Unit
10

THE INTERNET

UNIT STRUCTURE

10.0 Learning Objectives :

In this unit, we will discuss about the basics of computer organization and Data processing :

After working through this unit, you should be able to :

- Understand, what is Internet ? And How it works ?
- Know, IP–Addresses and Domain Name System
- Understand the Web technologies.
- Know about Browsers, Web–page design and Internet Communications

10.1 Introduction :

In the previous unit we have discussed that Internet is an example of Wide Area Network (WAN). Today lots of services, which are provided by the Internet we are accessing. One main reason to buy a computer by businesses, home and other–user is Internet. Internet provides its services almost in all sectors like businesses, governments, educational institutions and individuals. The internet is a worldwide collection of networks that connects millions of machines. Internet carries lots of information worldwide (it is information super highway). Internet is a main component of Information Technology. In this unit we will learn about Internet.

10.2 Evolution of The Internet :

In 1960, the Government of USA has given a project to Department of Defence (DOD) USA, to conduct research on nuclear weapons. Department of Defence, USA has observed that to conduct the research on nuclear weapons, they need lots of computing power. At that time the computer machines were larger in size and situated in different universities at different geographic locations. Department of Defence, USA has decided to create a network to connect various computing devices available in the different departments of different universities under the project called ARPANET (Advanced Research Project Agency Network) with the goal : [1] Allowed scientists and researchers of different geographical locations to share their information and research work together on military and scientific projects, and [2] Network could function even if part of the network were destroyed by any disaster such as nuclear attack. In 1969, the network called ARPANET becomes functional.

During the research work many students and developers has developed different applications like chat, Email online game etc. Many commercial companies had made request to the DOD to be a part of ARPANET, which refused by DOD.

In 1981, after DOD has given the responsibility of this network to National Science Foundation (NSF) who funded for the project, access to ARPANET was expanded by NSF and ARPANET became NSFNET. Later on, NSF has put the entire project open for public. The original ARPANET consisted of four main computers located at University of California at Los Angeles (UCLA), the University of California at Santa Barbara (UCSB), the Stanford Research Institute and the University of Utah. By 1984, this network had 1000 individual computers were linked as a host. Today millions of computers connect to this network, which now known as Internet.

❑ **Check Your Progress – 1 :**

1. _____ is a network of network, super highway of information.

   [A] Intranet [B] Internet

   [C] Network [D] None of the above

2. ARPANET stands for _____.

   [A] Advanced Research Project Agency Network

   [B] Advanced Research Programmed Auto Network

   [C] Advanced Research Project Automatic Network

   [D] Advanced Research Project Authorized Network

3. Internet is _____ own network. [Publicly, Privately]

10.3 Connecting to The Internet :

Internet is a publicly own network, but still you need to pay for the services. User can connect their mobile devices or computers to the Internet through wired or wireless technology and then access its services. With wired connections, computer physically attach via cable (transmission media) and devices like modem, which transmit the data on the Internet. For wireless connection some devices have built–in technology to transmit the data wirelessly. Other devices can access the internet wirelessly using Wireless modem which also known as dongle and Wi–Fi Router. Today, most user uses Internet connection via

broadband technology, which provides fast data transfer speed and always on connectivity. Through the broadband technology user can download any webpage directly, play online games, communicate in real time using chat and more.

Many public places, such as shopping malls, shops, hotels, restaurants, airports, and railway stations have *Wi–Fi Hotspots*. Wi–Fi Hotspots provides wireless network to the computers and many other devices.

Mobile users can share their Internet connection with other by creating Wi–Fi Hotspot in their mobile devices.

10.3.1 Internet Service Provider :

An Internet Service provider is also called Internet access provider, is an organization that provides individuals and organizations, access to the Internet. To provide the services the ISPs are charging fees from the customer. ISPs often charged a fixed amount to provide Internet services, or offering various plans to their customer, which are based on speed, download or time duration. Sometimes, ISPs also offer additional services like email, online storage etc.

Bandwidth means the amount of data travels on the network in designated time period. A higher bandwidth means more data transmit per second. Bandwidth can be in Kbps (Kilo Bits per second), MBPS (Mega Bits per second) or in Gbps (Giga Bits per second).

❑ Check Your Progress – 2 :

1. You can share the Internet from your mobile to your friend's mobile by creating _____ in your mobile.

   [A] Wi–Fi Router

   [B] Wi–Fi Hot spots

   [C] By choosing Internet share option

   [D] None of the above

2. ISP stands for _____.

   [A] International Service Provider [B] Internet Server Provider

   [C] Internet Service Provider [D] International Server Provider

3. _____ means the amount of data travels on the network in designated time period.

   [A] ISP [B] Wi–Fi [C] Bluetooth [D] Bandwidth

10.4 IP Addresses :

The internet relies on the addressing system same as our postal services to transmit the data from source machine to destination machine. Each machine on an Internet has unique address which is known as IP (Internet Protocol) address. IP address is a sequence of numbers that uniquely identify the location of the machine or device connected with the Internet.

There are two IP addressing schemes are available on the Internet : IPv4 (IP version 4) and IPv6 (IP version 6). In IPv4 total 32 bits are used to address any machine on the Internet. These 32 bits are divided into the group of four 8–bits longs number. Therefore, all four numbers of the IPv4 has to be smaller than 255 (as $2^8 = 256$) and it is separated by '.' (dot). For example, 192.168.111.1 is a valid IP address but 192.768.56.3 is not valid IP address as 768 > 255.

To overcome shortage of IP addresses, as a greater number of devices are connecting to the Internet new addressing scheme IPv6 is used. In IPv6, each machine is assigned 128–bit long IP address. Which divided into eight numbers. Therefore, each number of the IPv6 is a 16–bit long, which is further divided into four hexa–decimal digits (as we know to represent 1 hexa–decimal digit, we need 4–bits). All eight numbers are separated by ' :'(colon). For example, fe80:2b97 :3095:10c8:58a7:3ce9:12af:2c45 can be a valid address.

❑ **Check Your Progress – 3 :**

1. Identify the Invalid IP address from the given below.

   [A] 192.168.111.1 [B] 259.37.21.1

   [C] 8.8.8.8 [D] 170.16.0.1

2. In IPv4 addressing, _____ bits are used to address any device.

   [A] 16 [B] 32 [C] 64 [D] 128

3. The length of the IPv6 is of _____ bits.

   [A] 16 [B] 32 [C] 64 [D] 128

10.5 Domain Names :

We know that, each machine on the Internet has unique IP address. Machines are communicating with each other using IP addresses. But it is difficult to memorise the IP address of each server on the Internet for human. We always memorise facrbook.com, baou.edu.in, amazon.in and so on, and not the IP address of the servers on which these sites are hosted. Domain name converts these names into the IP addresses.

A domain name is a text–based name that corresponds to the IP address of a server that hosts a website. Usually, to open any website we type the domain name in the URL (Uniform Resource Locater) field in the browser. The suffix of the domain is called TLD (Top–Level Domain), which identifies the type of the organization associated with the domain. The list of the TLDs and its purpose is described in the table given below :

TLD	Intended Purpose
.com	Commercial organization, companies and businesses
.edu	Educational Institutes
.gov	Government Agencies
.mil	Military organizations
.net	Network provider, commercial companies
.org	Non–profitable organizations

❑ **Check Your Progress – 4 :**

1. _____ will convert the names of website into the IP address of the server on which the website is hosted.

   [A] DHCP [B] FTP [C] TCP [D] DNS

2. _____ is the TLD of your university web site's URL.

   [A] .com [B] .edu.in [C] .edu [D] .org

3. TLD for the agencies working for government is _____.

   [A] .agc [B] .edu [C] .gov [D] org

10.6 The Web :

The Internet is developed in the late 1960, the Web or World Wide Web (WWW) emerged in early 1990. It is an easier method to access the information available on the server, using a browser online. *The web* is a collection of world–wide websites. The Website is a collection of related Webpages, and associated items such as documents, audio, video, image etc. *Webpages* are electronic documents which provides information and are stored on special computer called *Webserver*.

10.6.1 Navigating the Web :

The computer or device from which we access the web page is called *client computer*. To access the website, we need to use specialized software called Browser. Browser has specialized field called URL (Uniform Resource Locator). We need to type domain name like 'www.baou.edu.in' in the URL field. Brower now send a request to the webserver on which the website is hosted. Webserver then accept the request, process the requested web page and provides response (information) to the requested browser. Client and Webserver machines are communicating with each other using special, stateless protocol called *HTTP* (Hypertext Transfer Protocol).

Web technologies matured in the middle of the year 2000. Industry experts introduced the new version of the web called Web 2.0 to refer the websites that provides a mean for users to share personal information (social networks), allow user to modify the content of the website, and provide dynamic and interactive web applications through browser.

10.6.2 Browsers :

As we have discussed, a client software used to access the content of the webpages of a website is called browser. Different types of browsers are available from different companies. In fact, browser also comes up with operating systems too. Different browsers which are available today are listed below :

1. **Chrome :** Chrome is a newer browser introduces by Google in 2008. The browser is available for Windows, Mac OS, Android and many other operating systems. Chrome provides independent tabbed browsing.
2. **Firefox :** Firefox browser is developed by Mozilla Corporation. It is available for Windows, Mac OS, Linux, Android and many other operating systems. Firefox is well known for its extensive array of plug–ins. It was first released in 2004. It doesn't come with the operating system, but you have to download and install it into the device.
3. **Internet Explorer :** Internet Explorer is also popular browser introduced by Microsoft Corporation in 1995. It comes with Microsoft's Windows operating system. In Windows–10 you can get the upgraded version of it, that is Microsoft Edge.
4. **Opera :** The second oldest browser is opera browser. It is small in size, fast and free. Opera browser is also available for Windows and Android operating system. To enjoy Opera browser, you need to download and install it.
5. **Safari :** Safari browser comes as preinstall browser in Apples computers. Safari is a default browser for Mac OS and IOS (operating system of Apple's iPhone). It was first released in 2003. The browser becomes well

known for its sleek design, built–in sharing feature for social networks, parent control and fast performance.

10.6.3 Webpage Design :

As we know, website is a collection of related webpages and contents like documents, images, audios, videos etc. The webpages are interlinked with other. A link on the web which, refers to the other web page is called hyperlink. Hyperlink is a built–in connection to other documents, graphics, audio files, videos, web pages, or websites.

To design the web pages a special language is used called HTML (Hypertext Mark–up Language). It is not a programming language like C, C++, Java etc. HTML has some predefined tags to design the web pages. <HTML>, <HEAD>, <TITLE>, <BODY> etc. are predefined tags. Each tag of HTML has its specific meaning, for example <B> tag is used to make the text bold and so on.

HTML is used just to design the web pages. Using HTML, we can build informatic static website only. To build dynamic and interactive web pages, other languages like JavaScript, VB.NET, C#.NET, PHP etc. are also used with HTML. The compiler for JavaScript is available in the most browsers, therefore it is called a client–side scripting language. VB.NET, C#.NET and PHP code will be processed by the server, so it is called server–side languages.

10.6.4 Internet Communications :

Web is one of the services on the Internet. Other services on the Internet facilitate communication among the users, including the following :

1. Email allows us to send messages to and receive messages and files from other users via a computer network.
2. With messaging services, we can have real–time typed conversation with another connected user.
3. VoIP (Voice over Internet Protocol) enables users to speak to other users over the Internet.
4. With FTP (File Transfer Protocol), users can transfer files to and from other computers on the Internet.

❑ **Check Your Progress – 5 :**

1. _____ is a browser.

   [A] Word [B] Opera [C] Chrome [D] Firefox

2. The protocol used between browser and web server is _____.

   [A] TCP [B] FTP [C] HTTP [D] DHCP

3. _____ is a client–side scripting language.

   [A] VB.NET [B] JavaScript [C] C#.NET [D] PHP

10.7 Let Us Sum Up :

In this unit, we have :

- Discussed what is Internet and How it evolved.
- Elaborated Internet connections and role of ISPs.
- Described importance of IP–Addresses and Domain Names.

- Talked about The Web Technologies.
- Discussed Web page design and Internet Communications.

10.8 Suggested Answers For Check Your Progress :

❑ **Check Your Progress 1 :**

1. [B] 2. [A] 3. Publicly

❑ **Check Your Progress 2 :**

1. [B] 2. [C] 3. [D]

❑ **Check Your Progress 3 :**

1. [B] 2. [C] 3. [D]

❑ **Check Your Progress 4 :**

1. [D] 2. [B] 3. [C]

❑ **Check Your Progress 5 :**

1. [A] 2. [C] 3. [B]

10.9 Glossary :

PHP : Hypertext Pre–Processor. It is a server–side technology.

HTML : Hypertext Mark–up Language. It is language of predefined tags, used to design the static and informative web pages.

HTTP : Hypertext Transfer Protocol. It is a protocol used by client (Browser) and web–server to communicate with each other. It is a stateless protocol.

TLD : Top–Level Domain. It is a prefix of website URL. For example .com, .edu, .gov, .mil etc are TLDs of the website URL.

10.10 Assignment :

1. Write a short note on IP–Addresses.
2. List and explain different types of browsers.
3. Explain the term 'ISP'.

10.11 Activity :

Find out the name of different ISPs providing their services into your area, also write the name of your ISP, your Internet connection plan details and bandwidth you are getting into your mobile or computer.

10.12 Further Reading :

1. Computer Fundamentals by P.K.Sinha and Priti Sinha.
2. Discovering Computers 2016 by Shelly Cashman Series. CENGAGE publications.
3. Computer Fundamentals by Pearl Software, Khanna Book Publishing.