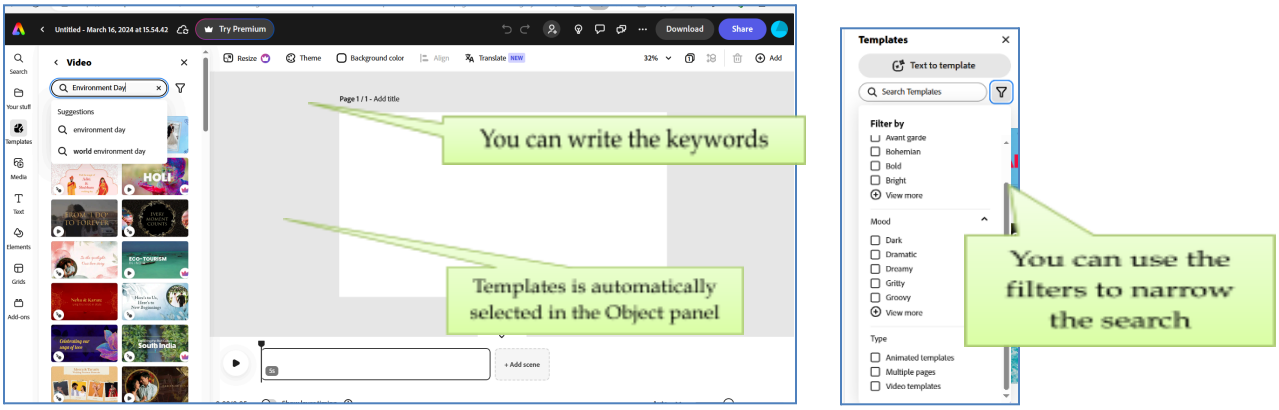
1		Search for templates, previous projects, photos, videos etc.
2		Add your own elements or Adobe files to your design.
3		Browse through thousands of professionally designed still images, videos and multiple page templates in a range of styles
4		Upload your own media, or select from royalty-free Adobe Stock photos, videos and music.
5		Choose your own font, colour and formatting or start from a text layout.
6		Search or browse thousands of elements like frames, shapes, brushes, icons, backgrounds from Adobe Stock.
7		Create quick and easy collages with photos and videos by adding Grid Layouts to your design.
8		Discover various apps, resources, some of which use AI. You can also find Google Photos, OneDrive etc.

3.15 Creating a Design Using Adobe Express Template

Step 1: On the homepage of Adobe Express, hover over a task in the top row, and select **Browse templates** to open the editor and view templates.

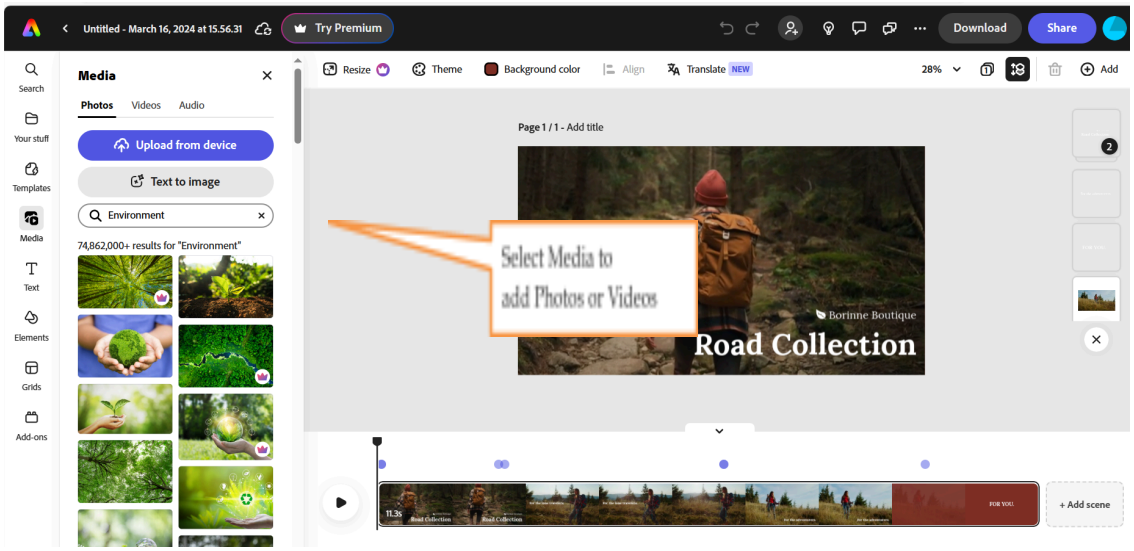


Step 2: Scroll through the templates or select to narrow your results to Video, Multiple page, or Animated templates. You can type in keywords to search.

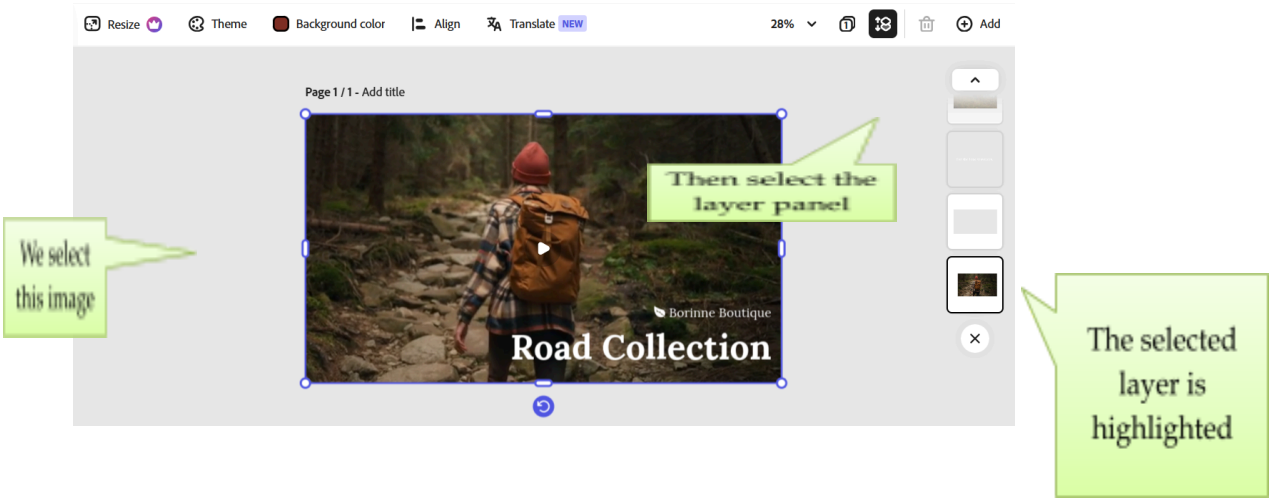


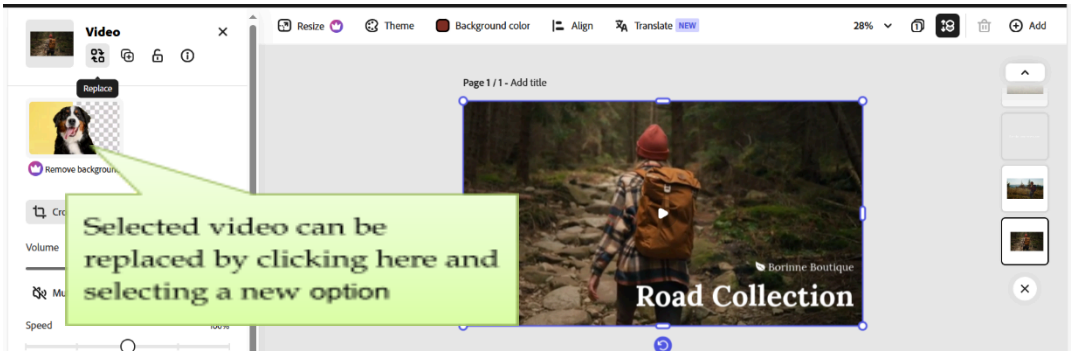
Step 3: In the Left panel, select **Text > Add your text** to add new text to the template. Type your text in the text box and format it using the available styling options from the Left panel. You can also edit and style the existing text on the template.

Step 4: In the Left panel, select **Media** to add **Photos** or **Videos,** depending on what you want to make. Select **Upload from device** or browse the library to add a photo or video to your template.

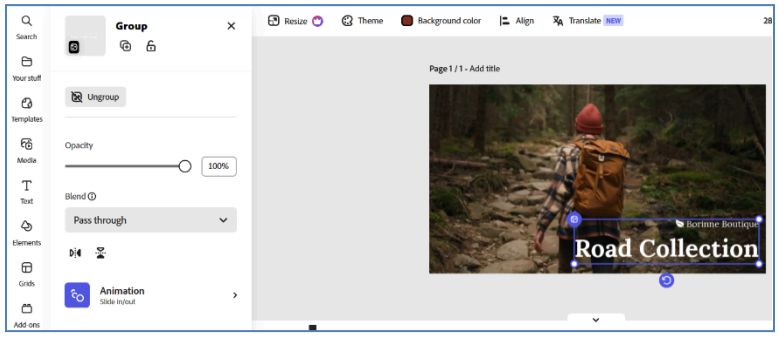


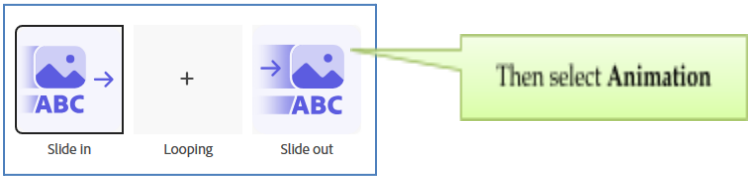
Step 5: Use the layers panel to select the image or video you want to replace in a template, then select **Replace** .



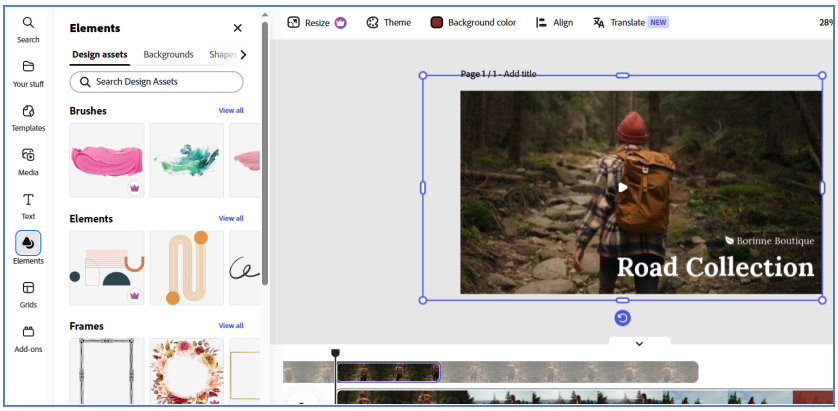


Step 6: Add animation to your text and photos to make your design more interesting. For animating anything select it and choose Animation from the side panel

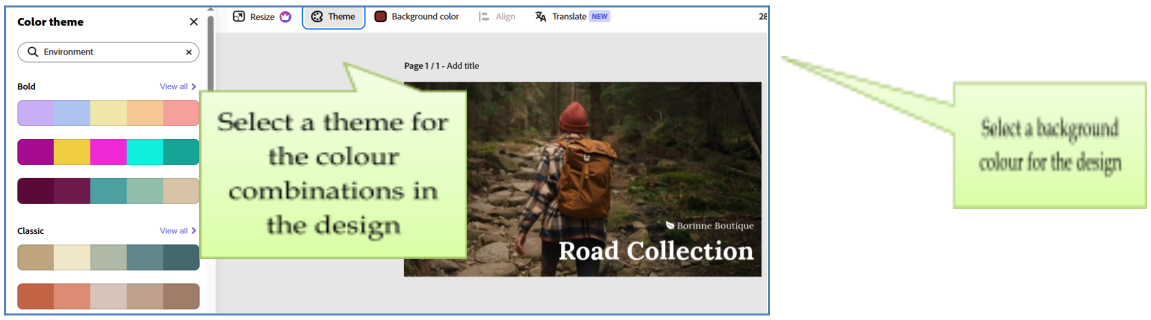




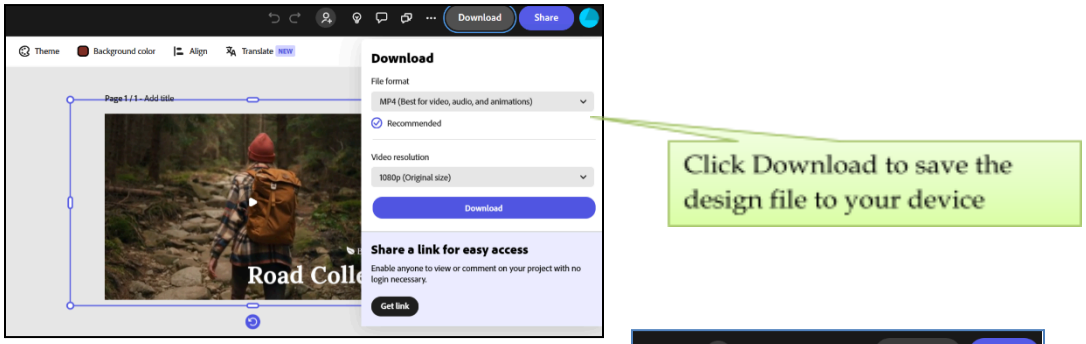
Step 7: Select **Elements** in the Left panel to add **Design, Assets**, **Backgrounds**, **Shapes**, and **Icons**.

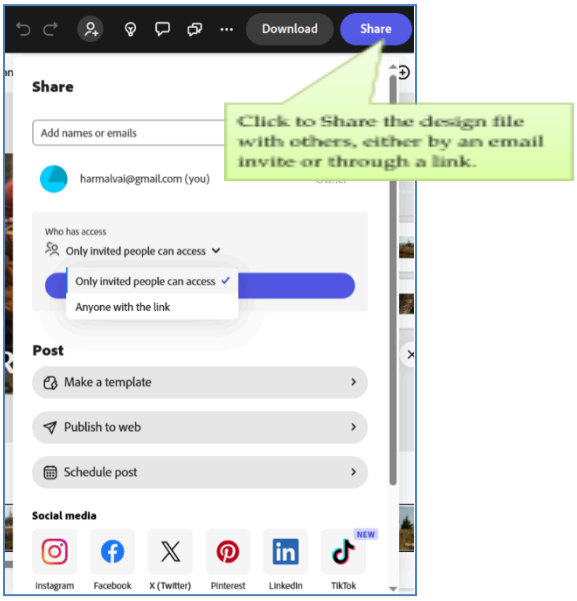


Step 8: Select **Theme** to edit colours and select **Background color** to add a background color to your template.



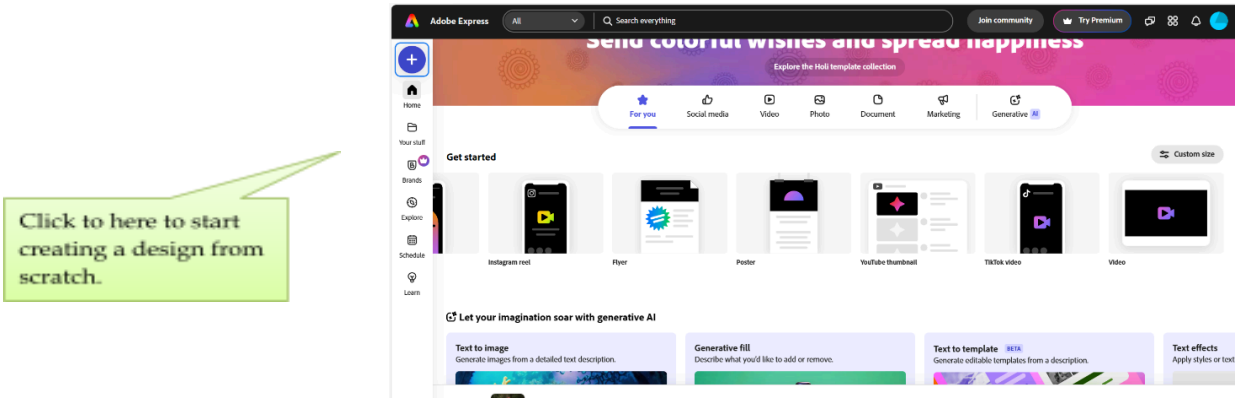
Step 9**: Download** your template on your device or select **Share** to collaborate or showcase your work to the world.



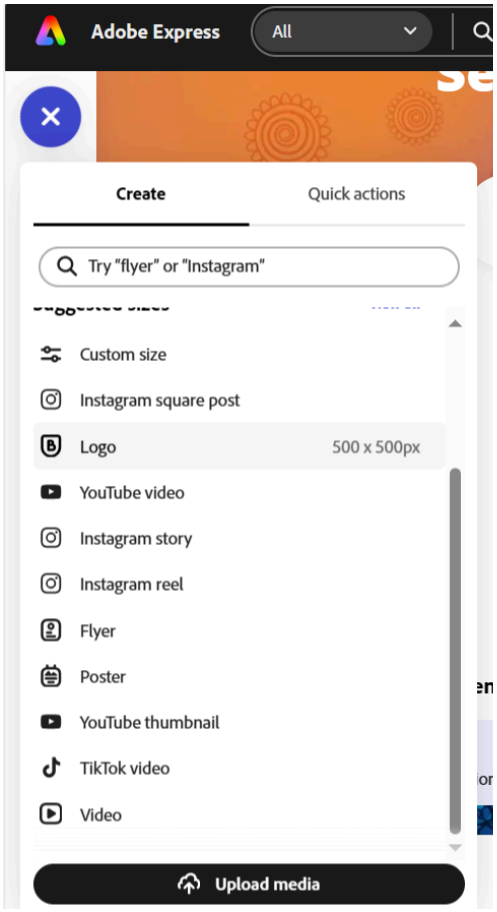


3.16 Creating an Original Design in Adobe Express

Step1: On the homepage of Adobe Express, click the  icon in the top left corner. Choose the option from the list

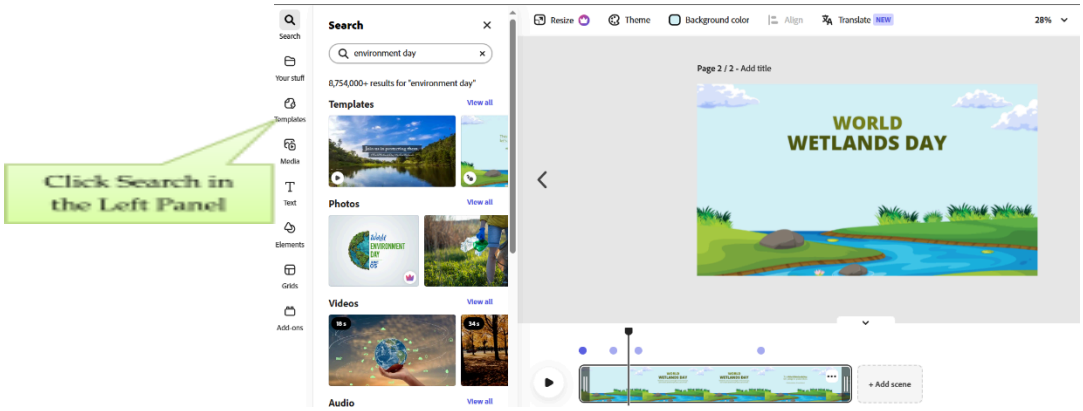


Step 2: Choose the options from the list and you can customize the size.



In both Canva and Adobe Express some of the templates, photos, videos and audio are only available in Premium or paid option, so you may not be able to use them.

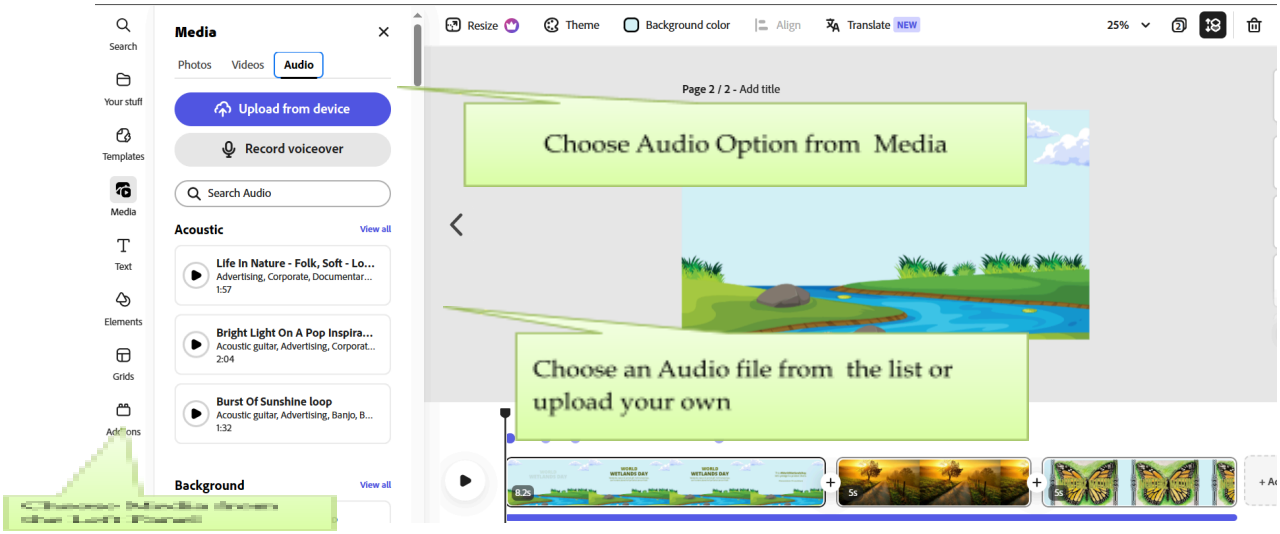
Step3: From the Left panel, select **Search** to search for photos or videos, you can select it and it'll be on the blank canvas.



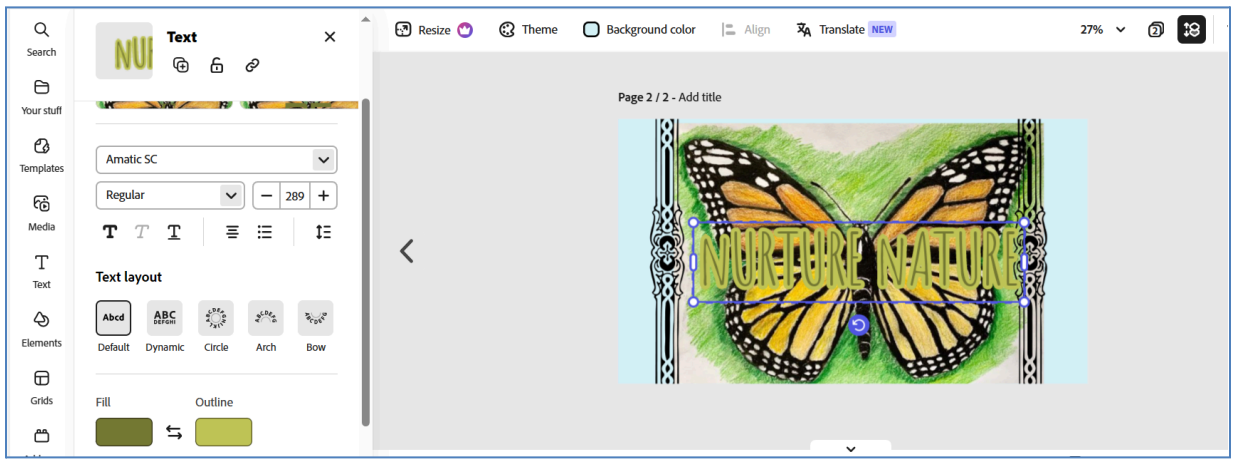
Step 4: Select **Your stuff** in the Left Panel, to easily apply fonts, colors, and logos to any design you've created or shared.

Step 5: Select Media to add new photos, videos, or audio from the photo library or select Upload from the device to add.

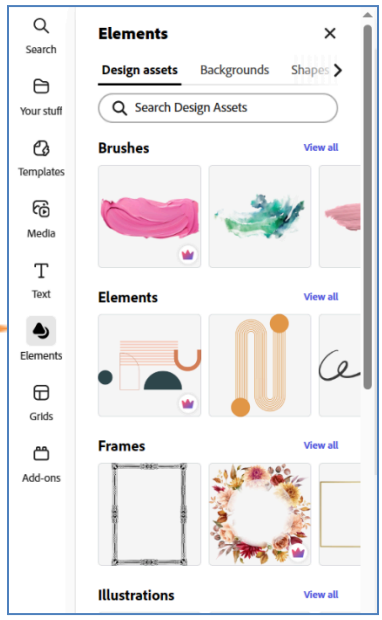
Adding an Audio file.



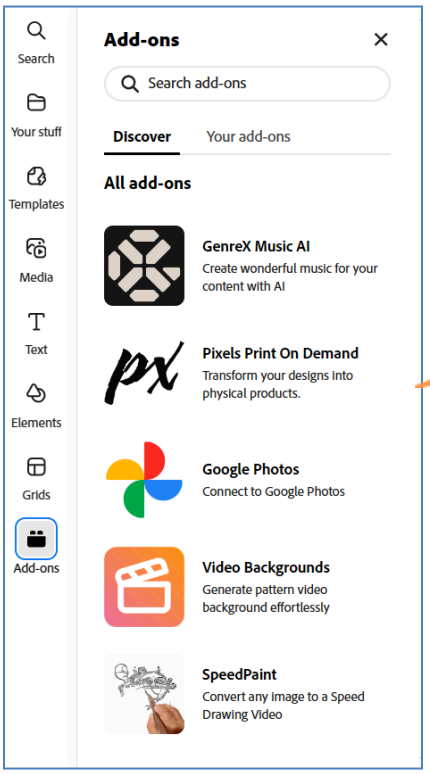
Step 6: Select Text to add text to the design, type your text in the text box and format it using the available styling options from the Left panel.



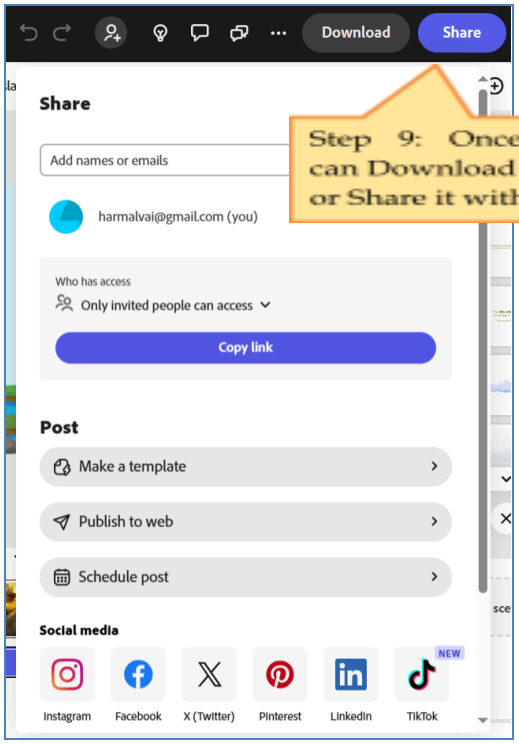
Step 7: Add Backgrounds, Shapes, and Icons from the Elements option



Step 8: Select Add-ons to bring the third-party app functionality into your design.

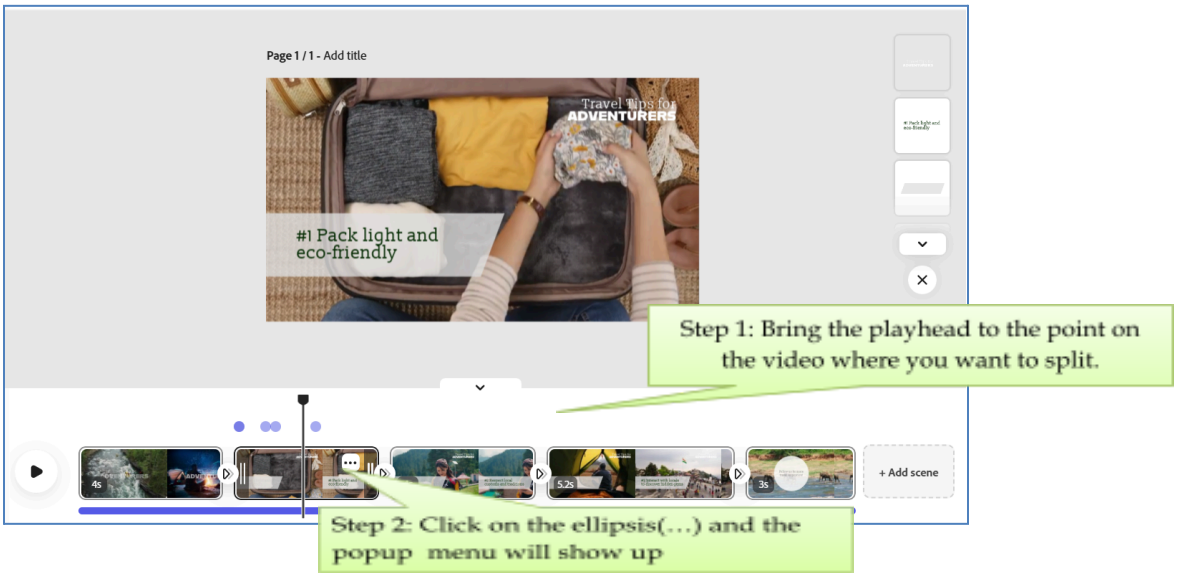


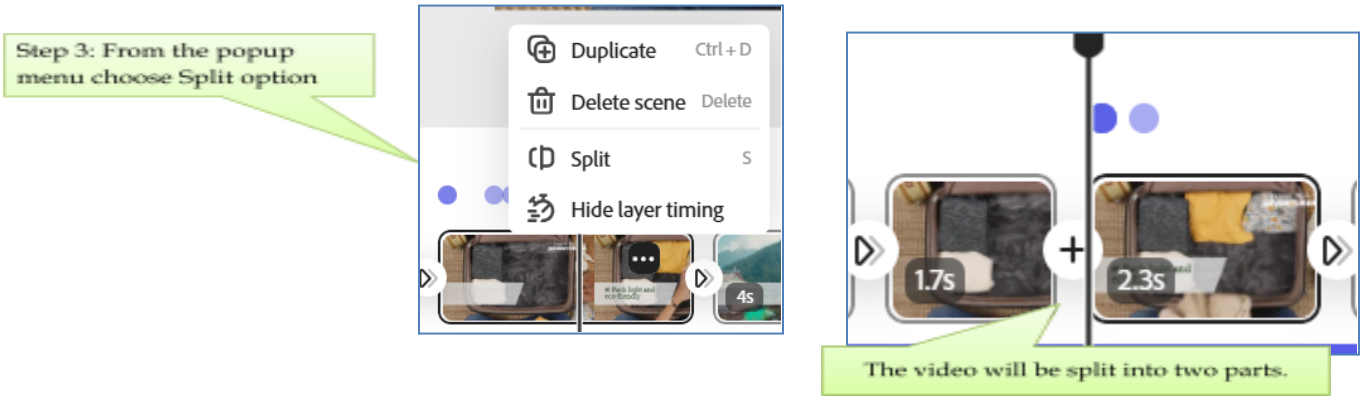
Step 9: Once done, you can Download your design or Share it with others.



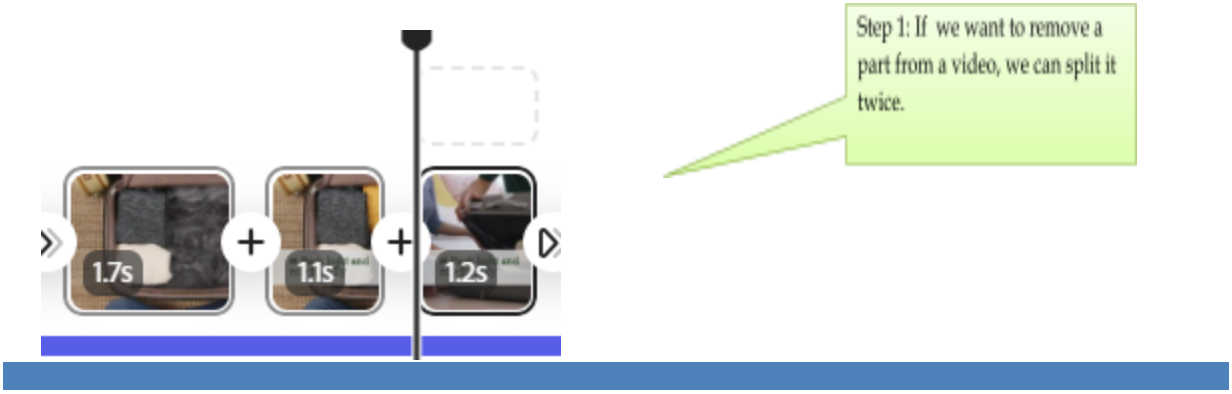
3.17 Splitting, Cutting and Trimming in Adobe Express

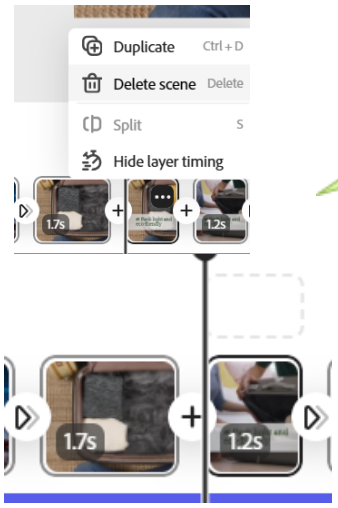
Steps to Split a Video in Adobe Express





Steps to Cut or Delete a part of the Video in Adobe Express

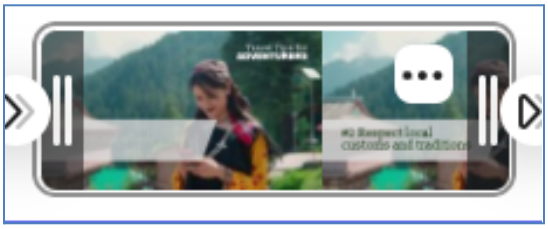




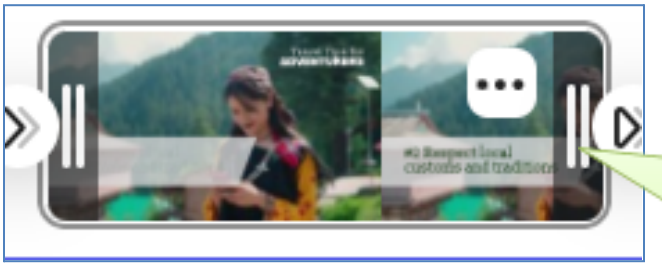
Step 2: Now bring the playhead to the point on the video where you want to split. Click on the ellipsis(…) and choose Delete scene from the pop menu.

The video will be deleted and we can only see the remaining video.

Steps to Trim a Video in Adobe Express



Step 1: Hover the mouse over the part of the video, we want to trim. The trim handles will appear (double lines on both sides)



Step 2: Drag the Trim Handles to hide the part of the video from the beginning or end.

Exercise

I. Multiple Choice Questions:

1. The process of transforming any idea or content into a visually appealing, eye-catching form is:

a. Event management
b. Product Designing
c. Content Management
d. Graphic Designing

2. The following is a free product for schools and other educational institutions intended to facilitate collaboration between students and teachers:

a. Canva School Domain
b. Canva Magic Write
c. Canva for Education
d. Canva Assistant for Schools

3. On January 11, 2024, Canva launched its own GPT in OpenAI's GPT Store which is

a. Magical AI b. Magic Studio c. Canva Magic Assistant d. My Studio

4. Which of the following is not true for Canva:

i) It is easy to use
ii) Cannot work in Canva without a license
iii) It is Versatile
iv) Your work will not be saved automatically

a. i), ii) and iii) b. i) and iii) c. ii) and iv) d. All of these

5. Why should we use High-Quality Images in Canva?

a. Helps create professional-looking designs.
b. The high-quality images do not get pixelated on magnification.
c. Canva provides a range of stock images that can be used for free or purchased.
d. All of the above.

6. In which part of the Canva editor window does a small toolbar appear when you click on an element:

a. Header b. Footer c. Object Panel d. Floating Toolbar

7. File, Save, Share, Design Name are parts of _____ in the Canva Editor Window
a. Header b. Footer c. Object Panel d. Floating Toolbar.

8. _____ in Object Panel allows you to upload your own elements such as images, videos, audios and graphics and save them in Canva.
a. Apps b. Uploads c. Files d. Projects

9. In Canva the _____ toolbar becomes visible whenever you choose video in the design.
a. Floating b. Design c. Video d. Text

10. Presenter notes, Zoom, Full Screen, Grid are available in which part of the Canva Editor Window?
a. Header b. Footer c. Object Panel d. Floating Toolbar

11. In Canva which toolbar comes up automatically when you choose text in the design?
a. Text Toolbar b. Design Toolbar c. Photo Toolbar d. Video Toolbar

12. In Canva, _____ option in the floating toolbar moves elements backwards, forward, to the front, to the back.
a. Lock b. Animate c. Layer d. Move

13. Which option in the floating toolbar of Canva can be used for collaborators to see or for later reference?
a. Post b. Comment c. Alternative Text d. Info

14. Which of the following statements is not true for splitting a video.
a. We can split a video into two parts each time.
b. We can split a video several times.
c. After splitting a video, we can add a transition between the two parts.
d. Splitting can only be done from the beginning and end of a video.

15. More Formal, More Fun, Rewrite, Summarize etc. are alternatives for which tool in Canva
a. Magic Edit b. Magic Grab c. Magic Write d. Magic Media

16. In Canva , all designs, images, files, favorites, purchases, items shared with you, and folders are available in _____ in the Object Panel
a. Apps b. Uploads c. Files d. Projects

17. We can share our design by clicking the _____ button in the Header.
a. Link b. Collaborate c. Share d. Save

18. _____ uses AI technology to find the beats in a song.
a. Beat Sync b. Audio Effects c. Adjust d. Magic Beats

19. In Canva each premium music purchase is for one-time use, which means
a. you can use the track once only.
b. you can only use the track in one design.
c. you can only use the track once in any design created in your Canva account.
d. None of these.

20. In Canva you can turn text to video or images in _____
a. Magic Grab b. Magic Write c. Magic Media d. Magic Morph

21. In Adobe Express we can generate extraordinary text effects and images instantly from just a description with _____.

a. Adobe Firefly generative AI

b. Adobe Spark generative AI

c. Creative Cloud Express AI

d. Adobe AI Express

22. The minimum memory requirements for creating content using Adobe Express is
a. 10 GB b. 12 GB c. 4GB d. No minimum requirement

23. In Adobe Express from the Left panel, select _____ to add Photos or Videos.

a. Library b. Media c. Frames d. Images

24. _____ in the Left Panel brings the third-party app designs into your design.

a. Add-ins b. Apps On c. Add-ons d. App Design

25. In Adobe Express use the _____ to select the image or video you want to replace in a template, then select Replace
a. Layers panel b. Template Panel c. Style Panel d. Image Panel

II. State True and False for the following statement:

1. Canva requires special software installation on your PC to be able to work.
2. You can sign up for free in Canva.
3. Only templates can be used for graphic designing in Canva.
4. Templates are only available for videos.
5. In its first year, Canva had more than 750,000 users.
6. Canva Magic Read, is the platform's AI-powered copywriting assistant.

7. You can use the tools for freehand drawing, underlines, highlighting and erasing.
8. Elements option in the Object Panel in Canva can be used to select photos, frames, shapes, lines, backgrounds etc. to add to your design.
9. Canva does not allow multiple users to collaborate on a single design.
10. Once you trim a video, the trimmed part is hidden and not deleted.

III. Answer the following questions

1. What is Graphic Designing ?
2. Give any four ways where Graphic designing is used.

IV. Answer the following questions based on Canva

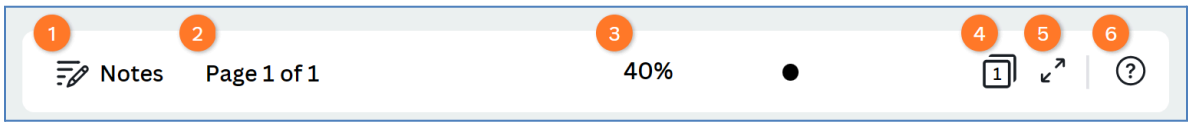
1. Write any 3 advantages of Canva.
2. Why should customize design elements even if we are using a template?
3. How can we use Canva effectively?
4. How is your design saved in Canva?
5. Explain the usage of Elements, Uploads and Apps in Canva's Object panel.
6. Briefly describe the main parts of the Canva editor window.
7. What is a floating toolbar in Canva?
8. Write the steps to split, cut and trim a video.
9. What is the difference between splitting, cutting and trimming a video?
10. Write the steps to add a transition effect between two slides in a presentation.
11. Write the steps for animating elements in a presentation.
12. Write the steps to share a design in Canva.
13. Write the steps to download a design in Canva.
14. How can you add audio tracks to a video?
15. By clicking the "ellipsis" menu, we get a menu with many options for audio tracks, briefly describe these options.
16. What is Beat Sync?
17. Name any 5 AI tools in Magic Studio. Are these free for all users?
18. What is the use of Magic Write?

V. Label the following Toolbars in Canva

i) Header

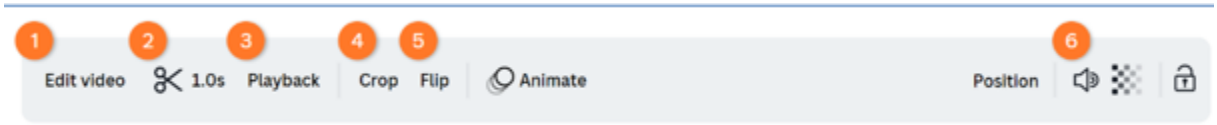
ii) Object Panel

iii) Footer



iv) Text Toolbar

v) Video Toolbar



VI. Using Canva do the following practically and write the steps for each

i. A poster for "Animal Protection Against Cruelty" using a template
ii. A presentation about "The National Education Policy" using a blank presentation
iii. A video about "Indian Startups" using a template and also generate an audio track using AI.

VII. Answer the following questions based on Adobe Express

1. What are the advantages of Adobe Express?

2. What is Adobe Express for Education?
3. Explain the usage of the following in the Left Panel:
   a. Templates
   b. Media
   c. Elements
   d. Grids
   e. Add-ons
4. Write the steps to:
   a. Split a video in Adobe Express.
   b. Delete part of a video in Adobe Express.
   c. Trim a video in Adobe Express.

VIII. Do the following in Adobe Express and write the steps accordingly.

1. Create a Poster for "Environment Day" using a template. Customize it using different theme colours, fonts and images.
2. Create a 1–2-minute video(like an advertisement) without using a template to introduce a new brand of school uniforms. Create a logo for your company and add theme colours, fonts, images and audio.

IX. Competency Based Questions

1. You are in the school annual day committee and have been made in charge of designing the invitation cards on an urgent basis. What is the best way to do this while sharing the designs with your teachers?
2. Your cousin is getting married and he wants to send an original save the date video to the family and friends through a link, how can you help him?

X. Group Discussion

- Compare the features of Canva with Adobe Express
- Share your views on using templates versus making original designs.

CHAPTER 4
Cyber Safety and Security

Topics covered

Introduction

In the past few decades, technology has grown exponentially and changed the world rapidly. The internet has become an essential part of our lives, connecting us to information, entertainment, and communication like never before and no aspect of the society is now alienated thanks to it. With the advent of computers, smartphones, internet and Wi-Fi, a lot of things have changed for the better. Almost everyone across the globe is using the digital media in some or the other form and they are creating digital footprints, whether knowingly or unknowingly. However, it's crucial to understand potential risks like cybercrimes, trolling, cyber bullying etc and be equipped with the knowledge and tools to stay safe.

Cyber safety and cybersecurity are both about staying safe online, but they focus on different things:

- **Cyber safety** is about protecting yourself from online threats. This can include things like malware, phishing attacks, cyberbullying, and inappropriate content. It's about being a smart and secure user of the internet.
- **Cyber security** is about protecting information systems and data from unauthorized access, use, disclosure, disruption, modification, or destruction. This focuses on protecting systems and networks from attacks.

Here's an analogy: imagine your house is your computer system. Cybersecurity would be like installing alarms and deadbolts to keep intruders out. Cyber safety would be like being careful about who you let into your house and what information you share with them.

This chapter will be your guide to becoming a confident and responsible digital explorer, ready to take full advantage of the amazing opportunities the internet offers while staying safe and secure.

4.1 Digital Footprints

Roopa, is a bright and ambitious student preparing for college applications. She maintains good grades, participates in extracurricular activities, and volunteers in her community. However, Roopa is also known for her playful and sometimes sarcastic online persona. Roopa enjoys posting funny memes and humorous comments on social media platforms. While most of her content is harmless, some past posts contain jokes or language that could be considered offensive or inappropriate in a professional setting.

During the college application process, Roopa realizes that potential colleges might be looking at her online presence. She worries that her past social media posts might create a negative impression and jeopardize her chances of admission. Roopa experiences anxiety and stress due to the fear of her digital footprint impacting her future. It also raises questions about the potential long-term impact of her online behavior on future job opportunities and other aspects of her life.

This case highlights how seemingly harmless online activity can have unforeseen consequences in the future. It emphasizes the importance of responsible online behavior, understanding and managing your digital footprint throughout your life, especially when entering professional settings.

This case study is just one example of how a digital footprint can impact an individual's life. By understanding the potential consequences and adopting responsible online habits, individuals can navigate the digital world safely and securely. We need to learn to strike a balance between freedom of expression and responsible online behaviour and about the strategies to be employed to manage and protect your digital footprint.

Did You Know?

- Ian Murphy was the first cybercriminal in the world.
- KaruppannanJaishankar is regarded as the father of Cyber criminology.
- Yahoo v. Akash Arora case was the first cybercrime case in India that happened in 1999.

What are Digital Footprints?

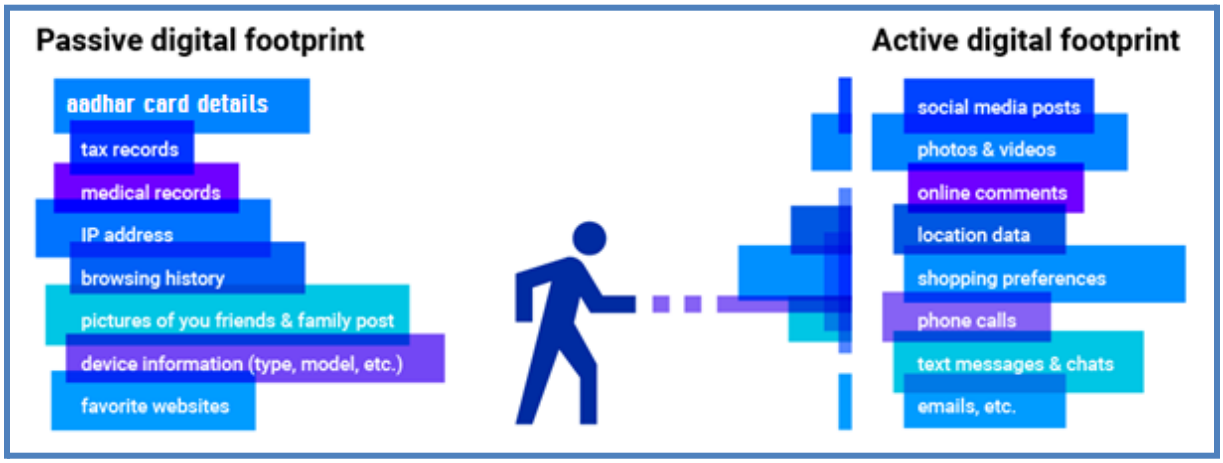
Your digital footprint, sometimes called a "digital shadow" or "electronic footprint," refers to the trace of data you create as you navigate the online world.

This includes everything from the websites you visit to the information you submit on forms, personal information, browsing history, online purchases, the emails we send and receive, the messages we send and receive when chatting and the posts you share on social media etc. Every activity we do is like moving around on the sand and leaving our footprints. Every trace of data is recorded.

These digital footprints are essentially a digital record of an individual organization or system as a result of their online activities or interactions with technology, and they can be used to track and analyze behavior and preferences. For example, online retailers may use digital footprints to personalize their marketing and sales efforts and to improve products and services, based on a user's past browsing and purchase history.

Scan the QR Code

Digital footprints can be classified into two categories. Active and passive data footprints refer to the types of data that are collected from an individual's online activities.



Active Digital Footprint

An active data footprint refers to the data that is deliberately provided by an individual through their online activities.

This includes

- Information such as name, email address, phone number, and other personal details that are submitted through online forms, surveys, or social media profiles.
- Data that is created by the individual's intentional actions, such as search queries, emails you send, photos/videos you upload
- Information you fill on a form, social media posts and comments, creating online accounts and online purchases.

Passive Digital Footprint

A passive data footprint refers to the data that is collected automatically through an individual's online activities, without their intentional participation. Passive data footprints are collected through the use of tracking technologies such as cookies, beacons, and other types of online tracking tools. This includes

- Data such as browsing history, device information, IP address, location
- Websites you visit(tracked through cookies)
- Date and time a photo was taken, the location where it was taken, and the device that was used to take it
- Data that is collected by websites, apps, and other online services.

4.2 Data Privacy

Data privacy focuses on your right to control your personal information like Name, address, email, social security number, browsing habits, online purchases, health records, location data, including who collects it, how it's used, and who has access to it. It's about understanding and having a say in how your online activities are tracked and used by others.

Imagine you have a personal journal filled with your thoughts, experiences, and maybe even secret dreams. Data privacy is about **c**ontrolling who gets to read that journal and deciding what information you share with others, especially online.

Think about having a special, secret box where you keep your favorite toys, drawings, or special notes. Data privacy is like keeping that box safe and deciding who gets to look inside.
When you tell your friend a secret, isn't that like sharing your data? It's okay with some friends , but maybe not with everyone. Websites and apps sometimes want to know your secrets, like your name, where you live or even what games you like to play.

The purpose of data privacy is to ensure that personal information is not misused or abused by third parties. This includes protecting the data from unauthorized access, theft, or other types of misuse. It is also important to provide individuals with control over how their personal information is used and to ensure that their privacy rights are respected. It is a fundamental human right and is becoming increasingly important in the digital age, as more personal data is being collected and processed by companies, organizations, and governments.

Real-world examples

- **Author:** An author holds the copyright to their book, allowing them to control its publication and distribution.
- **Pharmaceutical company:** A patent protects a new drug discovery, giving the company exclusive rights to manufacture and sell it.
- **Fashion designer:** A trademark protects the logo of a fashion brand, preventing others from using it on their products.

In today's interconnected world, data is the new currency. Every click, swipe, and search generates a digital footprint, raising concerns about data privacy, the right of individuals to control their personal information. Technological advancements have created a complex ecosystem where data is constantly collected, analyzed, and utilized by an intricate web of entities. This complex landscape poses significant challenges to data privacy.

Air India Data Breach (2021) : Air India suffered a massive data breach in which the personal information of over 4.5 million passengers was exposed. This data included customer names, credit card details, and passport information, highlighting the sensitivity of data airlines possess.

Domino's India Data Breach (2021) : Domino's India was targeted in a cyberattack resulting in a leak of 18 crore order records. This data breach contained details like credit card information, phone numbers and addresses, demonstrating how seemingly harmless food ordering data can become valuable to hackers.

The Importance of Data Privacy

Data privacy is not just about protecting personal details like names or addresses; it encompasses online freedom, self-determination, and protection from harm. Unchecked data collection can lead to targeted advertising and profiling, potentially influencing personal choices and decisions. Additionally, data breaches and unauthorized access can have devastating consequences, from financial loss to identity theft.

You have the right to decide:

- **What information is collected about you**
- **Who has access to your information**
- **How your information is used and shared**

Why is data privacy important?

- **Your online reputation:** Everything you share online builds your virtual image. Schools, employers, and even friends can look at your data to form an impression of you.
- **Targeted advertising:** Companies use your data to personalize the ads you see, which can sometimes feel intrusive.
- **Protecting yourself from harm:** Sharing too much information online can make you vulnerable to scams, cyberbullying, and even identity theft.

How can you protect your data privacy?

- **Be mindful of what you share online:** Think twice before posting anything, especially personal information.
- **Adjust your privacy settings:** Every website and app have privacy settings. Learn how to control who sees your information and how it's used.
- **Use strong passwords and keep them secret:** Don't share your passwords with anyone.
- **Beware of phishing scams:** Don't click on suspicious links or open emails from unknown senders.
- **Be cautious about using public Wi-Fi:** Avoid sensitive activities like online banking on public Wi-Fi networks.
- **Learn about your rights:** You have the right to know what data is collected about you and how it's used.
- **Stronger Regulations:** Governments need to enact and enforce robust data protection laws, setting clear standards for data collection, use, and storage.

This includes granting individuals the right to access, rectify, and erase their personal data.

- **Ethical Practices:** Organizations must prioritize ethical data practices by being transparent about data collection, obtaining informed consent, and implementing robust security measures to protect user data.

Additionally, using privacy-focused tools and services, such as **virtual private networks (VPNs)** or encrypted messaging apps, can help to safeguard personal data and maintain online privacy. In addition to legal requirements, organizations should also implement privacy policies and security measures to protect personal data from unauthorized access or misuse. This includes measures such as **data encryption, firewalls**, and access controls, as well as employee training on data privacy and security best practices.

Laws and regulations to protect your data

Imagine your phone is like your locker at school. It holds your stuff, things you want to keep private, like photos, messages, and games. Data privacy laws in India are like the rules for your locker. They make sure no one peeks in or takes your stuff without your permission.

- **Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011**, which set out guidelines for the protection of sensitive personal data or information by companies. These rules specifically address sensitive personal data (like financial information, passwords, health records). They mandate companies to implement security measures and obtain consent before collecting such data.
- **The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016,** which regulates the collection and use of biometric data for the purpose of authentication.

Data privacy in India is governed by the **Personal Data Protection Bill (PDPB),** which was introduced in 2019 and is currently under review by the Indian government. Introduced in 2019, this bill aims to establish a comprehensive framework for data privacy in India. It outlines how companies should handle personal data, what rights individuals have over their data, and how data breaches will be addressed.

4.3 Data Security

Data security refers to the protection of digital data from unauthorized access, use, or disclosure. It involves safeguarding personal information, such as names, addresses, and passwords, from hackers and cyber threats. It encompasses various strategies, technologies, and processes designed to safeguard sensitive information and ensure its confidentiality, integrity, and availability. Here are key aspects of data security:

Confidentiality: Ensuring that data is accessible only to authorized individuals or systems. Measures to maintain confidentiality include encryption, access controls, and data classification.

Integrity: Guaranteeing the accuracy, completeness, and reliability of data throughout its lifecycle. Data integrity measures include checksums, digital signatures, and data validation techniques to detect unauthorized modifications.

Authorization: Granting appropriate access permissions to users based on their roles, responsibilities, and levels of trust. Authorization mechanisms control what actions users can perform on specific data or resources.

Encryption: Encoding data in such a way that it can only be decrypted and read by authorized parties with the proper cryptographic keys. Encryption protects data both in transit (e.g., during transmission over networks) and at rest (e.g., stored on disk or in databases).

Importance of Data Security:

- ✔ **Protects personal privacy**: Ensures that sensitive information remains confidential and is not misused.
- ✔ **Prevents identity theft**: Safeguards against unauthorized access to personal accounts and financial information.
- ✔ **Maintains trust**: Helps build trust and confidence in online transactions and communication.
- ✔ **Preserves reputation**: Avoids potential damage to reputation or embarrassment from leaked personal information.

Security Measures:

a. **Strong passwords**: Use unique passwords that are difficult to guess and include a combination of letters, numbers, and symbols. Avoid using easily guessable passwords like "123456" or "password". Never share passwords with anyone, including friends or classmates. Regularly update passwords and avoid using the same password for multiple accounts.

b. **Privacy settings**: Adjust privacy settings on social media platforms and online accounts to control who can see personal information. Understand and adjust privacy settings on social media platforms and online services to control who can see your personal information and posts. Think carefully before sharing photos, videos, or personal details online, as once shared, they can be difficult to remove.

c. **Secure connections:** Ensure that websites use HTTPS encryption for secure communication and avoid connecting to unsecured Wi-Fi networks.

d. **Antivirus software:** Install reputable antivirus software to detect and remove malware from computer systems.

e. **Two-factor authentication (2FA)**: Enable 2FA for added security by requiring a second form of verification, such as a text message or authentication app, in addition to a password.

f. **Safe Browsing:** Be cautious when clicking on links or downloading files from unknown or suspicious websites. Use reputable antivirus software to protect against malware and viruses. Avoid sharing personal information such as your full name, address, or phone number on public websites or social media platforms.

g. **Email Safety:** Be wary of phishing emails that may try to trick you into revealing personal information or clicking on malicious links. Do not open email attachments from unknown senders, as they may contain malware.

h. **Data Backup**: Regularly backup important files and schoolwork to an external hard drive, USB flash drive, or cloud storage service like Google Drive or Dropbox. This ensures that even if your device is lost, stolen, or damaged, you won't lose your important data.

i. **Social Media and Online Interaction**: Be mindful of what you post online and how it may affect your reputation and future opportunities. Think critically about the information you see online and question the credibility of sources.

j. **Respect Copyright**: Avoid using copyrighted materials (such as images, music, or text) without permission. Instead, look for creative commons or public domain content that can be freely used and shared.

Responsible Online Behaviour :

Think before sharing : Be cautious about sharing personal information online and avoid disclosing sensitive details to strangers.
Verify sources : Verify the credibility of websites and sources before trusting or sharing information found online.
Report suspicious activity: Report any suspicious emails, messages or websites to trusted adults or authorities.

4.4 Intellectual Property

Intellectual property (IP) refers to creations of the human mind including:

- Inventions: New products, processes, or devices (protected by patents).
- Literary and artistic works: Books, music, paintings, software (protected by copyrights).
- Designs: Industrial designs, product packaging (protected by design rights).
- Symbols, names, and images: Trademarks, logos (protected by trademarks).

These creations are intangible, meaning they can't be physically touched, but they hold value and can be legally protected from unauthorized use by others. This protection is granted through various legal mechanisms like patents, copyrights, and trademarks.

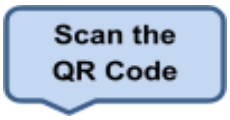
Think of it like this: you can't hold an idea in your hand, but that idea can be turned into a new invention, a piece of art, or a song. Intellectual property laws exist to recognize and protect the ownership of these intangible creations, similar to how physical property laws protect things like your car or house.

Understanding intellectual property is important for various reasons:

- Creative professionals: Knowing how to protect their own work and how to use the work of others legally.
- Businesses: Protecting their brand identity and innovations while understanding how to use existing intellectual property responsibly.
- Consumers: Being aware of the rights associated with intellectual property and respecting them.

Intellectual property rights (IPR) are the legal protections granted to the creators of original works and inventions. Here's a breakdown of what they are and why they matter:

4.4.1 Plagiarism



In the academic and artistic world, originality and creativity are cornerstones of excellence. However, maintaining integrity in the face of vast information resources can be challenging, leading to a prevalent problem: plagiarism. **At its core, plagiarism is the act of presenting someone else's work or ideas as one's own.** This can encompass various forms, including copying text word-for-word without quotation marks and proper citation, paraphrasing without proper attribution, using someone else's ideas or arguments without acknowledging them, and even submitting work previously written by oneself or another individual.

It is crucial to avoid plagiarism for various reasons:

- Maintaining academic integrity and ethical standards.
- Giving credit to the original source and avoiding copyright infringement.
- Developing your own critical thinking and communication skills.

There are several types of plagiarism, each with its own characteristics and degrees of severity. Here are some common types of plagiarism:

Direct Plagiarism: This involves directly copying someone else's work without any modification or paraphrasing. It can include copying entire passages, sentences, or paragraphs without citation.

Paraphrasing Plagiarism: Paraphrasing plagiarism involves rephrasing someone else's ideas or words while retaining the original meaning, without proper citation. Even if the words are changed, if the structure and ideas remain the same as the original source, it is still considered plagiarism.

Mosaic Plagiarism (Patchwriting): Mosaic plagiarism involves borrowing phrases, sentences, or paragraphs from a source and blending them seamlessly into one's own writing without proper attribution. It can give the appearance of originality while still infringing on the original author's work.

Accidental Plagiarism: Accidental plagiarism occurs when a person unintentionally fails to properly cite or attribute sources in their work. This can happen due to a lack of understanding of citation rules, careless research practices, or inadvertent oversight.

Inappropriate Citation: Inappropriate citation involves citing a source incorrectly, misleadingly, or without actually consulting it. This can happen when a person fabricates or misrepresents sources to support their own arguments or ideas.

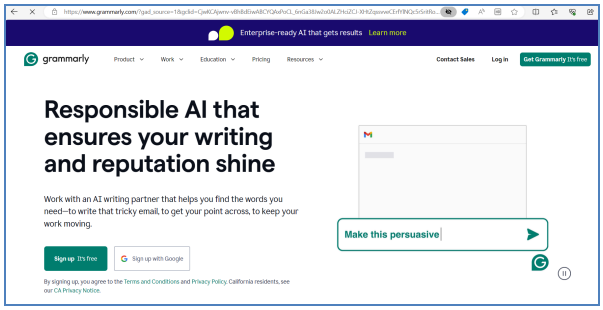
Verbatim Plagiarism: Verbatim plagiarism involves directly copying someone else's work word for word without any changes, and without proper citation. It is one of the most blatant forms of plagiarism and is easily detectable through text comparison tools.

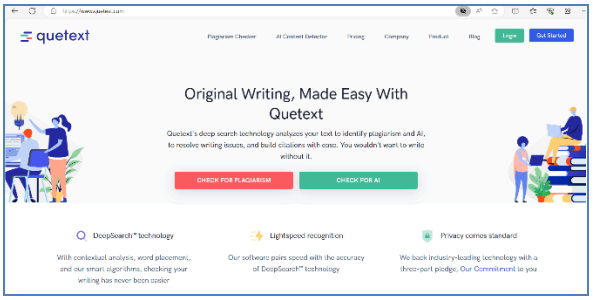
Proper citation and attribution are essential practices in academic and professional writing to acknowledge the contributions of others and to uphold ethical standards.

Fortunately, numerous tools and techniques can be employed to detect plagiarism. Firstly, manual comparisons remain an effective method, especially for smaller assignments or when suspicious similarities are identified. By carefully examining the structure, language, and content of the suspected plagiarized work and comparing it with potential sources, inconsistencies or direct copying can be revealed.

Websites:

- **Copyleaks:** https://copyleaks.com/ offers a free plagiarism checker with limited features and paid plans with additional functionalities.
- **Quetext:** https://www.quetext.com/ provides both a free and paid version with varying features and analysis options.
- **Grammarly:** https://www.grammarly.com/ offers plagiarism checking alongside grammar and writing suggestions in their paid plans.



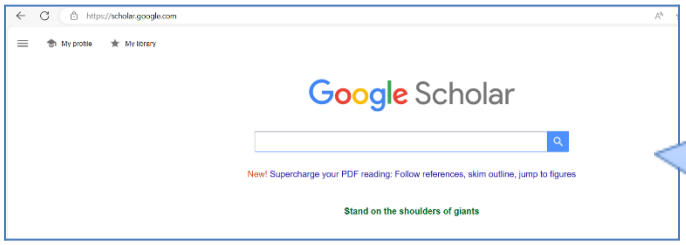


Apps:

- **Plagiarism Checker X:**https://plagiarismcheckerx.com/ (for Android) offers basic plagiarism checking functionalities.
- **Dupli Checker:**https://www.duplichecker.com/ (for Android and iOS) provides a free version with limited scans and paid options for more features.

How to prevent plagiarism?

- ✔ Understand proper citation: Acknowledge all sources used.
- ✔ Paraphrase responsibly: Use your own words but still cite the source.
- ✔ Seek help: If unsure, ask your teachers for guidance.
- ✔ Use Plagiarism detection tools.
- ✔ Develop your own ideas and perspectives on a topic.



Try exploring Google Scholar and cite the source whenever you use it. This improves the quality of your work and makes your writing look professional.

Is using ChatGPT plagiarism?

It's designed not to plagiarize, but it may draw from other writers' work in a way that may be plagiarism or that may be perceived as plagiarism. You can use ChatGPT and still create original writing by fact-checking, citing, and editing carefully while relying on it as an assistant, not a substitute writer. However, it's essential to use the text generated by ChatGPT responsibly and ethically. Here are some guidelines to follow:

- Add Value: Use the text generated by ChatGPT as a starting point or inspiration and add your own insights, analysis, or original content to it. Adding value to the generated text makes your work more original and avoids issues of plagiarism.
- Check for Accuracy and Reliability: Verify the accuracy and reliability of the text generated by ChatGPT, especially if you're using it for factual information or critical analysis. ChatGPT may not always provide accurate or up-to-date information.
- Be Transparent: Be transparent about the use of AI-generated text in your work, especially in academic or professional settings. Disclose that part of the content was generated by an AI model and clarify your role in creating the final product.
- Respect Copyright and Intellectual Property: Respect copyright laws and intellectual property rights when using text generated by ChatGPT. Avoid using copyright material without permission or proper attribution.

Types of Intellectual Property

4.4.2 Patents

A patent is a legal right granted by a government to an inventor, giving them exclusive rights to their invention for a limited time in exchange for publicly disclosing details about the invention, in a patent application. This allows others to learn from the invention and helps to advance technology. Protect inventions (products, processes, machines, compositions of matter) that are new, useful, and non-obvious.

In India, the Patents Act of 1970, along with subsequent amendments, governs the patenting regime. The Act aims to nurture a conducive environment for research and development while simultaneously safeguarding the interests of inventors and promoting industrial development. Over the years, India has witnessed a surge in patent activity, mirroring its growing aspirations in scientific research and technology-driven industries.

Beyond pharmaceuticals, patents are finding wider applications in various technological fields in India. Indian software companies are increasingly filing patents for their software inventions both domestically and internationally. In the agricultural sector, patents are utilized to safeguard innovations in seed varieties, fertilizers, and agricultural machinery. Moreover, the Indian renewable energy sector has witnessed a rise in patents related to solar power, wind energy, and biomass energy, marking a move towards sustainable and environment-friendly technologies.

Patent Journals are published periodically and can give a sense of the kinds of things being patented (https://search.ipindia.gov.in/DynamicUtility/Journal/Patent).

4.4.3 Copyrights

Copyright is a type of intellectual property that protects original works of authorship. It grants the creator (or their designated owner) exclusive rights to control how their work is used, for a limited time. Copyrights give the creator control over reproduction, distribution, performance, and derivative works based on the original. Copyright protects creative works that are original and have been tangibly expressed.

This can include various forms such as:

- **Literary works:** Books, poems, articles, scripts
- **Artistic works:** Paintings, sculptures, photographs, graphic designs
- **Musical works:** Songs, compositions
- **Dramatic works:** Plays, screenplays
- **Cinematographic works:** Films, videos
- **Sound recordings:** Recordings of music or spoken words
- **Computer programs:** Software code

The copyright owner has the exclusive right to:

- **Reproduce** the work (e.g., copying, printing)
- **Prepare derivative works** (e.g., creating translations, adaptations)
- **Distribute** copies of the work (e.g., selling, lending)
- **Display** the work publicly (e.g., online, in exhibitions)
- **Perform** the work publicly (e.g., playing music, performing a play)

Copyright protection typically lasts for the life of the author plus an additional 70 years in most countries. After that, the work enters the public domain and can be freely used by anyone.

Types of Works Protected by Copyright in India

(https://iclg.com/practice-areas/copyright-laws-and-regulations/india)

The Indian Copyright Office maintains records, but they're not easily searchable by the public. You might need to make a formal request with specific details about the work you're searching for (https://copyright.gov.in/).

4.3.4 Trademark

A trademark is a type of intellectual property that consists of a recognizable sign, design, or expression that identifies a specific product or service from a particular source and distinguishes it from others.

- Trademarks help consumers recognize the origin of a product or service.
- By establishing clear ownership and rights, trademarks discourage infringement and counterfeiting.
- This allows them to make informed choices based on their past experiences with the brand.

- Trademarks help prevent confusion and ensure consumers are getting what they expect.

Trademarks can take many forms, including:

- **Words:** Names, slogans, logos, taglines
- **Symbols:** Logos, icons, designs
- **Sounds:** Jingles, musical themes

Examples of Patent Disputes

Natco Pharma Limited v Assistant Controller of Patents (Delhi High Court): This case dealt with the rejection of a patent for a crucial anti-cancer drug. The Delhi High Court upheld the rejection on the grounds that the drug was a minor derivative of a pre-existing invention, lacking sufficient inventive steps. This highlights India's emphasis on genuine innovation.

Trademark Infringement Cases

Anil Kapoor vs Simply Life India &Ors and Krishna Kishore Singh vs. Sarla A Saraogi and Ors: These landmark cases saw the Delhi High Court grant injunctions against the use of celebrities' names or likenesses for commercial purposes without consent. This strengthens personality rights protection for prominent figures in India.

Copyright Cases

Universal City Studios LLC and Ors vs. Wynk Ltd. And Ors: A crucial case for the music industry. The Delhi High Court held that music streaming platforms like Wynk require licenses for every form of communication of copyrighted music to the public, not just downloads. This clarifies the scope of rights covered under copyright law.

Visit the official Intellectual Property India website (https://ipindia.gov.in/) for more information

4.5 Types of Cybercrimes

Cyber safety refers to the safe and responsible use of the internet to ensure safety and security of personal information. It also includes not creating a threat for anyone else's information. Confidentiality of information ensures that only authorized users can get access to data.

Cybercrime encompasses any illegal activity facilitated by electronic devices and the internet. **Cybercrime is the criminal act which takes place over the internet through computers as tools or targets or other smart devices meant for making our work easier.** Several examples of cyber-crime include frauds, identity theft, cyberstalking,

creating and sending malware like viruses for destroying the systems or stealing the data to make money.

A Cyber-attack is an assault launched by cybercriminals using one or more computers against a single or multiple computers or networks. Cyberattacks are unwelcome attempts to steal, expose, alter, disable or destroy information through unauthorized access to computer systems. Cyber-attack is an attack done online where your sensitive data is under threat and can be misused.

There had been 674,021 cyber-attacks in the country in 2022 until June. Almost 3,700 cyber-attacks a day, making India the third most impacted by network attacks in the world.

- From Covid vaccine research centres to banking and financial entities to PSU major Oil India Limited – a range of institutions came under cyber-attack during the two years of the pandemic.
- The April 2022 attack on Oil India in Assam was one of the "most serious" incidents of ransomware attacks. "There were over 200 computers of Oil India that got encrypted during the attack and operations of Oil India came to a halt for almost a week.

Classification of Cyber-crimes

- **Crime Against an Individual** - Crime committed against an individual by use of an individual's credit card details, confidential data and sending of spam emails. This crime is mainly done for making money.
- **Crime Against an Organization** - This is done against a firm, company or organization to get unauthorized access to the data. This is done either to reveal the important data and employee details of the company or for money-making.
- **Crime Against Government** - This is the crime against the nation, by getting access to the national data and records. This crime is of main concern as it concerns the safety of the people of the nation.

Different Types of Cyber-crimes

Cyberbullying is the use of electronic means to bully or harass another person. It can happen anywhere online, including social media, messaging platforms, gaming platforms, and even text messages. It includes posting negative or false content about someone else causing embarrassment or humiliation. The purpose is to scare, anger, embarrass, or shame the target. It's not just a one-time thing, but a pattern of actions

intended to hurt or upset someone. This includes sending mean messages, sharing embarrassing photos or videos, spreading rumors, impersonating someone, and excluding them online. Anonymity makes it harder to identify the bully and can be especially scary for the victim. Cyberbullying can cause serious emotional harm, including anxiety, depression, and even suicidal thoughts.

Cyberstalking is a type of cybercrime that uses the internet and technology to harass or stalk an individual, group, or organization that causes them fear. Cyberstalking behaviors may include tracking down someone's personal and private information and using it to make them afraid, texting them hundreds of times a day to let them know you are watching them, "creeping" on their social media accounts to learn where they are so you can show up there uninvited, or posting about them incessantly and without their permission. This can include rumors or false information. The stalker can be someone the victim knows or a complete stranger.

Phishing is a type of deceptive cybercrime that involves tricking people into providing sensitive information, such as passwords or credit card numbers, by posing as a trustworthy source. This involves obtaining the personal information of the user by sending spam emails, phone calls, using social media or by means of a phishing website which resembles the same as an authorized website. Here's how it works:

- They pose as a legitimate source, such as a bank, credit card company, social media platform, or even a friend or colleague.
- The message creates a sense of urgency. The message might claim your account is at risk, requires immediate action, or offers an enticing opportunity you can't miss.
- The message often contains a link or attachment that appears legitimate but actually leads to a phishing website designed to look like the real one.
- Once you enter your details on the fake website, the attacker captures them and uses them for malicious purposes like financial fraud or identity theft.

Identity Theft is a crime where someone steals your personal information, such as your name, Aadhar number, email, phone number, credit card number, or other identifying details, and uses it to **commit fraud** in your name. The personal identity is misused with an intention to defame a person. This can include:

- ❖ Opening new accounts (credit cards, bank accounts)
- ❖ Making unauthorized purchases
- ❖ Taking out money from your accounts

Victims often experience feelings of stress, anxiety, and even depression due to the violation of their privacy and the hassle of resolving the issue.

Malware Attacks involve the use of **malicious software (malware)** to harm or exploit a computer system, server, or network. These attacks can be launched by individuals, criminal organizations, or even state actors, with various motives including:

- **Financial gain:** Stealing personal information (credit card details, login credentials) for financial gain is a common goal.
- **Disruption:** Disrupting business operations or causing chaos can be another objective.
- **Espionage:** Stealing sensitive data for industrial espionage or national security purposes is also a potential motive.

Malware can be delivered through various methods, such as:

- **Phishing emails:** These emails appear legitimate but contain malicious attachments or links that, when clicked, install malware.
- **Malicious websites:** Downloading files or visiting compromised websites can unknowingly infect your device with malware.
- **Infected attachments:** Opening attachments from untrusted sources can introduce malware.
- **Physical media:** Inserting infected USB drives or CDs can also spread malware.

Email spoofing is a deceptive tactic where attackers forge the sender address in an email message to make it appear as if it came from someone else. This deceives the recipient into believing the email is legitimate, potentially leading them to:

- ✔ **Click on malicious links:** These links might download malware, redirect users to phishing websites, or steal their personal information.
- ✔ **Open infected attachments:** These attachments can contain malware that infects the recipient's device.
- ✔ **Reply to the email and reveal personal information:** Unsuspecting users might respond to the email, disclosing sensitive details like passwords or financial information.
- ✔ **Take unintended actions:** The email might urge the recipient to perform specific actions, like transferring funds or granting access to confidential data.

Denial-of-Service (DoS) Attacks: These attacks aim to disrupt the normal functioning of a website or server by overwhelming it with traffic, making it unavailable to legitimate users. Attackers bombard the target system with an excessive volume of requests, such as repeatedly visiting a webpage or sending numerous data packets. This overload consumes system resources, leaving no capacity for legitimate traffic. Some DoS attacks exploit security weaknesses in the target system, causing it to crash or malfunction even with lower traffic loads.

Ransomware is a type of malware that prevents or limits users from accessing their system, until a ransom is paid. Ransomware is a type of malicious software (malware) that encrypts a victim's files, rendering them inaccessible and unusable either by locking the system's screen or by locking the users' files. The attacker then demands a ransom payment in exchange for providing the decryption key to unlock the files.

Hacking refers to the process of gaining unauthorized access to a computer system or network. This can be with malicious or ethical intentions. Malicious hacking involves illegally accessing or using a computer system or network to harm or exploit it for stealing data, disrupting operations, spying etc. Ethical hacking involves legally accessing a computer system or network with authorization from the owner to identify and fix vulnerabilities before malicious actors can exploit them.

Data Breaches: A data breach occurs when unauthorized individuals gain access to sensitive or confidential information (e.g., financial records, customer's personal information), medical records, passwords etc. Data breaches can happen to individuals and organizations alike. They can be accidental or intentional, and the consequences can be severe.

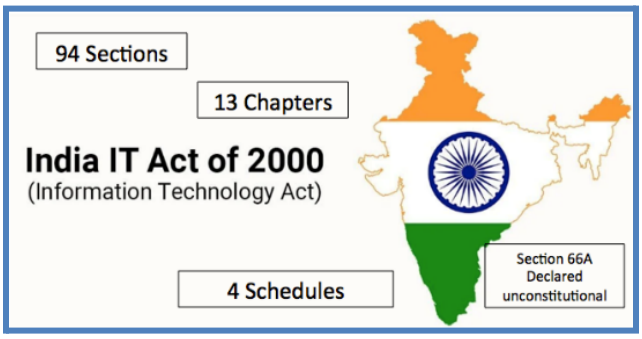
Cybercrime Awareness

Different security measures should be followed to be safe from the dreadful act of cyber-crime.

- Strong passwords should be used. The password must be a complex one, so it is not possible to guess.
- Use antivirus programmes to keep the system free of malware.
- Try to avoid opening websites which are not secure (without HTTPS).
- Don't provide your email, contact number , credit card/debit card information, address and other such information on websites/apps you are not fully sure of.

- Don't download software or other files from every website.
- Continuously update the system.
- Be vigilant to avoid identity thefts.
- Maintain privacy settings over social media.

4.6 Cyber Laws in India



Cyber laws in India are primarily governed by the **Information Technology Act, 2000 (IT Act)** and its subsequent amendments. This comprehensive piece of legislation aims to address various cybercrimes and protect electronic transactions and records. The Information Technology Act, 2000 ALSO aims to provide for the legal framework so that legal sanctity is accorded to all electronic records and other activities carried out by electronic means. The original Act contained 94 sections, divided into 13 chapters and 4 schedules. The law states that if a crime involves a computer or network located in India, persons of other nationalities can also be indicted under the law.

Key Provisions of the Information Technology Act, 2000

- **Legal recognition of electronic records and digital signatures:** The IT Act grants legal validity to electronic documents and signatures, putting them on par with traditional paper-based documents.
- **Data protection and privacy:** The Act includes provisions for safeguarding the privacy of individuals and ensuring the security of sensitive personal data. However, critics argue that these provisions need strengthening.
- **Cybercrime offenses:** The IT Act defines various cyber offenses, including:
    - Hacking
    - Data theft
    - Identity theft
    - Spreading online obscenity
    - Cyberterrorism
- **Penalties and offenses:** The Act outlines punishments for cybercrime offenses, including imprisonment and fines.

- **Establishment of the Cyber Appellate Tribunal:** This tribunal was set up to adjudicate disputes arising from the IT Act.

The IT Act 2000 has been amended several times to keep pace with the evolving nature of technology and cybercrime. Some key amendments include:

- **Information Technology (Amendment) Act, 2008:** This amendment introduced new offenses like cyber terrorism and clarified the liability of intermediaries.
- Further amendments have been made to address specific issues like data protection, online gaming, and social media regulation.

The Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021:

These rules provide guidelines for digital intermediaries, social media platforms, and OTT (Over-the-Top) platforms, including requirements related to content removal, grievance redressal mechanisms, and compliance with Indian laws.

These are just a few examples of sections from Indian cyber laws that are commonly used to address cybercrimes. The legal framework for cybercrimes in India continues to evolve to address new challenges posed by advancements in technology and digital communication.

Go to https://www.cybercrime.gov.in
Go to Media Gallery and Cyber Awareness on the Home page, listen to various audio and video resources and check out the messages.

The Bharatiya Nyaya Sanhita, 2023 (BNS)

The Bharatiya Nyaya Sanhita, 2023 (BNS) was enacted on December 25, 2023, repealing and replacing the Indian Penal Code, 1860 (IPC) as the new penal code of the country. The three new Laws Bharatiya Nyaya Sanhita, Bharatiya Nagarik Suraksha Sanhita and the Bharatiya Sakshya Adhiniyam came into effect from July 1, 2024. Any crime committed until 30 June 2024 will continue to be governed by the IPC.

- Overall there are 20 chapters under the BNS, some of which are:
  - Offences Against Women And Children
  - Offences affecting the human body
  - Offences Against The State
  - Offences Relating To The Army, Navy And Air Force
  - Offences Relating To Elections
  - Offences Relating To Coin, Currency Notes, Bank Notes, And Government Stamps
  - Offences Affecting The Public Health, Safety, Convenience, Decency And Morals.
  - Offences Relating To Religion
  - Offences Against Property
  - Criminal Intimidation, Insult, Annoyance, Defamation, Etc.
- The chapter about offences against women and children, murder have been given precedence. Further, the offences against women and children which were scattered throughout in the erstwhile Penal Code, 1860 have been brought together and have been consolidated under Chapter-V.
- In the same manner, the offences affecting the human body are also brought up in the order and placed after the Chapter on offences against women and children.
- BNS has been streamlined and it will now consist of only 358 Sections as opposed to 511 Sections in IPC, 1860.
- Fines in the IPC were very low ranging from Rs.10 to Rs. 1,000. Similarly, the punishments for various offences also needed rationalization. Hence, terms of imprisonment for 33 offences have been suitably enhanced, fines in 83 cases have been increased and mandatory minimum punishment has also been introduced in 23 many offences.

	Old Indian Penal Code, 1860	**Bharatiya Nyaya Sanhita, 2023**
Provisions	511	358
Additions	N/A	31
Deletions	N/A	19
Modifications	N/A	Community Service for 6 offences. Minimum Punishment for 25 offences.
Imprisonment	N/A	Increased for 41 sections
Penalty	N/A	Hiked in 82 sections

Visit for more information

- **Ministry of Electronics and Information Technology (MeitY):**
  - https://www.meity.gov.in/ - The official government website for information on cyber laws and regulations.
- **Indian Computer Emergency Response Team (CERT-In):**
  - https://www.cert-in.org.in/ - The national agency responsible for addressing cybersecurity threats.

How to file a Cyber-crime complaint online in India?

A cybercrime complaint can be filed using the National Crime Reporting Portal of India. This portal is an initiative of the Government of India to facilitate victims/ complainants to report cybercrime complaints online.

The website link is – https://cybercrime.gov.in

Exercise

I. Multiple Choice Questions

1. What is the term used to describe the data you leave behind online?

a. Online shadow
b. Digital echo
c. Digital footprint
d. Online history

2. Which of the following is an example of an active component of your digital footprint?

a. Location data collected by your phone (even when not in use)
b. Social media post you write and share
c. Cookies tracking your browsing history on a website
d. Search queries you use on a private browser

3. Which of the following is NOT a potential impact of your digital footprint?

a. Shaping your online reputation
b. Protecting your privacy
c. Improving your credit score
d. Influencing targeted advertising

4. Which of the following is NOT a recommended way to manage your digital footprint?

a. Regularly review and delete old or inappropriate posts.
b. Use privacy-focused tools like browsers and search engines.
c. Share all your personal information publicly on social media.
d. Adjust privacy settings on social media and other platforms.

5. Why is it important to be mindful of your digital footprint?

a. It helps you track your online activity for personal insights.
b. It can have long-term consequences in various aspects of your life.
c. It allows companies to offer you more relevant online services.
d. It is essential for maintaining a large network of online connections.

6. What is the primary purpose of data privacy regulations?

a. To restrict the use of the internet
b. To protect personal information from unauthorized access or misuse
c. To control the development of new technologies
d. To censor online content

7. What kind of data is typically protected by data privacy regulations?

a. Publicly available information, such as names and addresses in phone books
b. Personally identifiable information (PII), such as social security numbers and credit card details
c. Non-identifiable data collected through website cookies
d. All of the above

8. What is the best way to protect your data privacy online?

a. Sharing all your personal information with websites and apps
b. Using strong passwords and keeping them confidential
c. Clicking on all links in emails, even from unknown senders
d. Disabling all privacy settings on your social media accounts

9. Which of the following is NOT an example of an IPR?

a. Copyright b. Trademark c. Patent d. Trade secret

10. What right does a copyright grant the owner?

a. The exclusive right to use the invention commercially
b. The exclusive right to use a symbol or logo to identify a product or service
c. The exclusive right to control the reproduction and distribution of an original work
d.The exclusive right to prevent unauthorized access to confidential information

11. What is the key difference between a patent and a copyright?

a. Copyrights protect ideas, while patents protect the physical embodiment of an idea.
b. Patents have a longer duration of protection than copyrights.
c. Only tangible objects can be patented, while copyrights can protect intangible works.
d. All of the above

12. What is the primary goal of a phishing attack?
a. To spread malware and harm computer systems.
b. To steal personal information such as passwords, credit card details, or login credentials.
c. To disrupt website traffic and cause service outages.
d. To promote a specific product or service.

13. _____ theft is when someone uses your personal data to impersonate you , typically to steal from you.

a. Cyberstalking b. Cyberbullying c. Identity Theft d. Email Spoofing

14. In _____ the email is received from a forged email address but it appears to be from some authentic source.

a. Email Spoofing b. Email Forging c. Email harassment d. Email targeting

15. _____ is a type of cybercrime that uses the internet and technology to harass or stalk a person.

a. Cyber Harassing b. Cyber Targeting c. Cyber Stalking d. Cyber Bullying

16. You receive an email from a popular video game platform claiming you've won a free virtual pet. The email asks you to click on a link and enter your username and password to claim your prize. What should you do?

a. Click on the link and enter your information.
b. Ignore the email and report it to your parents or a trusted adult.
c. Forward the email to your friends to share the good news.

17. Your best friend asks you to share your login information for a social media platform because they want to see your private messages. What should you do?

a. Share your username and password with your friend.
b. Explain that sharing passwords is risky and suggest they create their own account.
c. Pretend you forgot your password to avoid sharing it.

18. A popular online challenge encourages users to post embarrassing photos of themselves. Your classmates are participating and pressuring you to join. What should you do?

a. Join the challenge to fit in with your classmates.
b. Politely refuse and explain why you don't feel comfortable participating.
c. Post a fake photo to avoid getting left out.

19. You see someone constantly posting mean comments about another student on social media. What should you do?

a. Join the conversation and add your own negative comments.
b. Report the cyberbullying to a teacher or trusted adult.

c. Ignore the situation and hope it goes away on its own.

20. I want to download a new movie, but the website asks you to disable your antivirus software first. What should you do?

a. Disable your antivirus software and download the movie.
b. Close the website and look for the movie from a trusted source.
c. Ask your parents for permission before downloading anything online.

21. You're playing your favourite online game when another player asks for your phone number to chat outside the game. What should you do?

a. Give them your phone number right away.
b. Ask your parents if it's okay to share your phone number.
c. Tell them you don't want to share your phone number and explain that it's not safe to give out personal information online.

22. You receive an email from a company you like offering a free gift card if you click on a link and enter your name and address. What should you do?

a. Click the link and enter your information right away to get the free gift card.
b. Talk to your parents or a trusted adult about the email before clicking anything.
c. Delete the email because it sounds suspicious and you don't want to get scammed.

23. You're creating a new account on a website and it asks for your birthday and address. You're not sure if it's safe to share that information. What should you do?

a. Enter your birthday and address without thinking twice.
b. Read the website's privacy policy to understand how they use your information.
c. Only share information that is absolutely necessary to create the account.

24. You're using a school computer and accidentally leave yourself logged into your social media account. What should you do?

a. Leave it logged in and hope no one else uses it.
b. Tell your teacher and ask them to log you out.
c. Log out of your account before leaving the computer.

25. You see a funny meme online about your friend. You think your other friends would find it funny too, so you share it on your social media page. What should you consider before sharing?

a. Share it right away because it's funny.

b. Think about how your friend might feel if they saw the meme.
c. Ask your friend's permission before sharing anything about them online.

26. What are some things you can do to create strong passwords?
a. Use the same password for all your online accounts.
b. Use short passwords that are easy to remember.
c. Use a combination of uppercase and lowercase letters, numbers, and symbols.

27. You're scrolling through social media and see a post from a stranger offering "free" followers for your account. What should you do?

a. Click the link and follow the instructions to get more followers.
b. Report the post as suspicious and tell an adult about it.
c. Ignore the post and never share your login information with anyone.

28. You're playing an online game with friends and someone starts sending mean messages in the chat. What should you do?

a. Engage with the person and respond with mean messages back.
b. Report the player to the game moderators and explain the situation.
c. Mute the player and continue playing without engaging in the negativity.

29.You receive a text message from an unknown number claiming to be from your bank and asking you to confirm your account information. What should you do?

a. Reply to the message with your account details to verify your information.
b. Call your bank directly using a phone number you know is correct, not the one provided in the text.
c. Delete the message and avoid clicking on any links it might contain.

30. You're creating a new online profile for a school project and need to include pictures. What should you consider before uploading pictures online?

a. Only upload pictures that you're comfortable with everyone seeing, including future employers and colleges.
b. Avoid uploading pictures that reveal your location or personal information.
c. Ask for permission from anyone else who appears in the photos before uploading them.

31. You're watching a video online and see an advertisement offering a free download of a popular game. What should you do?

a. Click the download link without hesitation to get the free game.
b. Only download games from trusted sources like official app stores.
c. Read reviews and do research on the game and download source before proceeding.

32. You're working on a school project and find a website that offers free research papers on your chosen topic. Is it okay to download and use the entire paper for your project?

a. Yes, it's a great way to save time and get a good grade.
b. No, using someone else's work without permission is plagiarism and can lead to trouble with your teacher.
c. It's okay if you cite the website as your source, even if you don't change anything in the paper.

33. You receive a message from an unknown number claiming to be your bank and asking you to confirm your account information due to suspicious activity. What should you do?

a. Click the link in the message and enter your information as instructed.
b. Delete the message and contact your bank directly through a known phone number or website.
c. Tell your parents or a trusted adult about the message and ask them for help.

34. You're scrolling through your social media feed when you see a friend post a challenge that involves downloading an unknown app to access a hidden filter. What should you do?

a. Download the app right away to try the filter.
b. Talk to your friend about the risks of downloading unknown apps and suggest finding a safer alternative.
c. Report the post to the social media platform for promoting potentially dangerous content.

35. You're creating a new online game account and are asked to choose a username. You want to choose a username that's cool and unique, but it also contains your real name. What should you do?

a. Choose the username that includes your real name because it's easy to remember.
b. Think of a creative username that doesn't reveal your real name or personal information.

c. Ask your parents or a trusted adult for suggestions on creating a safe and appropriate username.

II Answer the following questions

1. Define Cybercrime ? Explain at least two types of cybercrimes.
2. Differentiate between
   a) Cyberbullying and Cyberstalking
   b) Malware and Ransomware
   c) Trademark and Copyright
   d) Phishing and DoS Attacks
3. List some security measures that should be followed to be safe from the dreadful act of cyber-crime.
4. Define the term "digital footprint" and differentiate between active and passive digital footprints with an example each.
5. Explain why managing your digital footprint is important. Discuss one positive and one negative impact of digital footprints.
6. Describe the importance of responsible online behaviour and how cyber laws contribute to it.
7. Identify an object or concept in your daily life that would be protected by each of the following:
   a) Patent b) Copyright c) Trademark.

III Answer the following application-based questions

1. You are helping your younger sibling set up their first social media account. They are excited to connect with friends and share their interests online. What advice would you give your sibling about creating a safe and responsible digital footprint from the beginning? Explain your reasoning for each piece of advice.

2. You receive a message from an unknown number, claiming to be your favorite celebrity and offering you a chance to win a prize. What are some red flags that might indicate this is a scam, and what steps would you take?

3. You're playing an online game with a friend. They ask you to click on a link to download a cool new skin for your character. What questions would you ask your friend before clicking on the link?

4. You see a funny meme online that makes fun of a classmate. Even though you don't agree with the message, some of your friends are pressuring you to share it. How would you handle this situation and why?

5. You accidentally post a picture online that you later regret. How would you try to remove the picture and what lessons did you learn from this experience?

6. You overhear two classmates talking about using someone else's login information to access a restricted website at school. What are some possible consequences of their actions and what would you do in this situation?

7. You receive a direct message on social media from someone you don't know. The message claims you've won a contest and asks for your personal information to claim your prize. What are some red flags in this scenario? How can you verify if the contest is legitimate?

8. You come across a website that is offering free downloads of the latest video game. The website looks unprofessional and has a lot of pop-up ads. Is it safe to download the game from this website? Why or why not? What are the potential risks involved?

9. You come across a social media post that is promoting a product that seems too good to be true. How can you evaluate the legitimacy of this post and the product it is advertising? What steps would you take to verify its authenticity before sharing it or making a purchase?

10. You receive an email from a company claiming to be your bank, asking you to verify your account information by clicking on a link. What red flags should you look for to identify if this might be a phishing scam attempting to steal your data? How can you safely verify your bank account information if needed?

IV Conduct a group discussion on any of the following topics in class

1. Should ethical considerations play a role in granting patents? For example, should patents be granted for inventions that have the potential to cause harm?
2. How should copyright law balance the rights of creators with the public's right to access information and participate in creative expression?

3. Should copyright protection be extended beyond the current term in many countries (typically the author's life plus 70 years)?
4. How should copyright law be applied to the digital age, where information can be easily copied and shared?
5. How far should trademark protection extend? For example, should a company be able to trademark a common word or phrase if it becomes associated with their brand?