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COMPUTER SCIENCE With python

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Textbook for Class XII

- Programming & Computational Thinking
- Computer Networks
- Data Management (SQL, Django)
- Society, Law and Ethics

SUMITA ARORA

DHANPAT RAI & Co.

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17 Society, Law and Ethics

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17

Society, Law and Ethics

In This Chapter

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17.1 INTRODUCTION

We are now living an era called the information age where we see that most our activities are technology–influenced, be it making an online payment, creating or development of own piece of art or information (such as writing articles or clicking photographs and so forth). With the reach of technology to our day to day life, there has been a paradigm shift, and it has also raised specific issues and problems related to society, ethics and law. In this chapter, we shall talk about topics about this very domain such as intellectual property rights, plagiarism, cybercrime, cyberlaw, e-waste management etc.

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17.2 ETHICAL ISSUES

These days, we can easily say that our society is information society and our era is information era. As we all know that ***information is the means to acquire knowledge***. In other words, we can say that *information forms the intellectual capital* for a person or body. However, there are many ethical issues involved with the usage and availability of information.

Some common ethical issues are :

(*i*) Intellectual property rights
(*ii*) Plagiarism
(*iii*) Digital property rights

17.2.1 Intellectual Property Rights

As mentioned earlier, information makes intellectual property. Any piece of information is produced or created with a lot of efforts and it consumes a lot of time. The cost factor is also involved with the creation or production of information. Though once produced, it becomes very easy to duplicate it or share it with others. But this very thing makes information difficult to safeguard unlike tangible property.

NOTE

Intellectual property rights are the rights of the owner of information to decide how much information is to be exchanged, shared or distributed. Also it gives the owner a right to decide the price for doing (exchanging/sharing/distributing) so.

The creator/producer of the information is the real owner of the information. And the owner has every right to protect his/her intellectual property. To protect one's intellectual property rights one can get information copyrighted or patented or use trademarks.

The ethical issue involved with it is that information must not be exchanged without the consent of its owner.

The intellectual property rights must be protected, for it :

- encourages individuals and businesses to create new software and new software applications, as well as improving existing applications,
- ensures new ideas and technologies are widely distributed,
- promotes investment in the national economy.

17.2.2 Plagiarism

Simply put, *Plagiarism* means *stealing*. Surprised? If you look into an English dictionary to find the meaning of word plagiarism, it will give somewhat like "the unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work."

PLAGIARISM

Plagiarism is stealing someone else's intellectual work and representing it as your own work without citing the source of information.

Thus, **Plagiarism** is stealing someone else's intellectual work (can be an idea, *literary work* or *academic work* etc.) and representing it as your own work without giving credit to creator or without citing the source of information.

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Any of the following acts would be termed as Plagiarism :

- Using some other author's work without giving credit to the author.
- Using someone else's work in incorrect form than intended originally by the author/creator.
- Modifying/lifting someone's production such as *music-composition* etc. without attributing it to the creator of the work.
- Giving incorrect or incorrect source of information *i.e.*, wrongful citation.
- Failure in giving credit or acknowledging the contribution of others in a collaborative effort, to which you are also part of.

How not to Plagiarize ?

As most universities[1] put in their student-handbook. 'To avoid plagiarism :

You must give credit whenever you use

- another person's idea, opinion, or theory;
- quotations of another person's actual spoken or written words ; or
- Paraphrase of another person's spoken or written words.

Plagiarism is Offence

'If plagiarism involves copying not only ideas but also a substantial portion of a copyrighted work without attribution and without permission, it would amount to both copyright infringement and the violation of the 'special right' of the author to be credited.

Copyright infringement and the violation of an author's right to be credited are both civil wrongs and criminal offences. A civil suit may be instituted, and criminal charges may also be filed'[2].

Both civil suit and criminal charges are punishable offences and amount to fine and penalties.

17.2.3 Digital Property Rights

Digital property (or **digital assets**) refers to any information about you or created by you that exists in digital form, either online or on an electronic storage device. All of your digital property comprises what is known as your ***digital estate***.

> **DIGITAL PROPERTY**
>
> **Digital property** (or **digital assets**) refers to any information about you or created by you that exists in digital form, either online or on an electronic storage device.

Examples of digital property include : *any online personal accounts, such as email and communications accounts, social media accounts, shopping accounts, photo and video sharing accounts, video gaming accounts, online storage accounts, and websites and blogs that you may manage ; domain names registered in your name ; intellectual property, including copyrighted materials, trademarks, patents and any software or code (such as software tools created by you or games or apps created by you) you may have written and own etc.*

Digital property rights lie with the owner. Legally a person who has created it or the owner who has got it developed by paying legally is the legal owner of a digital property. Only the owner can use and decide who all and in what form can his/her digital asset may be used by other, whether by making payments or by buying it or by obtaining its license or usage rights etc. But this is not the case generally; there are many threats to digital properties.

1. Found in most universities' guidelines for students/ student-handbooks
2. www.mxmina[illegible]:om (interview of *Nandita Saikia*)

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Threats to Digital Properties

Let us briefly talk about common threats to digital properties :

1. **Digital software penetration tools.** Although one needs to buy usage rights or license to use a digital property, there are many software penetration tools such as *cracks* and *keygens*, tools created by hackers to penetrate your software's registration system and enable unauthorized users to freely access your software without actually paying for it.
2. **Stealing and plagiarizing codes of your digital properties.** Sometimes other developers somehow get hold of your software's source code and then create plagiarized versions of your code and use it in their own software. In other words, they steal your software's source code and use it to build their own versions of it, and then sell it under their own company name.

Digital Property Rights Protection

As there are multiple types of threats to digital properties, there are many ways you can ensure protection of your digital properties.

Let us talk about these protective measures :

1. **Anti-Temper Solutions.** There are many anti-tamper solution available today which ensure that your digital property is tamper-proof. These anti-temper solutions use a host of advanced technologies to prevent hackers from hacking, reverse-engineering or manipulating your digital properties such as *utility tools, software, apps, video games* and so forth.
2. **Legal Clauses.** Add legal clause in the clauses of use of your software/digital properties. You must include a transparent clause in your software's *Terms of Service* that prohibits the scraping of your software's source code for reuse. This is a sound legal backup for you.
3. **Limit the sharing of software code.** You should share your software code only with trusted individuals who are part of development team. You should also use a Digital Rights Management (DRM) solution to protect your software from being scraped for source code using decompilers etc.

17.3 OPEN SOURCE PHILOSOPHY AND SOFTWARE LICENCES

Broadly the term '*open source software*' is used to refer to those categories of software / programs whose licenses do not impose much conditions. Such software, generally, give users freedom to run/use the software for any purpose, to study and modify the program, and to redistribute copies of either the original or modified program (without having to pay royalties to previous developers).

There are many categories of software that may be referred to as open source software. Following subsection is going to talk about the same.

17.3.1 Terminology

Before we talk about various terms and definitions pertaining to '**Open**' world, you must be clear about *two* terms which are often misunderstood or misinterpreted.

These terms are :

- Free software and
- Open source software

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Free Software

Free Software means the software is freely accessible and can be freely used, changed, improved, copied and distributed by all who wish to do so. And no payments are needed to be made for **free software.**

The definition of **Free Software** is published by *Richard Stallman's Free Software Foundation.* Here is the key text[3] of that definition :

> *"Free software" is a matter of liberty, not price. To understand the concept, you should think of "free" as in "free speech," not as in "free beer." Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software :*
>
> - *The freedom to run the program, for any purpose (freedom 0).*
> - *The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.*
> - *The freedom to redistribute copies so you can help your neighbor (freedom 2).*
> - *The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.*
>
> *A program is free software if users have all of these freedoms.*

Open Source Software

Open Source Software, on the other hand, can be **freely used** (in terms of making modifications, constructing business models around the software and so on) but it ***does not have to be free of charge.*** Here the company constructing the business models around *open source software* may receive payments concerning support, further development. What is important to know here is that in *open source software, the source code is freely available* to the customer.

17.3.2 Philosophy of Open Source

Open source software is officially defined by the **open source definition** at *http://www.opensource.org/docs/definition_plain.html.*

It states that :

Open source doesn't just mean access to the source code. The distribution terms of open-source software must comply with the following criteria :

Free Redistribution	No restriction on the re-distribution of the software whether as a whole or in part.
Source Code	The program must include source code, and must allow distribution in source code as well as compiled form.
Derived Works	The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

3. Excerpt courtesy *Free Software Foundation.* This keytext is available at *www.gnu.org/philosophy/free-sw.html.*

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Integrity of the Author's Source Code	The integrity of the author'source code must be maintained. Any additions / modifications should carry a different name or version number from the original software.
No Discrimination Against Persons or Groups	The license must not discriminate against any person or group of persons.
No Discrimination Against Fields of Endeavor	The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.
Distribution of License	The rights attached to the program must apply to all to whom the program is redistributed.
License must not be Specific to a Product	There must not be any restriction on the rights attached to the program, *i.e.*, there should not be a condition on the program's being part of a particular software distribution.
The License must not Restrict other Software	The license must not place restrictions on other software that is distributed along with the licensed software. *For example,* the license must not insist that all other programs distributed on the same medium must be open-source software.
Licence must be Technology Neutral	No provision of the license may be predicated on any individual technology or style of interface.

A software which is **free** as well as **open** belongs to category **FOSS** (*Free and Open Source Software*).

NOTE

The terms Free and Open represent a differing emphasis on importance of ***freedom*** (*free software*) or ***technical progress*** (open source software).

17.3.3 Definitions

After understanding the difference between the terms free and **open**, let us now proceed to our discussion on terminology and definitions pertaining to open source software.

OSS and FLOSS	OSS refers to *open source software,* which refers to software whose source code is available to customers and it can be modified and redistributed without any limitation. An OSS may come free of cost or with a payment of nominal charges that its developers may charge in the name of development, support of software. FLOSS refers to *Free Libre and Open Source Software* or to *Free Livre and Open Source Software.* The term FLOSS is used to refer to a software which is both ***free software*** as well as ***open source software***. Here the words **libre** (a Spanish word) and **livre** (a Portuguese word) mean ***freedom***.
GNU	GNU[4] refers to ***GNU's Not Unix***. GNU Project emphasizes on freedom. The GNU project was initiated by *Richard M. Stallman* with an objective to create an operating system. With time, GNU project expanded and now it is not limited to only an operating system. Now, it offers a wide range of software, including applications apart from operating system.

4. GNU is recrusive acronym for GNU's Not Unix. A recursive acronym is the one that uses its abbreviation in full form *e.g.*, VISA is also recursive acronym – **V**ISA **I**nternational **S**ervice **A**ssociation.

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FSF

FSF is *Free Software Foundation*. FSF is a non-profit organization created for the purpose of supporting free software movement. *Richard Stallman* founded FSF in 1985 to support GNU project and GNU licences. Now a days, it also works on legal and structural issues for the free software community.

OSI

OSI is *Open Source Initiative*. It is an organization dedicated to cause of promoting open source software. *Bruce Perens* and *Erics Raymond* were the founders of OSI, that was founded in February 1998.

OSI specifies the criteria for open source software and properly defines the terms and specifications of *open source software*.

Open source doesn't just mean access to the source code. The distribution terms of open source software must comply with the *Open Source Definition* by OSI.

Freeware

The term *freeware* is generally used for software, which is available free of cost and which allows copying and further distribution, but not modification and whose source code is not available. Freeware should not be mistaken for open software or for free software. Freeware is distributed in binary form (ready to run) without any licensing fee. In some instances the right to use the software is limited to certain types of users, for instance, for private and non-commercial purposes. One example is Microsoft Internet Explorer, which is made available as freeware.

W3C

W3C is acronym for *World Wide Web Consortium*. W3C is responsible for producing the software standards for world wide web. The W3C was created in October 1994, to lead the world wide web to its full potential by developing common protocols that promote its evolution and ensure its interoperability.

The World Wide Web Consortium (W3C) describes itself as follows :

The World Wide Web Consortium exists to realize the full potential of the Web.

The W3C is an industry consortium that seeks to promote standards for the evolution of the Web and interoperability between WWW products by producing specifications and reference software. Although industrial members fund W3C, it is vendor-neutral, and its products are freely available to all.

Proprietary Software

Proprietary software is the software that is *neither open nor freely available*. Its use is regulated and further distribution and modification is either forbidden or requires special permission by the supplier or vendor. Source code of proprietary software is normally not available.

Shareware

Shareware is software, which is made available with the right to redistribute copies, but it is stipulated that if one intends to use the software, often after a certain period of time, then a license fee should be paid.

Shareware is not the same thing as *free and open source software* (FOSS) for *two* main reasons : (*i*) the source code is not available and, (*ii*) modifications to the software are not allowed.

The objective of shareware is to make the software available to try for as many users as possible. This is done in order to increase prospective users' will to pay for the software. The software is distributed in binary form and often includes a built-in timed mechanism, which usually limits functionality after a trial period of usually one to three months.

Copylefted Software

Copylefted software is free software whose distribution terms ensure that all copies of all versions carry more or less the same distribution terms. This means, for instance, that copyleft licenses generally disallow others to add additional requirements to the software) and require making source code available. This shields the program, and its modified versions, from some of the common ways of making a program proprietary.

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17.3.4 Licenses and Domains of Open Source Technology

As per Open Source Initiative, *"Open source licenses are licenses that comply with the Open Source Definition — in brief, they allow software to be freely used, modified, and shared."*

Open-source licenses make it easy for others to contribute to a project without having to seek special permission. It also protects you as the original creator, making sure you at least get some credit for your contributions. It also helps to prevent others from claiming your work as their own.

Broadly used open source licences are being given below for your reference :

1. GNU General Public License (GPL)

The GNU General Public Licence (GPL) is probably one of the most commonly used licenses for open-source projects. The GPL grants and guarantees a wide range of rights to developers who work on open-source projects. Basically, it allows users to legally copy, distribute and modify software. This means, with GPL, a user can :

Copy the software	Copy the software as many times as needed. There's no limit to the number of copies one can make.
Distribute the software however you want	There is no restriction of distribution methods and styles – can be in copied form or printed form or web-link form.
Charge a fee to distribute the software	After modifying the software, you can even charge for your software, explaining why you are charging them but the software should still be under GNU GPL.
Make whatever modifications to the software you want	You are free to make any kind of modifications to the GNU GPL software. The only catch is that the other project must also be released under the GPL.

2. GNU Lesser General Public License (LGPL)

There is another GNU license : the **Lesser General Public Licence (LGPL)**. It offers lesser rights to a work than the standard GPL licence. The LGPL is used to license *free software* so that it can be incorporated into both *free software* and *proprietary software*. The LGPL and GPL licenses differ with one major exception ; with LGPL the requirement that you have to release software extensions in open GPL has been removed.

Mostly, LGPL is used by libraries. LGPL is also called GNU libraries and formally called the Library GPL.

3. BSD License

BSD licenses represent a family of permissive free software licenses that have fewer restrictions on distribution compared to other free software licenses such as the *GNU General Public License*. There are *two* important versions of BSD licence :

the New BSD License/ Modified BSD License	The New BSD License ("3-clause license") allows unlimited redistribution for any purpose as long as its copyright notices and the license's disclaimers of warranty are maintained. The license also contains a clause restricting use of the names of contributors for endorsement of a derived work without specific permission.
the Simplified BSD License / FreeBSD License	The Simplified BSD license is different from New BSD License in the sense that the latter omits the non-endorsement clause.

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4. MIT License

The MIT License is the shortest and probably broadest of all the popular open-source licenses. Its terms are very loose and more permissive than most other licenses.

The basic provisions of the license are :

- You can use, copy and modify the software however you want. No one can prevent you from using it on any project, from copying it however many times you want and in whatever format you like, or from changing it however you want.
- You can give the software away for free or sell it. You have no restrictions on how to distribute it.
- The only restriction is that it be accompanied by the license agreement. It basically says that anyone can do whatever they want with the licensed material, as long as it's accompanied by the license.

NOTE

The MIT License is the least restrictive open source license.

5. Apache License

The Apache License, grants a number of rights to users. These rights can be applied to both *copyrights* and *patents*. The Apache License offers :

Rights are perpetual	Once granted, you can continue to use them forever.
Rights are worldwide	If the rights are granted in one country, then they're granted in all countries.
Rights are granted for no fee or royalty.	There is up-front usage fee, no per-usage fee or any other basis either.
Rights are non-exclusive.	You are not the sole-licensee; other can also use the licensed work.
Rights are irrevocable	No one can take these rights away once they're granted.

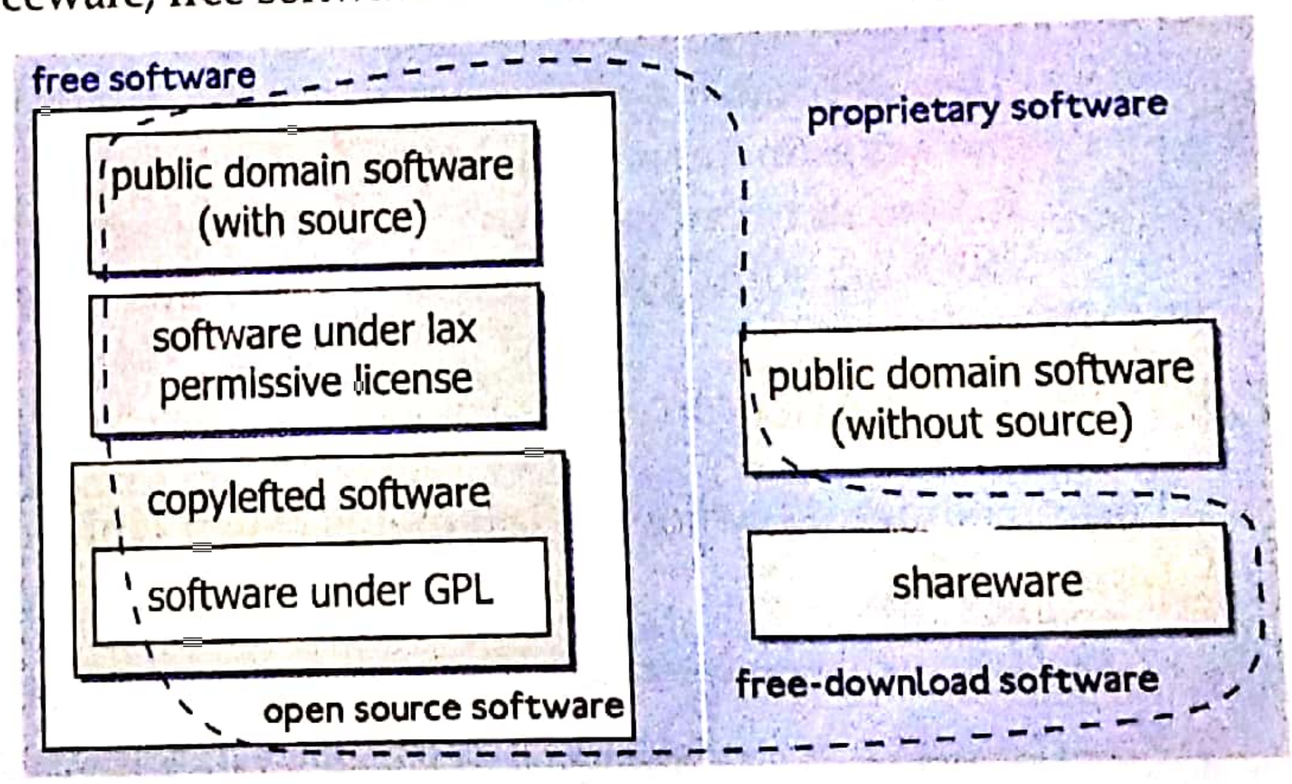
Redistributing code requires giving proper credit to contributors to the code and the same license (Apache) would remain with the software extension.

Public Domain Software vs. Proprietary Software

Public-domain software is free and can be used without restrictions. The term public-domain software is often used incorrectly to include freeware, free software that is nevertheless copyrighted. *Public domain software* is, by its very nature, outside the scope of copyright and licensing.

On the contrary, there is *Proprietary software*, which is neither free nor available for public. There is a proper license attached to it. User has to buy the licence in order to use it.

Consider the diagram (Fig. 17.1) originally made by *Chao-Kuei*[5] that describes the categories of software.



Figre 17.1 Categories and domains of software.

5. and available under GNU GPL v2.

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17.4 PRIVACY

In general, privacy means the protection of personal information given online while carrying out some online activity or transaction. In e-commerce especially, it is related to a company's policies on the use of user data.

Ethically, both the buyer and the seller must provide the correct information to each other, pertaining to the transaction that is taking place. An e-commerce company must clearly state: how it intends to use the customers' data collected this way (such as user's location, user's buying history, user's preferences etc.) or whether the customer can restrict the use of personal information.

PRIVACY

Privacy is the protection of personal information given online. In e-commerce especially, it is related to a company's policies on the use of user data.

An important factor of privacy is the **consumer consent** – whether the consumer is given a choice to decide what the information can and cannot be used for. Usually, when the proper security systems are in place, the user will not mind sharing the information necessary for a transaction to take place (needless to say, some information about the user is simply required in e-commerce, such as a delivery address, card details and name and customers are aware of this). But then the consent will relate to whether this information can be further exploited.

How to Safeguard User Privacy ?

To ensure that the user privacy is not compromised, following measures must be taken :

(*i*) The merchant or the seller must clearly state about how the user data will be used, in the terms and conditions of its site application.

(*ii*) The merchant or seller must ensure that the user has gone through the terms and conditions given on its site application prior to making any transactions.

(*iii*) The merchant must assure the user about data safety by implementing proper data safety and security measures such as *https protocol* and other security mechanism so that users' data is safe from hackers too.

(*iv*) The user must go through the terms and conditions of the seller/merchant site before providing any sensitive information and make sure that the site is a safe site by checking https protocol and padlock etc.

NOTE

To respect the privacy, the merchant or the seller must clearly state about how the user data will be used in the terms and conditions of its site and implement technical safeguards for the safety of data provided by user.

17.5 ONLINE FRAUD

Fraud committed using the Internet is called **Online fraud.** Online fraud may occur in many forms such as :

- Non-delivered goods
- Non-existent companies
- Stealing information
- Fraudulent payments etc.

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While the first two types of frauds can be countered by setting up official bodies ensuring the validity of e-commerce companies and promised delivery of goods, the last two types of frauds are more frightening. The examples of such frauds include *credit card frauds* and *identity theft*. In **credit card frauds**, the credit card details of user are stolen from his/her online activities and then some payment frauds are carried out with this stolen information. The **identity theft** is also very scary ; by stealing someone else's online identity (such as his/her social media handle, email-id etc.), fraudulent posts are posted or some other malicious /dangerous activity. (such as rumour mongering/riots fueling etc.) is carried out.

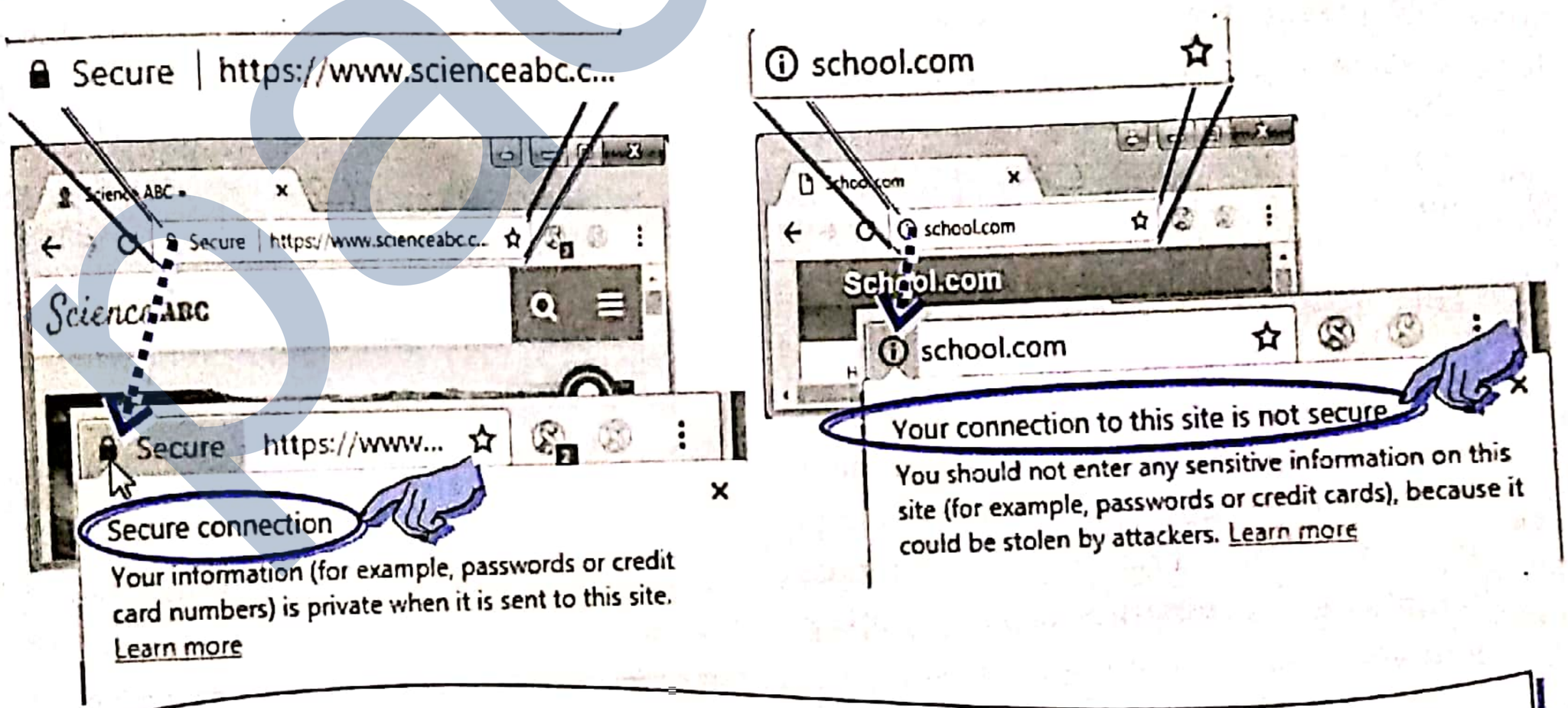
The measures to stop these frauds may include :

- A monitoring official body that ensures the sanctity of E-commerce Company and delivery of goods/services as promised.
- Strong security mechanism by the e-commerce site and payment gateways to prevent stealing of crucial information.
- Official guidelines and safeguards on the selling of users' data to third parties.

Ensure Safe sites while entering crucial information

Sometimes, you have a need to provide your crucial information such as your personal details or bank details etc. For example, you might be applying online to register for an entrance exam through a legitimate site that asks for your personal details. In such case, ensure these things :

- Type the URL of the website in the address bar of the browser on your own. Do not click on a link that takes to this website; or do not cut/copy the link of this website and paste it. TYPE THE URL ON YOUR OWN in the address bar of the web browser.
- **Ensure that the address contains HTTPs and a pad lock sign.** When this website gets loaded, before you start typing any information, ensure that the website address. A safe site's URL starts with **https://** and not with **http://**. Also, it shows a closed pad lock.



https:// in a URL means it is a ***secure connection*** and no one can see your private information. When there is no https or the URL contains only **http**, then it is an ***insecure connection***, which means your private information may get leaked.

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17.6 CYBERCRIME

Cybercrime is any criminal offense that is facilitated by, or involves the use of, electronic communications or information systems, including any electronic device, computer, or the Internet. The term, **cybercrime**, is a general term that covers crimes like *phishing, credit card frauds, illegal downloading, industrial espionage, child pornography, cyber bullying, cyber stalking, cyber terrorism, creation and/or distribution of viruses, spam* and so on.

CYBER CRIME

Any criminal offense that is facilitated by, or involves the use of, electronic communications or information systems, including any electronic device, computer, or the Internet is referred to as **Cyber Crime**.

Some cybercrimes common these days are being discussed below :

(i) Information Theft

While working online, you often enter and create information related to you. You often enter information related to payments and even about your home address etc. while shopping. This information must be safe and must not fall into wrong hands. One should be careful while working online as there are many ways through which thieves can obtain your personal information :

Phishing. Phishing is the practice of attempting to acquire sensitive information from individuals over the internet, by means of deception. Information typically targeted by phishing schemes includes passwords, user-names, bank account information, and social security numbers. The term 'phishing' is a play on 'fishing'— hackers use various forms of 'bait' in order to catch a victim.

PHISHING

Phishing is the practice of attempting to acquire sensitive information from individuals over the internet, by means of deception.

It is the criminally fraudulent process of attempting to acquire sensitive information such as usernames, passwords, credit card information, account data etc. In Phishing, an imposter uses an authentic looking email or web-site to trick recipients into giving out sensitive personal information. For instance, you may receive an email from your bank (which appears genuine to you) asking to update your information online by clicking at a specified link. Though it appears genuine, you may be taken to a fraudulent site where all your sensitive information is obtained and later used for cyber-crimes and frauds.

Social engineering/pretexting. They pose as a legitimate business or government officials to obtain your personal information from financial institutions, telephone companies, and other sources.

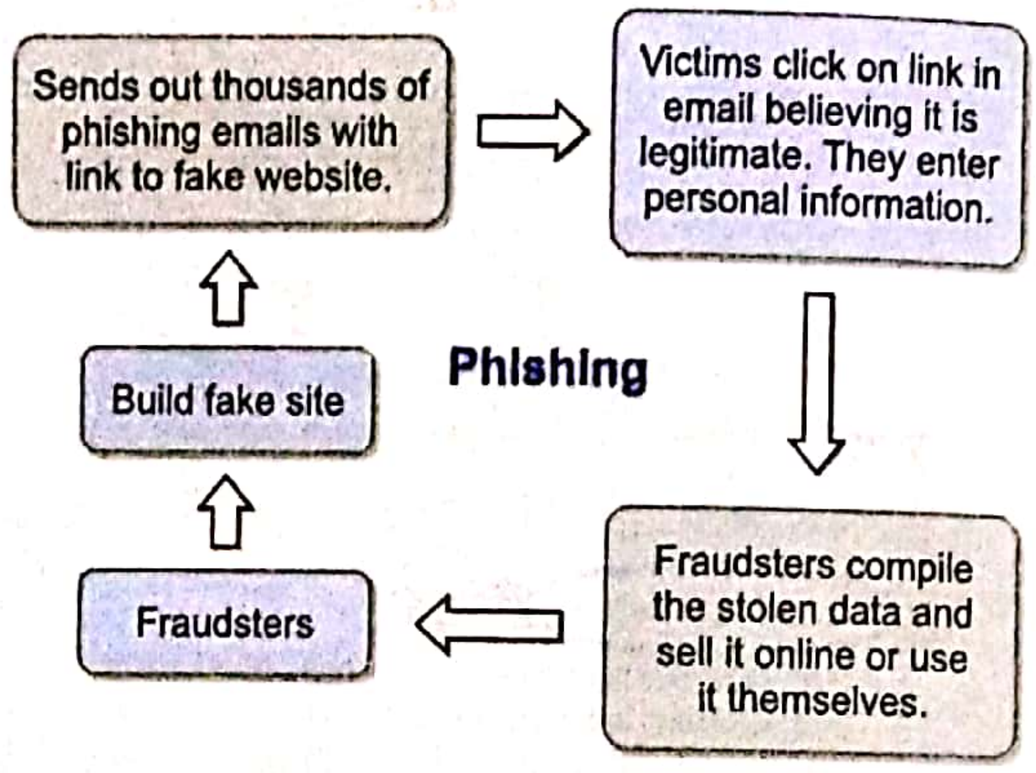

Figure 17.2 How Phishing attacks are carried out.

(ii) Scams

Any fraudulent business practice that extracts money from an unsuspecting, ignorant person is called a scam. These days, the Internet has become another primary source of scams. Scams committed over the Internet are called **online scams.**

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An example on online scam is being given below :

"Mrinalini wanted to gift her friend a customized bracelet whose picture she saw of a photo sharing website that listed the design and cost of customization. Mrinalini, happily transferred an advanced payment of ₹2450 to the account mentioned on the site and was promised a date of delivery. But to her shock, the gift never arrived. Even after repeated calls, she only had a promise that it would be delivered soon and suddenly that website account was deleted from the photo sharing website and even the numbers went dead."

This is one example of the common cyber scam that may happen to unsuspecting customers.

Measures to avoid Online Scams

Important things to keep in mind while using the Internet to avoid scam include the following :

(*i*) Never enter personal information or any financial information (banking information or credit/debit card, information) on unsecure websites, *i.e.*, the sites that do not employ HTTPS and do not have padlock sign.

(*ii*) Never reply to emails from any unknown or unreliable source.

(*iii*) Never click on any links that you have received in your email, even if you know the sender. Rather open a browser window and type the url yourself than clicking on the link in the email.

(*iv*) Never respond to an e-mail or advertisement claiming you have won something.

SCAM

Any fraudulent business practice that extracts money from an unsuspecting, ignorant person is called a **scam**.

(iii) Illegal Downloads

Illegal downloading refers to obtaining files for which you don't have the right to use or download from the Internet. It is downloading a paid digital item, without making any payment and using an illegal way to download it.

For example, If you are downloading a movie which is not available for free download, this is illegal download. Similarly, downloading a copy of the licensed software bypassing the legal measures is also illegal download.

Most items that are protected under copyright law are available against a payment. Violating this is known as illegal download. For example, a movie or a photograph or a video etc. is copyrighted in the favour of the creator/owner/producer.

A product is protected by copyright law cannot be downloaded, copied, reproduced or resold without their permission.

(iv) Child Pornography

Child pornography is defined as any visual or written representation (including images, movies and/or texts) that depict or advocate sexual activity (including sexual molestation or exploitation) of anyone under the age of 18. The law also includes some child nudity, simulated sex involving children and any material that is computer-doctored to look like child porn.

Information Technology Act, 2000 & Indian Penal Code, 1860 provides protection from child pornography. Child is the person who is below the age of 18 years.

According to the new (amended) Information Technology Bill, Section 67 has been amended – that **not only creating and transmitting obscene material in electronic form but also to browse such sites is an offence.**

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17.7 COMPUTER FORENSICS

Digital forensics or computer forensics refers to methods used for Interpretation of computer media for digital evidence. Computer forensics provides our legal system with a way to recover data from electronic or digital devices.

Computer forensics is a systematic process that interprets electronic data for use in a court of law. The goal of the process is to preserve any evidence in its most original form while performing a structured investigation by collecting, identifying and validating the digital information for the purpose of reconstructing past events.

COMPUTER FORENSICS

Digital forensics or **computer forensics** refers to methods used for Interpretation of computer media for digital evidence.

Important Practices of Computer Forensics

Computer forensics combines the elements of law and computer science so as to collect the digital evidences while ensuring that the collection process has retained data integrity, which means having proof that this digital evidence is not planted or the data has not been altered during investigation.

That is, computer forensics follows the following practices :

- Acquire the evidence without altering or damaging the original.
- Authenticate that your recovered evidence is the same as the originally seized data.
- Analyze the data without modifying it.

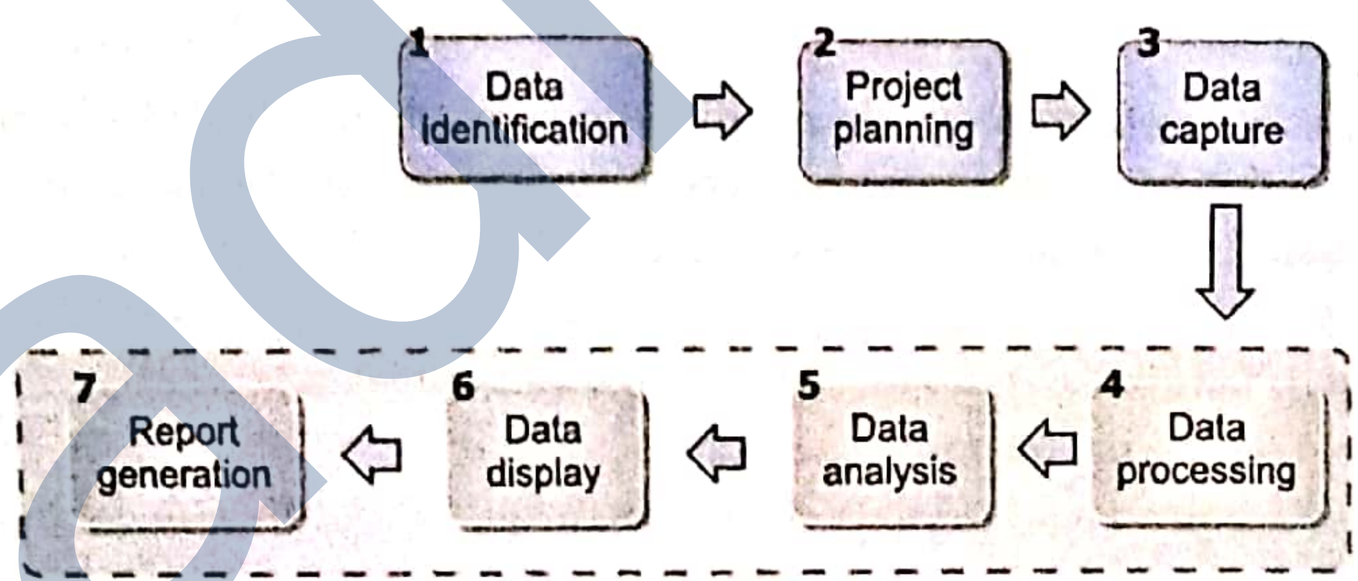

Figure 17.3 Digital Forensics investigation process.

17.8 CYBER LAW AND IT ACT

Cyberlaw is a generic term which refers to all the legal and regulatory aspects of Internet and the World Wide Web. Anything concerned with or related to or emanating from any legal aspects or issues concerning any activity of netizens and others, in Cyberspace comes within the ambit of Cyberlaw. The growth of Electronic Commerce has propelled the need for vibrant and effective regulatory mechanisms which would further strengthen the legal infrastructure, so crucial to the success of Electronic Commerce. All these regulatory mechanisms and legal infrastructures come within the domain of Cyberlaw.

Cyberlaw is important because it touches almost all aspects of transactions and activities on and concerning the Internet, the World Wide Web and Cyberspace.

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India's IT Act and IT (Amendment) Act, 2008

In India the cyber laws are enforced through **Information Technology Act, 2000** (*IT Act 2000*) which was notified on 17 October 2000. It is based on the United Nation's Commission for International Trade related laws (UNCITRAL) model law.

IT ACT 2000's prime purpose was **to provide legal recognition to electronic commerce** and to facilitate filing of electronic records with the Government, *i.e.*, to provide the legal infrastructure for e-commerce in India.

The Act was later amended in December 2008 through the **IT (Amendment) Act, 2008.** It provided additional focus on Information Security. It has added several new sections on offences including Cyber Terrorism and Data Protection. **The Information Technology Amendment Act, 2008** (IT Act 2008) came into force from October 27, 2009 onwards. Major amendments of IT ACT (2008) included :

Digital Signatures	Authentication of electronic records by digital signatures gets legal recognition.
Electronic governance	E-Documents get legal recognition. Documents required as per law by any arm of the government may be supplied in electronic form.
Offences and Penalties	The maximum penalty for any damage to computers or computer systems is a fine up to ₹1 crore.
Amendments to other laws	Other related acts such as the Indian Penal Code, 1860, the Indian Evidence Act, 1872, the Bankers' Books Evidence Act, 1891, the Reserve Bank of India Act, 1934 were to be amended to align them with the IT Act.

17.9 TECHNOLOGY AND SOCIETY

ICTs are general purpose technologies, *i.e.* technologies whose value and impact arise primarily from their use in other economic and social sectors. *Three* capabilities are especially important for economic and social development.

ICTs :

- enable greater efficiency in economic and social processes ;
- enhance the effectiveness of cooperation between different stakeholders ; and
- increase the volume and range of information available to people, businesses and governments.

Systemic impacts which ICTs have had on the development of economies, societies and culture, include :

Economic Impacts include the globalisation of production in goods and services, changes in international trade and distribution networks, changes in patterns of consumption, the virtualisation of some products and behaviours, and the growing importance of the ICT sector within the world and national economies.

Social Impacts include mass market access to an enormously increased range of information resources, enhanced freedom of expression and association, new patterns of work and human settlement, changes in the relationships between government, citizen and the state, and between citizens, and associated challenges to traditional ideas of privacy and individuality.

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17.9.1 Economic Benefits

The impact of ICT on the economic sector has a positive multiplier effect on the Business World. Some major benefits include :

1. Secure Transactions

Banks and similar institutions could be said to be the sector that have benefited the most from latest developments in ICT. Fund transfer can now be made in a matter of seconds within a locality and to the most parts of the world with a greater security than ever.

2. Ease and Availability

One doesn't need to stand in long queues for fund withdrawal ; with the use of the ATM Card and Internet banking, the banking transactions can be carried out at any time of the day within the scope of transactions allowed. Such transactions could even include payment of bills such as electricity, water rates etc.

3. Net Banking

With online or Internet banking a lots of payments and buying can be done online via one's bank account at the convenience of one's home or Office. The life wire of any business is fund availability and its timeliness and net banking ensures both.

4. Global Market

With ICT, now the market is entire globe. A small business in a small town can think of reaching to a buyer in any part of the world. And buyer's access is not just limited to his own market, (s)he can now have access to the all world market, courtesy Internet and ICT.

17.10 E-WASTE MANAGEMENT

Electronic waste, e-Waste, e-Scrap, or **Waste Electrical and Electronic Equipment** (WEEE) describes discarded electrical or electronic devices. "Electronic waste" may also be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets and refrigerators. This includes used electronics which are destined for reuse, resale, salvage, recycling, or disposal.

Of all the different types of waste, electronic waste has the characteristics of : (*a*) the fastest growing segment of waste (*b*) most valuable due to its basic composition (*c*) very hazardous if not handled carefully

17.10.1 E-Waste Disposal Process

E-Waste is categorized by the government of India under the broad class of hazardous waste. Within e-Waste, there are several categories such as Large and small household appliances, electrical and electronic toys and sporting equipment, tools, computers and related equipment and so forth.

Composition of e-waste. Electrical and Electronic equipment contains metallic and non metallic elements, alloys and compounds such as Copper, Aluminum, Gold, Silver, Palladium, Platinum, Nickel, Tin, Lead, Iron, Sulphur, Phosphorous, Arsenic etc.

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The E-waste management involves proper recycling and recovery of the disposed material. The recycle and recovery includes the following unit operations.

1. **Dismantling.** Removal of parts containing dangerous substances (CFCs, Hg switches, PCB); removal of easily accessible parts containing valuable substances (cable containing copper, steel, iron, precious, metal containing parts).
2. **Segregation of ferrous metal, non-ferrous metal and plastic.** This separation is normally done in a shredder process.
3. **Refurbishment and reuse.** Refurbishment and reuse of e-waste has potential for those used electrical and electronic equipments which can be easily refurbished to put to its original use.
4. **Recycling/recovery of valuable materials.** Ferrous metals in electrical are furnaces, non-ferrous metals in smelting plants, precious metals in separating works.
5. **Treatment/disposal of dangerous materials and waste.** Shredder light fraction is disposed off in landfill sites or sometimes incinerated (expensive), chlorofluoro-carbons (CFCs) are treated thermally, Printed Circuit Board(PCB) is incinerated or disposed off in underground storages, Mercury(Hg) is often recycled or disposed off in underground landfill sites.

17.10.2 Benefits of e-Waste Recycling

The e-Waste disposal and proper recycling is very much necessary and important for the benefit of people , environment and the nation. The key benefits are :

1. **Allows for recovery of valuable precious metals.** Most consumer electronics contain valuable materials like copper, gold and zinc that can and should be recycled. Virgin Materials are significantly more costly than recycled materials for manufacturing.
2. **Protects public health and water quality.** E-waste contains a variety of toxic substances, which may include lead, mercury and cadmium. When e-waste is disposed into landfills, these toxins can be released into the atmosphere or leak in through the land and have negative health and environmental effects.
3. **Creates Jobs.** Recycling e-waste domestically creates jobs for professional recyclers and refurbishers and creates new markets for the valuable components that are dismantled.
4. **Toxic Waste.** Mining produces toxic waste, which are linked with crop devastation and human health crisis due to water contamination
5. **Saves landfill space.** E-waste is a growing waste stream. Recycling these items will help conserve landfill space.

17.11 IDENTITY THEFT

Identity theft occurs when someone uses another person's personal information such as name, Adhaar number, driver's license number, credit card number, or other identifying information to take on that person's identity in order to commit fraud or other crimes. Stealing an identity is, unfortunately, surprisingly easy to do and happens mostly to unsuspecting victims.

IDENTITY THEFT

Online **identity theft** is the theft of personal information in order to commit fraud.

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Online identity theft is carried out through a mix of actions such as :

- through phishing via your email account.
- stealing your online purchase information where you give out sensitive information such as your credit card information or your Adhaar number.

Once someone's personal information is obtained, a thief can commit any of the following crimes :

(*i*) **Credit card fraud.** Thieves may obtain a new credit card getting blocked your original card and asking for a duplicate one.

(*ii*) **Change your personal information.** Thieves after obtaining your sensitive information may use it to change crucial information of you such as the phone number. Now you won't be getting any SMS updates even after your bank accounts are being robbed. By the time you will get to know, thieves would have robbed you fully without even your knowledge.

(*iii*) **Phone or utilities fraud.** Using your information, the thieves may get new cell phones or get some utilities that require such information.

(*iv*) **Bank/finance fraud.** Thieves may take out loans for mortgages or a car in your name.

(*v*) **Other fraud.** Thieves may use your *Adhaar number* to get variety of utilities services or even obtain a job in your name or rob you off any financial benefit that is on your name.

Protection against Identity Theft

You can protect your against identity theft by following the steps given below :

(*i*) **Protect personal information.** You should ensure that all your identification and financial documents are kept in a safe and private place. You should provide personal information only when :

- You know how it will be used
- You are certain it won't be shared
- You initiated contact and know who you're dealing with

(*ii*) **Use Unique Ids to protect your devices and accounts.** To access your online accounts and digital devices, if you use any login and password information, make sure to make them unique in a way that they are not easy to guess or break. Follow these practices:

- Avoid names, addresses, and birth dates for your passwords/login details.
- Make passwords that are hard-to-guess.
- Make sure all passwords you use include both lower-case and capital letters, numbers, and some special characters.
- Do not use same password for multiple accounts. Each of your passwords should be unique so that if one of them is compromised, the thief does not have access to anything else.

(*iii*) **Use Bio-metric protection.** Biometrics are any metrics related to human physical features such as *your voice waves, hands, fingerprints, earlobes, retina patterns, iris patterns, DNA* etc.

Modern age computing devices like smartphones provide biometric protection such as finger print login or face detection technology.

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But as with any other technology, biometric information can also be misused. Thus, you should always make sure to :

- Not to overuse it
- Use it only at places you are fully confident of and not at any unreliable place.

You should **be very careful with the safety of your biometric data** because the data stored in a biometric database is far more intimate and personal than any other kind of data. You can change passwords but you can't change your fingerprint or iris scan. This means that **once your biometric data has been compromised, there might be no going back.**

17.12 GENDER ISSUES WHILE TEACHING/USING COMPUTERS

The subject 'computers' is introduced in primary classes in most of the schools, 'Computer Science' as a major subject gets introduced only in high school. While teaching computers, there are many gender specific issues that must be addressed to enforce gender equity in computer science education. Let us talk about these issues.

17.12.1 Gender Issues

Gurvinder and *Bela* are Computer Science teachers at two different co-educational schools. Both said that in the class of the subject 'Computer Science', 60-70%[6] are boys and rest are girls. This trend *i.e.*, more boys opt for 'Computer Science' than girls, has been continuing for years now. So '*under representation*' of girls is one major issue.

There are some other issues as well. Let us discuss some major gender issues at school-level Computer Science education.

1. Under Representation

In India, this has been commonly observed over cities that girls are under represented in 'Computer Science' studies be it 'Computer Science' major subject at high school or 'Computer Science major' at college level. There are far less girls than boys in a computer science section.

A leading engineering institution of India has reported that there has been about 17% of girls represented in 'Computer Science' engineering in recent years.

There are many factors that are attributed as the reasons behind this. These are :

(*i*) **Preconceived Notions.** There are many preconceived notions prevalent that subconciously play a role. Notions like '*boys are better at technical things, girls are good at humanities, arts etc.*'; '*girls must take up a career keeping in mind that they have to raise a family. They must not take up high involvement careers*', and '*Teaching is the best option for girls as it gives you half day off and ample number of holidays so that you can easily take care of your family*', etc. have their impact in decision making of girls while taking up subjects. Also, in India, parents play an important role while deciding about subjects and parents directly/indirectly push these pre-conceived notions influencing girls' decisions and girls end up taking other subjects than 'Computer Science'.

(*ii*) **Lack of Interest.** During primitive years, children often play games on computers/smartphones. Most games available today are boys-centric that increase their interest in computers. Also, at homes boys get to play more on computers/smartphone (keeping in mind the entire India scenario) and develop more interest in computers than girls.

6. A rough figure as estimated in an informal talk.

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(*iii*) **Lack of Motivation.** Girls are pressurised to choose a career option which will give them 'work life balance' in favour of family roles they have to play later on. Girls are always told directly/indirectly in households that you have to play important family role later on and indulging in a subject which will consume most of your time is not advisable as no matter what, whatever job option you choose, you cannot shy away from your family role. This 'double burden' theory also discourages girls from taking up technical subjects like Computer Science.'

(*iv*) **Lack of Role Models.** Girls these days see less of role models in the field of 'Computer Science' whom they can imitate. TV, movies, advertisements, every where it is portrayed that is technical fields like 'Computers Science', are men's fields. If you see a woman scientist in a team, there are 10 other scientists who are males, in a movie/advertisement etc. what would you think sub-consciously. All these things influence girls sub-psychologically and they infer that 'Computer Science' is for boys and do not take up the subject.

(*v*) **Lack of Encouragement in class.** As there are lesser number of girls in a class, the teachers for most work-assignments end up choosing more boys. Also, less number of girls means, lesser peer-encouragement. Also, some teachers pin point on their roles in society such 'girls will get married and may not take it up as career'. All this may play as a hindrance and girls do not develop as much interest as they can in 'Computer Science' subjects.

2. Not Girl-Friendly Work-Culture

It has been observed that when, in schools, work-partners are chosen, boys prefer boys over girls. And even if a girl and a boy are made work-partners, boys prefer to work actively and make girls silent observers. Boys are not comfortable in situations where they are not playing active roles.

Even if girls are given separate computers to work on, they are very shy of working actively. As per a study, the problems mentioned by girls in a computer room are like : 'insufficient access time', 'difficulty with maintenance' or 'insufficient peripherals available' etc. contrary to problems mentioned by boys such as 'software not usable', 'limitations of software', 'poor quality of help' etc.

17.12.1A Possible Solutions

The issues listed above are not intentionally created, hence they need a different type of handling.

(*i*) There should be more initiatives and programmes that encourage girls to take up Computer Science subject. Presently there are many initiatives supported by government and run by many tech-giants to encourage more girls to take up 'Computer Science' subject.

(*ii*) The Film and TV censor board should ensure fair representation of female role models in TV, cinema etc. so that more girls get encouraged to take up 'Computer Science'.

(*iii*) In the practical rooms, girls should be encouraged more to work on computers on their own and also to find solutions of their routine problems such as 'peripheral not available'. They should assertively speak to the lab attendant to get all the peripheral devices they want. They should be encouraged to celebrate small success in the lab (such as a bug successfully removed) to big success (such as project working superbly). This will instill more confidence and more interest in girls to work with 'Computer Science' subject.

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17.13 DISABILITY ISSUES WHILE TEACHING AND USING COMPUTERS

Increased focus on 'inclusive education' and promoting access for students with disabilities and impairments, in the field of technology and computer science have made today's classroom really diverse and inclusive. While at one end, it has positively aided to the cause of 'inclusive education', on the other side, there are many issues that have risen and those must to taken care of in order to impart real education.

In the specially abled students, there can be one or more disabilities :

(*i*) **Locomotor disabilities.** Severe deformities, polio, leprosy, cerebral palsy.

(*ii*) **Hearing and speech disabilities.** Hearing impairment, speech aphasia.

(*iii*) **Cognitive impairment.** Specific learning deficits (Dyslexia, Dyscalculia), Down's syndrome, Autism.

(*iv*) **Vision impairment.** low vision, blindness.

Various disability issues faced in the teaching/using computers with regard to above disabilities are being discussed below.

1. Unavailability of Teaching Materials/Aids

Students with different disabilities need different types of teaching aids/materials. For instance, visually challenged students would want that there are screen readers that could read the digital content to them ; also programming lessons should not involve visual inputs (*e.g.*, in classes 9-10 there are two alternatives for programming concepts : Python for visually impaired students and Scratch for others).

Similarly, hearing impaired students would want more of visual input than oratory, rather oratory instructions should be available in sign language if possible.

A lot of children, not all, with locomotor disabilities are both keyboard disabled and mouse disabled; however, they can use virtual keyboards for writing computer programs. For virtual keyboards supporting such students, following types of hardware are required :

1. Sophisticated virtual keyboard software.
2. A joystick that is specific to the needs of the child.
3. A programming editor that can be interfaced with the virtual keyboard, and does not require any mouse movements.

For low-vison students, **Braille keyboards, Braille monitors,** and **Braille printers** along with **screen readers** should be made available to facilitate their learning and working on computers.

Unavailability of such supportive programming aids and software are a big issue that must be handled by schools and their managements.

2. Lack of Special Needs Teachers

For different types of special needs, if special needs teachers are available, disabled students get their needs addressed in right manner *e.g.*, for hearing impaired students, a teacher who is able to converse in sign language would be able to convey and explain the study material than traditional methods.

There should be teachers who know what types of hardware, software, tools etc. can be used for the differently able students as per their specific needs, *e.g.*, special types of specialized hardware such as *Braille keyboards, monitors, printers, synthetic speech generators* etc., software assistants such as *Google assistant* etc.

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There are many types of software features and voice assistants that visually impaired students can use, *e.g.*,

- Microsoft's ***Narrator*** and ***Cortana*** and Ubuntu's ***Orca*** and ***onBoard***, the voice assistants which blind people can use for a variety of essential tasks.
- A special version of Linux called **BLinux** especially meant for the blind.
- host of accessibility features of various Office software that can be easily activated. These features are present in both Microsoft Office and open source offerings such as Apache OpenOffice and LibreOffice.
- Specialized editor for visually impaired students for typing programs.

Check Point 17.1

1. Credit card fraud may include :
   (*a*) Stealing of credit card
   (*b*) Unauthorized and illegal use of credit card
   (*c*) Both of the above
   (*d*) Neither
2. Using someone else's twitter handle to post something, will be termed as :
   (*a*) Fraud (*b*) Identity theft
   (*c*) Online stealing (*d*) Violation
3. Standard security protocol that establishes encrypted links between a web server and a browser is called _____ .
   (*a*) Online safety technology
   (*b*) SDT technology
   (*c*) Web encryption technology
   (*d*) Secure sockets layer technology
4. Things like these, *e.g.*, online email account, social media account or handle, online shopping account, online photo sharing account, trademarks, patents, own registered domain name etc. are collectively called _____ .
   (*a*) Online identity
   (*b*) Online estate
   (*c*) Digital identity
   (*d*) Digital property
5. Name some specialized software, features that may be used by special needs students ?
6. What is computer forensics ?
7. What is phishing ?

3. Lack of Supporting Curriculum

Curriculum should be designed while keeping focus on inclusive education. There always should be possible alternatives keeping in mind special needs of the students. Software and programs should be so used so that the disabled students can easily work on that. For example, office software based curriculum can easily be implemented for all types of students as nearly all office software provide accessibility features. Similarly, a programming language that requires manual code typing, such as Python, can also be used for teaching programming as long as specialized editors are also available, but Scratch, the block based programming language should not be used as it lacks accessibility features.

Further, the computer science contents and programming contests should be so conducted so that all types of students can participate in them, inclusively.

Possible Solutions

Possible solutions for the disability issues are straight forward :

- Schools must work toward making available the required teaching aids/materials to fulfill special needs of students with disabilities. There should be proper budget allocated for buying the required material and equipment to promote inclusive education.
- School must employ special needs teachers and should also train other teachers as well about how to interact with students with special needs so as to help them learn in a better inclusive way. There should be special budget allocated for training the staff about such needs.
- Schools must support the inclusive curriculum and refrain from any other practice that directly or indirectly puts the disabled students at the disadvantaged side.

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LET US REVISE

- ***Intellectual property rights** are the rights of the owner of information to decide how much information is to be exchanged, shared or distributed ; and to decide the price for doing (exchanging/sharing/distributing) so.*
- ***Plagiarism** is stealing someone else's intellectual work and representing it as your own work without giving credit.*
- *Digital property (or digital assets) refers to any information about you or created by you that exists in digital form, either online or on an electronic storage device.*
- *OSS refers to Open Source Software, which refers to software whose source code is available to customers and it can be modified and redistributed without any limitation. An OSS may come free of cost or with a payment of nominal charges that its developers may charge in the name of development, support of software.*
- *FLOSS refers to Free Libre and Open Source Software or to Free Livre and Open Source Software. The term FLOSS is used to refer to a software which is both **free software** as well as **open source software**. Here the words **libre** (a Spanish word) and **livre** (a Portuguese word) mean **freedom**.*
- *Fraud committed using the Internet is called Online fraud (e.g, fraudulent payments, identity theft etc.)*
- *Secure data transmission means applying enough technical safeguards so that data travels safely to its target, without being compromised or eavesdropped.*
- *Phishing is the practice of attempting to acquire sensitive information from individuals over the internet, by means of deception.*
- *Any fraudulent business practice that extracts money from an unsuspecting, ignorant person is called a scam.*
- *Digital/computer forensics refers to methods used for Interpretation of computer media for digital evidence.*
- *Online identity theft is the theft of personal information in order to commit fraud.*
- *Gender issues while teaching/using computers are : under representation of girls, not girl-friendly work-culture.*
- *Disability issues while teaching/using computers are unavailability of teaching materials/aids, lack of special needs teachers and lack of supporting curriculum.*

Solved Problems

1. *What is Online fraud ?*

Solution. Fraud committed using the Internet is called **Online fraud**. Online fraud may occur in many forms such as :

non-delivered goods ; non-existent companies ; stealing information ; fraudulent payments etc.

2. *What is secure data transmission ? What technical ways are used to ensure the secure data transmission ?*

Solution. Secure data transmission means applying enough technical safeguards so that data travels safely to its target, without being compromised or eavesdropped.

To ensure secure data transmission, majorly following techniques are applied :

(*i*) ***SSL secure data transmission.*** SSL (Secure Sockets Layer) is a standard security protocol which ensures data security by establishing encrypted online links between a web server and a browser.

(*ii*) **Data encryption.** Encrypted data when sent over Internet is hard to steal and hence is safer.

(*iii*) **Using Safe protocols** such as for files, secure FTP protocol.

3. *What are intellectual property rights ?*

Solution. **Intellectual property rights** are the rights of the owner of information to decide how much information is to be exchanged, shared or distributed. Also it gives the owner a right to decide the price for doing (exchanging/sharing/ distributing) so.

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4. *Why should intellectual property rights be protected ?*

Solution. The intellectual property rights must be protected because protecting them

- encourages individuals and businesses to create new software and new software applications, as well as improving existing applications,
- ensures new ideas and technologies are widely distributed,
- promotes investment in the national economy.

5. *What do you understand by plagiarism ? Why is it a punishable offence ?*

Solution. Plagiarism is the act of using or stealing someone else's intellectual work, ideas etc. and passing it as your own work. In other words, plagiarism is a failure in giving credit to its source.

Plagiarism is a fraud and violation of Intellectual property rights. Since intellectual property holds a legal entity status, violating its owner's right is a legally punishable offence.

6. *What is digital property ? Give some examples of digital properties.*

Solution. Digital property (or digital assets) refers to any information about you or created by you that exists in digital form, either online or on an electronic storage device.

Examples of digital property include : **any online personal accounts (email/social media accounts/ shopping accounts/video gaming accounts, online storage accounts) and personal websites and blogs ; domain names registered in your name; intellectual properties etc.**

7. *Describe the terms free software and open source software. Write examples of one Proprietary and one OSS Software.*

Solution. *Free software* is the software free of cost, which can be copied, modified and redistributed as well but whose source code is not available. *Open source software*, on the otherhand, is the software, whose source code is available and which can be copied, modified and redistributed as well. There may or may not be charges payable for open source software.

Open Source Software : Linux ; *Proprietary Software* : Microsoft Windows 8.

8. *Expand the following terms : (i) OSS (ii) SDLC (iii) GNU (iv) FLOSS*

Solution. (*i*) **OSS.** Open Source Software. (*ii*) **SDLC.** System Development Life Cycle.
(*iii*) **GNU.** GNU is Not Unix. (*iv*) **FLOSS.** Free Libre/Livre and Open Source Software.

9. *Mr. Jayanto Das is confused between Shareware and Open source software. Mention at least two points of differences to help him understand the same.*

Solution. Shareware is software, which is made available with the right to redistribute copies, but it is available for limited time, often after a certain period of time, then a license fee should be paid. Shareware is not the same thing as *free and open source software* (FOSS) for *two* main reasons : (*i*) the source code is not available and, (*ii*) modifications to the software are not allowed.

OSS refers to ***open source software***, which refers to software whose source code is available to customers and it can be modified and redistributed without any limitation. An OSS may come free of cost or with a payment of nominal charges that its developers may charge in the name of development, support of software.

10. *Would you suggest open source software (OSS) for an organization or sector where the **performance** is the factor of utmost importance, such as Military ?*

*You must be aware that military has different software needs than the commercial sector because of its unique mission and environment. While **commercial sector** chooses software on the basis of factors like : application choice, ease of use, service and support, price, reliability and performance, **the military** does the same depending upon factors like : reliability, long-term supportability, security, scalability and performance of the software.*

Keeping in mind the above scenario, answer the above question with a proper justification. Give example of a software, if you are recommending one.

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Solution. The open source software comes with characteristics like : availability of open source, no license restriction on type of usage, freedom to modify, redistribute etc. But all these characteristics are not enough to be suggested as a preferred software. Not all the OSS provide long-term support or are secure-enough or scalable. Therefore, we can not blindly recommend any OSS software. The same applies to proprietary software as well.

Therefore, we can recommend only those software to Military that have solid support-base in the form of *community-development-groups* etc. and that have features like *security, scalability* and *performance* along with it. Thus, the OSS software suite like LAMP (*Linux, Apache, MySQL, PhP*) that has all the above mentioned features can be recommended to Military.

11. *"**Privacy** is the protection of personal information given online. In e-commerce especially, it is related to a company's policies on the use of user data."*

(*a*) *Why is the above given statement important ?*

(*b*) *What is the need to safeguard user privacy ?*

Solution.

(*a*) It is important for the safeguard of user privacy, online.

(*b*) Online world is an open world and thus the personal information of a user must not be available openly, as it may be misused. Thus, it is very important and highly needed to safeguard user privacy.

12. *Posing as someone else online and using his/her personal/financial information shopping online or posting something is a common type of cyber crime these days.*

(*a*) *What are such types of cyber crimes collectively called ?*

(*b*) *What measures can you take to stop these ?*

Solution. (*a*) Online fraud

(*b*) The measures to stop these frauds may include :

- A monitoring official body that ensures the sanctity of Ecommerce Company and delivery of goods/services as promised.
- Strong security mechanism by the ecommerce site and payment gateways to prevent stealing of crucial information.

Official guidelines and safeguards on the selling of users' data to third parties.

13. *What are common gender and disability issues faced while teaching/using computers in classrooms?*

Solution. The Gender issues while teaching /using computers are : under representation of girls, not girl-friendly work-culture.

Disability issues while teaching /using computers are : unavailability of teaching materials/aids, lack of special needs teachers and lack of supporting curriculum.

14. *Give examples of software, hardware that may be used for special needs students.*

Solution.

1. Sophisticated virtual keyboard software.
2. A joystick that is specific to the needs of the child.
3. A programming editor that can be interfaced with the virtual keyboard, and does not require any mouse movements.

For low-vison students, Braille keyboards, monitors, and printers should be made available to facilitate their learning and working on computers.

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GLOSSARY

FLOSS	Free Libre (or Livre) Open Source Software. Software that are free as well as open.
Freeware	Software that are available at no cost but cannot be modified.
Free Software	Software available free of cost and also can be copied and redistributed but no source code is available.
OSS (Open Source Software)	Software whose source code is available and which can be modified, copied and redistributed.
Proprietary Software	Software that are neither free nor open.
Shareware	Software for which licence fee is payable after some time limit.
Digital Property	Any information about you or created by you that exists in digital form, either online or on an electronic storage device.
Plagiarism	Stealing someone else's intellectual work and representing it as your own.
Intellectual Property	Creative creations of mind such as patents, literary and creative arts, copyrights, trademarks tec.
Phishing	Attempting to acquire sensitive information from individuals over the internet, by means of deception.
Scam	Any fraudulent business practice that extracts money from an unsuspecting, ignorant person.
Computer Forensics	Methods used for Interpretation of computer media for digital evidence.

Assignment

1. What is online fraud ? Give some examples.
2. What is credit card fraud ?
3. What is identity theft ?
4. What measures can you take to curb online frauds ?
5. What is safe data transmission ? How can you ensure secure data transmission ?
6. What is intellectual property ? What do you understand by intellectual property rights ?
7. What is plagiarism ? How can you avoid plagiarism while referring to someone's else's creation ?
8. What is digital property ? What are the threats to digital properties ?
9. How can you protect your digital properties ?
10. Expand the terms : OSI, FLOSS, FSF, GNU, GPL W3C, OSS.
11. What are open source based software ?
12. Compare and Contrast (*i*) Free software and Open source software (*ii*) OSS and FLOSS (*iii*) Proprietary software and Free software (*iv*) Freeware and Shareware (*v*) Freeware and Free software.
13. What is public domain software ? Name some common public domain software licenses.
14. What is GPL software license ? How is it different from LGPL software license ?
15. These days it is equally important to safeguard digital properties : (*a*) What are digital properties ? (*b*) Why is above given statement/fact important ? (*c*) What are possible threats to digital properties ? (*d*) How can digital properties be safeguarded ?
16. Define these terms : (*i*) Phishing (*ii*) scam (*iii*) computer forensics (*iv*) Identity theft
17. What is cyber crime ? Give example.
18. Can you give an example of crime which is not cyber crime ?
19. What protection measures would you take against identity theft ?
20. What is computer forensics ? What important practices are followed in computer forensics ?
21. How can special needs of differently abled students be met while teaching computers ?
22. Discuss Gender issues that you see in the field of computer science studies.

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