UNIT 6 GENERATION OF INFORMATION: MODES AND FORMS

Structure

6.0 OBJECTIVES

After reading this Unit, you will be able to:

- grasp the concept of information in a better way, realise how the concept is moulded in different disciplines to suit the respective needs of the disciplines;

- know the various modes of generation of information such as observation, thinking, experimentation, and so on;
- get an interesting overview of the variegated forms of information such as oral form, written form, printed form, pictorial form, etc.; and
- perceive the impact of information technology on the generation of information.

6.1 INTRODUCTION

The human civilisation has passed through different ages such as stone age, iron age, industrial age, and so on. Now it has entered the information age. The countries rich in information are today in a much more advantageous position compared to those poor in information. In many cases the poor countries are obliged to purchase information from the vendor sometimes at a very high cost. The advent of Internet has proved to be a great boon for accessing any information from any part of the world practically in no time. Even here in many cases, we are to pay for obtaining information. In other words information has become a commodity. The generators of information are churning out various information products, marketing them, and earning profit. The information age has given birth to information industry. The society we are living in has already been termed as information society.

6.2 INFORMATION

In your BLIS programme you have already studied about information and gained some knowledge about it. You have also learnt the meaning of data, information and knowledge and the subtle differences existing among them. in Block 1 of this course, several units have dwelt on the concepts – data, information and knowledge providing definition, outlining types and discussing nature, properties and scope. One peculiarity of information, which you might not have noticed, is that the meaning of information changes from subject to subject. Now, let us see the definition of information in some subjects.

Law – 'An accusation or complaint made without the intervention of a grand jury' [The New International Webster's Comprehensive Dictionary of the English language, 1996]. This definition is clear and does not require any discussion.

Communication theory – 'Any distinct signal element forming part of a message or communication, especially one assembled and made available for use by automatic machines, such as a digital computer: usually measured in bits' [The New International Webster's Comprehensive Dictionary of the English Language, 1996]. In this case, information is communicated through signals. In the receiving end the signals are assembled by automatic machines and turned into a language comprehensible to the receiver. What the receiver gets is nothing but information.

Computer technology – 'Data that have been processed into an organised, usable form and are meaningful to the recipient for the task at hand. Any data that can be coded for processing by a computer or similar device'. [Szymanski, R.A. 1994], A set of data is fed into the computer to generate different types of information to fulfil the needs of the user. Again, any data can be considered

as information in case it can be coded for computer processing. Thus, we find, in computer technology, information has two distinct meanings.

6.3 GENERATION OF INFORMATION

All the while, information is being generated in the world, nay in the universe. The bursting of a supernova in a particular constellation, discovery of a planetary system around a star like the Sun, spotting of a river on the Mars, inundation of areas by a swelling river, eruption of a volcano, invention of a machine, successful testing of a drug, conquering of a deadly disease, birth of a child, and millions of other events are generating information every moment. You may be interested to know whether the generation of information follows any well-defined rule or it generates at random without any regard to any rule.

If you just take a newspaper and try to find out how the news have generated you will notice that they have generated following certain modes. *The Hindustan Times* of 21 July 2004 contained the following headlines in its first page: i) HIV vaccine could come from AIIMS; ii) 'Soften Hurriat with foreign trips' iii) It's almost clear, monsoon's a failure, iv) NCERT's recipe for confusion. On going through the news it will be clear that the first news has resulted due to experimentation, the second news due to deliberation, the third news due to observation, and the fourth news again due to deliberation. In many cases, generation of information involves more than one mode. For example, Newton saw the falling of an apple from a tree. This observation immediately switched his thought process on which ultimately resulted in his propounding the theory of gravitation. In this case, the combination of observation and thought process gave rise to information.

In the next section we intend to discuss various modes of the generation of information.

6.4 MODES OF INFORMATION GENERATION

Information usually generates following such modes as Observation, Thought process, Deliberation or Imagination, Experimentation, Processing of data, Happening of various events, and so on. In certain cases like language, information generates following the path of evolution. Now, we shall discuss all these modes one by one.

6.4.1 Observation

By the word 'observation' here we mean not only seeing with eyes, but also hearing, smelling, tasting and feeling with skin. We can get information about the sky whether it is sunny, cloudy or hazy by looking at it. Many a time, an ornithologist can identify a bird just by hearing its call. Often chemists can recognise a chemical substance, e.g. phenol, by smelling it. Our tongue gives us information about the taste of a substance. A simple touch by the hand is enough to know whether a substance is hot, cold or warm.

Observation may be termed as the most potent mode of generation of information. Charles Darwin observed nature for years to gather information for establishing the theory of evolution. Astronomers all over the world gathered information by observing the celestial bodies for centuries initially with naked

eyes and subsequently with telescopes. Similarly microbiologists gathered information on all microbes observing them with microscopes. A police officer has to observe minutely every detail of the venue while investigating an accident, theft, etc. A scientist conducting an experiment has to observe very carefully the changes taking place in temperature, pressure, colour, etc. and faithfully record the changes. A doctor has to observe the condition of a patient at regular intervals to see whether his condition is improving or deteriorating. Thus, we find, in every walk of like observation is a prerequisite for the generation of information.

Self Check Exercise

1) Explain how Observation helps in the generation of information.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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6.4.2 Thought Process, Deliberation and Imagination

Thought process is the mother of generation of information. Be it observation, experimentation or data collection, thought process is involved in every case to generate information. Man has seen the solar and lunar eclipses for thousands of years and have tried to find out the underlying causes with his limited knowledge and generated information. The ancients observed that during eclipse the sun or the moon is gradually swallowed by something and again it comes out. Hence, the ancient Hindus reasoned that during an eclipse the sun or the moon is gradually gobbled by the beheaded *Rahu*. As it gobbles the celestial body through the mouth it comes out through the cutout throat. Considering the level of knowledge human beings possessed at that time, the reasoning was quite logical. After centuries of observation and reasoning, now we know the real cause of eclipse. The information we generate through our observation, experimentation, reasoning, etc may not always be absolutely true. In many cases, it is subject to correction at a later date. In Arthur Conan Doyle's novels we have seen both Dr. John Watson and Mr. Sherlock Holmes have visited together the site of the crime. It was always the superior thought process of Sherlock Holmes that was able to pinpoint the culprit.

Be it a household, an office, an organisation or institution, the process of deliberation is encountered everywhere. While studying in class XII, many students are to appear in a number of entrance tests. When a student qualifies in more than one test, the student and the parents are to deliberate a lot to arrive at a decision as to the course the student is going to pursue. The moment the final decision is taken and is made known to others, information is generated.

Before declaring the dates of a general election, the Election Commission (EC) has to consider a number of factors like weather (usually rainy season is avoided), school and college examinations (because schools and colleges are used for setting up polling booths), availability of security personnel, dates suggested by various political parties, and so on. After deliberating on all the factors, when the EC announces its decision, information is generated. In a parliament or a legislative assembly, after a lot of debates, decisions are taken giving birth to plenty of information.

An artist has to imagine about the art piece he is going to create, a chemical engineer has to visualise in his mind the chemical plant he is going to install, an architect is also to picture the building in the canvass of his mind. Once the art piece is complete, the blue prints of the chemical plant or the building are ready and handed over to the persons concerned, information is generated.

Self Check Exercise

2) Explain how imagination helps in the generation of information.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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6.4.3 Experimentation

If we go through abstracting and indexing services devoted to physics, chemistry, biology, medicine, engineering, agriculture, and other scientific disciplines, we shall find that about two million articles are being included in these databases every year. Most of these articles are based on experimentation. Just from this, one can make out how much information is being generated per year through experimentation. It is however to be noted that experimentation is always attended with observation and thinking process. The results of experimentation usually appear in the form of research papers, short communications, patents and so on.

6.4.4 Processing of Data

You have already learnt that data collected through questionnaire and other methods gives rise to information when processed. Now, we shall see how the processing of data gives rise to information with a concrete example. Let us take the students of a BLIS class of an Indian university as a sample. The data collected about the students is given in Table 6.1.

Table 6.1: Particulars of the Students of a BLIS Class

Sr. No	Name	Age	Sex	H.Q.	Class in H.Q.	Nationality	Religion
1	Nirmalendu	41	M	BA	2nd	Indian	Hindu
2	Gita	33	F	B Sc	1st	Indian	Jain
3	Diana	24	F	BCA	1st	Indian	Christian
4	Aurobinda	27	M	MA	2nd	Indian	Hindu
5	Asit	22	M	BA	2nd	Indian	Hindu
6	Yogendra	23	M	B Com	1st	Indian	Hindu
7	Laxman	24	M	M Sc	2nd	Sri Lankan	Buddhist
8	Rabi	25	M	MA	2nd	Indian	Hindu
9	Rahul	23	M	B Sc	2nd	Indian	Hindu
10	Rajib	26	M	M Com	2nd	Indian	Hindu
11	Ali	24	M	BA	2nd	Indian	Muslim
12	Monica	23	F	B Sc	1st	Indian	Hindu
13	Rabeya	22	F	M Sc	1st	Bangladeshi	Muslim
14	Ram Bahadur	29	M	BA	1st	Nepali	Hindu
15	Dan Singh	23	M	B Com	2nd	Indian	Sikh
16	Farooq	24	M	BA	1st	Indian	Parsee
17	Latif	22	M	BA	2nd	Indian	Muslim
18	Aparna	23	F	BA	2nd	Indian	Hindu
19	Renu	24	F	B Sc	2nd	Indian	Hindu
20	Prashant	34	M	M Com	2nd	Indian	Hindu

Sr. No = Serial No; H.Q. – Highest qualification; M = Male; F= Female

Now, one by one we shall arrange the columns of the Table in some order and see how information generates from each of the operation.

Information Relating to Names

In Table 6.2, we take column 2 and arrange the names in alphabetical order.

Table 6.2: BLIS Students (arranged alphabetically according to names)

Sr. No	Name	Age	Sex	H.Q.	Class in H.Q.	Nationality	Religion
11	Ali	24	M	BA	2nd	Indian	Muslim
18	Aparna	23	F	BA	2nd	Indian	Hindu
5	Asit	22	M	BA	2nd	Indian	Hindu
4	Aurobinda	27	M	MA	2nd	Indian	Hindu
15	Dan Singh	23	M	B Com	2nd	Indian	Sikh
3	Diana	24	F	BCA	1st	Indian	Christian
16	Farooq	24	M	BA	1st	Indian	Parsee
2	Gita	33	F	B Sc	1st	Indian	Jain
17	Latif	22	M	BA	2nd	Indian	Muslim
7	Laxman	24	M	M Sc	2nd	Sri Lankan	Buddhist
12	Monica	23	F	B Sc	1st	Indian	Hindu
1	Nirmalendu	41	M	BA	2nd	Indian	Hindu
20	Prashant	34	M	M Com	2nd	Indian	Hindu
13	Rabeya	22	F	M Sc	1st	Bangladeshi	Muslim
8	Rabi	25	M	MA	2nd	Indian	Hindu
9	Rahul	23	M	B Sc	2nd	Indian	Hindu
10	Rajib	26	M	M Com	2nd	Indian	Hindu
14	Ram Bahadur	29	M	BA	1st	Nepali	Hindu
19	Renu	24	F	B Sc	2nd	Indian	Hindu
6	Yogendra	23	M	B Com	1st	Indian	Hindu

Now, from column 1 of Table 2, we find there are four names starting with A, two names starting with D as well as L, one name starting with each of the letters F, G, M, N, P and Y, and six names starting with R. It is observed that the largest number of names is starting with R and no names are starting with the letters B, C, E, and H to K, O, S to X and Z.

Information Relating to Age

Now, we take column 3, and arrange the students in the ascending order of their ages (Table 6.3)

Table 6.3: BLIS Students (arranged according to age)

Sr. No	Name	Age	Sex	H.Q.	Class in H.Q.	Nationality	Religion
5	Asit	22	M	BA	2nd	Indian	Hindu
17	Latif	22	M	BA	2nd	Indian	Muslim
13	Rabeya	22	F	M Sc	1st	Bangladeshi	Muslim
18	Aparna	23	F	BA	2nd	Indian	Hindu
15	Dan Singh	23	M	B Com	2nd	Indian	Sikh
12	Monica	23	F	B Sc	1st	Indian	Hindu
9	Rahul	23	M	B Sc	2nd	Indian	Hindu
6	Yogendra	23	M	B Com	1st	Indian	Hindu
11	Ali	24	M	BA	2nd	Indian	Muslim
3	Diana	24	F	BCA	1st	Indian	Christian
16	Farooq	24	M	BA	1st	Indian	Parsee
7	Laxman	24	M	M Sc	2nd	Sri Lankan	Buddhist
19	Renu	24	F	B Sc	2nd	Indian	Hindu
8	Rabi	25	M	MA	2nd	Indian	Hindu
10	Rajib	26	M	M Com	2nd	Indian	Hindu
4	Aurobinda	27	M	MA	2nd	Indian	Hindu
14	Ram Bahadur	29	M	BA	1st	Nepali	Hindu
2	Gita	33	F	B Sc	1st	Indian	Jain
20	Prashant	34	M	M Com	2nd	Indian	Hindu
1	Nirmalendu	41	M	BA	2nd	Indian	Hindu

Table 6.3 shows that the minimum age of a BLIS student is 22 and maximum 41. There are three students of age 22, five students of age 23 and another five of age 24. That means the age of 13 (65%) students range between 22 to 24. The age of rest of the students range from 26 to 41. The Table indicates that even slightly elderly students also join this course.

Information Relating to Sex

Now, we move on to the fourth column, and arrange Table 1 according to sex and get Table 6.4.

Table 6.4: BLIS Students (arranged according to sex)

Sr. No	Name	Age	Sex	H.Q.	Class in H.Q.	Nationality	Religion
12	Monica	23	F	B Sc	1st	Indian	Hindu
19	Renu	24	F	B Sc	2nd	Indian	Hindu
2	Gita	33	F	B Sc	1st	Indian	Jain
18	Aparna	23	F	BA	2nd	Indian	Hindu
3	Diana	24	F	BCA	1st	Indian	Christian
13	Rabeya	22	F	M Sc	1st	Bangladeshi	Muslim
15	Dan Singh	23	M	B Com	2nd	Indian	Sikh

6	Yogendra	23	M	B Com	1st	Indian	Hindu
9	Rahul	23	M	B Sc	2nd	Indian	Hindu
5	Asit	22	M	BA	2nd	Indian	Hindu
17	Latif	22	M	BA	2nd	Indian	Muslim
11	Ali	24	M	BA	2nd	Indian	Muslim
16	Farooq	24	M	BA	1st	Indian	Parsee
14	Ram Bahadur	29	M	BA	1st	Nepali	Hindu
1	Nirmalendu	41	M	BA	2nd	Indian	Hindu
10	Rajib	26	M	M Com	2nd	Indian	Hindu
20	Prashant	34	M	M Com	2nd	Indian	Hindu
7	Laxman	24	M	M Sc	2nd	Sri Lankan	Buddhist
8	Rabi	25	M	MA	2nd	Indian	Hindu
4	Aurobinda	27	M	MA	2nd	Indian	Hindu

Table 6.4 shows that the number of female students is 6(30%), and male students 14(70%). Obviously, there is a preponderance of male students in the class.

Information Relating to Highest Qualification

To generate this information, data of the fifth column has been organised in alphabetical order (Table 6.5). From the Table we find that as many as seven students have BA as their highest qualification, followed by B Sc (4); B Com, M Com, M A, and M Sc (2 each); and one BCA student. It may be noticed that students belonging to Arts are joining the profession more than the students of any other discipline.

Table 6.5: BLIS Students (arranged according to highest qualification)

Sr. No	Name	Age	Sex	H.Q.	Class in H.Q.	Nationality	Religion
6	Yogendra	23	M	B Com	1st	Indian	Hindu
15	Dan Singh	23	M	B Com	2nd	Indian	Sikh
12	Monica	23	F	B Sc	1st	Indian	Hindu
19	Renu	24	F	B Sc	2nd	Indian	Hindu
9	Rahul	23	M	B Sc	2nd	Indian	Hindu
2	Gita	33	F	B Sc	1st	Indian	Jain
18	Aparna	23	F	BA	2nd	Indian	Hindu
5	Asit	22	M	BA	2nd	Indian	Hindu
1	Nirmalendu	41	M	BA	2nd	Indian	Hindu
14	Ram Bahadur	29	M	BA	1st	Nepali	Hindu
17	Latif	22	M	BA	2nd	Indian	Muslim
11	Ali	24	M	BA	2nd	Indian	Muslim
16	Farooq	24	M	BA	1st	Indian	Parsee
3	Diana	24	F	BCA	1st	Indian	Christian
10	Rajib	26	M	M Com	2nd	Indian	Hindu
20	Prashant	34	M	M Com	2nd	Indian	Hindu
13	Rabeya	22	F	M Sc	1st	Bangladeshi	Muslim
7	Laxman	24	M	M Sc	2nd	Sri Lankan	Buddhist
8	Rabi	25	M	MA	2nd	Indian	Hindu
4	Aurobinda	27	M	MA	2nd	Indian	Hindu

Information Relating to Class in Highest Qualification, Nationality, and Religion

Arranging the data of the columns six, seven and eight in desired manner, we find that while obtaining the highest qualification seven students secured first class and thirteen students second class. Also we find that in the class there are seventeen Indian students, one Bangladeshi, one Nepali, and one Sri Lankan

student. Of the students, as many as twelve are Hindu, three are Muslim, and the rest five are Buddhist, Christian, Jain, Parsee, and Sikh, obviously only one student belongs to each of these religions.

Now, you can see how from a single set of data a substantial amount of information can be generated just by processing it in different ways.

6.4.5 Events

The Concise Oxford Dictionary defines an event as 'a thing that happens or takes place [Pearsall, Judy (ed), 1999]. A scholar releasing a book, an artist inaugurating an exhibition, a philosopher explaining the concept of time, a saint giving a discourse on a religious matter, a political leader campaigning for vote, legislators debating in a parliament, a lawyer passing a judgement, the prime minister of a country taking oath of office, a war breaking out at a particular region of the world, a patient dying in a hospital due to neglect, a new train being flagged off by a minister, two buses colliding causing death and injuries to a number of passengers, a terrorist hijacking a plane, a comet appearing in the sky, a physicist bombarding an atom with alpha particles, a chemist conducting an experiment to create a new material, a geologist drilling a borehole to prospect petroleum deposit, a paleontologist spotting the skeleton of a dinosaur, a geneticist giving birth to a high-yielding variety of rice, an inventor filing a patent application, a surgeon performing an open heart surgery, a director shooting a new film, umpteen number of sports and games being held every day all over the world, adventurers venturing to conquer a mountain peak, etc. are all examples of events.

Let us go through some of the headlines figured in *The Hindustan Times* of 30th July 2004.

1) IA diverts flight, saves Pakistani baby. (p 1)

2) Bofor's Ardbo dead (p1)

3) Aravali bio-diversity park takes off (p2)

4) PM flies, spares traffic (p3) [PM's journey to the airport by a helicopter while proceeding to Thailand]

5) 16 lockers cleaned out at Safdarjung Enclave Bank (3)

6) 1 killed as bus overturns in NOIDA (p5)

7) As expected Pak win easily [in Asia Cup ODI in Sri Lanka](p9)

8) CA examination results on August 4 (p19]

9) Pakistani hostages killed (p21)

10) Madonna makes peace with Jesus in Portugal (p22).

It can be seen that all these news items have generated out of events. A newspaper not only provides information about past events but also of future events (vide headlines against serial no. 8). It is also to be noted that a newspaper also contains items of thought process, (e.g. editorials); data processing (prediction about election results); observation (reporting of an accident); and so on.

It is to be noted that just the happening of an event does not generate information. The information relating to the event generates only when it is seen by someone and reported.

6.4.6 Evolution

Man started communicating by speech some 100,000 years ago [Odham's Colour Library of Knowledge: Language and Communication, 1968]. In those dizzy old days of human civilisation, the vocabulary of human beings of a particular race was only limited. They had only that many words which were required to express their ideas. As they invented newer and newer devices, encountered objects not known before, they started naming them for the purpose of easy identification. This led to the enrichment of vocabulary. When they moved from an old area to a new area they encountered numerous new things such as trees, animals, fruits, tubers, and so on. They also named them. In the course of their endless journey sometimes they encountered an alien race, which resulted either in fighting or friendship. For the exchange of ideas between two different races, need arose for interpretation. How and when the art of interpretation came into being is shrouded in mystery. However, this much is sure that the need for interpretation occasioned the need for linguistic information. That is, how a particular object is called by the alien group. In plain words, they needed information as to the equivalent terms in the language of the alien race. The process of building up of the vocabulary of languages is as mind-boggling as interesting. Sometimes a word has travelled over centuries from one language to the other retaining its original form. For example, the word 'ginger' belonging to a now extinct Middle Indian language travelled from India to Europe through Middle East. In twenty-four languages of the world the word has retained its original form. In many cases words have undergone small changes while travelling from one language to the other. For example, the word 'nine' has taken the following forms in a number of Indo-European languages of the world. It seems as if the word first originated in a particular language and then moved from language to language with small changes in its sound and form. It is depicted below:

Dutch	English	French	German	Italian	Spanish	Swedish	Welsh	Hindi
Negen	Nine	Neuf	Neun	Nove	Nueve	Nio	Naw	Nau

In some cases, of course, we find that a word having the same or similar meaning differs from language to language. Let us take the example of the word 'science'. In Sanskrit it is called 'vijnan', in Russian 'nauka', in German 'Wissenshaften' and so on. In the development of vocabulary, conquest of a country by another, international trade, etc. has also helped a lot. The development of languages, which originated 2,000 or more years ago, is still continuing. Take for example, the English language. Even today, hundreds of new words are being added to this language every now and then. Just with e, we have e-mail, e-journal, e-zine, e-library, e-librarian, and so on. Similar is the case with cyber. We have hundreds of words starting with cyber. Even a decade ago most of these words were unknown. In this way a language has developed over thousands of years following the path of evolution and still the process is on.

Several thousand years ago, man invented the art of writing. Starting from stones down to leaves were used as writing media. Products of human thought thus started getting recorded. At one time the art of translation also began. In the famous 'Rosetta Stone' of 2nd century BC, the decree has been engraved in three different languages, ancient Egyptian hieroglyphics, demotic (the popular language of Egypt at that time), and Greek [Odham's Colour Library of Knowledge: Language and Communication, 1968]. This record bears infallible testimony to the fact that the art of translation was pretty developed in Egypt at that time.

The requirement of translation necessitated reference tools to provide information about the equivalent words in the target language in which the matter is to be translated. In response to the need started appearing bilingual and multilingual dictionaries. For translating, sometimes we need information even for a letter. For example, we come across letters like Vk in Indus scripts. Scholars have been trying for about a century to extract information from these scripts.

6.4.7 Dream

It is common with every human being to dream. Some of the dreams we remember, other we do not. The dream that we remember and convey about the same to others or record it in our diary, information is generated. Psychologists extract a lot of information about the subconscious mind of a patient through the interpretation of dreams. At times dreams provide the necessary information or clue for solving a problem. Kekule, an organic chemist, was trying to find out the structural formula of benzene for quite sometime, but failing again and again. One night, he dreamt that six snakes had created a ring by biting the tail of each other. This dream immediately gave him the information or clue that the structural formula of benzene would be ring-shaped.

6.4.8 Information Generation in some Selected Subjects

Following different modes, information is generated in various subjects. Taking a few selected subjects, we shall see how information generates in those subjects.

1) **Classification**

Going through any classification scheme like Dewey Decimal Classification or Colon Classification deeply, we can easily realise the tremendous amount of mental exercise that has undergone for building up the scheme. Sometimes, the mental exercise is preceded by observation or an event. For example, Ranganathan's chance encounter with a meccano set sparked in his mind the idea of a faceted scheme of classification. Moreover, every designer of a scheme of classification had to think of sound canons, principles, devices and so on to maintain consistency, provide logical sequence of subjects, meet the present need and face with confidence the demand of the future. The amount of mental exercise required to build up a classification scheme can be well realised if we ourselves undertake building up a small classification scheme. In this particular subject, information generates mainly through mental exercise.

2) **Philosophy**

Ever since man learned to reason, he started thinking about creation, the creator, environment, life, and all other phenomena he came across. The Greeks, centuries before the birth of Christ tried to understand the nature of the world for the sake of knowledge. In their reasoning, they introduced logical element thus occasioning the beginning of philosophic and scientific thought. Thales (c640 – 546 BC), the Ionian Greek, as well as the first philosopher recorded in history, speculated about the origin and nature of the universe [Odham's Colour Library of Knowledge: Religion and Philosophy, 1968]. From then on till date, the world has seen thousands of philosophers putting forward their ideas on matter, energy, space, time, cosmos, God, knowledge, morality, beauty, and so on. All these are the fruits of their fertile imagination and logical thinking. It will not be very wrong to say that the subject philosophy has borne out of human thinking.

3) **Religion**

In the dawn of civilisation, man with utter helplessness observed numerous natural phenomena like devastating earthquakes, ravaging floods, deadly forest fires, thundering storms, awesome volcanic eruptions, and so on. Even with their limited knowledge, the early men could realise that behind each of these phenomena, there is someone who is enormously powerful and humans are not mighty enough to control and overpower him. Thus dawned in them the idea of supernatural beings basing their imagination and thought process. They reasoned that when these mighty beings get enraged, all natural calamities occur. To appease those mighty beings, developed various forms of worship. Phenomena like diseases, deaths, crop failures, etc. also made them realise that there are many things, which are beyond their control. These also strengthened their beliefs in supernatural entities, which at one time took the form of Gods and Goddesses. In the long journey of human civilisation took birth great religious leaders like Gautam Buddha, Jesus Christ, and others. All of them founded religions basing what they realised out of their meditation or deep thinking about God and related matters. Hence, we find religion is also the outcome of the brainwork of human beings.

4) **Social Sciences**

In social sciences information is generated following various modes. Here, we shall demonstrate this taking the example of statistics, politics and government, and law.

a) **Statistics**

In this field, information is mostly generated through the processing of data. In any statistical survey, e.g., census, data is collected usually using a questionnaire. Once the collection is over, data is cleaned, fed into the computer according to the predetermined format, and then processed to generate the desired information. Of course, the statistical theories, formulas, etc. come into being through process.

Self Check Exercise

3) Explain how is statistical information generated.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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b) **Politics and Government**

In these two fields, information mostly is generated through events. A political leader inaugurates a conference and delivers a speech that becomes information. The election process generates a good deal of information encompassing such events as nomination of candidates by various political parties, filing of nomination papers, issuance of the manifesto, campaigning, exercising of franchise by the electorates, and formation of the ministry. However, political theories, ideologies, etc are the brainchild of political thinkers.

5) **Pure Science**

In pure science, information is generated through thinking, observation, experimentation and so on. Here, we shall discuss the generation of information in mathematics, astronomy, and physics.

a) **Mathematics**

Whatever we find today in mathematics starting from Hindu numerals (1, 2, 3, etc.) up to any sophisticated calculation has been generated from human thinking. Of course, in applied mathematics, there might be some exceptions. By and large, mathematics is a thought-based subject.

b) **Astronomy**

Unlike mathematics, information has been generated in astronomy mainly through observation. Early men observed the sky years after years. The change in the phases of the moon possibly delighted them. The eclipses obviously generated in them a sense of fear. They noticed some heavenly bodies move faster than others. Gradually and gradually they identified the constellations, zodiac, and the planets visible with the naked eye. At certain point of time, they realised the return of seasons at regular intervals and the concept of year dawned in them. Hence, we find that the entire edifice of astronomy was built on the observation power and the thought process of astronomers. The discovery of telescope enhanced the observation capacity of human beings manifold as far as distant objects are concerned. Using telescopes men could discover many new galaxies, nebulae, stars, and other celestial bodies. When the life of a star comes to an end, it explodes violently throwing the debris with unimaginable force into the space. With naked eyes such phenomenon is rarely seen from the earth. However, in the early morning of 24 February 1987, the phenomenon of an exploding star, named Supernova 1987A, was observed simultaneously

by astronomers Ian Shelton of the University of Toronto, Southern Station, Chile; Oscar Duhalde of Las Campanas Observatory, Chile; and amateur sky watcher, Albert Jones of Nelson, New Zealand. The explosion took place in the galaxy called Large Magellanic Cloud and was visible with naked eyes from the Southern Hemisphere [Britannica Book of the Year, 1988]. The astronomers informed the media and the entire world came to know about the astronomical phenomenon. This is how an important piece of astronomical information generated.

c) **Physics**

Generation of information in physics involves events, observation, and experimentation and thought process. It is, however, not necessary that all the four factors will be required for the generation of information in all cases. Newton saw the falling of an apple from a tree. The event led Newton to think deeply about the phenomenon and his thinking finally gave birth to the famous theory of gravitation. Here, event, observation and thought process were responsible for the generation of information. Michael Faraday conducted a number of experiments by passing electricity through various substances. Once he passed electricity through a vacuum tube and was astonished to see a beam of light travelling from the positive electrode to negative electrode. He further experimented by subjecting the beam of light to strong magnetic field and amused to see that the beam was attracted towards the positive pole of the magnet. From the experiment he could make out that the beam was composed of negatively charged particles. Later on, these particles were named as 'electrons'. Here also we find that experimentation, observation and thinking process – all these three were involved in the generation of information. In the propounding of many theories thinking process becomes paramount compared to observation and experimentation. For example, in propounding the theory of relativity Einstein did not conduct any experiment. His thinking process coupled with mathematical calculations gave rise to the theory. Experiments were conducted afterwards to test the validity of the theory.

6) **Applied Science**

Here we take the examples from medicine. Medicine comprises anatomy, physiology, health, pharmacology, pathology and surgery. Information in these subjects generates following different modes, which will be clear from the following discussion.

a) **Anatomy**

Information on anatomy has been generating since ancient times. In Ayurveda, there is clear-cut instruction as to how information is to be gathered about human anatomy using the dead body of a healthy person. In modern times, doctors dissected body of a dead person to observe bones, muscles, arteries, nerves, veins, nerves and so on. They observed and recorded accurately the exact location, size, shape etc of every part of the body to generate detailed information about the human body. Veterinary doctors did the same thing to reveal the anatomy of animals. Thus, it is clear that information on anatomy has generated mainly based on observation.

b) **Physiology**

Generation of information of physiological processes, in many cases requires a great deal of thinking apart from observation. In some cases experimentation is also necessary. For example, the discovery of circulation of blood by Galen required a great deal of thinking besides observation.

c) **Health**

World Health Organisation brings out publications providing the status of public health in the world. For generating the information, data is collected from various countries of the world through questionnaire and other methods, and then the data is processed to generate information.

d) **Pharmacology**

Every year hundreds of drugs undergo trials throughout the world. The drug, under trial, is given to a set of patients, and another set of patients is given placebo [a harmless substance that exactly looks like the drug, but not the drug in reality]. The result of the drug as well as the placebo is observed taking into account the process of healing, side effects and so on. Interestingly, many patients get cured with the placebo! In case, more patients are healed with the drug than with the placebo, and the side effects are not serious, then the drug is allowed for use and the information generated is made public. Usually, the trial goes on for years throughout the world. Generation of information in this case involves experimentation, observation, and processing of data.

e) **Surgery**

In the case of surgery also, in most cases, prior diagnosis is necessary using x-ray, ultrasound, and pathological and other methods. During surgery, information is generated about the patient's blood pressure, heart condition and so on to help the surgeon to proceed with the surgery. After surgery, the condition of patient is monitored and information generated about the progress of the patient to help the doctor take next step. Here also, several processes are involved for the generation of information.

Summing up, we find that in the field of medicine also experimentation, observation, processing of data and thinking is necessary to generate information.

7) **Arts**

An artist using his thinking process gives birth to a painting, an idol, an object of sculpture, a song or music. Information about many of these is generated through events such as an exhibition. When the painting called *Mona Lisa* by Leonardo da Vinci was stolen from Louvre Museum in Paris, a great deal of information was generated. When an artist organises an exhibition of his paintings information is generated.

8) **Sports**

Generation of information in this case is mostly event-based. A football match, a cricket match, or any other sports or games generate information. Needless to say, international game events like Olympic, Commonwealth Games, Asiad,

etc. generate a huge amount of information.

9) **Literature**

Authors compose poems, write fictions or dramas, script erudite essays, and so on basing their imagination or thinking capabilities. Information about these writings are generated usually through some events like the release of a book at a function, publication of its reviews in a journal, inclusion of its bibliographical details in a bibliography and so on.

10) **Geography**

People since time immemorial have gone from one place to another for various purposes. In the process of their journey they observed new places, came across new people and their culture. The information they gathered was passed on to others. Thus, the subject of geography was born. At a later stage, the entire world was mapped applying scientific method of observation. Hence, geography is predominantly an observation-based subject.

11) **History**

Information on history is predominantly event-based. Thinking also plays a major part. The events like the birth of a king's son, his ascendancy to the throne, his meetings with dignitaries and VIPs, his decisions, and all other activities generate information. In a democratic set up, the election of a president, prime minister and other ministers and their respective activities generate huge amount of information. Recording of all these activities including wars create history.

6.5 FORMS OF INFORMATION

We are already familiar with the forms of documents such as books, periodicals, patents, theses, standards, catalogues, dictionaries, encyclopaedias, bibliographies, and so on. The form of information is different from the form of documents. In a document, the information may be in hand-written form, printed form, coded form, simplified form, disguised form, and so on. Here, we are going to deal with oral form, hand-written form, printed form, digitised form, condensed form, coded form, simplified form, translated form, and disguised form. This is not an exhaustive list.

6.5.1 Oral Form

When we talk to a person sitting or standing in front of him or through telephone, the information exchanged between the two is oral form of information. This form of information is extensively used in our day-to-day conversation, in the lectures delivered by teachers, speeches delivered by ministers, notes and letters dictated by officers, cross examination undertaken by lawyers, interviews conducted by interviewers, commands given by military officers, and so on. In our Vedic period also this was the most predominant form of information. People used to listen (*shruti*) and remember (*smriti*). They also did not have any system of writing. Illiterates all over the world use this form of information to express themselves. Using this form of information does not require the knowledge of the scripts and the spelling of words. There are tribes in the

world who speak languages that do not have any script. Obviously, those tribes use oral form of information for communication.

6.5.2 Information in Sign Language

Deaf and dumb people cannot use oral form of information. Hence, sign languages have been developed for them whereby they communicate. In this case, information is generated using hands, fingers, and other parts of body. For example, using our forefinger and middle finger we produce the shape of V to indicate victory. Many a time we indicate our consent with a nod. People all over the world use sign languages to communicate. Some primitive tribes use sophisticated sign languages for communication.

6.5.3 Hand-written Form

People of ancient Egypt, Indus Valley, China developed systems of writing much before the advent of Christian era. With this development the written form of information came into being. Different languages of the world developed varied scripts and alphabets. Sometimes a group of languages adopted the same script and alphabet with slight change here and there. For example, languages like English, German, Spanish, Italian, Portuguese, and Rumanian use the Roman scripts. Even in our country, Roman scripts are used for writing in languages like Mizo. Some ethnic groups like the Romans preferred writing from left to right; the Arabs preferred writing from right to left, and the Chinese from top to down. For recording hand-written information numerous recording materials like papyrus, parchment, vellum, *bhurjapatra*, palm leaves, terracotta tablets, bamboo strips, etc. were used. The advent of paper extensively reduced the use of other writing materials. Lakhs of manuscripts preserved in thousands of libraries of the world are all hand-written. Scribes thrived in those centuries when printing was still a very distant dream. Copying manuscripts was the order of the day and a respectable means of earning livelihood.

6.5.4 Pictorial Form

In newspapers, everyday, we see cartoons conveying some message in a humourous or satirical way. General maps and atlases present information in pictorial form about places, rivers, lakes, mountains, universe, and so on. Anatomical atlases present information about various parts of the body. There are other types of atlases as well. A photograph of Taj Mahal, a portrait of Shakespeare, a statue of Gandhiji, etc. tell us about their look. Children like to read comics such as *Amar Chitra Katha*. In many cases, say in comics and cartoons, words and/or sentences are also added to make it more comprehensible and interesting.

6.5.5 Printed Form

The Chinese developed the technique of block printing by 8^{h} century AD or before since the oldest known example of block printing recording Buddhist charms dates to around 765 AD. The Chinese and Koreans also developed the technique of printing from movable types. However, their technique remained confined within the region. The technique of printing from movable types that spread the world over was developed by the German printer Johannes Gutenberg

in mid-1450s [9]. The impact of Gutenberg's technique was so great that by the end of 15th century some 9,000,000 books comprising mostly religious writings, and classical works of Greek and Roman authors were in circulation all over Europe. The world has never seen the generation of so many titles in just less than 50 years! [Odham's Colour Library of Knowledge: Languages and Communication, 1968]. Even today, printed information reigns supreme as maximum amount of recorded information is in printed form.

6.5.6 Digitised Form

With the advent of computers, digitised form of information came into being. Here information is recorded using only two digits 0 and 1. For digitisation, there are codes like ASCII and EBCDIC. ASCII stands for American Standard Code for Information Interchange and EBCDIC for Extended Binary Coded Decimal Interchange Code. ASCII is 7-bit code, and EBCDIC 8-bit code. However, extended ASCII is 8-bit code. In extended ASCII, the word INFORMATION will be recorded as 110010011100111011000110110011111101001011001101110000011101010011001001110011111100111 0. This is digitised form of information. Presented in this form, a computer will be able to easily handle the data.

6.5.7 Condensed Form

We are all aware of abstracts and summaries. These are nothing but condensed form of information. An article of twenty pages may have an abstract of half a page only. Abbreviations like ILA, BLA, etc. are also condensed form of information. In fact, condensed form is secondary form of information as it is always derived from the primary form of information.

6.5.8 Coded Form

In the coded form of information, usually numbers, letters and symbols are used. Sometimes, they are used singly, and sometimes in combination with one another.

We find coded form of information in a number of subjects including our own. When we represent the subject of a book on science with a class number like 500 or A, we put the information in a coded from. A class number like 954 or V2 immediately tells the classifier that the number signifies 'history of India'. The above examples show us that the information can be codified simply with numbers, letters, or a combination of both.

The information exchanged in espionage is normally in codified form. Each country has its own codes for the purpose. For deciphering the coded information there are keys to the codes. Once keys are available, coded information can be deciphered without much of a problem. There are also experts who can break the codes even without the keys.

In trade and commerce we use $ to mean dollar, £ to mean pound, ¥ to mean yen, @ to mean at the rate of, and so on.

We use PIN code in postal communication. For example, 110019 indicates Kalkaji area of New Delhi encompassing Kalkaji, Nehru Place, Chittaranjan

Park, Alaknanda and few other places. From the term 'PIN code' itself, it is clear that the information in coded form.

The number written on the number plate of a car or scooter is also coded information. From the number it is possible to make out whether the vehicle belongs to the government, an embassy, or an individual. The state wherefrom the license for the car has been issued can also be identified. For example, the number TN01S9899 indicates that the vehicle belongs to Tamil Nadu. The number DL1T 2345 informs that the vehicle is a Delhi taxi.

In mathematics, we encounter symbols like +, –, x, ÷, <, =, > etc. meaning respectively plus, minus, into, divide, less than, equal to, and greater than. In geometry ∠ indicates an angle, Δ a triangle, O a circle, ? a square, and so on.

Astronomers also use various symbols like O, ?, O, •, ∗, to mean respectively the sun, mars, full moon, new moon, and star.

Abbreviations and equations in physics are also coded form of information. The formula that provided the base for the manufacture of atom bomb is as simple as $E = mc^2$ where 'E' means energy, 'm' means mass and 'c' velocity of light. It indicates that the annihilation of one kilogram of mass can generate $1 \times 300{,}000{,}000 \times 300{,}000{,}000 = 9 \times 10^{16}$ joules of energy.

Chemists all over the world use coded form of information for representing names of elements as well as compounds. For example, to them Fe means iron, Pb lead, Nacl sodium chloride and so on.

In telegraphy, Morse code is being used to send telegrams. As in digitisation, in Morse code also, two symbols are used to represent all the 26 letters of Roman alphabet and the numbers. The two symbols are • (dot) and - (dash). For example in Morse code A is represented by • -, B by - •••, and so on. When a ship or an aircraft in danger sends the distress signal SOS, it is sent with the following Morse code • • • - - - • • •.

6.5.9 Simplified Form

Writings in many subjects are pretty difficult to understand for a common man. One requires special knowledge to grasp. Moreover, an expert in a subject may be a total novice in another. Hence, simplification of information becomes essential for laymen, school children, and in certain cases even for scholars.

Now let us see how difficult-to-understand sentences can be made simple and easily understandable. John Keog of Australia patented a 'circular transportation facilitation device' in the year 2001 and was awarded the Ig (Ignoble!) Nobel Prize [11] for his novel invention [Australian Patent No. 2001100012]. The sentence may not be comprehensible to every one because of the jargon used. If we rewrite the sentence as – John Keog of Australia patented a 'wheel' in the year 2001 and was awarded the Ig (Ignoble!) Nobel Prize [Abrahams, M, 2004] for his novel invention, then everybody will understand the sentence without any difficulty. Let us take another sentence – Mr. Salim Ali was numero uno in ornithology in India. The sentence may not be comprehensible to a layman or school-going children because of the two terms numero uno and ornithology. If we rewrite the sentence as 'Mr. Salim Ali was the number one bird specialist in India', everybody will get the meaning of the sentence quite

easily. Thus we find difficult writings can be simplified to make them understandable to a layman.

Information is generally presented in simplified form in encyclopaedias meant for children and laymen. In these encyclopaedias, usually jargons; long, difficult and highly complex sentences are avoided and whenever a technical term occurs, its meaning is explained in simple terms.

6.5.10 Translated Form

There are numerous languages in the world, which are extant. There are also languages, which are extinct. Some of the extinct languages of the world had even written form, e.g. hieroglyphics of Egypt. The people of Indus Valley civilisation had also a language in written form.

The need for translation of information from one language to the other was felt by men even in ancient times. We find in Rosetta stone, the content in hieroglyphic and its translation in demotic and Greek. It may be noted here that the translation of the hieroglyphic content into Greek was of great help to the linguists like Champollion in deciphering writings in Egyptian hieroglyphics. The deciphering of the Egyptian hieroglyphics opened up before the world the entire history of Egypt.

We have already discussed about the oral and written form of information. The translation can be from oral to oral form, oral to written form, written to oral form, and written to written form. In the written form we include the printed form as well.

i) **Oral to Oral Form**

In the UN Assembly, international conferences, and in many other occasions the speaker delivers his speech in a particular language and immediately it is translated into several other languages by interpreters. When two persons do not know the language of each other, they take the help of an interpreter to convey their messages. In these cases the translated form of information is oral.

ii) **Oral to Written Form**

In Purnea Zila School where I studied in early 1950s, the teachers in subjects like social studies used to deliver the lecture in Hindi. The Bengali students in the class immediately translated the same mentally and took down the notes in Bengali. This was a case of oral to written form of translation.

iii) **Written to Oral Form**

In India and many other countries of the world an English teacher in a non-English medium school orally translates the poems, short stories, essays, etc from English language to local language (Bengali, Hindi, etc.) to make the student understand the thought content of the piece of writing. In this process, the student understands the thought content of the piece of writing much better. In bilingual mode of teaching, the practice is quite common all over the world.

iv) **Written to Written Form**

Every year thousands of books are translated from one language to another. For example, Nehru's *Glimpses of World History* has been translated into Arabic, Assamese, Bengali, Croatian, German, Gujarati, Hindi, Japanese,

Kanarese, Malayalam, Marathi, Mongolian, Oriya, Persian, Russian, Swedish, Urdu, and so on. Apart from books journals, articles are also translated. Once upon a time, INSDOC used to translate articles and books from around twenty non-English languages of the world to English language. Many Russian journals are translated from cover-to-cover.

There are various other modes of translation such as natural language to digitised language and vice-versa; sign language to natural language and vice versa; and so on.

6. 5.11 Disguised Form

In a disguised form of information, sentences appear pretty innocuous to a common man. Only the person, for whom the information is meant, can get the real meaning of the sentence. One of our drivers at INSDOC used to stop the car at a particular point on the road and say, "Sir, I am going to fetch my medicine". Only those close to him used to know that he was going to fetch a bottle of wine! In 1942 Arthur H Compton, head of the nuclear fission project at the University of Chicago telephonically told James B Conant, Director of the National Defense Research Commission of the USA, "The Italian navigator arrived at the shores of the new world and found the natives were quite friendly. It is a smaller world than he believed" [Cane, P, 1961]. The sentences looked as if somebody like Columbus had found out a new continent. It was not so. In reality, the information was about the successful achievement of the first nuclear chain reaction by Enrico Fermi, the very first step towards the manufacture of atom bomb. In the aforesaid quotation the 'Italian navigator' was Enrico Fermi, 'the new world' meant the world of atomic energy, 'natives were friendly' connoted that the reaction could be controlled, and 'smaller world' gave an idea of the amount of uranium needed [Cane, P, 1961]. I think the example makes it clear what the disguised form of information is.

Self Check Exercise

4) How do you differentiate form of documents from the form of information? Explain briefly.

5) Why sometimes information is passed in disguised form?

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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6.5.12 Secondary Form

So far we have talked about the generation of primary information. Secondary information is generated basing the primary information. When somebody

prepares an abstract of a research article, the abstract becomes the secondary information. Most of the editorials in newspapers are based on primary information. However, the editorials themselves are secondary information. Suppose, the railway budget has been presented in a parliament. Some newspapers have written editorials on the budget. Here, the railway budget provides the primary information and the editorials on it are secondary information. Encyclopaedias, dictionaries, indexing periodicals, abstracting periodicals, etc. usually contain secondary information.

6.5.13 Tertiary Form

In many cases tertiary information is generated basing secondary information. For example, if a scientist writes a review article basing the abstracts of the original articles, then the review article provides tertiary information. Sometimes review articles are based on both primary and secondary information.

6.6 IMPACT OF INFORMATION TECHNOLOGY ON INFORMATION GENERATION

Information technology has impacted information generation in a number of ways. Let us take the case of a fledgling author. The author writes an article and tries to get it published. In many cases, he has to move from pillar to post to see his writing in printed form. Sometimes, he is successful, and sometimes not. Where he is successful, information is generated. Where he is not the article with the passage of time vanishes from the world remaining totally unknown to anybody. Now, the author has options. He can place the article in his own website, if he has one. Otherwise, thre are websites where he can place his articles. The article will come to the notice of thousands of people. Thus, information will be generated. To what extent information contained in the article is authentic is a difficult question. It may be authentic, partially authentic and may be devoid of authenticity. The user will have to judge it. In Internet, there are many articles written by school children, where you will find spelling mistakes, grammatical errors, factual inaccuracies, and so on.

The IT era has given birth to a number of publications in electronic form. These publications among others comprise books, periodicals, and conference proceedings. *Cybermetrics*, an electronic-only journal as well as a virtual forum is devoted to the study of the quantitative analysis of scholarly and scientific communications in the Internet. The URL of the journal is: http:// www.cindoc.csic.es/cybermetrics/cybermetrics.html. Nowadays, like books and periodicals, there are many articles which are available on Internet only. For example: the article by Kalyane and Sen on Tibor Braun, is available only on Internet. The number of electronic-only publication is continuously increasing opening up a new gateway for the generation of information as well as access to information.

IT has also helped in the generation of quicker as well as better information. Before the advent of IT era, information search used to take a huge amount of time. Moreover, information that could be searched was not very up-to-date. For example, a journal from US or European countries used to take a month or more to reach India by sea mail. Hence, in a place like India we used to get at least one-month old information, sometimes more. Today, the time for locating

and accessing information in many cases has been reduced considerably. In all probability, this has increased the productivity of researchers and many other writers. Moreover, they are now in a position to provide more updated information in their publications.

Self Check Exercise

6) Describe briefly the impact of information technology of the generation of information .

Notes: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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6.7 SUMMARY

In the beginning, we have learnt about various objectives of the Unit. Subsequently, we have seen how the concept of 'information' connotes different meanings in different disciplines.We, LIS professionals generally deal with the information that is recorded in some media. Information generates through various modes such as observation, thought process including deliberation and imagination, experimentation, processing of data, and occurrence of various events. The generation of information in different areas follows different modes. To illustrate this point, the generation of information has been discussed in areas like classification, philosophy, religion, statistics, politics and government, mathematics, astronomy, physics, anatomy, physiology, health, pharmacology, surgery, sports, literature, geography and history. The form of information is different from the form of documents. In the form of documents, the presence of a document is a must. In the form of information, document may or may not be present. In a document, the information may be in hand-written form, printed from, coded form, simplified form, disguised form and other forms. In this Unit we have discussed oral form, hand-written form, printed form, digitised form, condensed form, coded form, simplified form, translated form, and disguised form of information. Generation of secondary information and tertiary information has also been mentioned. At the end we have discussed the impact of information technology on information generation.

6.8 ANSWERS TO SELF CHECK EXERCISES

1) Observation is one of the most potent modes of generation of information. We observe an object, an event, an experimentation, and so on and record that in our brain. When we communicate this to other, it becomes information. We can communicate by speaking, sign language, writing

or recording the information in some other media. Suppose, a shpherd has seen a wolf in the jungle bordering his village. The moment he conveys this message to a villager, information is generated. Monica has visited Lakshmi Narayan temple in Delhi. She conveys this fact to ther friend Sonia through a letter. To Sonia, this is an information. Here, Monica generated information by recording it in a letter. Astronomers all over the world generated information by observing the celestial bodies for centuries initially with naked eyes and subsequently with telescopes. Similarly, microbiologists generated information on all microbes observing them with microscopes. A scientist generates information by conducting experiments. A doctor generates information by examining a patient about the disease the latter is suffering from. Thus we find, in numerous cases we generate information by observing.

2) An artist first of all imagines about the art piece he is going to create, a chemical engineer also visualises in his mind the chemical plant he is going to install, an architect also draws a picture of the building he is going to design in canvass of his mind. As the work of all these starts, many a time people come to know about these from the person concerned and information is generated.

3) Statistical information generates mostly through the processing of data. In any statistical survey, e.g. census, data is collected usually using a questionnaire. Once the collection is over, data is cleaned, inputted into the computer according to the predetermined format, and then processed to generate the desired information. If the amount of data is small, it can be processed manually. Of course, for the generation of statistical theories, formulas, etc. a great deal of thinking is necessary.

4) Documents are found usually in the form of books, periodicals, patents, theses, reports, standards, catalogues, dictionaries, encyclopaedias, bibliography and so on. The form of information is different from the form of documents. In the form of documents, the presence of a document is a must, which is not the case with the form of information. Information in oral form, sign language, etc. do not involve any document. However, documents are involved in hand-written form printed from coded form, simplified form, disguised form, etc. of information. Hence, for of documents are different from the form of information.

5) Some information needs are to be kept secret. It is as true in the case of a family as in the case of anation. Information on defence of a country is usually kept secret. Only a few can have this information. When the secret information is to be passed on to somebody it is passed either in coded from or in disguised form. Even if this information accidentally goes to a third hand, he will not be able to make out what it is, and thus the interest of the country, organisation or a family will be protected.

6) Information technology has impacted information generation in a numbe rof ways. Previously, a budding author had to struggle a lot to get his writing published. Now, he can straightway place his writing in Internet to attract the attention of others without wasting any time. The process will generate information and to a certain prevent information loss.

The IT era has given birth to a number of publications in electronic form. these publications among others comprise books, periodicals, and conference proceedings. *Cybermetrics*, an electronic-only journal as well as a virtual forum is devoted to the study of the quantitative analysis of sholarly and scientific communications in the Internet. The URL of this electronic journal available at Internet is: http://www.cindoc.csic.er/cybermetrics/cybermetrics.html. The number of electronic-only publicatin is continuously increasing opening up a new vista for the generation of information as well as acces to information.

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6.9 KEYWORDS

Coded Form of Information : In this form, information is recorded using some codes. For example in the classification of books we provide information in coded form.

Condensed Form of Information : Information in brief provided in the form of summary, abstract, etc.

Consolidated Form of Information : When scattered information on a topic is gleaned first and then put together in a logical order. This gives rise to consolidate from of information.

Digitised Form of Information : Presentation of information using the digits 0 and 1 gives rise to this form of information.

Disguised Form of Information : Information is communicated using common language. The hidden meaning becomes apparent only to the person for whom the informationis meant.

Handwritten Form of Information : Information written on a medium like paper. Before the advent of paper, people used to write on papyrus, parchment, vellum, palm leaves, bhurjapatras, and so on.

Oral Form of Information : Information communicated orally.

Pictorial Form of Information : Information communicated through pictures instead of alphabets and symbols. Examples: maps, atlases, photographs, portraits, etc.

Printed Form of Information : Information printed on a medium like paper.

Secondary Form of Information : Information generated from primary information e.g. an abstract.

Simplified Form of Information : Information presented replacing the jargons, difficult words and long complex sentences with simple words and sentences to make it understandable to children and layman.

Tertiary Form of Information : Information generated basing secondary information, sometimes primary information as well.

Translated Form of Information : Original information is presented in a different language called the target language retaining the original meaning.

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