# ADVANCED KNOWLEDGE ORGANIZATION – 1

## Classification Theory

# ADVANCED KNOWLEDGE ORGANIZATION – 1

**Unit - I**

Universe of Knowledge: Structure and attributes-Modes of formation of subjects

**Unit-II**

General theory of Library Classification: Normative Principles and their applications; Canons and Facet Analysis; fundamental Categories

**Unit – III**

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**Unit –IV**

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**Unit – V**

Subject cataloguing – subject heading lists-SLSH, LCSH. Bibliographic Control –ISBD (G) and

UBC.

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# UNIT – 1
# UNIVERSE OF KNOWLEDGE

**Objectives:**

- ➢ To get to lean about the universe of knowledge.
- ➢ To learn about structure and knowledge.
- ➢ To gain knowledge on modes of formation of subjects.

**Introduction:**

Knowledge and its transmission is a central concern of education. What aspects of the vast fund of human knowledge are to be selected for transmission and what criteria are to be used for selection of critical issues in curriculum planning? In this context, knowing about the philosophical basis of knowledge and knowing various sources of knowledge and their validity become important. Philosophy is conceived as critical inquiry, and as a second-order discipline, is concerned with the claims of various concrete forms of intellectual activity involving Knowledge. It is an activity of analysis, clarification and criticism of concepts. This view of Philosophy has been inspired by the realization that the results of any sort of enquiry are acceptable only in so far as they are publicly testable, reliable and coherent with the rest of public knowledge. Knowledge must never be thought of merely as vast bodies of tested symbolic expressions. These are only the public aspects of the ways in which human experience has come to be shaped. To acquire knowledge is to become aware of experience +s structured, organized rnd made meaningful in a specific way. The varieties of human knowledge constitute the highly developed forms of curriculum planning and the choice of disciplines. It is necessary to know how knowledge has evolved and epistemological consideration of different forms of knowledge that go under 'Disciplines".

**Definition of Knowledge:**

According to the most widely accepted definition, knowledge is justified true belief. That it is a kind of belief is supported by the fact that both knowledge and belief can have the same objects and that what is true of someone who believes something to be the case is also true, among other things, of one who knows it. For example, sun rises in the east is the knowledge or true belief that is supported by the fact which is arrived at through daily observations for millions of years by people. It is obvious and generally admitted that we can be said to have

knowledge only of what is True. If one admits that a proposition (p) is false, it must be admitted that the person did not "know" it and that no one else did, although the person may have thought and said so. Beliefs that merely happen to be true cannot be regarded as knowledge, because knowledge is justified belief. First of all, knowledge is expressed in propositions. A meaningful sentences that conveys truth or meaning is said to be a proposition. For a sentence to be meaningful, the words in a sentence should be meaningful. That is, the concepts expressed in the form of words should be true. They should correspond to the state of affairs that is existing at present or existed once upon a time.

A proposition (p) is what the sentence means. Two or more sentences can be used to express the same proposition. It is the proposition that is true or false, but it is the sentence that has meaning or fails to have it. Not every sentence states a proposition. Only sentences that we use to assert something express proposition. 'For example, a square has four sides that are equal. I know that ice melts on heating. Concept and Nature of Knowledge But in order to understand any proposition, we should first of all know the concepts involved in a proposition. . According to John Hospers, there are two requirements for knowing: (a) objective requirement (p must be true) b) subjective one (one must believe p).

**Requirements of Knowing:**

**a) A proposition (p) must be true.**

One cannot "know" p if p is not true. If one says "I know p, but p is not true" - the statement becomes self-contradictory, for a part of what is involved in knowing p is that p is true. Therefore, 'knowing p is knowing p to be true'. John Hosper in his analysis of requirements of knowing differentiates the term "know" from other verbs like "believe", "wonder", "hope" and so on. For example, one can wonder whether p is true, and yet p may be false; one can believe that p is true, though e p is false and so on. Hosper states that believing, wishing, wondering and hoping are all psychological states, which are occurring and dispositional in nature. Unlike these psychological states, knowing is not merely a mental state. It requires that the proposition one claims to know is true. But the truth requirement, though necessary is not sufficient. For example, one may not know certain concepts in physics like "energy" and "light wave" unless one happens to be a specialist in that area though they are true. But the fact that they are true does not imply that one knows them to be true. Though there are many true statements, one may not be in a position to know that they are true. There are other conditions that are required for knowing a proposition.

**b) Not only must a proposition (p) be true; we must believe that a proposition (p) is true.**

This is the subjective requirement, which implies that one must have certain attitude towards p - not merely wondering or speculating about p, but positively believing that p is true. There may be numerous statements that one believes but do not know them to be true, bu there can be none which one knows to be true, but does not believe t them, since believing is a part (a defining characteristic) of knowing. "I know p" implies "I believe p" and "he knows p" implies "he believes p", for believing is a defining characteristic of knowing. For example, "I know that the Sun rises in the east" implies that I believe in it. But believing p is not a defining characteristic of p's being true; p can be true even though one does not believe in it.

**c) Necessity of evidence or a reason to believe p.**

There is a necessity for evidence or a reason to believe a proposition to be true. For example, 'I know that the sun will rise tomorrow', 'I know that ice melts on heating' have excellent reasons or evidences to believe them to be true, because of their certainty. The knowledge that we gain about the physical world through our senses and our judgements about them amount to be true. But there are other kinds of propositions where only self-experience is involved like, one 'feeling headache' or 'feeling drowsy' or 'feeling depressed', to which one may not require evidence. Knowing these propositions is not well covered by the definition of knowing that require evidence. To say "I feel pain", the experience itself constitutes all the evidence that one requires. One can know the statement to be true, simply on the basis of having an experience. This holds only for propositions reporting the occurrence of sense-experiences. There are also statements, which are analytical in nature for which evidence is not claimed. The statements of this class are called 'truths of reason' for which evidence is not required. Even if it is required, it is not in the sense as described above. These are truths in the "realm of necessity". Based on the above analysis of knowledge, one can distinguish three divisions of knowledge, which are as follows:

**Three Divisions of Knowledge:**

Based on the way or manner in which it is obtained, knowledge can be classified under three heads:

**1. A priori Knowledge** is knowledge whose truth or falsity can be decided before or without recourse to experience (a priori means 'before'). Knowledge that's a priori has universal

validity and once recognized as true (through the use of pure reason) does not require any further evidence. Logical and mathematical truths are a priori in nature. They do not stand in need of empirical validations. Traditional philosophers have regarded a priori knowledge as superior to all other knowledge. The propositions that come under this category of knowledge are known as analytical propositions. An analytic proposition is one whose truth can be determined solely by an analysis of the meaning of the words in the sentence expressing it and whose truth or falsity can be decided by pure reason without recourse to verification with experience, for example, the propositions "bachelors are unmarried men" or "two plus two equals four"

**2. A posteriori knowledge** is the knowledge based upon observation and experience. This is the knowledge of the scientific method stressing accurate observation and exact description. The propositions that fall under this category can be looked at from the point of view of whether they contain any factual content and from the standpoint of the criteria employed for deciding their truth or falsity. For example, we have propositions like Ice melts. Snow is white. Metals conduct heat and electricity. These propositions give us factual information whose truth or falsity can be decided only through observation and verification. These are called synthetic propositions. An analytic proposition is a statement whose negation is self-contradictory. If someone said, 'Black is not black' he would be contradicting himself. If a true analytic proposition is denied, one would get a self-contradictory proposition. One can negate the proposition "Snow is white" - assuming that whiteness is not a defining characteristic of snow - we get "snow is not white", which though false, is not self-contradictory.

**3. Experienced knowledge** is always tentative and cannot exist prior to experience or be concluded from observation. It must be experienced to have value.

Basic to the, three types, is propositional knowledge (a priori and a posteriori) and it is to this type that the structure of the knowledge question is addressed. This has important implications to curriculum planning. Conflicting systems of philosophy have arisen from different initial choices among the ways of knowing. It is important to know in advance some ideas about the main ways in which knowledge could be related to the things known. There are six theories of knowledge in the field of Epistemology which are as follows:

**Six Theories of Knowledge and Truth:**

**a) The Revelation Theory:**

This view holds that the final test of the truth of assertions is their consonance with the revelations of authority. We recognize this as one of the views, but not the only one, favoured in religious thought. However, weight of authority has played its part in areas other than religion. Aristotle's utterances, for instance, were depended upon for centuries as the "sine qua non" of wisdom. It is said that even scholars of Galileo's time refused to look through the telescope because Aristotle had not indicated this as permissible.

**b) The Coherence Theory:**

This theory says that a statement is true if it is consisted with other statements accepted as true. Statements, of course, must be "true" to the particulars to which they refer, just as revelations accepted as valid in religion are not necessarily extended to other areas of belief. But on the hypothesis that the entire universe expresses a single unified and rationally consistent order, each statement accepted as true must be congruent with all other statements accepted as true. Thus, in a system of geometry, all propositions are congruent with all other statements accepted as true in that geometry. But geometry does not usually assume that such congruence is to be found everywhere outside geometry, nor even as between different systems of geometry. Certain idealists in philosophy have held the view that the whole universe is a perfect facade of reason in which all particular truths are united into one congruent whole.

**c) The Presentative Theory:**

This view holds that reality as presented to the mind in perception is known directly and without alteration. Errors of perception occur, but further observation is able to detect and explain them. Realists, specifically the neo-realists, favour this view. The presentative view is typical in common-sense thinking; although common sense, with admirable impartiality, may adopt all six of our theories of knowledge as convenience requires. The presentative theory regards such traits as the colours, shapes, and odours of objects, which appear to our senses as true objective characteristics of the objects, except for the occurrence of detectable errors.

**d) The Representative Theory:**

This view, again favoured by certain realists, holds that our perceptions of objects are not identical, with them. This differs from the presentative view sketched above which goes the length of saying that when we perceive truly, our perception is identical with the object perceived This implies that the object perceived literally enters the mind, which perceives it.

The representative realist tries to be more cautious on this point. What we see when we look at a tree is only its image. The tree cannot be identical with this image. The image is in one's mind, and the mind is somehow located in the brain; if the tree is fifty feet high, there is not room enough in one's brain to accommodate it. Although the representative realist does not identify the perception with the object, he believes that the perception usually represents the object with accuracy. The image is usually a reliable replica of the object. Again, we consider that the tree continues to exist whether or not we are seeing it.

**e) The Pragmatic Theory:**

This view holds that statements are true if they work successfully in practice. If an idea or principle is effective in organizing knowledge or in the practical affairs of life, then it is true. The belief of the pragmatist that the function of knowledge is to guide thought and action successfully is at the root of the important development in American education known as the progressive movement.

**f) The Intuition Theory:**

This view varies so much in its definite that it sometimes becomes identical with some of the other theories sketched above. At one extreme, intuition refers to a mysterious and immediate inner source of knowledge apart from both perpetual observation and reasoning. In this sense, intuitionism is encountered in some philosophies (e.g. Neo-Platonism and Bergsonism), in religion, philosophic spiritualism, and in the twilight areas of mysticism in general. At the other extreme, the term intuition has been used to designate generally accredited and immediate ways of knowing, such as in immediate sensation, or the immediate awareness we may have of some self-evident or axiomatic truth. Thus Aristotle's principle in logic that any object A cannot be at the same time be not-A is said by some to rest on immediate intuition. It does not arise from proof because all proof presupposes it. A related concept denoted by the term "insight" occurs in the literature of modem Gestalt psychology.

**Sources of Knowledge:**

A proposition may be true although one does not know it to be true. By what means, then do we come by knowledge? There are six sources of knowledge, which are as follows:

**Knowledge through sense experience:**

We can know many things about the external world, their characteristics and so on through our senses - by seeing, smelling, touching, tasting, hearing and so on. It is through touching and seeing we know that there is a table in front of us. Our senses on various occasions inform us of what a thing's characteristics are. But sometimes we commit mistakes while perceiving things around us through our senses. For example, we may mistake a rope for a snake which is known as perceptual error. Here it is not our senses that have deceived us. We have been led to make judgements that we subsequently found to be untrue. The error lies in the judgement, but not in sensation. All the senses can do is to present us with experiences which requires judgement. The existence of perceptual errors show that our judgement is fallible, but not our senses.

When we make a perceptual error owing to incomplete or fragmentary sense experience, it is always further sense experiences that lead us to discover our error. For example, one can get closer and confirm whether 'it is a rope or a snake so the fact of error based on sense experience does not show that we must appeal to something over and above sense experience; it only shows that we need more sense - experience. Thus one can get the knowledge about the external world through external senses. There are also the 'internal senses', acquainting us with our own internal states (feelings, attitudes moods, pains and pleasures), as well as our own mental operations such as thinking, believing and wondering.

In these cases, sense-organs are not involved in knowing; nevertheless, on the basis of certain experiences one may state certain propositions like "I am having a headache", "I feel sad; "I feel ill" and so on. In all these cases the fact that we are having the experience in question is the only guarantee we have or need for the truth of the proposition. In general, feelings are occurrent states, and their occurrence warrants one to say that he or she has a headache, or feels sad or ill. The words that can be used to describe people's 'inner states' or 'modes and emotions' are 'dispositional words'. For example, "I am in an irritable mood" means that if someone were to annoy me, I would be irritated more quickly than usual.

It is important to make a distinction between occurrent and dispositional state in order to understand knowledge through internal senses. A seed having a potency to grow into a plant, but kept in a jar is said to be dispositional; when it grows into a young plant being provided all favourable conditions, then it is said to be in an occurrent state. Thus we have the knowledge of our inner states of mind which can be occurrent in a situation or dispositional (having the potency or properties) to be something given a chance.

**Knowledge through Reason:**

Certain types of knowledge like 'two plus two equals four' are arrived at by means of reasoning. There are two types of reasoning which serve as the source of knowledge

(i) Deductive and (ii) Inductive.

The most familiar kind of reasoning, which is often taken as the model for all reasoning is 'deductive reasoning'.

**Deductive reasoning:**

In a deductive argument, the conclusion logically follows from the premises. If the premises are true, the conclusion that follows must be true. For example,

a) 'If it is raining, the streets will be wet.

It is raining. Therefore, the streets will be wet.

b) All men are mortal.

John is a man. Therefore, he is mortal.

The above two examples represent a valid argument. If one accepts the two premises, one must also accept the conclusion - conclusion follows from the premises. Tt is important to distinguish validity from truth. In a valid argument, the premises need not be true; it is only required that the conclusion follow logically from the premises. For example.

c) All cows are green.

She is a cow. Therefore, she is green.

In this example, the argument is valid, i.e. conclusion follows from the premises. But the premises are not true. Therefore, the conclusion arrived at is also not true. When chains of reasoning are involved, affirmation of the consequent does not logically corroborate the theory. Bertrand Russell demonstrated it through a syllogism which is. as follows.

d) If bread is made of stone

and if stone is nourishing  then bread is nourishing.

Although the empirical evidence strongly affirms the consequent, we can hardly say that it corroborates either of the premises. Sometimes, the premises may be true, but there may not be valid arguments.

e) India is a democratic country.

2 plus 2 equals 4.

'Therefore, he is driving the car.

In the above example, the conclusion does not follow from the premises, although all premises happen to be true. In order to know that a conclusion is true, (a) we have to know that the premises are true and (b) the argument is valid i.e. the conclusion follows logically from the premises. In deductive reasoning, the conclusion is, however, contained in the premises in the sense it is deductible for a specific case from the premises. In order to know if the conclusion is true we have to know that all premises are true and that the argument is valid.

**Inductive Reasoning:**

In inductive reasoning, the premises provide evidences for the conclusion - but not complete evidence. The conclusion is not certain but only probable to a certain degree. For example,

a) Crow 1 is black.

Crow 2 is black.

Crow 3 is black (and so on for 10,000 crows or more than that)

Therefore, all crows are black.

Similarly,

b) Iron conducts heat and electricity.

Copper conducts heat and electricity.

Aluminium conducts heat and electricity. (And so on for all metals).

Therefore, all metals conduct heat and electricity.

Here, though 10,000 premises where crow being black are true, the conclusion is not established. It is always possible; the next crow, which we may come across, might be white.

Similarly, there may be a metal, which does not conduct heat and electricity. In inductive reasoning, truth is established based on earlier evidences for something, which is not observed. For example, the proposition like 'tomorrow the sun will rise in the east' is made based on so many years of observations of seeing sun rising in east;. Though the phenomenon for next day is still not witnessed. Based on the repeated observations. We can say inductively that the sun will rise in the east. This conclusion has some probability on the basis of evidence presented in the premises. In an inductive argument, we rely on certain laws of nature, which are formulated based on certain recurring uniformities in the course of our experience. For example,

i) Green plants prepare their own food.

ii) Water vaporises on heating.

iii) Metals expand when heated. There are countless uniformities that are quite familiar in our experience, and on the basis of them we construct inductive arguments. In an inductive reasoning, the conclusion is not certain but only probable.

**Intuition:**

It is a label for a certain kind of experience when a conviction of certainty comes upon us quite suddenly like a flash. Here also we should exercise certain precautions.

a) Intuitions sometimes conflict. For example, two people can intuit about tomorrow's weather in different ways. How do we decide which of them is true in that case? If 'X' asserts that it would rain tomorrow and Y asserts that it will not, we can wait for tomorrow to find out which of the claims is true. But this we do through sense experience (seeing it rain), not by intuition. Intuition itself provides no way of deciding which of two conflicting intuitions is correct.

b) Knowing by intuition does not really explain "knowing how". It tells us nothing about the validating procedure.

We have examples from history of scientific investigations (Archimedes principle) and mathematical discoveries where the knowledge was discovered through intuition and provcd to be valid also. One can argue here saying, the knowledge was not arrived at as through a flash of thought without certain amount of pre suppositions. The problem was contemplated upon for a long period in search of a solution in cases where the scientists were supposed to

have intuited. In the process, the scientist must have intuited the solution, which was explained later with sufficient grounds of evidence and reasoning. However, this does not guarantee that every time the scientist intuited, it had carried a valid piece of knowledge.

**Revelation**

This source has the same problem as intuition. Sometimes one claims to know something by means of revelation. For example, "It was revealed to me in a dream"(or a vision). What if one person had a vision that told him one thing, and another person had a vision that told him the opposite? The fact that the person had a dream or a vision, does not show that its message is true or can be trusted. If what it says is true, its truth can be discovered only by other means.

**Faith:**

This source of knowledge overlaps the previous one having the same problems. "I know this through faith"; "I have faith in it, so it must be true"; "I believe it through faith, and this faith gives me knowledge". The same difficulty that plagued the claims to knowledge by intuition and revelation occurs here. People have faith in different things and the things they claim to know by means of faith often conflict with one another. Faith is a firm belief in something for which there is no evidence. It is an attitude of belief in something in the absence of evidence. What feeling or attitude one has towards the belief, and whether that belief is true, are two very different things. So it cannot be a valid source of knowledge.

**Nature of knowledge:**

By means of sense experience we learn many things about the physical world. We perceive countless things, processes and events. But if our knowledge ended there, we would have no means of dealing effectively with the world. The body of knowledge consists of a series of facts, concepts, principles, classifications, generalizations, laws and theories. These will be discussed in detail in the sub-sections that follow.

**Classification:**

No two things are exactly alike in the universe in all aspects. Even though they may be alike, we may still use the characteristics in which they differ as a basis for putting them in different classes. Similarly, there is no doubt that primitive man's approach to temperature was based on his classification of temperature into very hot, hot, moderately warm, lukewarm, cool,

cold and very cold. In daily life, what we do is to use rather inclusive class words, such as 'dog' and then if the need arises, we can make differences within the class the basis for further distinction, such as "Alsatian, Pomeranian, German shepherd" and so on; marking out as many sub-classes as found convenient within the same class. The classification depends on one's interests and one's need for recognizing both the similarities and the differences among things. Animals are classified in one way by the zoologist, in another by the fur industry, in still another way by the leather industry. There are as many possible classes in the world as there are common characteristics or combinations thereof, which can be made the basis of classification. Nature guides us in the selection of classes, through certain regularly occurring combinations of characteristics, which are useful in assigning a name to the combination.

Classes are in nature in the sense that the common characteristics can be found in nature, waiting to be made the basis for classification. On the other hand, classes are man-made in the sense that the act of classifying is the work of human beings depending on their interests and needs.

**Generalizations:**

A generalization is a statement expressing relationships between or among concepts. To generalize is to treat things that may appear to be different as if they are the same. A generalization may be a rule, law, principle, probability statement or sentence defining critical attributes. Here are some examples:

"Thrones are the official chairs of rulers".

"Elephants, whales and mice are all mammals"

A generalization expresses the relationship among concepts. The knowledge and understanding of the concepts that are related in a generalization are essential steps before the generalization can be understood and subsequently applied to a new situation. The term molecule as used in the molecular theory is a concept. Generalizations are used by scientists interchangeably with facts because they are based upon so many direct observations and repeatable demonstrations.

Some of the scientific generalizations are:

- o Heated metals expand.
- o Light is refracted when it passes from less dense to more dense media.

- Metals conduct heat and electricity.

Generalizations enable man to construct broader, more inclusive explanations for the phenomena he observes.

**Laws:**

Scientific knowledge begins only when we begin to notice regularities in the course of events. Many events and processes in nature occur the same way over and over t again. For instance, iron rusts, chicken lays eggs, lightening is followed by thunder; cats catch mice and the Sun rises in the east. Nature does contain regularities. We are nature works in regularities not because we enjoy contemplating them for their own sake, but because we are interested in prediction and control over events. Most of the regularities that we find have many exceptions. They are not invariants.

For example, chickens lay eggs, but how many eggs they do lay and at what intervals is extremely variable. The scientific enterprise consists in searching for genuine invariants in nature, for regularities without exceptions so that we can say, "whenever such and such conditions are fulfilled, this kind of thing always happens". Some scientific statements make assertions about unique events. For example, 'This egg smells rotten'; 'This baby has a temperature of 105°F'. Such assertions are termed singular statements. Other scientific statements offer generalizations about relationships between concepts i.e. they are statements about classes of events. For example, 'curdling of milk can he brought about by the action of bacteria'; 'Aspirin usually reduces fever symptoms'.

Such assertions are termed general statements... Law statements such as Newton's Laws of Motion, Ohm's Law and Boyle's Law belong to the latter class. Each of these laws makes assertions that a relationship exists between two or more concepts; each of the concepts is tied (either directly or indirectly via chain of inference) to observable phenomena.

A law describes a situation which, to use a phrase coined, by Norman Feather, ' might conceivably have been otherwise'.

**Examples:**

'Objects fall with increasing velocity".

"Gas pressure is inversely proportional to volume".

These are clear general statements about events of nature, make truth claims which may be checked by experiment.

**Prescriptive and Descriptive Laws:**

Laws of nature are descriptive. They describe the way nature works. For example, Kepler's laws of planetary motion describe how planets actually do move. Laws describe uniformities in nature.

Laws of nature are a smaller class of propositions than empirical statements in general.

(Any statement whose truth can be tested by observation of the world is an empirical proposition). Laws of nature are the very basis of the empirical sciences.

**Characteristics of laws of Nature:**

**1. It must be a true, universal, empirical proposition.**

It must be applicable to all members of a given class. A proposition about a single thing may be material for a law of nature, but it is not a law.

- This piece of iron rusts

- Some iron rusts

- All iron rusts

In behavioural sciences, unlike in the physical sciences, we come across many such singular propositions and very few genuine laws. A law must be an empirical truth of the form "All A is B" where B must be connected with A not as a matter of necessity, not a priori but as a matter of contingent fact. The law 'Metals expand when heated' is a taxonomy of law statement involving a relationship between classes of objects ('metals', and 'things which expand when heated').

The so-called "laws of human nature" on examination turn out to be analytic. Consider "people always act from the strongest motive". The strongest motive turns out to be the motive from which one acts. Even true propositions about some members of a class are not considered as laws of nature. They are called statistical laws.

**2. These universal propositions are hypothetical in form.**

They are usually interpreted as propositions of the "if.. .then.. ..." form.

i) "All iron rusts when exposed to oxygen" is actually "If there is iron, it will rust when exposed to oxygen".

ii) "If molecules are in rapid motion, then finely divided particles suspended in water are seen".

The hypothetical interpretation of laws can get us into trouble sometimes.

For example, if p is true then q is true - It is not the case that p is true but q is false. If there is friction, there is heat - It is not the case that there is friction but no heat (true).

"All unicorns are white" though a universal hypothetical proposition is not a law of nature because there is no evidence from other laws that this law is true.

**3. A law of nature is open-ended. It has an infinite range both in time and space. It is an open class with no structures of time and space.**

i) All the chickens in this poultry are white.

(Limited to a definite area in space and time).

ii) All the chickens I have ever had in my poultry are white.

(It would say nothing about (111 chickens).

(They are universal in form but universality restricted in time and space).

The number of things covered is finite and this finiteness may be inferred from the terms of the proposition itself. Evidence for the proposition exhausts the domain of application.

But "all crows are black" does not have these difficulties.

The claim of the laws of nature extends into the future and this enables them to be made the basis for prediction.

**4. A law of nature should have some indirect evidence for it.**

"All crows are black" is not a law because the only evidence for it is direct evidence.

Laws of science are not viewed in independence of one another. Together they form a vast body or system with each law mutually reinforcing others.

"All crows are mortal" is supported by much indirect evidence such as the mortality of organisms in general, the biochemical deterioration of tissue, and increase in auto allergenic

response. But "all crows are black relates to their significant regularities of either greater or lesser generality. A crow that was not black would change no other I~IWS known to us but a crow that was immortal would excite considerable scientific surprise because it might force us to reconsider many other laws (about deterioration of tissue etc.) with which it is interlocked. Similarly, "All metals are good conductors" is so fundamentally tied to other laws (of atomic structure) that a counter instance would have far-reaching consequences. Whether or not something is called a law, then, depends to a large extent on how deeply embedded it is in a wider system of laws.

## 5. Universal propositions whose degree of generality is greater are more likely to pass as laws.

As explained earlier, the assertions that have more generality can be considered as laws. when compared to singular statement. For example,

"Silver is a good thermal conductor".

"All metals are good thermal conductors" (more general).

"Tungsten melts at 3370°C.

"All rake-earth metals have higher melting points than the halogens" (more general).

Sometimes one of those conditions works against another and the outcome is not certain.

Einstein refers to the constancy of the velocity of light in a vacuum as a law of nature (limited generality, but a very fundamental item).

The mass of the electron, (not considered a law as its precise value remains largely independent of the main body of science.

### Theory:

Theories are statements that explain a particular segment of phenomena by specifying certain relationships among variables. A theory is general in its approach it is not specific in nature like facts and principles. It is of a higher order of abstraction than a fact or principle; Theories date, explain and predict wider varieties of experimental and observational findings in the simplest and efficient way. Scientific theories serve as means and ends in the development of science. As means they provide a framework, which guide scientists in making observation and discovery. They summarize knowledge and put knowledge in an order w,ithin a given

field. As ends, theories provide scientists explanations for observed events and relationships for specific phenomena with objectivity. They do so by showing the relationship between variables and explaining how they are related. On the basis of understanding of such relationships, scientists make deductions and predict about what will happen in certain situations under specific conditions. In a scientific theory, predictions are generated and empirically tested. The most powerful question that we can ask of a theory is not 'Is it true', but 'is it capable of being proved false?' According to Karl Popper, it is the ability of a theory to be refuted that is, the most important criterion for judging whether the theory is scientifically sound.

**Difference between a law and a theory:**

The terms Law and Theory are sometimes interchangeably used in science. Newton's F = G m M /R2 relationship, for example, is frequently referred to as his law of I gravitation, occasionally as, his Theory of Gravitation. Nevertheless, it can be argued that in most cases, it is possible to distinguish between, laws and theories because they have rather different syntactical structures. In case of laws, overt observational or laboratory procedures are available to give operative meaning to the terms in the relationship, whereas in case of theories, no such direct procedures are possible. For example, it is possible to operationally define the potential difference for Ohms law (in terms of number of standard batteries in series and mass of metal deposited at an electrode). While in the kinetic theory of gases there are no direct operational procedures for testing the relationship of pressure with the number of molecules per unit volume, molecular mass and the average of the square of the molecular velocity* 'p = 113 nm V2. In general, we construct or devise theories, but we discover laws of nature. A scientific theory always contains some term that does not denote anything that we can directly observe. If we can observe something only through a telescope or microscope, we are still said to observe it. But if there are no conditions under which we can observe it, it is a theoretical entity; and when the theory-word is a part of a statement, that statement is said to be a theory. For example, protons and electrons cann66e observed, though we do observe many things that are presumed to be effects of them. So the statements about protons and electrons are theory but not law.

**Difference between a fact and a theory:**

A fact is something we already know. It reports a single event (E.g. there is a sun in the sky right now). A theory states things that are not yet observed. (E.g. protons and electrons). It

reports an innate number of events resulting in a universal statement. (E.g. the Sun rises every 24 hours). A scientist makes observations and records them in mathematical language, while a theoretician tries to formulate a general mathematical proposition by incorporating the facts observed and develops his theory by seeing relationships between variables in operation be deriving certain predictions of facts in mathematical propositions. Theories often offer a crude and general explanation of a phenomenon. They are refined and modified as knowledge in the presence of facts. The discovery of facts is essential in order to determine whether a theory can be confirmed or rejected or reformulated. A scientist holds the theories tentatively, always prepared to abandon them if the facts do not bear out the predictions and looks for a new or improved theory. A theory provides means for its own interpretation and verification. In other words, it provides deductions, which can be tested empirically. It comprises a model which is a mental picture, analogy or mathematical relationship that permits the theoretical concepts to be visualized in more or less familiar terms.

**Universe of knowledge:**

The concept of the "universe of knowledge" is a metaphor of great importance in library classification theory (Hjørland, 2006). Different authors in different moments of history have provided examples and models on this concept in relation to classification: tree, maps, atlas, and even constellations and multiverses (in the most physicist fashion, such as in Heuvel & Smiraglia, 2010; Smiraglia et al., 2011) are some of the examples that have been used in the literature. A common concern of all classificationists reflecting on the universe of knowledge is the necessity of mapping or translating knowledge "out there" into concrete and logically developed classes that compound the classification system. This is one of the core aspects of knowledge organization and development of knowledge organization systems. The methodological approach to this mapping (e.g., top-down or bottom-up) has been also considered as an epistemological question (e.g., Hjørland, 1992). In other cases, the sole mention of universality in classification (as in universal representation) has been politically questioned from critical and poststructuralists stances (in opposition to the inclusion of the particular views of marginalized groups, as in for instance Olson, 2002; Martínez-Ávila & Guimarães, 2013; Sahadath, 2013; Martínez-Ávila et al., 2016). This position is summarized by Olson (1998, p. 217) as follows: "The rejection of universals or absolutes is central to postmodernism and post structuralism. This rejection is accompanied by the suggestion that realities are constructed by discourses operating within societies. [...] The rejection of universals suggests a relativism that some critics find threatening, but does not require this

frightening fragmentation of realities. Automatic acceptance of absolute individuality as concomitant to rejection of universality is a tacit acceptance of binary opposition, the intellectual division of concepts into dualities. Such binarism is a presumption that one conceptual framework is universally applicable." On a theoretical plane, and especially from a post structuralist point of view, Smiraglia et al's discussions on multiverses might provide an exciting solution to this problem. However, in practice, common and implicit understandings of universe and universals among classificationists might be different. While Green et al. (2002) discussed universality in classification as "full equivalence across schemes for knowledge representation and knowledge organization," Szostak (2014) raised the question of the multiple meanings of universal in the classification fora, and also put the definition that it is understood and followed in this paper: a universal system that has a place for everything (and thus everything is potentially represented in the system). As not only the concept but also the practical mapping of the universe of knowledge has been approached differently by the different authors. In this paper, we aim to review and systematize the main principles for mapping the universe of knowledge and the examples of mappings in the different modern library classification schemes.

It has been argued that if any classification system or theory is to be fully understood it should be regarded as part of a specific socio-cultural and philosophical framework (Olson 2002; Hjørland 2003; Mazzocchi 2013). This implies that an inquiry into their foundations needs to include also an analysis of the underlying ontological and epistemological questions. Shiyali Ramamrita Ranganathan's ideas about classification are not an exception. In this paper it is asserted that these ideas were influenced significantly by the Indian philosophical tradition, in which together with metaphysical thinking schools of logic and dialectics sprung up too. Some authors have stressed the kinship with the Nyaya-Vaisesika system (Adhikary and Nandi 2003). Indeed, Colon Classification embeds elements of the Hindu worldview, such as the idea of transistorizes in respect to the ceaseless transformation of the universe and above all the inclination to analyse existence in fundamental categories.

Then Ranganathan's approach is scrutinized in the light of the cultural background in which it developed. In particular, his PMEST is looked at against the background of the Indian philosophical tradition, comparing it with the *Vaisesika* categorical systems. Finally, the role of categorical systems as a cognitive means is analysed. Certain basic categories have surfaced within the Indo-European linguistic and cultural frame in different ages and

latitudes. The fact that they are somehow 'culturally constructed' does not undermine their role of establishing the meaningful domain of discourse of a cultural tradition.

**On the concept of knowledge:**

Knowledge can be defined as the sum total of conserved ideas, facts, fiction, myths, experiences and expressed emotions conserved by the society. In simple words, what is known to the society and is held in its collective memory is knowledge. Knowledge is essentially public. Private knowledge is not knowledge per see. Tacit knowledge is formed with public knowledge. In other words the society is the conservator of knowledge. The knowledge is knower dependent. Humans are the creators and consumers of knowledge to solve problems facing society, or may be created for its own sake. Whatever be new knowledge invariably leads to new systems, products, services, values and ultimately the outlook to life and the universe. All assorted chunks of knowledge can be unified into a single big whole. There is unity in knowledge says Jesse. H.

Shera (1903-1981) (Shera, 1970). In other words, the entire body of knowledge is a system having its definite characteristics:

- Knowledge is not independent, it is dependent upon the knower, the man (Meadows, 1991, p. vii).

Knowledge originates from the environment, both physical and social. Human being is the knower. The Nature, including society, is the ultimate source of knowledge. Our sense organs are raw tools to perceive data and convert these into knowledge.

- It is conserved and used by the human society. Thus it is social in character.

- Knowledge is never complete. It is fragmentary, dynamic, multidimensional and changing. It changes with time and society and with its own progress.

- Knowledge builds on knowledge, and is thus cumulative especially the empirical knowledge

- Thus it is inexhaustible, i.e., never ending. In other words it tends to be infinite

- Technology, social advancements and knowledge discovery are mutually dependent.

Information is generated when the knower interacts with the nature through the sense organs. Information thus gained is given context with the previously conserved knowledge for its use

and validation. Thus knowledge is socio-biological in nature. Society is the producer and consumer of knowledge, while knowledge is the prime mover of society. Thus society and knowledge are inextricably locked in mutual influence on one another. It is not possible to isolate the one way influence. Knowledge grows as society grows; whereas society changes and develops progressively as new knowledge is generated. It is the society which decides which kind of knowledge it is going to have; in which direction and in how much quantity; and determines the value scales for the different categories of knowledge. Therefore thrust areas in research to develop new knowledge will depend on the values and priorities of society at a given time.

**Ranganathan's universe of knowledge**

To investigate the nature of knowledge and its dynamics is of paramount importance for library science scholars and classification theorists, since the 'world' in which they are supposed to operate is made up of such items. Ranganathan's 'universe of knowledge' is the universe of subjects (as an analogy of what occurs in chemistry, three types of subjects are distinguished: basic, compound and complex). This universe is described in terms of a complex, dynamic multidimensional space. It is a "dynamical continuum" which is "turbulently growing at every moment" and made up of an "infinity of points" (Ranganathan 1951). Being a mathematician, a certain correlation between mathematics and classification theory is noticeable. For example, the idea of infinity with which Ranganathan describes the universe of subjects has been compared by analogy to the infinite set theory developed by the mathematician Georg Cantor in the late 19th and early 20 th centuries (Hjørland 2013).The question is how to handle this dynamic complexity for practical purposes. Ranganathan was aware that we are living in an age typified by an increasing proliferation of subjects. New discoveries constantly occur and there is a social and intellectual interest for an advancement of research activity. He criticized the shortcomings of enumerative (classification) systems such as the Dewey decimal classification and Library of Congress Classification. These systems attempt to enumerate all possible subjects in a given domain within a fixed set of predetermined classes. However they encounter many problems in dealing with the dynamic aspect of knowledge. Their functional value would be greater if the 'universe of knowledge 'corresponded to a closed system, but it is open and dynamic; new items are continuously added, resulting in the nonstop need for new classes to be created: "new branches may stem from any of its infinity of points at any time; they are unknowable at present. They cannot therefore be enumerated here and now; nor can they be anticipated, their filiations can be

determined only after they appear" (Ranganathan 1951, 87ff.).In response to this, Ranganathan searched for a novel flexible approach based on a "sound resilient foundation" and capable of coping with continuous change in knowledge:

If a scheme for classification forms an essential element to be built into a document finding system, the helpfulness of the document-finding system will depend upon the efficiency of the scheme for classification in keeping step with the incessant growth of the Universe of Subjects and also with the variation, from time to time, of the subject approach of readers. To secure this efficiency, the scheme for classification should be based on a dynamic theory of classification (Ranganathan 1970, Vol. 7, p. 99, in Ranganathan 1964 -1971).

These ideas are coupled with the belief in the steadiness or artificiality of any (unilateral) classification. "There is no unique system of natural classification even for the universe of knowledge in abstract" (Ranganathan 1964, Vol. 1, p. 3, in Ranganathan 1964 -1971). In any grouping of subjects a factor of convention is implied. There is no single way, for example, to decide if the discipline of Biochemistry belongs to Chemistry or Biology or Medicine. "Only God can make a classification true to the needs of all readers at all times" (Ranganathan 1968, Vol. 5, p. 296, in Ranganathan 1964 -1971). Nowadays many would argue that classification is socially and culturally biased (Olson 2003; Mazzocchi 2013) or that even within the same cultural tradition the social value and the spatial order of subjects can change through time (Satija and Singh 2010).On the one hand, Ranganathan believed that the structure of knowledge exhibits a kind of underlying unity, and a classification has to show this structure which displays hierarchically. On the other hand, he acknowledged that the universe of subjects is multidimensional and that any classification involves a linearization of this multidimensionality, i.e. to "transforming a multi-dimensional space into a uni-dimensional one" (Ranganathan 1964, Vol. 1, p. 19, in Ranganathan 1964 -1971). Classification should be able to include multidimensionality within itself:

The terms **Like** and **unlike** are in respect of a single attribute or a complex of attributes…Classification in this primitive sense should have originated with the primitive man. It is practised very early in childhood. It may be done on the basis of a single characteristic to begin with. But, with the evolution and the development of the cortex of the brain, the single characteristic has been giving place to a characteristic - complex; the complex itself has been steadily increasing in complexity"(Ranganathan 1964, Vol. 1, p. 3, in Ranganathan 1964 -1971).

**Importance of knowledge studies for librarians:**

Knowledge is both public and tacit, recorded and oral (tribal and illiterate societies orally preserve their knowledge). Librarians deal only with recorded knowledge i.e., documents. Knowledge is stock in trade of the librarians and information professionals. Therefore, quite obviously the study of the knowledge, its characteristics, and structure is important to us librarians. Study of the nature of knowledge is as important to the library and information professionals as is the study of anatomy to a surgeon, says Jesse Shera (1970). Hence as librarians we need to know the sources, nature and structure of knowledge. Only then we will be able to collect, organize, disseminate and preserve it effectively.

**Modes of growth of knowledge:**

Knowledge has always grown incessantly, but now is growing so turbulently that it has been termed as information revolution. New subjects are emerging. S.R. Ranganathan (1892-1972) identified many modes of growth of subjects of various kinds. These are:

A By Specialization

A1 by Denudation (Vertical Division)

A2 by Dissection (Horizontal Division.)

A3 by Lamination (Specification)

B Interdisciplinary mode

B1 by Loose assemblage (Ad hoc Combination)

B2 by Fusion (Permanent Combination)

C Multidisciplinary

C1 by Distillation (Indiscriminately fused)

C2 by Agglomeration (Permanently federated)

C3 by Subject bundles (Loosely gathered, ad hoc)

The modes of formation of subject cast a considerable influence on the structure of the subject. Explanation of these modes of formation of subjects is beyond the scope of this paper though the process has been extensively reviewed in Satija et al. (2014).

**Attributes of knowledge:**

Knowledge is the creation of human beings. Since time immemorial, humans have observed, experienced, experimented, reasoned, expressed and recorded many a thing. All these things whatever has survived, formed the universe of knowledge. The aforementioned activities of humans that started in prehistoric era continues till date unabated and will continue till humans exist on earth. Hence, the addition to the universe of knowledge will continue up to a time one cannot foretell.

**Definitions:**

**Segment** - A part of the universe of knowledge that harbours a subject and sometimes acts as a component of a subject system.

**Subject** – A subject is composed of a segment or segments of the universe of knowledge.

**Subject system** – A subject having a component or components like object, action, space and time.

Example: History: India: British period.

**Universe of knowledge** – The totality of knowledge that have survived till date. The knowledge that is being generated now and will be generated in the future will also be a part of the universe of knowledge.

**Modes of formation of subjects:**

Every system and entity in this universe is growing and changing. Universe of knowledge is a system; and like every system it grows. Growth of knowledge is both additive, as in humanities and cumulative, as in sciences (Dogan, 2001a, 11025). S.R. Ranganathan's fifth law of library science, viz. Library is a growing organism, is a simple bibliotheca manifestation of this impeccable law of growth of knowledge. Kevin McGarry aptly equates this growth to biological growth. Today this growth rate is unprecedented and alarming. We are obviously witnessing an information deluge – though it is not easy to quantify the volume of knowledge or its speed of growth (McGarry 1993, Machlup 1979). However, as measured through the quantity of literature, scientific literature grows annually at the rate of 5 to 15% and thus doubles between 5 to 15 years, writes a Director of Chemical Abstract Service (Satija 1984). In some areas of soft sciences, such as humanities, knowledge growth is slow, so is the rate of obsolescence. We however see a palpable growth

of knowledge in all areas of human thought and endeavours. The growth may be of three types:

**Natural Growth:**

Paul Weiss (1960) and S.R. Ranganathan (1963, 449) liken knowledge growth to the growth and development of living organism so does Kevin McGarry (1993, 146). Thus knowledge grows without any conscious efforts, as in a forest, provided the environment is not inimical. In every age and society there are curious and restless souls engaged of their own in knowledge creation. This continuous growth makes knowledge a system in a dynamic continuum. Every system needs information feed for its stability and development. This is true even of homeostasis stage. It means knowledge needs further knowledge for preservation and dissemination of the existing stock of knowledge – thus adding to the existing stock. Hence, it grows of its own. Another factor for growth of knowledge is the innate curiosity, urge to be held in high esteem, and spirit of adventure and exploration in human beings. Next to food, shelter and security what man wants is to know the unknown.

This quest is known to drive humans to life risking adventures to explore the deep secrets of raw Nature. It is a motivating force to generate and store knowledge. Weiss (1960) is apt to say that "key agent in the growth of knowledge has always been the human mind, imaginative, critical and integrative…". Another natural reason is inherent in the fragmentary nature of knowledge. By nature, knowledge is never complete or final. It is an inexhaustible resource. For example, any research inquiry is always open ended. This is too obvious from the fact that every worthwhile piece of research raises more questions than it answers. Ironically advancing knowledge holds a mirror to some areas of our ignorance. (Smirensky 1994) Hence, knowledge is always incomplete, whatsoever may be added to its huge and inestimable repertoire. It is always moving towards its ever advancing frontiers. Hence, it has infinitely innate capacity to grow forever and ever (Weiss, 1960). This growth is both quantitative and qualitative. Qualitative growth leads to refinement and precision or corrects our existing world view. It also fills known gaps in our knowledge. Quantitative growth opens new frontiers and increase its boundaries in all directions.

**Planned Growth:**

No society, no nation can achieve success in economic, cultural, technological and educational welfare activities if the production and consumption of knowledge is not up to a

certain optimum level (Satija, 2013). Since the Industrial Revolution knowledge based innovations are prized by every society for leading ultimately to economic growth which further fuels new social and political ideas for welfare, dignity of life and individual justice to mankind. (Al- Hawamdeh, 2005). Every new piece of knowledge translates into wealth creation to enrich life on this planet and brings all social benefits. It is essentially the true capital of economy. Knowledge production, as a major economic sector, is now a reality (Cornforth 1955, 206). Alvin Toffler is apt to say that "Information has become perhaps the world's fastest growing and most important business" (1980, 172). Therefore, there are planned and organized national and international efforts for its growth. India's National Knowledge Commission (NKC 2005-2008) is a shining example of national plans for development and harnessing knowledge for overall social development.   Research is public-financed for new ideas, both basic and applied. Population pressure, rising standard of living and quickly eroding natural resources to sustain economic growth make it imperative to supplement the natural resources by artificial ones, and explore new kinds of natural but renewable resources. This requires further research to make life secure and ensure growth on this planet. This gives rise to an abundant growth in cultivated   knowledge. Indeed the growth of knowledge   is   exponential,   and needs to be so. Within a decade, the number of universities in India has increased three fold, and colleges many more.

**Induced Growth:**

Induced growth of knowledge lies half way between the natural and planned methods. Knowledge is not a commodity in the sense it is decimated by consumption. We can eat our knowledge cake and multiply it too at the same time. In fact, more we consume more it grows and multiplies. Gaining or communicating knowledge further facilitates the growth of knowledge. Fritz Machlup equates knowledge dissemination to its growth (1962, 4). Widespread education, social awareness, more leisure time, wonderful advances in information and educational technology, super-fast means of communication, generous financial support from the governments, organized and relay research, increase in number and variety of information media, growth in library and information services are some of the congenial factors which induce the growth of knowledge. Immense    pressure on the academicians to "publish or perish", personal rivalries and corporate wars for priority claims, are some other such factors. Post World War II Cold War, especially since the launch of Sputnik, has generated lot of research based knowledge in defence and social welfare among nations and their political  blocks  across  the  Atlantic  (Bhattacharya,  2012).  Close

interaction between scholars, specialization trends, team work and interdisciplinary studies have also induced the growth of knowledge. In fact all these are – both the cause and effect of the continued growth of knowledge.

**Modes of Knowledge and Growth:**

Knowledge is essentially a cerebral construct though social in character; and only the socially available or the public knowledge is knowledge ipso facto. Factors and means to procreate knowledge are numerous and varied. Nature is the ultimate source, and human being is the only agent to unearth knowledge. Non-human creatures do not have this creative facility. Research is one process to increase the fund of knowledge. Intuition, imagination and apperception are transcendental ways to conceive knowledge, whereas experimental, empirical, and speculative methods are available to all. Studies on the nature of knowledge have given rise to a body of knowledge called social epistemology (Shera, 1962). In spite of the increased importance of epistemological studies in philosophy, psychology, metaphysics, sociology, economics, education, genetics, linguistics, research methodology, cybernetics, artificial intelligence, and of course the library and information science surprisingly there have been very few studies on the mode of topology of growth of subjects. "We do not take enough notice of what contemporary philosophers and scientists have to say about the nature of knowledge", aptly warned D. J. Foskett (1980, 3). Knowledge is librarians' stock-in-trade, and study of its nature is of as much important to us as the study of anatomy to a surgeon (Machlup 1962, 33-34). Its implications in information management are all pervasive and too numerous (McGarry 1993). In Library and Information Science (LIS) discipline, S.R. Ranganathan (1892-1972) is a pioneer in the studies on the modes of knowledge growth and on the science of knowledge. In the year 1948 Ranganathan got introduced to a paper "Development and structure of the universe of subjects" in the postgraduate library science curriculum of the University of Delhi, though his announced book on the subject was never published. However, he had an abiding interest in the field and always obtained fresh results (Kemp 1976, 11, Ranganathan 1968). The work has been continued by his schoolmen at the Documentation Research and Training Centre at Bangalore (Neelameghan 1973a, Neelameghan 1973b, Gopinath and Seetharama 1979) and elsewhere (Puranik, 1952, Vickery, 1952, Kabir, et al, 1996). Late Dean Jesse H. Shera (1903-1982) lauds this as Ranganathan's "intellectual contribution to the underlying philosophy of librarianship" (1962, 106-07).

**Three Modes:**

All the specific modes Ranganathan discovered and a few more for the growth of knowledge can summarily be discussed under three general modes: Growth by specialization, interdisciplinary, and multidisciplinary growth. In fact Ranganathan studied growth of knowledge not qua knowledge but in form of subjects and especially the main classes. He defines main class as the first division of the entire mass of knowledge into manageable block of interrelated and coherent ideas for study and communication. He further warns, "Generally speaking a main class cannot be represented either as a subclass of another or as a combination of two or more of the main classes". Ranganathan categorized all the subjects in the universe of knowledge into three categories namely, Basic, Compound and Complex. Main classes are basic subjects. Compound subjects virtually infinite in number are basic subjects with a focus such as agriculture of wheat, or rural sociology. Complex subjects are two phased subjects such as psychology for nurses. However, he divides main classes which he terms them as Basic Subjects (BS) into the following categories: Primary (BS) and Non-primary (BS) (Satija 2011, 10-11).

**Fission:**

As the term from nuclear physics suggests it is successive ceaseless breaking of the subject into smaller fragments as in a nuclear chain reaction. It happens through the following two ways depending upon the time taken and the size to which the fragments are broken. Basic subject (BS) Primary (PBS) Newly emerging (Journalism) Traditional (Physics) Fused (Biophysics) Distilled (Research Methods) Agglomerates (Social Sciences) Subject bundles (Religion and Ethics) Canonical (Algebra) System (Marxian Economy) Special (Sports Medicine) Environment (Desert Biology) Non-Primary (NBS).

**Dissection:**

One time splitting of a subject into an immediate array of its subordinate fragments of equal ranks is called dissection. Cutting a whole bread into slices (of more and less equal thickness) is dissection. Division of physics into its traditional branches such as properties of matter, heat, light, sound, electricity is an example of dissection. Division of the earth into its constituent seven continents is another example of dissection, so is the political division of a country in to its provinces. Generated divisions have a common genus, are mutually exclusive, exhaustive and equally ranked. In simple words, all segments

form an array of cognate classes/entities. Dissection process is horizontal and instantaneous in action. Sometimes Ranganathan termed dissection by fission itself (Ranganathan 1972).

**Denudation:**

Long drawn and repeated dissection of a single entity becomes denudation. It is stripping a subject, like pealing an onion, of its successive layers to  reach  the  bottom  of  the bottomless.  Sciences, physical sciences, chemistry, organic chemistry, aromatic compounds, benzenoids, benzene and so on illustrate the denudation at work. It works vertically downwards and generates a chain of entities in successive subordination. Its action is prolonged.  Extension of the subject decreases while its intension increases in the process.  It may be noted that dissection  and  denudation  both  are  relative  terms differing only in degree (Ranganathan  1967,  section PD4).  Denudation  is  dissection  applied repeatedly  on  one  entity. Therefore, denudation includes dissection. This  process is at work especially since the scientific revolution of 17th century when all experimental sciences were termed by a common term "Natural Philosophy" and once all social sciences were called sociology. (Dewey, 1876)

**Lamination:**

Main class is large, diffused but somewhat coherent area of knowledge. When its area of study is limited by specifying topics, it becomes a compound subject, from a basic subject. Lamination is the process of placing one or more isolates on the parent basic subject. English language, linguistic grammar, and English grammar are three examples    of laminated subjects from   the main class linguistics. These have been obtained by placing the laminate of "English", "grammar", and "English grammar" respectively on the basic subject "Linguistics". These  are  termed  as  compound  subjects  in  Ranganathan's  terminology. Number of laminate placed on a subject could be as large as feasible.  Number   of such laminate is    a direct measure of the specialization of that topic. Laminated or compound subjects are most populous in this universe of subjects --virtually these are infinite. A faceted classification such as the CC, UDC or BC-2 makes the structure of a compound subject quite clear whereas in the enumerative classification like the DDC compound subjects can neither take many laminate nor their structure is visible. In fact it is another kind of specialization - by qualifying and specifying a fissioned subject.

**Procreation:**

If knowledge grows organically then some of it might be procreated by copulation of two subjects. One such subject is "Linguistics" which is a knowledge field of recent and rapid growth says McGarry. He further writes "Claiming descent from a union of philosophy and philology, it became a widely taught subject in the early 1960s. It claimed territory in the scientific study of human language and this claim was supported by the increasing need to investigate language and communication in relation to human needs and human behaviour... A group of brilliant theoreticians created a new and broader picture for students and scholars. The discipline soon began to diversify and fuse with other disciplines. The results are specialist studies such as psycholinguistics, sociolinguistics, and neuro-linguistics" (1993, 146)

**Self-Procreated:**

Furthering the analogy of knowledge bio-organism some organism like the bi-sexual are self-procreated. Applied mathematics, applied physics, applied Optics, and applied Chemistry, human biology are a few of numerous such subjects being taught as independent disciplines. Though every knowledge is applied, they say every mature knowledge is theoretical. Indeed a theory is the most applied knowledge. These subjects are not applied in the sense of technology, as applied chemistry is not chemical technology.

**Analogical mode:**

Some subjects find parallels in other disciplines. For example Darwin's theory of the evolution of species and survival of the fittest found echoes in social institutions and processes. Society, its organs and institutions evolve, grow and even mutate into other forms. Such studies are aptly described by the term Social Darwinism. Social Darwinism has been used to illuminate and explicate many social phenomena and problems. Social physics, social entropy and political dynamics are some of the examples of such subjects.

**Instrument Based Subjects**:

Some subjects are based on a machine and have grown into full discipline by gathering around a machine or device. An example is Microscopy or Microbiology which has risen from the Microscope. But the most outstanding example is of the all-pervasive discipline of Computer Science and engineering and of late mobile based applications. It has

encompassed and influenced every strata of society. Such subjects are growing and even fragmenting, for example, Internet studies is emerging as independent subject.

**Inter-disciplinary Growth:**

The trend of specialization got so perverse that the scholars became isolated and distant from one another. Subjects became too jargon ridden to be easily communicated to other scholars. McGarry (1993, 164) argues "This tendency, though it makes for greater efficiency, can lead to communication problem, to individual researchers loosing sense of the 'whole'. In practical terms it can lead to costly duplication of efforts. It can even lead to duplication of efforts within the same profession..." Reporting on the proceedings of a World Conference on interdisciplinary Judge (1995, p.82) reports "However there was a clear concern that the fragmentation of the disciplines was failing to serve society in the face of a complex of global problem and conflicting initiatives." This trend has happily been counter-balanced by inter-disciplinary studies, set in especially after the last World War (Puranik 1952). Team and relay research, close cooperation among scholars, availability of subject consultants, have led the scholars to join hands for inter-disciplinary studies. Knowledge advances through the juxtaposition of subjects. It has been aptly said that subjects criss-cross in boundaries and neat demarcations are now gone. There is inter- and cross breeding to produce new species of subjects. Then there are subjects like "Physical Education" which feed on the other subjects in the environment. Inter-disciplinary subjects may be defined as a subject of interest to scholars from different disciplines or vice-versa. Ranganathan isolated the following modes of their formation.

**Loose Assemblage:**

Loose assemblage is combination of two or more subjects or their parts in a sort of temporary, casual or incidental ways involving any relation viz, influencing, comparison, biasing, difference, tool, or any undefined one. These subjects are from different disciplines. For example, 'statistics for librarians', 'psychology for nurses', or 'influence of computers on library operations' are some such subjects taken at random. In such cases a subject is studied in light of the other and here their encounter or assemblage is temporary ad hoc or loose, and reversible. Inevitably these subjects are of inter-disciplinary interest. We can have limitless number of subjects by this process. Subjects formed by loose assemblage are termed as complex subjects by Ranganathan. Each constituent of a complex subject is termed as a phase. Phase relation is counted among Ranganathan's brilliant devices for subject

analysis and depth classification of inter-disciplinary subjects. Some of its methods such as the tool and bias phase have been borrowed by other systems such as the DDC, BSO and BC-2 (Slavic, 2008).

**Fusion:**

Fusion is an advanced stage of loose assemblage. When loose assemblage solidifies into a permanent relation and the different constituents are irreversibly joined to form an entirely new subject with its own special isolates and literary warrant, it is called a fused subject or a subject born by fusion. Here the friendship of loose assemblage is upgraded to marriage or permanent bonding. Fused subjects transcend complex classes to become basic subjects. Biophysics biochemistry, geopolitics, agricultural economics are a few random examples of homogeneous and irreversibly combined complex classes – called fused main subjects. Fusion as a mode of formation of subjects has been isolated as recently as 1968, though the phenomenon is much older (Ranganathan 1962). In fact, earlier loose assemblage included fusion. Later in 1968 the loose assemblage and fusion were viewed as two different modes of formations.

**Multidisciplinary Growth:**

During the last year of his life in association with colleagues at the Documentation Research and Training Centre at Indian Statistical Institute, Bangalore (established in 1962), Ranganathan isolated three more modes of formation of subjects. These are all multidisciplinary in nature in accordance with the latest trends in research. Area or mission oriented or marginalised social groups, such as women, dalit studies, family studies, and early childhood studies being the latest fashion in research are a major cause for the outbreak of such subjects which are mostly of applied nature. Team work and interaction of pure and applied research also give birth to such subjects. These modes are as described below:

**Distillation:**

When relatively not so fully developed a technique finds applications in different disciplines and as a result it gets more developed and accumulates a body of its own literature "distilled" out of its different applications. When such a technique acquires sufficient literature then it gets the status of a new main class in itself, and it is termed as distilled main (basic) class. Such main classes are slow in formation. Museology, management science, career-ology, archaeology, seminar technique and research methodology are some of the examples of

distilled main classes in the Colon classification (Ranganathan 1987, section DE13, p.66). These are new entries to the array of main classes. These are born multidisciplinary in the sense that such subjects have been nurtured on the experience of different disciplines or they inherit the genes of different subjects to make a new organism, which is mostly applied in nature.

**Partial Comprehensions / Agglomerates:**

Out of courtesy to tradition, and many a time out of necessity, some basic subjects coordinate in rank have appeared coupled together. These are neither loosely assembled nor fused. So in their intra-relations these are inert subjects. Plant sciences (botany, agriculture, horticulture, forestry) mathematical and physical sciences, humanities, religion and philosophy, religion and ethics, geography and history are some examples of partially comprehensive subjects. Usually the constituents of a partially comprehensive class are consecutive main classes held under an umbrella. These are also of generic nature, e.g., social sciences, life sciences. In the Colon classification these are now existing at many hierarchical levels. Agglomerates may be viewed as bringing together of fissioned subjects. This phenomenon is already viewed by Kedrove (1974, p.3) who writes "The integration of sciences is today effected to an ever greater degree through their further differentiation". "What is now partial comprehension might have been a main subject in the very early days, before fission advanced sufficiently", says Ranganathan (Ranganathan 1972). Such subjects are usually embodied in periodical publications, and encyclopaedias. Partial comprehensive subjects are also termed as agglomerates in new terminology (Gopinath and Seetharama 1979, section 42j). Partially comprehensive subjects do not have their direct isolates. Though their subdivisions in the form of main classes are there like in a 'bunch of bananas', held together by some commonality; they are only good neighbours having a common distant forefather.

**Subject Bundles:**

As per Ranganathan and Gopinath, the subject bundles comprehend subjects drawn from different disciplines pursued by a team of different specialists (Ranganathan 1987, section DF1, 68). The Gulbenkian Commission accepting the emergence and social relevance of such subjects has now recommended:"The expansion of institutions, within or allied to the universities, which would bring together scholars for a year's work in common around specific urgent themes. They already exist, of course, but in far too limited a

number. One possible model is the ZiF (Zentrum für interdisziplinäre Forschung) at Bielefeld University in Germany, which has done this since the 1970's. Recent topics for the year have included body and soul, sociological and biological models of change, utopias."(Italics theirs) Such subjects are related and either fined application in other subject, or work in unison with each other subjects towards a common goal. They are not inert to one another. Usually these are area or mission oriented studies; and usually such subjects are of applied nature. These may be in the form of a project undertaken by a widely based research team. These projects fall in the domain of "big" science. Every expert or his group has a demarcated area of work at the initial stages. Some of the subject bundles enumerated in the CC-7 (Colon Classification Ed. 7) are: surface science, social science, material science, earth science, hydro science, ocean science, deep sea science, atmosphere science, defence science (Ranganathan 1987). Tennese Valley Project, Antarctic expeditions, Gandhiana, Indology, Sinology, Middle East studies are some practical examples of subject bundles. These are also called subject clusters (Gopinath and Seetharama, 1979, section 42R, 124). These subjects are beginning to have literary warrant. One actual publication cited by Ranganathan and Gopinath (Ranganathan 1987) is:

Indian Ocean expedition: Recent progress in surface sciences.

1964For such subjects Whitley (1984, 206-207) uses the term fragmented adhocracies which are polycentric in nature. These subjects are weakly bound. "Research is rather divergent and …limited in its interconnectedness". Professionalization of social sciences has also given a fillip to such studies. Ranganathan erroneously thinks that partial comprehensions and subject bundles are the fruits of new developments in book production (Ranganathan 1969, 204). In other words he thinks such subjects have been procreated more by the publishers than the researchers and educationists. In our view, it cannot be so. It is the research trends or social needs which exercise formative influence on the publishing industry, and not vice-versa. Research trends are catapulted by social needs. For example, subject bundles have come into being because of social necessity and availability of huge funds. Publishers only follow the lead given by author, editors and researchers.

**Annexation Mode:**

Geography is a good example of all subject areas that grow by accretion or colonization...it has annexed many loosely defended positions in the social and human sciences, writes

McGarry (1993, 146). This imperialist tendency of geography is visible in its branches such as commercial geography, medical geography, political geography and many more. Take another example of Physical education, including sports and aerobics, which draw its sustenance from physical, bio and social sciences. Knowledge and research methods from the hard sciences and mathematics have strongly influenced developments in exercise physiology, kinaesthetic and sport biomechanics. Physiology, sociology, history and philosophy formed the foundation for development of exercise physiology kinematics, sport psychology, motor learning. Sport sociology, sport history and sport philosophy have obviously drawn from social sciences and humanities. The rehabilitation sciences particularly physio-therapy have exercised an indelible influence on sport medicine and adapted physical activity. In sport management the influence of business management, law, communication and marketing is evident (Wuest and Bucher 2006, 14).

**Review questions:**

1. Define universe of knowledge.

2. Define knowledge.

3. What are the attributes of knowledge?

4. What are the modes of formation of subjects?

**Reference:**

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# UNIT – 2

# GENERAL THEORY OF LIBRARY CLASSIFICATION

**Objectives:**

- ➢ To get to learn about general theory of classification.
- ➢ To learn about normative principles.
- ➢ To gain knowledge on Canons and facet analysis.
- ➢ To study about fundamental categories.

**Introduction:**

We are aware that libraries keep various types of documents. At the outset, it is necessary to know that libraries hold several types of collections like printed books, journals, manuscripts, maps, charts, micro-documents, CD-ROMs, video and audio cassettes etc. All these collections should necessarily be arranged systematically. There are three possible ways in

which a reader may demand library material. He may ask by the name of the author whose works he wishes to read, or by the title of the book. The third situation is that he may need book(s) on a particular subject. This last one is known as subject approach. In short, subject approach is the means of securing unknown items from the collection, and classification is the means of facilitating it.

Library classification yields subject-wise arrangement of library materials in which documents are arranged by subject and each subject is followed by another subject related to it, e.g., physics following mathematics. This is known as systematic arrangement. The other important activities in a library such as book selection, circulation and reference services are somewhat indirectly dependent upon library classification. It is thus no wonder that classification is widely regarded as the foundation of librarianship.

Classification can ensure Need and Purpose of Library Classification full exploitation of library material and strengthen other services in a library. .The need for classification is all the greater in modern libraries, as they store different types of documents requiring diverse storage media. In other words, documents on the same subject(s) get scattered throughout the collection because of their diverse physical forms. Classification, however, is the means of bringing books on the shelves and their entries in a catalogue or index at one place. Let us, therefore, acquaint ourselves with these different types of documents that modern libraries acquire and store.

**Definition of Library Classification:**

Having understood the meaning of classification in library science, let us now go through a few well-known definitions of library classification. Library classification has been defined by both the classificationists and the critics, all necessarily underlying its utilitarian aspect. According to Margaret Mann, classification is "the arranging of things according to likeness and unlikeness. It is the sorting and grouping of things, but in addition, classification of books is a knowledge classification with adjustments made necessary by the physical form of books". W.C.Berwick Sayers defines it as the arrangement of books on shelves or description of them in the manner which is most helpful to those who read". Arthur Maltby revises Sayers definition as "the systematic arrangement of books and other material on shelves or of catalogue and index entries in the manner which is most useful to those who read or who seek a definite piece of information". Ranganathan is more elaborate in his definition. We will study his definition, therefore, in detail. According to Ranganathan, "it is the translation of

the name of the subject of a book into the preferred artificial language of ordinal numbers, and the individualisation of several books dealing with the same specific subject by means of a further set of ordinal numbers which represent some features of the book other than their thought content".

In this definition, we find three important phrases, viz.

i) Artificial language,

ii) Ordinal numbers, and

iii) Specific subject.

These three phrases need some explanation.

**Artificial Language:**

In library classification we use symbols to denote subjects. The names of subjects are in ordinary language understandable to an ordinary person. Therefore, we call it the natural language which comes naturally to the human being living in a society. On the other hand, the symbols that we may use to denote a subject, say B, or 510, or QA for mathematics, are artificial in the sense that the common man will not ordinarily understand the meaning of these symbols. Hence these are artificial and intelligible to a specifically trained class of professionals. Their value is only ordinal, which means that these symbols have no quantitative or qualitative value; they only determine the sequence/order of documents on the shelves. These symbols also preserve the chosen sequence as the books will be replaced at their proper place after taking them out for reading or lending. These symbols do not indicate anything except the sequence of these documents on the shelves.

**Ordinal Numbers:**

These are used not for the purpose of counting but ordering and mechanising the arrangement of things. For example, participants in a conference can be listed in a desired sequence on the basis of some suitable principle and then this sequence can be mechanised with the help of ordinal numbers. Melvil Dewey (1851-1931), the father of modern library classification, was the first classificationist to use simple Indo-Arabic numerals (0-9) as ordinal numbers for the systematic listing of subjects both broader and narrower, in his Decimal Classification first published in Need and Purpose of Library Classification1876 (see Unit 4, Unit 10 and Unit 11 of this Course and Blocks I and 2 of BLJ&03Pto know more about Dewey Decimal

Classification). Since then the system of ordinal numbers-notation as it is called in library classification-has been the principal element in the design and use of library classification schemes.

**Specific Subject:**

The contents of a document may deal with some field of knowledge. It is a prerequisite for a classifier to know what subject matter the document exactly contains. After ascertaining the exact subject, or specific subject, the classifier translates that specific subject into the artificial language or ordinal numbers of the classification scheme used. In order to know the specific subject of the document the classifier has to examine its title, contents page, preface and introduction, and to scan through some chapters, and, if necessary to go through the entire book. There may be certain occasions where a classifier has to consult an expert to ascertain the specific subject of a document.

Ranganathan defines the specific subject of a document as "that division of knowledge whose extension and intension are equal to those of its thought content". Extension means the scope (if the subject treatment and intension means the depth of the subject treatment in a given document.

Palmer and Wells define it as "that division of knowledge which exactly comprehends all the major factors that go in its making".

Let us take an example and perform an analysis to ascertain the specific subject.

A.L. Srivastava: A Short History of Akbar the Great (1542-1605). Agra, Shivlal Aggarwal, 1957.

It is possible to interpret the contents of this book as `Mstory' or `History of India' or 'History of India during the Mughal Period'.

All these possible subjects are not specific enough and are too broad to convey the actual thought content of the book. It is, therefore, necessary to add one more phrase to the above analysis to make it complete, and that phrase is `Reign of Akbar'. All these aspects should now be brought into the class number. If you omit any of these aspects, the extension and intension will not be equal to the thought content of the book.

The specific subject of the book can be arrived at as follows History

Indian History

Mughal Period

Akbar

Reign

When you analyse the thought content of the document on the above lines, the extension (scope) decreases and the intension (depth) increases with every successive division, as seen above. This sort of subject ordering is called "general to specific". Ranganathan's definition of classification, quoted above, refers to two objectives: Translation of the subject into an ordinal number and individualisation of a given document in the total order of documents in a libr4ry. The subject of the document is translated into a class number with the help of a notation. But, several documents are likely to bear the same class number and the problem of individualisation arises. The class number is, therefore, not enough. It has to be supplemented by one, or if necessary, by two, additional elements. These additional elements are (i) book number and - (ii) collection number. Class number, book number and collection number constitute the call number of a document. It is only the call number that individualises a given document in a library.

**Descriptive theory of classification:**

In the beginning there was no theory; only practice was followed. Practice gave rise to descriptive theory. Thus, the descriptive theory was the first stage in the development of library classification. This theory was able .to meet the requirements of the universe of subjects (the totality of subjects comprising knowledge), as it existed at that time. The descriptive theory was based on the practices in vogue based on different schemes of classification then available. The descriptive theory, distilled out of the contemporary-schemes, held its sway until the early 1950s. The schemes designed before the 1950s were based on `the flair or natural gift of the designers and not on any objectively worked out theory of library classification. Their methods were empirical. The development of the descriptive theory is attributed to several stalwarts like Brown, Richardson, Hulme, Sayers, Bliss and Ranganathan. The period between 1898 and1937 witnessed the genesis and development of this theory. These stalwarts, through their schemes and writings, enunciated certain principles of library classification which greatly contributed to the development of a General Theory of Library Classification. These principles and contributions of the personalities are briefly outlined in the following sub-sections.

**J.D. Brown (1862-1914)**

J.D. Brown was an English librarian, whose contribution to the General Theory_ of Library Classification was small but significant. He brought out three different schemes of classification. The first of these three was developed in 1894 jointly with J.H. Quinn and was known as Guinn-Brown Scheme. This scheme did not make much impact. Three years later, in 1897, Brown independently brought out another scheme and called it Adjustable Classification. This scheme also proved inadequate even in those days. In the year 1906, Brown published the first edition of his Subject Classification, the scheme for which he is mostly known. Its second edition was brought out in 1914and the -third;, edited by J.D. Stewart; in 1939. Brown's Subject Classification was founded on the principle that every science and art spring from some definite source. In the order of things, there were first two factors, viz., matter and force. These, in turn, gave place to life. Life, in course of time, led to the mind, which in turn gave birth to records. In addition to the shove principle, Brown also advocated -two other principles. The first of these two was his one place theory. According to this principle, each subject has only one place in the scheme in respective of its aspects and numerous manifestations. For example, the subject of rose may be viewed from the viewpoints of botany, horticulture, history, geography, decoration, -bibliography, etc. The subject of rose, according to Brown, is concrete, while the, various viewpoints represent its aspects. He was of the opinion that the interest of the scholar in `rose' is constant, unlike that of the bibliographer whose interest is only occasional. He, therefore, preferred to place rose under one concrete or specific heading. It means that his arrangement of books was not the discipline (as in the Dewey Decimal Classification (DDC) or Library of Congress, (LC); but by topic. It was an experiment, which failed. The other principle advocated by Brown was the science and its applications theory. According to this principle, he places each subject as nearer as possible to the science from which it has sprung. Thus, rose is placed under botany, libraries under library economy, coal under mineralogy, and persons under biography. Theory and practice are collocated. As a result of this principle, Brown dispensed with "conventions, distinctions and groupings, which are arbitrary rather than scientific". For example, the distinction between Pure and Applied Sciences, between Fine Arts and Useful Arts, between Currency and Numismatics, between Architecture and Building and between Costume and Press was not made. He faithfully followed these principles in his Subject Classification.

**E.C Richardson (1860-9939)**

E.C. Richardson was the first librarian of Hartford Theological Seminary, USA, and later took over as librarian of the Princeton University Library. Richardson is regarded as the first classificationists to have a systematic attempt to set down a theory of library classification. In 1910, he published his book Classification, Theoretical and Practical. It was the first textbook on classification, which later influenced W.C.B. Sayers. In the introduction to this work, he enumerated basic laws and principles meant to guide the work of designing a scheme of classification. These principles, called as Criteria of Classification, are as follows: Classification should follow the order of things; classes should be arranged in historical sequence.

1) Division of classes should be minute.

2) Arrange things according to likeness and unlikeness.

3) Books are collected for use; they are administered for use, and hence, it is the use, which is the motive behind classification.

4) A scheme of classification should be provided with a notation. The notation should be amenable to indefinite subdivisions preferably using a mixed symbol with decimal base and with mnemonic features.

Richardson asserted that "things: nature are already classified and roan has to trace only the order -of the classification and record it."

**E.W Hulme (9659-1954)**

Hulme was the librarian of the Patent Office Library, London. In 1911-1912, he published his book Principles of Book Classification in the library Association Record. Has principles influenced the later theories of book-classification. In the words of W.C.B.Sayers, the contribution of Hulme was "A valuable lead up to, the more complete and satisfactory theories today". According to Hulme, all classifications could be arranged into two groups- (categories), viz., •Mechanical and-•Philosophical According to this categorisation, book classification is mechanical Hulme's principles of book classification are as follows:

1) Book classification is the plotting of areas pre-existing in literature, and coincidence with a philosophical order is no guarantee of accuracy.

2) Book classification-is mechanical assembly of material into classes.

3) The division and coordination-of classes in literature is determined mainly upon formal and no philosophical lines.

4) Classification should be based literary warrant.

Hulme states that mechanical classifications are left uncoordinated. But in book classification, systematic coordination of classes is introduced. His theory of literary warrant immensely attracted the attention of later classificationists. E.A. Savage (1877-1966) revived the term. Hulme regards books as "concrete aggregates of facts selected from the common stock of knowledge". What Hulme meant by concrete aggregates is that if there are books on the subject of electricity and magnetism there is literary warrant, for providing a number for such a class named "electricity and magnetism". Literary warrant simply means that a subject cannot be listed in the scheme unless some literature has already appeared on it. The existing literature on a subject only justifies the inclusion of that subject in the scheme. Hulme's principle of literary warrant greatly influenced the Library of Congress Classification (LC).Ranganathan also made use of this principle, but not exactly in the sense Hulme made, use of it. According to Ranganathan, when the literature on a particular subject grows in size, there may arise a need for providing a separate class for, it in the scheme. Ranganathan's principle of literary warrant states that "the subjects in an array of subjects or the isolates in an array of isolates may be arranged in the sequence of decreasing quantity of the documents published or anticipated to be published on them, except when any other overwhelming consideration rules it out." Hence, it requires that the various aspects of such a new subject should be so listed as to bring those aspects first on which more literature have appeared.

**W.C.B. Sayers (1881-1960)**

William Charles Berwick Sayers, an English librarian and teacher of S.R. Ranganathan made a remarkable contribution to the development of the theory of classification. He is referred to as the first grammarian of library classification. He is responsible for interpreting and systematising the ideas of other theoreticians. He never designed any classification scheme, though, through his theory he has shown the way for others in the designing of classification schemes. His theory of book classification first appeared in 1915 under the title "Canons of Classification". He expanded the outline of the theory contained in this book in three other books, viz., Grammar of Classification (Ed.2, 1915; Ed.4, 1935), Introduction to Library Classification (Ed.1, 1918; Ed.9, 1958) and Manual of Library Classification (ed.l, 1926; Ed.3, 1955; Ed.4, 1967 and Ed.5, 1975, revised by Arthur Maltby). It has now been revised

by Rita Marcella and Robert Newton in 1994. Sayers Canons of Classification: Sayers simplified his theory of classification by stating 29 principles. He called them canons, meaning rules, regulations, standard tests or criteria of classification.

The 29-canoris can be grouped under six categories as follows:

Canons of definition (6)

Canons of divisions (7)

Canons of terms (4)

Canons of book classification (4)

Canons of notation (4)

Canons of book classification (5) schemes

These are discussed below:

**Definition:** Classification is a mental process by which things or ideas are grouped according to their likeness. The likeness which exists in the universe of things and in ideas is called characteristic in classification. A characteristic is a basis of division or grouping of classes. In a scheme of classification, classes are to be arranged in a systematic order. The order is based on the theory of knowledge.

**Division:** Assembling things according to their degree of likeness and separating them according to their degree of unlikeness is the process of division. The chosen likeness or characteristic used to 'divide the given things may be natural or artificial. A natural characteristic is the inherent quality of a thing and hence, is responsible for its very existence. An artificial characteristic may be possessed by a group of things. For example, colour of clothes is an artificial characteristic. The division should proceed from greater extension and smaller intension to smaller extension and greater intension. The process of division should be gradual moving from general to specific. The characteristic used must be consistent at each stage of division.

**Terms:** A scheme of classification is a statement of knowledge using verbal terms. A term is the name for a class. It may be a word or a phrase. The terms should be unambiguous and unique with the same meaning whenever they are used in a scheme of classification. In a scheme of classification the terms used should always be noncritical. Book Classification: A

book classification is a device for the arrangement of books by subject or form in a logical order. It must be capable of admitting any new subject without dislocating the class of subjects already drawn. Book classification schemes must be equipped with

1. A generalia class;

2. Form classes like poetry, fiction, drama, etc.

3. Forms in which subjects are presented like theory, history, dictionary, etc.

4. A notation; and

5. An index.

**Notation:** A notation consists of signs representing the class names in a scheme of classification. A notation should be brief, simple and flexible and have a mnemonic value. Book Classification Schemes: A scheme of classification should provide columnar schedules in the order of precedence of subjects. It is necessary to explain how to use the scheme. There should be a machinery for the revision of the scheme to keep it up to-date accommodating new developments in the knowledge.

**H.E. Bliss (1870-1955)**

Henry Evelyn Bliss devoted his entire active life to the intensive study of the art and science of classification. In addition to the articles; which he contributed in library journals, his theories and principles of classification were expanded in his first work, titled Organisation of Knowledge and the System of Science (1929). In this work, he formulated scientific, philosophical and logical grounds for the study of bibliographic classification. This work is regarded as one of the basic texts on the theory of organisation of knowledge. He laid down the foundation for a relatively stable, scientifically acceptable and consistent scheme of classification. He also published another basic work on the theory of library classification titled Organisation of Knowledge in Libraries and the Subject Approach to Books (1933, 2nd ed. 1939). His work helped in establishing librarianship as a scholarly discipline. These two basic works convey to us the fundamental principles of classification which Bliss later tried to apply in his System of Bibliographic Classification (BC) whose outline was first published in1935. The basic concepts of classification as expounded by Bliss may broadly be categorised as:

1) Consensus 2) Subordination 3) Collocation 4) Alternative locations 5) Notation

These concepts are briefly discussed below;

**Consensus**: Bliss viewed book classification as basically knowledge classification. He felt that considerable agreement existed among the experts on the arrangement of various branches of human knowledge. He termed this as scientific and educational consensus. The growth, organisation and development of human knowledge are brought about through the process of science and education. The word consensus refers to a relative agreement on the major classes of knowledge, their scope, order of arrangement and the essential relation between them. He believed that the natural order of main classes was close to this consensual order. Bliss felt that more closely a library classification reflected this consensus, the more stable, durable, flexible and efficient it would be. His order of main classes is based on this consensus.

**Subordination:** Bliss theorised that a classification scheme should observe two types of subordination, viz., 1) Subordination of the special to the general, and 2) Gradation by speciality. Subordination of the special to the general. This is also referred to as the principle of decreasing extension. A scheme of classification should arrange subjects in the order of decreasing extension so that a general subject is followed by a special subject. The order of subjects in a scheme of classification should reflect the sequence from general to specific. Gradation by speciality: This concept is based on the philosophical notion of gradation by speciality. Gradation principle is employed for organising a series of topics of equal rank into a rational sequence. The principle is that some subject depend for their very existence on the works or findings of others, and those that so dependant should follow the disciplines upon which they rely. This is also known as the principle of dependency. For example, among the natural sciences, physics comes first because it deals with the fundamentals of natural phenomena. Chemical phenomena depend to some extent on the findings of the physicists and, therefore, chemistry follows physics. Bliss claims that "gradation by speciality is no mere arbitrary basis for classification but is a principle essential to the very process". Thus, the order of classes will be: General treated generally. General treated specially. Special treated generally Special treated specially.

**Collocation:** It is a by-product of the above two principles. By collocation, Bliss means "bringing together in proximity subjects which are most closely related". Ranganathan termed this as filiatory sequence. The principles of subordination and gradation by speciality help to decide the sequence of broad subject fields or disciplines and, within each subject, the

principle of decreasing extension and various orders in any array determine the sequence of the subject. It is also necessary for bringing together similar subjects, which are most closely related. Therefore, Bliss, in his Bibliographic Classification, collocated language with literature, because of their very close affinity with each other. Similarly, education is collocated with psychology, and chemical technology with chemistry. Collocation generally refers to coordinate classes. But, it may also refer to subordinate classes. Bliss subordinated sociology to anthropology and anthropology to biology.

**Alternative locations:** A scheme of classification should meet the different needs and requirements of a special collection. Therefore, libraries may wish to- alter the order established by logical sequence. A scheme, if it is to be of maximum usefulness, should therefore provide for the adaptation of logical sequence to practical convenience in order to meet different views. Bliss did not believe in the rigid and unadaptable view of the order of knowledge. To meet this principle of practical convenience, provision has been made deliberately for alternative locations and treatments in his unique scheme, though it is somewhat contrary to the principle of consensus. Provision has been made in notation for moving certain topics to other locations. For example, moving theology from the main class P religion to class AJ following philosophy; technologies like aeronautics or ship building from applied physics to useful arts and subordinating international law to political science or to law; and economic history to general history. This principle provides flexibility needed to solve certain problems in classification faced by all classifiers of all systems. But it also proves that there is no absolute consensus on the order of subjects.

**Notation:** Bliss recognised three important qualities of a good notation, these are

•It should be correlative and subsidiary.

•It should be simple and brief, i.e., a notation should remain reasonably simple. He even suggested an economic limit of three to four digits in a class number.

•It should use synthetic features. This is to achieve economy in the printing and display of schedules resulting in the simplicity of structure and convenience in use. Bliss achieved this by the provision of general and special systematic schedules for construction of coextensive class numbers.

**S.R. Ranganathan (1892-1972)**

Right from 1924, S.R. Ranganathan had been developing his theory of library classification. In the first edition of Prolegomena to Library Classification (1937), he provided an integrated theory, mainly descriptive and comparative, of the practices in classification then in vogue. Ranganathan went ahead of those classificationists, mentioned in the preceding sub-sections, by extending the principles put forward by them. He also provided the largest list of normative principles named by -him as Fundamental Laws, Postulates, Principles and Canons and evolved a special terminology, which is evident from the first edition of Prolegomena. These rightly belong to stage-2 in the development of the General Theory of Library Classification. His theory is now synonymous with the General Theory of Library Classification.

**Need for library classification:**

Definition of library classification according to JS Mills **– Book classification is a mechanized act of saving time in the search of knowledge in literature.**

Classification in a library is very important because without it the work of the library is not able to run smoothly. Following is the requirement of library classification.

1. Unlimited expansion of books - In the modern era, the number of books is numerous and it is increasing daily and classification is necessary to control it.

2. Subject complexity - Currently, the complexity of subjects is increasing and classification becomes necessary to organize the subject with the subject concerned.

3. For the purpose of the library - Classification is necessary to fulfill the purpose of the library. Because all the work in it becomes simple.

4. To increase the use of books - Classification is necessary for the use of books in the library. The reader easily reaches the book by classification. Hence classification is helpful in book usage.

5. For the configuration in auxiliary order - Classification is necessary to place the book in auxiliary order i.e. near the related book, Ranganathan has said - "To configure books in auxiliary order" is the main objective of classification.

6. Saving time - In today's time, the reader lacks time, so the reader wants to reach the relevant book in minimum time and this classification becomes necessary. In the absence of classification, it may take the reader a long time to reach the book.

**Purpose and Function of library classification:**

The following are the main purposes of library classification:

**Helpful Sequence:**

Classification helps in organizing the documents in a method most convenient to the users and to the library staff. The documents should be systematically arranged in classes based on the mutual relationship between them which would bring together all closely related classes. The basic idea is to bring the like classes together and separate these from unlike classes. The arrangement should be such that the user should be able to retrieve the required document as a result it will make a helpful sequence.

**Correct Replacement:**

Documents whenever taken out from shelf should be replaced in their proper places. It is essential that library classification should enable the correct replacement of documents after they have been returned from use. This would require a mechanized arrangement so that arrangement remains permanent.

**Mechanized Arrangement:**

It means to adopt a particular arrangement suitable for the library so that the arrangement remains permanent. The sequence should be determined once for all, so that one does not have to pre-determine the sequence of documents once again when these are returned after being borrowed.

**Addition of New Document:**

Library would acquire new documents from time to time therefore library classification should help in finding the most helpful place for each of those among the existing collection of the library. There are two possibilities in this regard. The new books may be or a subject already provided forin the scheme of library classification, or it may be or a newly emerging subject that may not have been provided in the existing scheme.

**Withdrawal of Document from Stock:**

In this case, the need arises to withdraw a document from the library collection for some reason, and then library classification should facilitate such a withdrawal.

**Book Display:**

Display is adopted for a special exhibition of books and other materials on a given topic. The term is used to indicate that the collection in an open access library is well presented and guided. Library classification should be helpful in the organization of book displays.

**Other Purposes:**

Compilation of bibliographies catalogues and union catalogues.

Classification of information.

Classification of reference queries.

Classification of suggestions received from the users.

Filing of non-book materials such as photographs, films, etc.

We would now do well to see what exactly is achieved by classifying documents and arranging them in a systematic way in a library. In the era of the information revolution, the role of libraries in acquiring and organising various types of documents hardly needs any emphasis-Libraries as service institutions acquire documents for use. These acquisitions should systematically be arranged so as to meet the ever growing needs of readers precisely, exhaustively and expeditiously.

We are witness to the information revolution. Documents are published in various languages in various disciplines in diverse forms. Libraries have always been acquiring books and adding them to their collections. Therefore, the collection of an active library continues to grow year after year. Ranganathan compares active and effective libraries with growing organisms, in an unclassified library, when the collection grows steadily into thousands and lakhs of volumes, it t would be difficult for the library staff to lay hands on a particular document required by a reader. To meet the subject approach of readers the collection must necessarily be classified by subject. In libraries where the collection is arranged by accession number, or author or title, and not by subject, books on the same subject will be scattered throughout the collection. Even if the books are arranged alphabetically -by subject, the resultant sequence will not be helpful, as unrelated material will come together. See the following example:

Adult education

Agriculture

Algebra

Alloys

American history

Anthropology

Applied mechanics

Arithmetic

Astronomy

Atomic energy

Australian history

This type of sequence of subjects surely is far less useful and will fail to meet the requirements of readers. Alphabetical sequence leads to alphabetical scattering of logically related subjects; as shown in the above example. It is through systematic arrangement that a filiatory sequence or collection of closely related subjects can be achieved. For this we require a scheme of library classification. Here is an example of arranging documents on the basis of Dewey decimal classification which brings documents dealing with different aspects of economics systematically one after another at one place in a collection.

The second, third and fourth Laws of Library Science, viz., Every reader his/her document, Every document its reader and Save the time of the reader, as expounded by Ranganathan, can be practised by libraries through the systematic arrangement of documents. The First and Fifth Laws, i.e., Books are for use and A library is a growing organism also advocate a systematic classification of books in libraries. The arrangement of documents on the shelves is in a progressive order of complexity, i.e., from the general to the specific. Colon Classification is able to arrange documents in an APUPA pattern. Such an arrangement is in pedagogical order, i.e., it is self-educative and reflects the progress of that subject in an evolutionary order. In the light of the discussion in this subsection, the functions of library classification can be summarised as follows:

i) Library classification helps to arrange documents in a systematic order, which is most convenient to the reader and the library staff. It brings related subjects in close proximity, called collocation by Henry Bliss.

ii) It helps the identification and location of a document on a given subject wanted by a reader whatever may be the size of the library collection. Documents can be quickly retrieved from and replaced to their original positions. The location, lending and replacement of documents are completed mechanically in libraries.

iii) It helps to arrange documents into organised groups, like pigeonholes; and when anew document is added to the collection, classification finds an appropriate place for the newly added documents among the other documents on the same subject.

iv) The universe of knowledge is dynamic, continuous, infinite and ever growing. New areas or subjects are being continuously added to the sum total of human knowledge, When the first document on a new subject is added to the library collection, it finds itself at the appropriate place among the already existing related subjects, i.e., among its kith and kin and according to the level of its relationship to them.

The functions stated in (ii), (iii), and (iv) are also known as mechanisation of the arrangement.

v) It helps to organise book displays and exhibitions. It facilitates withdrawal of certain documents from the main collection for special purposes and occasions such as book talks, seminars, symposia, conferences and special exhibitions, on a given topic.

vi) It helps in recording the daily issue and return of documents on various subjects at the circulation counter of a library. This facilitates the compilation of statistics on issues, which reflect the pattern of use and demand of documents on different subjects. The feedback helps in the allocation of funds to various subjects and guides the book selection policy of the library. The statistics so collected can be included in the annual report of the library.

vii) Stock verification is a very important aspect of library administration. Library classification, through the medium of shelf lists, facilitates an efficient and thorough stock verification of the library's holdings.

viii) It helps in the compilation of reading lists. This facilitates facet analysis of the reference queries on various aspects and 'indirectly helps in an efficient reference service.

ix) It helps in the compilation of subject union catalogues and bibliographies of books and other reading material. The union catalogues are very important tools for resource 'sharing and cooperation among libraries.

x) Classified catalogues are only possible with a classification scheme. In a research library classified catalogues are preferred over dictionary catalogues.

xi) It assists in systematically deriving subject entries. It also aids the cataloguer to use the alphabetical list of subject headings for deriving specific subject headings through class numbers, i.e., by the chain procedure.

xii) Classificatory principles are used in subject headings and thesaurus construction.

xiii) It helps the library staff, especially the classifiers, to be aware of and comprehend the complexities in the development of the universe of knowledge, which is the basis for a systematic arrangement of documents in libraries.

xiv) Nowadays classification finds immense uses in OPACs (i.e., online public access catalogues). In a computerised catalogue, the class number field can be used in combination with other fields such as language, date or even subject heading and can be used with logical operators such as AND/OR/NOT or the Boolean logical operators. Class numbers can be used to broaden or narrow the searches. Class number searches in combination with other fields increase the efficiency (recall and precision ratios) of the information retrieval system, of which classification is a tool.

xv) It is the basis for the organisation of knowledge emb6died in documents for maximum use. It is the basis for efficient bibliographic control and retrieval of documents. It is a great time saving device for the reader and the library staff. As Hulme puts it, "it is a mechanical time saving device for the discovery of knowledge in books".

**Normative Principles:**

The normative principles of classification have been recognised for a long time, and have proved to be highly useful. These have provided a scientific basis to the field of classification. The framers of classification scheme and classifiers have been making their use in varying degrees. These principles can serve many purposes, as stated below:

1) These can serve as the basis of a scheme for classification, leading to a scientific approach. As such a scheme should be designed keeping in view the guidelines provided by normative principles. These principles are also useful for a remodelling of the existing scheme.

2) Critical study of a given scheme can be carried out with the help of these principles.

3) The principles can be very helpful for the purpose of comparing different schemes of classification.

4) Interpretation of the rules and schedules of a scheme can be done with their help.

5) These can provide guidance to a classifier in the day to day work of classification.

6) These are helpful in developing a theory, and also provide a scientific basis to theory.

The term 'basic law' is used at the level of a basic process of thinking. 'Fundamental law' is applied at the level of library science as a discipline. 'Canon' is used in the context of divisions of the first order of the discipline of library science, such as classification, cataloguing, book selection and so on. The term 'principle' is applied in the context of divisions of the second or later order of library science, such as helpful sequence in array and facet sequence.

Ranganathan has recognized the following basic laws;

1) Law of interpretation

2) Law of impartiality

3) Law of symmetry

4) Law of parsimony

5) Law of local variation

6) Law of osmosis

**1) Law of interpretation** – Ranganathan refers to 1008 principles of interpretation, listed in the Nyaya-Kosa. These principles are applicable in interpreting legal texts. The canons, principles, postulates and rules of classification taken together can be considered a legal document. Therefore, we should interpret various sections just like a legal text. In case of a conflict, the conflict should be resolved with the aid of the laws of interpretation. If necessary, the rules, principles and canons should also be modified to solve the conflicts. It has been suggested by Ranganathan that colon classification should be scrutinized from the angle of these laws. This will help in determining many of its weakness. CC could be revised to overcome these weakness. Similarly, the laws of interpretation can be applied in the study of other schemes also.

**2) Law of impartiality** – The law directs that between two or more claimants (e.g., for the first position among two facets of a subject or the choice to be made among the needs of different categories of users) preference should be made only on sufficient grounds, and not arbitrarily.

Example: The law of impartiality insists that the sequence of facets in different subjects should not be determined in an arbitrary manner in each subject. The sequence should be based on some guiding principles of a general nature, equally applicable to all subjects. That is why Ranganathan has suggested the application of a wall-picture principles for facet sequence.

**3) Law of symmetry** – The law prescribes that of two entities or situation which admit of being regarded as symmetrical counterparts of each other, if one entity or situation is given weight in any particular context, the other entity or situation should also be given a corresponding weight.

Example: In CC, Ranganathan allocated greater ordinal value to Roman caps than Indo-Arabic numerals. Later Roman small letters were used to represent posterior zing common isolates. These were given lesser ordinal value than Indo-Arabic numerals, which led to the satisfaction of the law of symmetry.

**4) Law of parsimony** – The law directs that between two or more possible alternatives bearing on a particular phenomenon the one leading to overall economy of manpower, material, money and time, considered together with proper weightage, is to be preferred. A faceted scheme consists of a set of schedules instead of a single schedule for all subjects in an enumerative classification. Our experience shows that the length of schedules gets reduced in the first one, thereby satisfying the law of parsimony.

Example: In case a collection is to be reclassified the law of parsimony would suggest that only that part of the collection be classified which is known to be in much use, and also those documents which are returned by the users after being taken out by them from the collection.

**5) Law of local variation** - The law of local variation says 'that in any discipline and technique there should be provision for the users of them to secure, for strictly local use, results alternative to those for general use'. Therefore, the law directs towards the formation of special collections of documents separate from the general collection. The word 'local' should be interpreted broadly to refer to a geographical area, irrespective of the size such as

European interests, interests of developing countries, Indian interests, Rajasthani interests and so on. One can go on to interest's peculiar to a village or of a particular library. However, special interests are largely confined the national level.

**6) Law of Osmosis** – The principles says that owing to the canon of context, a change in the catalogue code or the scheme of classification becomes essential; then, from a particular date, the following work should be carried out.

A) 1) Catalogue and classify all newly accessioned material according to new code and new scheme.

2) Re-catalogue and re-classify that old collection which is known to be in much use.

3) Re-catalogue and re-classify, on return by readers, any book taken out by a reader from the old collection.

B) Maintain two catalogue (old catalogue and new catalogue) and two sequence on the shelf.

C) Attention of readers should be directed by the reference librarian to the two sequence on a shelf and to two catalogues. If a library decides to re-catalogue and re-classify the entire collection, then in most cases the cost would be enormous. Often, the necessary finance is made available for the purpose at the cost of active service of book funds. As the cost of re-cataloguing and re-classification can be very high, most of the libraries avoid it.

However, the approach suggested by Ranganathan reduces the cost and makes it possible for most of the libraries to go in for re-cataloguing and re-classification, if found essential due to the direction from the canon of context. The approach not only reduces the cost but is a practicable one, without affecting the service of the library thus satisfying the canons of context and the law of parsimony. The basis of the method is that the old documents, which are used rarely, need not bere-catalogued and re-classified. In the beginning there would be a great deal of extra work to be done. Therefore extra staff would be required in the initial stage. But later on, the quantum of extra work would be reduced and become less and less. The active collection would be smaller, as also its catalogue. The users would find it more convenient and helpful to use an active collection.

**Canons:**

Canons means a rule, regulation or law. It can also be defined as a principle, model, standard or criterion hence various models, principles, test used for the working and efficiency of

different schemes of classification are called canons of classification. Ranganathan recognised three plane of work to explain the design and application of work, he provided a specific norms for designing a scheme of classification and classify the documents according to it. In designing a scheme for classification , it has to deal with dynamics, infinite and multidimensional universe knowledge which need to be clearly and thoroughly analysed thereafter it is required to be transformed into an artificial language for smooth and convenient use of the scheme as well as systematic and helpful arrangement of documents. To make this complicated system smooth Ranganathan has formulated a separate set of canons for work into three plane, they are

1) Idea plane,

2) Verbal plane, and

3) Notational plane

1) Canons for the Idea plane – In idea plane all aspects of the universe of knowledge are analysed by its structure, dimensions, qualities, characteristics, kind of relationship and bond of strength among each item of knowledge. A scheme for classification assumes the prior concept of a scheme of classes. A scheme of classification involves five inherent concepts, they are

a) Canons for characteristics,

b) Canons for succession of characteristics,

c) Canons for array,

d) Canons for chain, and

e) Canons for filiatory sequence.

2) Canons for the verbal plane – Verbal plane helps to decide the type of terminology to be used in the scheme of classification. Natural language is imperfect, there is a vagueness in the meaning of ordinary words used in everyday conversation. There are also the incidence of homonyms and synonyms. New terms appear from time to time and these may be used to express new ideas, the meaning of a new term often keeps changing from time to time unless it is accepted in the concerned subject. Classifier are concerned with the application of schemes, they may find this useful in interpreting the terms in the schedule at the time of classifying documents. These canons must be followed by those engaged in the designing and

construction of the schedules of a scheme. Ranganathan has formulated the following canons of work at the verbal plane, they area) Canons of context,

b) Canons of enumeration,

c) Canons of currency, and

d) Canons of reticence.

3) Canons for notational plane – It has the responsibility of implementing the findings of of the idea plane. While designing the scheme of classification the idea plane decides the necessary characteristics to be used for the arrangement of the universe of subjects in the filiatory sequence. The notational plane therefore has to provide the mechanism in the form of the notational system for the helpful and systematic arrangement for the existing as well as for future unknown subjects in a scheme for classification. The canons for notational plane are,

a) Canon of synonym,

b) Canon of homonym,

c) Canon of relativity and canon of uniformity,

d) Canon of hierarchy and canon of non-hierarchy,

e) Canon of mixed notation and canon of pure notation,

d) Canon of faceted notatio and canon of non-faceted notation, and

f) Canon of co-extensiveness and canon of under-extensiveness.

The notational system for a growing universe should satisfy canons for hospitality in array and chain. They are

a) Canon of extrapolation in array,

b) Canon of interpolation in array,

c) Canon of extrapolation in chain,

d) Canon of interpolation in chain.

**Helpful sequence in array:**

According to the canon of helpful sequence, 'The sequence of the classes in an array of classes, and of the ranked isolates in an array of ranked isolates, should be helpful to the purpose of those for whom it is intended'. An array is essentially a systematically ranked and arranged group of equal entities. There are many ways the members of a group may be arranged. Librarians have to choose their sequence which is helpful to the majority of the users and also logical. Entities in an array maybe arranged in a chronological or historical sequence as per the need of time and demand. Even within a small field, there can be various helpful sequence. What may be found to be the most helpful sequence to one category of users may turn out to be less than helpful to another category. Under this circumstances, the practical solution is to take care of the majority point of view. Most users are not able to pinpoint the specific subject of their interest in such cases helpful sequence may help to find out the subject so that a user approaching the sequence from a broader or narrower angles are led by the sequence itself to the specific subject. In order to achieve a helpful sequence in array, we can use the principles of a helpful sequence.

1) Time sequence

a) Principles of later-in-time

b) Principles of earlier-in-time

2) Evolutionary sequence

a) Principles of later-in-evolution

b) Principles of earlier-in-evolution

3) Spatial sequence

a) Principles of spatial contiguity

4) Quantitive measure sequence

a) Principles of increasing quantity

b) Principles of decreasing quantity

5) Complexity sequence

a) Principles of increasing complexity, or principle of decreasing simplicity

b) Principles of decreasing complexity, or principle of increasing simplicity

6) Traditional or Canonical sequence

a) Principles of traditional or canonical sequence

7) Literary-warrant sequence

a) Principles of decreasing literary warrant

b) Principles of increasing literary warrant

8) Alphabetical sequence

a) Principles of alphabetical sequence

**Postulates and principles for facet sequence:**

Postulates and principles for facet sequence are used in the practical classification of subjects. They guide the work of classifying, the postulates are also used in the design of a scheme for classification. In library classification, our problem is to choose what should be kept invariant in the classifications of subjects. While mapping a subjects there can be a different factors to see under which the subject lie, the most used method is to see its immediate neighbourhood relation but sometimes the mapping becomes extremely complicated. Different schemes have provided different solution to this problem. The problem of mapping has been solved by Ranganathan by means of postulational approach. The seminal ideas have been postulated and work is carried out with these. Nothing can be asserted about them being true or false. A postulate is a statement about which we cannot use either 'right 'or 'wrong'. We can only speak about the set of postulates as 'helpful' or'unhelpful'.The formation of postulates is guided more by intuition and logical inference at the unconscious level. It is not easy to verify this physically by means of a direct approach to our sense but instead it is very important to determine before head. The postulational approach in library classification brings the objectivity in the study and practice of this discipline. It also puts the study and practice of library classification on a scientific basis. As a result of such an approach, practical classification has become easier and more interesting. The postulates given by Ranganathan are,

a) Postulates for freely faceted classification

b) Postulates for fundamental categories

c) Postulates of basic facet

d) Postulates of isolate facet

e) Postulates of rounds and levels

f) Postulates of rounds for energy

g) Postulates for facet sequence

**Principle for Facet Sequence:**

The postulates are helpful in determining the sequence of isolate ideas in a compound subject where each isolate is the presentation of different fundamental categories but in determining the sequence of two personality isolates or two matter isolates or two energy isolate or two space isolates or two time isolates, postulates may not be sufficient to define or to help us. Therefore there is a need for guiding principles which could provide a solution to these problems. The principles are,

a) Wall-picture principles

b) Whole-organ principles

c) Cow-calf principles

d) Commodity raw material transformation principles

e) Act and-Action-Actor-Tool Principle

**Five fundamental categories:**

**Time:**

According to Mills, the fundamental category, Time "is usually embodied in periods". According to Dr Ranganathan, "The fundamental category time occurs in every subject forming a local description of local history of any subject". Time indicates that the entities under different subjects must change in its structure, meaning, history development, with the progress of times.

 Example: History of the 18 century is different from that of the 15 century.

**Space:**

According to Dr Ranganathan, "the surface of the earth is a manifestation of the category 'Space'. It occurs in every subject forming a local description or local history of any subject.

"Most of the subjects, if not all, get manifested in relation with continents, countries and their subdivisions. In CC (Colon Classification), there is a schedule of Geographical Divisions which can be attached to a subject. In DDC (Dewey decimal classification), there is a space facet applicable under the class History, and throughout the scheme the facet is available under the direction divide, like 940-999.

Example: In the following examples, the term denoting space is given in brackets.

i. Agriculture in (India) brought up to 1990

ii. History of education in (India)

**Energy:**

According to Mills, the fundamental category, Energy is, "a category of facets which characterize the exercise of energy, i.e., activities, operations, processes, problems, etc. Palmer and Wells feel that Energy "usually presents itself as a problem to be solved, or a mode of work or approach." Dr Ranganathan, in his Colon Classification, calls the facet based on the characteristic Energy, the problem facet. Thus, the fundamental Energy covers the problems, action including methods, functioning, and etc. aspects of a main class. Many main classes will have certain units which deal with the problems in the subject. These problems are generally applicable to all the organs of the class. In the class Agriculture, certain processes and actions like sowing and harvesting also come under Botany; units like physiology, and pathology are noticed in Zoology and Medicine, which deal with functioning. Isolates, which make the category Energy, are generally important actions in the subject and commend a greater influence on the subject from two directions. One is when they are in general reference to the class and the second when they refer to the organs of the subject individually.

Dr Ranganathan postulates that the energy aspect in a main class may manifest itself indifferent rounds of energy, that is, 2E= second round of energy after 1E; 3E= third round of energy after 2E and so on. In Agriculture, the energy focus 'manuring' needs to be followed by another energy facet consisting of foci (facet) such as collection, grading and application. Another example is from Medicine. Pathology or disease is a problem and therefore it is [1E] of the subject treatment and surgery, etc. are for actions on diseases themselves, and therefore, they are the [2E] of the subject.

**Matter:**

Dr Ranganathan postulates matter as a fundamental category capable of manifesting itself as the 'constituent of a whole'. However, Mills argues, "Matter is the category of facets which reflect substances, materials, etc. It is manifested clearly in most technologies and in many of the natural sciences; and it is generally absent from theoretical disciplines like Law, Economics, Literature, etc." Vikery feels that "Matter comprises constituent materials of all kinds.

"The Matter facet is inherent in many subjects falling within a main subject. The onset enumerated in CC are: Library Science, Engineering, Sculpture, Painting and Music. The 7 edition of the Colon Classification has given large scope to the Matter facet. There are three groups of "Matter" viz. Matter Material, Matter Property and Matter Method.

For Example: In the Main class of Library Science, Matter figures as the reading material. In the class Painting, Matter figures as the materials used for painting. In the class Music, Matter figures as the musical instruments, and so on. Dr Ranganathan was convinced that the facet "Matter" should be expended into three groups and many isolates from the facet "Energy" be shunted to "Matter Property".

The three groups of Matter are:

1. Matter Property [MP]

| Ex. | Main Subject | MP |
|-----|--------------|-----|
|     | Biology      | Morphology |
|     |              | Physiology |
|     | Education    | Thinking |
|     |              | Reasoning |

2. Matter Method [MM]

| Ex. | Main Subject | MP |
|-----|--------------|-----|
|     | Chemistry    | Physical Method |
|     |              | Fluid Method |

3. Matter Material [MM]

Ex.       Main Subject      MP

          Technology        Product

          Biology           Substance

**Personality:**

The fundamental category 'Personality' is most concrete and the category 'Time' is the most abstract or the least concrete sector. The Personality facet indicates the core point of the subject at hand. According to Palmer and Wells, 'the term personality is used for the wholeness of any subject. Personality inheres in the subject itself and gives colour to the other fundamental concepts transforming them into concrete things. The Personality facet is of prime importance in many subjects, belonging to different classes, and it is the most recognizable facet for the specialists of a class. Personality is the first facet in many subjects and it is often experienced that the other facets work as attributes of personality for its further subdivision. Matter, Energy, Space, and Time are often required in relation with the personality facet. The other facets are required in lesser degree in relation to the main class. Without Personality there can be no organ, constituent, attribute, action, etc. According to Dr Ranganathan, if a concept cannot easily fit into the other four categories then it is probably a Personality facet. He further adds that Personality is only recognizable by elimination. After separating out the manifestation of Time, Space, Energy and Matter in the subject, the residue often turns out to be a personality facet. This may be called the Principle of Residue. Within the Personality facet, we find a number of levels into which the whole personality is spread. These are known as levels of personality facet, P1, P2, P3, P4 and so on. The different levels are arranged with the help of the principles of helpful sequence.

Example, Personality facet

Main class P1 P2 P3 P4

Literature Language Form Author work

The following example enumerates how the fundamental category, personality, is used in

DDC and CC respectively:

Main class Personality facet DDC CC

Psychology Abnormal psychology 137 S6

Zoology Vertebrate 596 K9

The fundamental category and the connecting symbols used to distinguish them in a class number are as indicated below:

Personality: The connecting symbol is comma (,)

Matter: The connecting symbol is semi-colon (;)

Energy: The connecting symbol is colon (:)

Space: The connecting symbol is period (.)

Time: The connecting symbol is inverted comma (')

**Review questions:**

1. What are normative principles?

2. What are their applications?

3. Name the five fundamental categories and explain them.

4. Explain facet analysis.

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# UNIT – 3

# SCHEMES OF LIBRARY CLASSIFICATION

**Objectives:**

- ➢ To learn in depth about the features of CC, UDC, LC etc.
- ➢ To learn about their applications.

**Introduction:**

Everything can be classified by various ways according to its characteristics. For example, an apple can be classified according to its size, taste, weight or place of origin. Ever since man started to record knowledge, he has tried to arrange the recorded knowledge or documents in a manner that is helpful for those who want to retrieve it. In a modern library, documents (books and other reading materials) are arranged by subject for an easy location. Arranging similar things in some order according to some principle unites and controls information from various sources. This is possible with the help of library classification. Library classification is thus a system of arrangement adopted by a library to enable users to find its materials quickly and easily.

In simple words, library classification aims at arranging the books in a helpful sequence. It also mechanizes the correct replacing of books returned after use by the users. Besides, it fixes the most helpful place for a newly procured and added book among the already existing collection. A common method of arranging books is by the names of their authors. This sequence is helpful to users who want books by a particular author. But it has been experienced in libraries that most readers ask for books on a particular subject rather than for books by a particular author. Therefore, if the sequence of the books is to be helpful, it should be determined by the subject of the book. Library classification is thus the translation of the name of the subject of a book into a preferred artificial language of ordinal numbers. The individualization of books dealing with the same specific subject is possible by means of a further set of ordinal numbers which represent some features of the book other than their thought content.

**Dewey decimal classification (DDC):**

DDC was conceptualised by Melvil Dewey and was first published in 1876. It is now in its 21st edition. Its author Melvil Dewey (1851-1931) is veritably acknowledged as the father of modern, librarianship. It is the first discipline-oriented classification -and uses decimal numbers Basic Terminology to divide the entire knowledge into ten main classes. Divisions of main classes are hierarchical and minute. In Edition 21, there are seven auxiliary tables to supplement and the main schedules 001/999 in volume 2. Its bibliographical details are: Dewey Melvil: Decimal Classification and Relative Index: Ed. 21 edited by Joan S. Mitchell. Albany, MY Forest Press/OCLC, 1996. 4 Volumes. For small libraries, abridged edition of DDC is brought out. The present abridged edition in one volume is the 13th edition (1997).Most of the class numbers are enumerated, and many more numbers can now be extended through add-to instructions and seven auxiliary tables. It is the most popular classification scheme being used in about 2,00,000 libraries in135 countries and has been translated in 35 languages. It is also used in Cataloguing in-Publication (CIP) data and MARC records.

The impact of information technology on DDC can be seen in that on 29 July 1988, a computer tape containing substantially all of the text of DDC was delivered to a firm in Massachusetts to begin production of the twentieth edition. Thus, as DDC enters the online age, the Editorial Policy Committee will continue to monitor future developments of the classification, and recommend policies that will help it to become more adoptable and amenable to online information storage and retrieval. It is already available in CD-ROM (Dewey for Windows, 1996).

The Dewey Decimal Classification (DDC) was developed by Melvil Dewey in the year 1873 to arrange the documents of Amherst College Library. The first edition entitled, "A Classification and subject index for cataloguing and arranging the books and pamphlets of a library" was published in 1876. It appeared in the form of small book of 44 pages. Dewey decimal classification continued to be modified and revised with many alterations and additions. The DDC is presently being published by OCLC - Online Computer Library Center, Inc. The DDC is published in full and abridged editions in print and electronic versions. The latest edition is available in 3 formats,

i) Four Volumes Print Edition

ii) The Electronic version Web Dewey,

iii) Abridged Edition for small libraries.

The 20th Edition of DDC is in four volumes. First Volume contains the introduction and various tables. Second and Third Volumes are Schedules. Second Volume covers class numbers from 000 to 599 and Third Volume covers class numbers from 600 to 999. Fourth Volume provides Relative Index to the Schedules and a Manual. DDC is an enumerative scheme of classification. An enumerative classification system is a system that lists all the specific subject classes, as opposed to, for example, an analytico-synthetic classification where subjects are divided intofacets (aspects), and class numbers are synthesized from the classification schedule. It means that the classifier does not have to construct numbers as the numbers are readymade and can be picked up from the classification schedules. Notation is the system of symbols used to represent the classes in a classification system. Notation gives both the unique meaning of the class and its relation to the other classes. Following symbols and digits are used in DDC:

Arabic Numerals 0-9

Dot (.) Decimal Point

Roman Alphabets A to Z

Arabic numerals are used to represent each class in DDC. Each base number in DDC has minimum of three digits and further divisions follow a decimal (.) or a dot. Thus the name Dewey decimal classification scheme. The first digit in each three-digit number represents the Main class. The second digit in each three-digit number indicates the Division and the third digit in each three-digit number indicates the Section. For example, 500 is used for general works on the sciences and mathematics. Notation 510 is used for mathematic, 520 for astronomy, 530 for physics and 540 for chemistry. The third digit in each three digit number indicates the section. Thus, 540 is used for general works on chemistry, 541 for physical chemistry, 543 for analytical chemistry, 546 for inorganic chemistry and 547 for organic chemistry. The Roman alphabets are used for expressing concepts which are not enumerated in the Schedules.

**Features of DDC:**

Features of DDC

1. Hierarchical scheme of classification

- o ▢ General to specific

## 2. Universal scheme of classification

- o Its classes reflect all the areas of specialized knowledge developed in modern society.

## 3. Relative location:-

- o It assigns notations to the books on the basis of thought content and on the basis of shelves. In this way, a new book on a given subject may be put in between the existing sequence at the required position directed by the notation assigned to that book.

## 4. Decimal notation/ Decimal system:-

- o Universe of subject is divided into 10 main classes from 0 to 9. It uses decimal fraction notation for the arrangement of knowledge and the Indo-Arabic numerals are used decimal for subdivision of knowledge.

10 main classes →10 Division →10 Sections

At each stage of division, a given number is subdivided decimally.

## 5. Classification by Discipline:-

- o The concept of discipline, or branch of learning forms the basis of DDC. It scatters subjects by discipline.

## 6. Minute Division:-

- o The continuous growth of number of pages suggests enormous number of subdivisions which are possible and useful for minute classification.

## 7. Mnemonic Division: aid to memory

- o Here in DDC, Mnemonics are available for subject synthesis. The use of consistent order in the subject division of different classes produces mnemonics. Use of tables, scheduled mnemonics, systematic mnemonics, etc.

## 8. Integrity of Numbers:-

- o Incorporating changes with the growth of knowledge without changing the basic structure. Integrity is a state of being whole not divided. But later editions are showing less integrity.

9. Auxiliary Tables:-

- o These provide an important basis for preparing numbers and lead to uniform meanings of numbers when used in various contents.
- o 13 edition had 5 tables, but 18, 19 and 20th edition has 7 tables.

**Introduction and tables:**

Volume one presents the Editor's introduction of DDC. It is an important and useful part of the system in all respects. Introduction provides:

1. History and current use of DDC

2. Overview of DDC including basic plan

3. A practical Guide to the use of classification

Besides, there is a Glossary, a valuable feature, explaining all the technical terms, used in Editor's Introduction. It also provides rules to further synthesize (extend) a number either from the Schedule or from any of the Auxiliary Tables.

**Tables:**

The second part of Volume 1 contains seven numbered Tables. Tables provide notation that can be added to the class numbers in the Schedules to provide greater subject specificity. Following are the seven Tables:

Table 1: Standard Subdivisions

Table 2: Geographic Areas, Historical Periods, Persons

Table 3: Subdivisions for individual Literatures, for Specific Literary Format

Tables 3-A: Subdivisions for Works by or about Individual Authors.

Table 3-B: Subdivisions for Works by or about More than One Author

Table 3-C: Notations to be added where Instructed in Table 3-B and in 808-809

Table 4: Subdivisions of Individual Languages

Table 5: Racial, Ethnic, National Groups

Table 6: Languages

Table 7: Groups of Persons

In the end of Volume 1 are the Lists which compare Edition 19 and 20:

Relocations and reductions, Comparative Tables for Music and British

Columbia, and Equivalence Tables for Music and British Columbia.

**Schedules:**

In Schedules, Knowledge is organized from 001 to 999. Volume 2 covers class numbers from 000 to 599 and Volume 3 covers class numbers from 600 to 999.

**Summaries:**

Summaries of the Schedules provide an overview of the intellectual and notational structure of classes. The summaries of the schedules as a whole are found at the front of the Volume 2.

**First Summary:**

Dewey divided the whole universe of knowledge into 10 Main classes. This is first practical step to learn the system for the beginner. The first summary contains the 10 main classes. The first digit in each three digit number represents the main class. For example 600 represent technology.

**The Ten Main Classes:**

000 Generalities

100 Philosophy & psychology

200 Religion

300 Social sciences

400 Language

500 Natural sciences and mathematics

600 Technology (Applied sciences)

700 The arts

800 Literature & rhetoric

900 Geography & History

**Second Summary:**

In Second Summary, the 10 Main classes are again subdivided into 10 Divisions resulting into 100 Divisions on the whole. The second digit in each three digit number indicates the division. For example, 600 is used for general works on technology, 610 for medicine and health, 620 for engineering, 630 for agriculture, etc. It is better to remember this Summary also. The entire Second Summary is reproduced for your reference.

**Third Summary:**

The Third Summary contains 1000 sections. The third digit in each three digit number indicates the section. For example, 610 is used for general works on medicine and health, 611 for human anatomy, 612 for human physiology, 613for personal health and safety, etc. Each of the 100 Divisions is further divided into 100 Sections resulting into 1000 Sections. The Thousand Sections the Third Summary, taken from the Schedules of DDC 22nd ed., is reproduced in the subsequent pages.

**Outline and Features of DDC:**

o Scheme of classification enunciated by M. Dewey in 1876.
o In 1876, the scheme was published under the title "A classification and subject index for cataloguing and arranging the books and pamphlets of a library."

Decimal Classification is an almost enumerative scheme of classification. Since 1876 to 2011(23$^{rd}$ edition) this scheme did not look back, and its popularity has grown day by day throughout the world. This statement can be justified by the fact that DC has been translated into many languages, such as Chinese, Spanish, Danish, Turkish, Japanese, Hindi, Portuguese, Sinhalese and several other languages across the globe. Dewey introduced the notion of using notation for the subjects in his scheme and applying the notation to the book and not to the shelves. But certain features forming the basis of its present form can be still recognized as follows:

1. **Universal Scheme:** A distinctive feature of the DDC is that its classes reflect all the areas of specialized knowledge developed in modern society. These specialized areas are loosely put together in the main classes in the scheme, able it in this manner the principle of collation of bringing of related subjects in close proximity is sometimes violated.

2. **Relative Location:** In his scheme, Melvil Dewey introduced the brainwave of 'relative location' as opposed to 'fixed location.' For this purpose, he utilized the decimal notation consisting of Arabic numerals for the subjects and assigning that notation to the books on the basis of thought content and not on the basis of the shelves. In this method, a new book on a given subject may be put in between the existing sequence at the required position, directed by the notation assigned to that book and there is no necessity to put the book at the end of the sequence as had been the practice in "fixed location."

3. **Decimal Notation:** Melvil Dewey used decimal fraction notation for the arrangement of knowledge on the shelves. Indo-Arabic numerals (0 to 9) are used decimally for the sub-divisions of knowledge. In this process, the universe of subjects is divided into ten main classes, each of which is again divided into ten divisions. Again each division is further divided into ten sections. At each stage of division, a given number is sub-divided decimally. All the class numbers in DDC are decimal fractions.

4. **Minute Division:** The first edition of DDC consisted of only 42 pages and at that time, it was criticized for its being too broad in its sub-division. The number of pages had since been increasing as shown in Table 1. This growth suggests the enormous number of sub-divisions which are possible and useful for minute classification. Dewey emphasized the need of minute division as "the advantage of close classing is unquestioned if the user knows just what it is."

5. **Mnemonics:** Another important feature of DDC is mnemonics, which means 'aid to memory.' In DDC, mnemonics are available for subject synthesis. The use of consistent order in the subject division of different classes produces mnemonics. There are various tables, such as, Area Table, Language Table, Standard Division Table, etc. which are used to achieve subject synthesis. The user may also find Scheduled Mnemonics, Systematic Mnemonics and Alphabetical Mnemonics at a few places in DDC.

6. **Integrity of Numbers:** One of the most important features of DDC is the integrity of numbers. To incorporate new developments and to keep pace with the growth of knowledge, a scheme of classification should be revised continually, without changing the basic structure, so that the professionals may accept the revised edition without hesitation.

7. **Auxiliary Tables:** Auxiliary tables provide an important basis for preparing numbers and lead to uniform meanings of numbers when used in various contexts. A document, which is a source of knowledge, always has some physical form. Melvil Dewey in the second edition of the scheme published in 1885 introduced the concept of "Form Divisions" to be used for the sub-divisions of a subject based on the characteristics of documents, either in accordance with the point of view of the author, i.e. Bibliographical, Philosophical, Theoretical, Historical or in accordance with the form of thought content in documents, i.e. Digest, Manual, Monograph, Dictionary, Periodical or Manual. The "form divisions," could be attached to any class number according to the instructions provided therein. The system of 'form divisions' remained in use up to the 12$^{th}$ edition. The 13$^{th}$ edition consisted of 5 "Auxiliary Schedules." The 14$^{th}$ edition had 4 tables. In the 15$^{th}$ edition, the conventional 9 form divisions, i.e. 01-09 were annexed along with the tables,without any detailed sub-divisions. The word 'Form divisions' was replaced by"Standard Subdivisions' in the 17thedition, along with new area table in volume 2(Index). The 18$^{th}$, 19$^{th}$ and 20$^{th}$ editions consist of 7 auxiliary tables which are detailed under DDC 20.

**Structure of Dewey decimal classification:**

1. **Schedule:** A basic premise of DDC is that it is arranged by discipline and not by subject. At the broadest level, the DDC is divided into ten main classes, which together cover the entire world of knowledge. Each main class is further divided into ten divisions, and each division into ten sections (not all the numbers for the divisions and sections have been used). The three summaries of the DDC are as given:

2. **Summaries:** Summaries provide an overview of the intellectual and notational structure of classes. Three types of summaries appear in the schedules and tables of DDC. The summaries of the schedules as a whole are found at the front of the schedules (Volume 2-3). Single level summaries in the schedules and tables provide

an overview of classes that have sub-divisions extending over more than two pages. Multi-level summaries are provided for eight major divisions and the Area Tables for Europe and North America.

**Colon Classification (CC):**

Colon classification (CC) is a classification scheme devised by Dr S. R.Ranganathan. The first edition of the scheme was brought out in 1933 and the seventh edition is the latest edition. The 7th edition is not much in use and the 6th edition is widely used. For this reason, here we will use the 6th edition of CC, which was first published in 1960. It is a freely faceted classification conforming to the General Theory of Classification and guided by postulates and principles. The major structure of the scheme ' is in its basic subject schedules and the schedule of isolates belonging to the five fundamental categories: Personality, Matter, Energy, Space and Time. With the identification of three planes of work - Idea, Verbal and Notational Plane, work of classification has become objective. It is still a best and sound example of ananalytico- synthetic classification.

The Colon Classification is now in its seventh edition (1987). The scheme though a trend setter is not a highly used classification. It is used in some special and academic libraries in India. Its complex mixed notation is a barrier, in its use and popularity. But its methods and theory have had an impact on other schemes, such as, DDC, andBC-2, UDC in their revision, and in the designing of new systems such as Broad System of Ordering (BSO). CRG members have used its methods to design many special classification systems. The Colon Classification (CC), 6th edition is a one –volumed book of about430 pages. The book has been divided into 3 parts:

Part 1: Rules

Part 2: Schedules

Part 3: Classics and sacred books

The First part briefly describes the important principles, concepts and canons of classification on which the classification system is based. It is also used with the rules and examples for constructing the class numbers. The second part has all the subject schedules. At the end of Part 2, an index is given for all the isolates listed in various schedules. The Part 3 comprises the schedules of classical works and sacred books.

**Notation:**

Notation refers to the symbols and numbers which have been used in the scheme of classification for various classes. CC has used mixed notation as several kinds of symbols have been used. They are as follows.

1. Indo Arabic Numerals (1-9) 09

2. Roman Alphabets (A to Z) 26

3. Roman alphabets (a-z, excluding i, l, o) 23

4. Greek letters [$\Delta$ (delta) and (sigma)] 02

5. Parenthesis () 02

6. Punctuation marks as indicator digits 06

   Inverted comma (')

   Dot (.)Colon (:)

   Semi colon (;)

   Comma (,)

   Hyphen (-)

7. Zero as an indicator digit 01

8. Arrows 02

   Forward arrows→

   Backward arrows←

**Genesis of Colon classification:**

Ranganathan was a mathematics lecturer. It was a mere accident that he was appointed Librarian of the Madras University Library in the year 1924. He was soon deputed to Britain for an observational tour of British libraries. While in Britain he also attended classes in the School of Librarianship, University of London. Berwick Sayers, known as' the grammarian of library classification, was one of the teachers at the School. During his tour of Britain; Ranganathan visited several libraries and was quick to notice the lacunae in the classification schemes in use then. A chance visit to a departmental store in London gave Ranganathan a

clue for evolving a scheme of classification. He saw the demonstration of a toy called meccano set. The meccano set consists of several slotted strips, rods, wheels, screws, nuts and bolts with which several different models could be made. This gave him the idea that in a classification scheme there should be standard units that could be joined by connecting symbols. Ranganathan's standard units resembled the strips and his connecting symbols resembled the nuts and bolts of the meccano set. The standard units became the schedules. Thus, a class number could be constructed with the different elements enumerated in the schedules with a connecting symbol and he chose the colon as the connecting symbol. This was, dip, Ranganathan's conception of Colon Classification. The foundation of Colon Classification was laid in Britain in the year 1924. In 1925, his journey back to India gave Ranganathan ample time to work on the schedules. The library on the ship he was travelling in and the Madras University Library's book catalogue, which he was carrying with him served as the working equipment for him.

**First Edition:**

On reaching Madras he took up the work of classifying the Madras University Library collection. The years between 1925 and 1932 were devoted mainly to the\ construction 'of the schedules of CC. In 1929, he also established a library school at the University. Both teaching and library work at the University contributed immensely to the publication 'n 1933 of the first edition of Colon Classification. It had three distinct par:127 pages of rules explaining the underlying principles, 135 pages of schedules and 106pages Of index. The notation was mixed, consisting of the-26 Roman capital letters denoting main classes, Indo-Arabic numerals- and also Roman lower case letters. The colon (:) was used as the connecting symbol for joining facets. Each main class was provided with a facet formula.

**Search for Theory:**

Ranganathan was aware of several inconsistencies in his scheme and did not fight shy of consulting subjects' experts to know the gamut of each discipline. At the same time he tried to evolve a theory of library classification. The years from 1933 to 1939 were spent in working on the theory of classification. It was during these years that several Canons of Classification were formulated. The result was the publication of Prolegomena to Library Classification in 1937. Based on this theory, the second edition of Colon Classification was published in 1939. The changes from the first to the second edition were not substantial.. In this edition, two new, concepts of Octave principles and auto-bias device were introduced. A

new main class 8 Spiritual Experience and Mysticism carne into being. The first edition, as already said, had three parts. A fourth part was added in the second edition. This additional part contained about 3,000 examples, which were illustrative of the rules given in the first part.

**Merits and demerits of colon classification:**

Due to a sound theory and the provision of a hospitable notation, CC is capable of giving a unique number for almost every subject. The systematic order and the degree of detail due to analysis and synthesis are two great virtues of CC. As a result, it has achieved two objectives: i) provision of a helpful order in each class, and ii) facility in locating a given topic whether it is simple, compound or complex. It is claimed that CC can be effectively used in a computer-aided document finding system. The major drawback of CC is that there exists no machinery to keep up the revision work as in the case of DDC and UDC. The guidance provided in the recently published seventh edition is not enough and lacks clarity at places. It calls for a manual with numerous examples to explain the application of various rules. And above all, it is far from simple, the virtue most cherished by the users.

**Basic postulates of Colon classification:**

The CC, like- other schemes of classification, starts with a set of main classes which form the first order array, of classes. Each main class is divided into facets. All facets are regarded as manifestations of five fundamental categories. Before we proceed further let us see the meaning of the terms introduced in the above paragraph. The terms are i) -main classes, ii) array, iii) facet, and iv) fundamental categories.

**Main classes**: The main classes in CC are like disciplines in DDC and theoretical subjects in UDC. They are the traditional subjects, which you are well acquainted with, - like mathematics, physics, history, political science and soon. The number of main classes in CC is greater than those in DDC and UDC.

**Array**: The dictionary meaning of array is 'a systematic arrangement of numbers or symbols in an orderly manner.' In CC also, it means the same as its dictionary meaning. The arrangement, however, is referred to as the preferred sequence. The numbers, in a classification refer to a division of a subject on the basis –of a, single characteristic. For example, in medicine, the organs of the human body form the array- of organs.

**Facet**: A facet is a characteristic by which ' a class is divided/grouped, Each main class is divided into facets to signify the whole series of arrays based on, a set of related characteristics of division. In the main class Literature, all enumerated languages, after which the national -literatures are known, constitute in DDC,, the language facet of that class. In the same class, all literary forms (poetry, drama, fiction, etc.) constitute another facet. It may also be stated here that within a facet an individual member is called a focus. Hindi literature, for example, is a focus in the language facet of the class Literature.

**Fundamental categories:** To understand the basic principles of CC you have to first understand some of the rules framed by Ranganathan. He calls them postulates. One postulate states that there are five fundamental categories (FC), viz., personality [P],.matter [M], energy [E], space [S], and time [T], PMEST for short. A postulate is a presumption or assumption, which is never put to test. It is a basis for argument and hence one is not supposed to question the veracity of the assumption. That is the meaning of a postulate. According to Ranganathan, in any given subject, there may be a maximum of five fundamental categories. There can be less, but in no case more than five. They also come in the order of PMEST according to their decreasing concreteness.

If you are able to identify the fundamental categories irk a given subject, you can classify any subject. Hence, you must have a clear perception of each of the five fundamental categories. We will take up the five fundamental categories one by one for discussion in the reverse order.

**Time and Space**- These two have the usual meaning known to you.,  A century, a decade, a year, a month, a day, an hour are all indicators of time. If the subject is stated as Economic conditions of India in the 19th century, you can identify the time element in it. In some subjects, it may, not be stated explicitly, e.g., Economic conditions during the reign of Akbar. In this example, the fundamental category time is concealed, but still identifiable. In the same way, it is fairly simple to locate the space element in a subject. In the above title Economic conditions of India in the 19th century, you can find the space facet, i.e. India. Space is indicated by terms like continent, country, city, village, etc. All these come under the facet space.

**Energy:** The next fundamental category is energy. Energy refers to some type of action. In the subject medicine, diagnosis or treatment falls under the facet energy. It shows action. In

agriculture, ploughing is energy, in education teaching is energy, and in sociology relief work is energy, and so on.

**Matter:** There is a major change in the seventh edition of CC in the case of the fundamental category matter. Up to the sixth edition, Matter was present only in a few main classes. There is a complete reversal in the seventh edition. In certain cases, what was considered energy now forms part of the matter facet. Besides, the fundamental category matter has undergone some other changes. It is distinguished as Matter Property [MP], Matter Material [MMt] and Matter Method [MM]. It is only matter property, which has almost replaced the fundamental category energy. To explain matter with a concrete example, in the class medicine, anatomy, physiology and diseases are viewed as manifestations of matter property. Similarly, in the main class agriculture, soil, manure, propagation, etc. are treated as manifestations of matter property. In the main class fine arts, under the class drawing, pencil drawing, ink drawing, and cartoon drawing are considered as a manifestation of matter method. In technology, product, and in biology substance are manifestation of matter material.' Hence, in a given subject, it is not difficult to recognise the fundamental categories of time, space, energy and matter.

**Personality:** The fundamental category personality has evaded definition. Ranganathan found a Way out to recognise personality by the method of residue, i.e., when it cannot be any other fundamental category it is assigned to personality. However, experience in the design of depth schedules suggests that it is possible to identify a core concept in compound subjects going with a basic subject, such as, ` Human Body' in Medicine.

**Features of CC:**

The CC is a general scheme, which aims to classify by discipline (a method adopted and perpetuated by DDC) all subjects and all forms of library documents — books, periodicals, reports, pamphlets, microforms, and electronic media — in all kinds of libraries. For bibliographic records and micro-subjects, requiring depth classification, its potential becomes even greater. The scheme is described as an analytico-synthetic as opposed to an enumerative classification system. Enumerative systems provide an exhaustive top down list of all subjects recorded at a given time. In contrast, the CC system lists concepts which are to be combined in a pre-set order, to construct a class number co-extensive with the subject of the document. This objectively formulated and dynamic theory for designing and evaluating classification systems is enshrined comprehensively in his magnum opus Prolegomena to

library classification (Ranganathan 1937; 1957a; 1967a), and later summarized in a paper (Ranganathan 1964). For designing a classification system, Ranganathan divided the whole work into three successive planes, named Idea, Verbal and Notational planes. The idea plane is the message, the verbal is its expression, and the notational plane is its visible representation in shorthand symbols.

**Five fundamental categories:**

**Time:**

According to Mills, the fundamental category, Time "is usually embodied in periods". According to Dr Ranganathan, "The fundamental category time occurs in every subject forming a local description of local history of any subject". Time indicates that the entities under different subjects must change in its structure, meaning, history development, with the progress of times.

 Example: History of the 18 century is different from that of the 15 century.

**Space:**

According to Dr Ranganathan, "the surface of the earth is a manifestation of the category 'Space'. It occurs in every subject forming a local description or local history of any subject. "Most of the subjects, if not all, get manifested in relation with continents, countries and their subdivisions. In CC (Colon Classification), there is a schedule of Geographical Divisions which can be attached to a subject. In DDC (Dewey decimal classification), there is a space facet applicable under the class History, and throughout the scheme the facet is available under the direction divide, like 940-999.

Example: In the following examples, the term denoting space is given in brackets.

i. Agriculture in (India) brought up to 1990

ii. History of education in (India)

**Energy:**

According to Mills, the fundamental category, Energy is, "a category of facets which characterize the exercise of energy, i.e., activities, operations, processes, problems, etc. Palmer and Wells feel that Energy "usually presents itself as a problem to be solved, or a mode of work or approach." Dr Ranganathan, in his Colon Classification, calls the facet

based on the characteristic Energy, the problem facet. Thus, the fundamental Energy covers the problems, action including methods, functioning, and etc. aspects of a main class. Many main classes will have certain units which deal with the problems in the subject. These problems are generally applicable to all the organs of the class. In the class Agriculture, certain processes and actions like sowing and harvesting also come under Botany; units like physiology, and pathology are noticed in Zoology and Medicine, which deal with functioning. Isolates, which make the category Energy, are generally important actions in the subject and commend a greater influence on the subject from two directions. One is when they are in general reference to the class and the second when they refer to the organs of the subject individually.

Dr Ranganathan postulates that the energy aspect in a main class may manifest itself indifferent rounds of energy, that is, 2E= second round of energy after 1E; 3E= third round of energy after 2E and so on. In Agriculture, the energy focus 'manuring' needs to be followed by another energy facet consisting of foci (facet) such as collection, grading and application. Another example is from Medicine. Pathology or disease is a problem and therefore it is [1E] of the subject treatment and surgery, etc. are for actions on diseases themselves, and therefore, they are the [2E] of the subject.

**Matter:**

Dr Ranganathan postulates matter as a fundamental category capable of manifesting itself as the 'constituent of a whole'. However, Mills argues, "Matter is the category of facets which reflect substances, materials, etc. It is manifested clearly in most technologies and in many of the natural sciences; and it is generally absent from theoretical disciplines like Law, Economics, Literature, etc." Vikery feels that "Matter comprises constituent materials of all kinds.

"The Matter facet is inherent in many subjects falling within a main subject. The onset enumerated in CC are: Library Science, Engineering, Sculpture, Painting and Music. The 7 edition of the Colon Classification has given large scope to the Matter facet. There are three groups of "Matter" viz. Matter Material, Matter Property and Matter Method.

For Example: In the Main class of Library Science, Matter figures as the reading material. In the class Painting, Matter figures as the materials used for painting. In the class Music, Matter figures as the musical instruments, and so on. Dr Ranganathan was convinced that the facet

"Matter" should be expended into three groups and many isolates from the facet "Energy" be shunted to "Matter Property".

The three groups of Matter are:

1. Matter Property [MP]

Ex.     Main Subject     MP

        Biology            Morphology

                          Physiology

        Education        Thinking

                          Reasoning

2. Matter Method [MM]

Ex.     Main Subject     MP

        Chemistry       Physical Method

                          Fluid Method

3. Matter Material [MM]

Ex.     Main Subject     MP

        Technology     Product

         Biology         Substance

**Personality:**

The fundamental category 'Personality' is most concrete and the category 'Time' is the most abstract or the least concrete sector. The Personality facet indicates the core point of the subject at hand. According to Palmer and Wells, 'the term personality is used for the wholeness of any subject. Personality inheres in the subject itself and gives colour to the other fundamental concepts transforming them into concrete things. The Personality facet is of prime importance in many subjects, belonging to different classes, and it is the most recognizable facet for the specialists of a class. Personality is the first facet in many subjects and it is often experienced that the other facets work as attributes of personality for its further subdivision. Matter, Energy, Space, and Time are often required in relation with the

personality facet. The other facets are required in lesser degree in relation to the main class. Without Personality there can be no organ, constituent, attribute, action, etc. According to Dr Ranganathan, if a concept cannot easily fit into the other four categories then it is probably a Personality facet. He further adds that Personality is only recognizable by elimination. After separating out the manifestation of Time, Space, Energy and Matter in the subject, the residue often turns out to be a personality facet. This may be called the Principle of Residue. Within the Personality facet, we find a number of levels into which the whole personality is spread. These are known as levels of personality facet, P1, P2, P3, P4 and so on. The different levels are arranged with the help of the principles of helpful sequence.

Example, Personality facet

Main class P1 P2 P3 P4

Literature Language Form Author work

The following example enumerates how the fundamental category, personality, is used in

DDC and CC respectively:

Main class Personality facet DDC CC

Psychology Abnormal psychology 137 S6

Zoology Vertebrate 596 K9

The fundamental category and the connecting symbols used to distinguish them in a class number are as indicated below:

Personality: The connecting symbol is comma (,)

Matter: The connecting symbol is semi-colon (;)

Energy: The connecting symbol is colon (:)

Space: The connecting symbol is period (.)

Time: The connecting symbol is inverted comma (')

**Concept of PMEST:**

The Colon Classification scheme contains both, the basic subjects and their facets (which contain isolates). A basic subject can stand alone but in contrast an isolate is a term that

mediates a basic subject. To create a class number, the basic subject is named first. The isolates follow, entered according to a facet formula. This formula states that every isolate in every facet is a manifestation of one of the five fundamental categories -- personality, matter, energy, space, and time. Personality is the distinguishing characteristic of a subject. Matter is the physical material of which a subject may be composed. Energy is any action that occurs with respect to the subject. Space is the geographic component of the location of a subject. And time is the period associated with a subject. As mentioned above, there are five fundamental categories into which a subject or main class is divided. These are the five aspects of a subject. Dr Ranganathan named the five fundamental categories as PMEST, which is, Personality, Matter, Energy, Space and Time. A subject may have a Personality aspect, a Matter aspect, an Energy aspect, a Space aspect, and a Time aspect.

**Universal Decimal Classification (UDC):**

The UDC was developed in 1895 by Paul Otlet and Henri Fontaine taking the DDC as its base. Their efforts resulted in the publication of a scheme called Manuel repertoire Universal Bibliographies, an almost-faceted scheme which involved adopting the almost-enumerative classification into one which allows synthesis. It is a bibliographic classification available in three versions: Full edition 2, 2 1,000 terms Medium edition. 70,000 (30% of the full edition) Abridged edition 20,000 (10% of the full edition) English edition is published by the British Standards Institution as BS: 1000.Now, the UDC is owned', by a consortium (having members from England, Spain, Belgium, Japan, France and the FID itself). It is constantly revised and revisions are announced in its annual bulletin: Extensions and Corrections to UDC. At present, the UDC is being restructured to a fully faceted system.

The UDC notation consists of the following sets of symbols:

i The ten lndo-Arabic numerals: 0, 1. to 9.

ii The Roman alphabets both capital and lower case.

iii Punctuation marks like point, semi-colon, colon and inverted commas.

iv Mathematical signs: the plus and the equals. '

v Besides these, it includes parentheses, square brackets, the stroke and the apostrophe.

This, then, is the complete system of symbols used in UDC as its notation. The numerals are used to divide the whole of human knowledge into ten broad classes each of which has been

further divided to form ten theoretical classes and so on, Nature and Structure. Roman letters are used in such places where the subject can be better identified by their use, for example, in the class Literature. The punctuation marks and mathematical signs are used as connecting symbols to build compound numbers by adding to the base numbers from the auxiliary tables. The numbers carry ordinal value and not arithmetical value, meaning they are decimal fractions and not integers. This facilitates division of a class at any point in the order without disturbing it. The other qualities of UDC notation are explained in the following sub-sections.

Hospitality:

Because the UDC notation consists of numbers, which are taken as decimal fractions, it can accommodate emerging new ideas, where appropriate, ad infinitium. This is so in the case of not only main numbers but auxiliaries as well. The notation is, thus, Mispitable and capable of reaching the required level of detail. 'Since it is hierarchic, moving from the general to the particular, it expresses the order of classes. Take the following example;

6 Technology

62 Engineering

621 Mechanical Engineering... Electric* Engineering. Machinery

611.3 Electrical engineering

621.39 Telecommunication. Telecontrol

621.396 Radiocommunication apparatus and methods (Radio).

621.396.7. Radio stations

At any place in this hierarchic chain any new concept can be accommodated without disturbing the order of existing concepts. The division on the basis of decreasing extension clearly expresses the order of classes in the hierarchy. 47 (DDC)

**Facetisation and Synthesis:**

The editors of UDC claim that the scheme is faceted. Every recurrent category is a facet and "the best example of facetisation is presented by its tables of common auxiliaries. It also uses a device called intercalation to change, as required, the citation order of facets with a view to create a more helpful sequence. The UDC is, therefore, a faceted classification. It is also a highly synthetic scheme. Ordinarily, every faceted scheme is synthetic in structure. However,

in addition to facetisation in the form of common auxiliary subdivisions, UDC also contains a number of other synthetic devices such as:

1) The use of signs (+9 : , [ ], ::) to connect two or more numbers.

2) The use of the apostrophe (' ) in special auxiliaries (see 12.3.4).

3) The facility to combine, in a single number, two special auxiliaries.

In short, if the main tables of UDC display its hierarchical enumerative character, the auxiliary tables represent its faceted and synthetic structure.

**Intercalation:**

You are already aware that the citation order for facets is flexible in UDC. Intercalation is the use of the auxiliary as an infix. Genenally, an auxiliary is prefixed or suffixed to a main number. In UDC, it can also be infixed to interrupt a main number. This, at times, becomes necessary to provide an alternative approach. For example:

622 Mining

622(410) Mining in Britain

622.333 Mining of coal

622.333(410) Mining of coal in Britain

622.34 Mining of metal ores

622.34(410) Mining of metal ores in Britain

In the above arrangement, the books about mining in Britain 'get scattered throughout the class Mining. Ideally, if required, all books on British mining should be brought together. It is possible to bring them together, if the auxiliary number for space in the above case is used as an infix and allowed to interrupt the main number as follows:

622

622(410)

622(410)333

622(410).34

**Mnemonics:**

The common auxiliary sub-divisions and the parallel division are two principal mnemonic devices used in UDC. Mnemonics results from the use of the same notation representing a given concept wherever that concept occurs in the scheme.

**Filing Order:**

The filing order of UDC symbols is based on a progression from the general to the particular. Thus, a common auxiliary used as an independent number is filed before a main number. This is followed by a compound number having the plus sign or the stroke in it, as it is broader in meaning than a simple number. Next, the simple numbers are filed in the order of increasing length. The length indicates specificity (due to an auxiliary) or particularity (dud to hierarchical division). The filing order of UDC notation is given on page xi of the International Medium Edition

-- English Text (BS 1000M: 1985) which is reproduced here.

**UDC Hierarchic Structure:**

UDC's most innovative and influential feature is its ability to express not just simple subjects but relations between subjects. This facility is added to a hierarchic structure, in which knowledge is divided into ten classes, then each class is subdivided into its logical parts, each subdivision is further subdivided, and so on. The more detailed the subdivision, the longer the number that represents it. This is made possible by the decimal notation.

| Notation | Description |
|---|---|
| 5 | Mathematics. Natural sciences |
| 53 | Physics |
| 539 | Physical nature of matter |
| 539.1 | Nuclear physics. Atomic physics. Molecular physics |
| 539.12 | Elementary and simple particles (charge less than 3) |
| 539.120 | Theoretical problems of elementary particles physics |

| Notation | Description |
| --- | --- |
| 539.120.8 | Strong interaction, including experiments |
| 539.120.81 | Quantum chromodynamics |
| 539.120.811 | Lattice QCD |

In UDC, the universe of information (all recorded knowledge) is treated as a coherent system, built of related parts, in contrast to a specialised classification, in which related subjects are treated as subsidiary even though in their own right they may be of major importance. Thus specialists may often be led to related information of which they would otherwise have been unaware.

## UDC Tables:

There are two kinds of tables in UDC:

## Main tables:

Also called the 'schedules', these contain the outline of the various disciplines of knowledge, arranged in 10 classes and hierarchically divided (as explained in 'Structure' above). They are numbered from 0 to 9.

| Notation | Description |
| --- | --- |
| 0 | Science and Knowledge. Organization. Computer Science. Information Science. Documentation. Librarianship. Institutions. Publications |
| 1 | Philosophy. Psychology |
| 2 | Religion. Theology |
| 3 | Social Sciences |
| 4 | vacant |
| 5 | Mathematics. Natural Sciences |

| Notation | Description |
|---|---|
| 6 | Applied Sciences. Medicine, Technology |
| 7 | The Arts. Entertainment. Sport |
| 8 | Linguistics. Literature |
| 9 | Geography. History |

Each main UDC class may also contain tables called special auxiliaries (or special auxiliary numbers), which express aspects that are recurrent, but in a limited subject range. These are usually facets of concepts related to operations, techniques, processes, materials, agents etc. They are listed only in particular sections of the main tables. Special auxiliary numbers can be recognized as they all begin with one of these three specific symbols/indicators: .0 (point nought), - (hyphen) or ' (apostrophe). Any UDC number beginning with any of these symbols can be combined with any other UDC number in its designated area of application.

**Common auxiliary tables:**

These tables contain common auxiliary signs and common auxiliary numbers.

**Common Auxiliary Signs:**

The signs (e.g. the plus, the stroke, the colon) are used to link two (or more) numbers, so expressing relations of various kinds between two (or more) subjects.

| Notation | Description |
|---|---|
| + | Coordination. Addition (plus sign). Table 1a |
| / | Consecutive extension (oblique stroke sign). Table 1a |
| : | Simple relation (colon sign). Table 1b |
| :: | Order-fixing (double colon sign). Table 1b |
| [] | Subgrouping (square brackets). Table 1b |

| Notation | Description |
| --- | --- |
| * | Introduces non-UDC notation (asterisk). Table 1h |
| A/Z | Direct alphabetical specification. Table 1h |

**Common Auxiliary Numbers:**

These are tables enumerating concepts that denote recurrent characteristics, applicable over a range of subjects; the auxiliary is simply added at the end of the number for the subject. Common auxiliaries, are applicable throughout the main tables, and represent notions such as place, language of the text and physical form of the document, which may occur in almost any subject.

| Notation | Description: |
| --- | --- |
| =... | Common auxiliaries of language. Table 1c |
| (0...) | Common auxiliaries of form. Table 1d |
| (1/9) | Common auxiliaries of place. Table 1e |
| (=...) | Common auxiliaries of human ancestry, ethnic grouping and nationality. Table 1f |
| "..." | Common auxiliaries of time. Table 1g helps to make minute division of time e.g.: "1993-1996" |
| -0... | Common auxiliaries of general characteristics: Properties, Materials, Relations/Processes and Persons. Table 1k. |
| -02 | Common auxiliaries of properties. Table 1k |
| -03 | Common auxiliaries of materials. Table 1k |
| -04 | Common auxiliaries of relations, processes and operations. Table 1k |
| -05 | Common auxiliaries of persons and personal characteristics. Table 1k this table is repeated |

**Structure of UDC:**

UDC is an analytico-synthetic and/or faceted classification. It allows an unlimited combination of attributes of a subject and relationships between subjects to be expressed. UDC codes from different tables can be combined to present various aspects of document content and form, e.g. 94(410)"19"(075) History (main subject) of United Kingdom (place) in 20th century (time), a textbook (document form). Or: 37:2 Relationship between Education and Religion. Complex UDC expressions can be accurately parsed into constituent elements.

**Example:**

Tourist maps of Grafton County (USA, Maine) from 1970s as a pdf file will be expressed as a combination of simple UDC numbers as follows:

**338.48(734.211.4)"197"(084.3)(0.034.2PDF)**

This expression is created from the following simple UDC numbers:

**338.48** Tourism **(734.211.4)** auxiliary number of place: Grafton County [USA, Maine] **"197"** time auxiliary number for 1970s **(084.3)** auxiliary number of form - map **(0.034.2)** auxiliary number of form - carrier - digital file

**Library of Congress Classification (LC):**

The LC is a purely enumerative classification. It consists of 21 classes in 29 parts and45 volumes and is the bulkiest of all the classification systems. It is based upon literary warrant. Main classes are denoted by alphabets:

| | |
|---|---|
| A Generalia | N Fine arts |
| B Philosophy and Religion | P Languages and Literature |
| C/F History | Q Science |
| G Geography | R Medicine |
| H Social Sciences | S Agriculture |
| J Political Science | T Technology |
| K Law | U Military Science |

L Education                               V Naval Science

M Music                                   Z Library Science &

The alphabets 1, 0, W, X, Y are still vacant. Further divisions are again denoted by alphabets:

Q Science                                 QC Physics

QA Mathematics                            QD Chemistry

QB Astronomy

Further subdivisions are by numerals:

QD

71-142 Analytical Chemistry

156-197 Inorganic Chemistry

241-44 Organic Chemistry

It makes frequent use of alphabetical mnemonics for further subdivisions:

QD171 Metals

QD172 By group A/2

QD172.M4 Magnesium Group

QD172.P8 Platinum Group

QD 182.R2 Rare Earth Metals

The alphabets and numerals M4, P8 and R2 have come from the simplified Cutter Table for author marks. Sometimes the year of publication is also included in the class numbers: The economic way of thinking by Paul T Helyne HB 171.5.H46 1990Class numbers, which are call numbers, are lengthy.

**Problems:**

It is a bulky scheme and suitable for shelf arrangement only. It is a mark and park system. Being enumerative, it is difficult to accommodate .new subjects at proper places. Only device used by the scheme is the gap device for hospitality.

**Use:**

It is one of the big three classification systems - the other two being the DDC and UDC and is being used in the largest library of the World - the Library of Congress (USA) which has 10 crore documents. 60% of the research libraries, and 50% of the college libraries are using this system in 1JSAA. It is also used in some big libraries in Africa, Asia and Europe. LC class numbers are available on CIP data, MARC record, and are used by other centralised agencies. It is also being used in online catalogues. Due to its strong institutional backing it has an assured future.

**Features of library classification:**

**1. Schedules:** The term Schedule is used to describe the printed list of all the main classes, divisions and sub-divisions of the classification scheme. They provide a logical arrangement of all the subjects encompassed by the classification scheme.This arrangement usually being hierarchical shows the relationship of specific subjects to their parent subject. The relevant classification symbol is shown against each subject library

**2. Index:** The Index to the classification scheme is an alphabetical list of all the subjects encompassed by the scheme, with the relevant class mark shown against each subject. There are two types of index:

A Relative Index: includes broad topics in its alphabetic arrangement, but indented below the broad subject heading is a list of all the aspects of the subject. For e.g. Dewey Decimal Classification Scheme has an excellent relative index.

A Specific Index: lists specific subjects in a précis alphabetical sequence. It does not indent lists of related topics under the broad subject headings. For example, Brown's Subject Classification Scheme has a specific index.

**3. Notation:** Notation is the system of symbols used to represent the terms encompassed by the classification scheme. The notation can be pure – using one type of symbol only – or mixed – using more than one kind of symbol. A pure notation would normally involve only letters of the alphabet or only numerals. A mixed notation would normally utilize both letters and numerals. Some notations also involve the use of grammatical signs or mathematical symbols. The notation usually appears on the spines of library books to facilitate shelving and to ensure that each book is in its correct place. The notation is also shown on catalogue entries to help the staff and public to remove books quickly. It therefore serves as:

A link between the index and the schedules of a classification scheme, and

A link between the library catalogues and the shelves.

**4. Tables:** The tables of a classification scheme are additional to the schedules and provide lists of symbols which can be added to class marks to them more specific and precise.

**5. Form Class:** A form class makes provision for those books where form is of greater importance than subject. Most books of this kind are literary works– fiction, poetry, plays etc.

**6. A Generalities Class:** This class caters primarily for books of General knowledge which could not be allocated to any particular subject class due to their pervasive subject coverage. In some respects, a generalities class is also a form class since general bibliographies, general encyclopaedias and general periodicals would been compassed in it.

**Review questions:**

1. Name three well known classification systems.

2. Define Colon classification.

3. Explain the structure of DDC

**References:**

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SHARMA (C D). Use of libraries: A guide to better use of libraries and their resources. 1978. Metropolitan Book; New Delhi. P-120.

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KRISHAN KUMAR. Op. cit., p 4.

INDIRA GANDHI NATIONAL OPEN UNIVERSITY (IGNOU). Unit 2: Needand purpose of library classification. IGNOU; New Delhi. p 26.

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# UNIT – 4

# CATALOGUING

**Objectives:**

➢ To learn about the purpose of cataloguing

➢ To get to know about their structure and types

➢ To study about canons and laws of cataloguing

➢ To gain knowledge on standard codes of cataloguing

**Introduction:**

There can be different kinds of catalogues, like a library catalogue, publisher's catalogue, catalogue of furniture, catalogue of two wheelers of a company, etc. In the context of a

library, a catalogue can be defined as a list of books and other types of documents of a particular library. It is systematically arranged following a definite order. It contains certain specific bibliographic elements. These elements enable to identify and locate particular documents from the large collections of the library. Though different authorities defined the term library catalogue in different contexts they provide an almost similar basic underlying concept of the term, that a library catalogue:

☐ is a list of documents available in a particular library;

☐ contains entries arranged systematically according to the catalogue code adopted by the library;

☐ gives specific bibliographical elements of the documents in each entry to determine and identify the document;

☐ provides location number of the documents which enables the users to locate the document; and

☐ serves as an inventory of all the materials available in the library

**Purpose:**

The basic purpose of a library catalogue is to tell the kinds of documents available in a library and their location on the shelves. These documents may be in a variety of forms such as – printed documents, microfilms, other machine readable forms or e-resources in floppies, CD-ROMs, DVDs, etc. They are shelved at different locations in the library. To make these resources known to the users is the duty of the library for their optimal utilisation. Libraries prepare catalogues as access tools to these resources. Therefore, the main purpose of a library catalogue is to serve: As an inventory and retrieval tool. It serves as a guide to various kinds of resources enabling the users to find out their desired materials.

**Objectives:**

The objectives of a library catalogue as described by Charles Ammi Cutter (who is called as the father of library cataloguing) in 1876 still have substantial validity. He used the term "book" while describing the objective. However, in place of the term "book" the term "document" needs to be replaced to cover all types of information sources. With certain modifications to Cutter's description the objectives of library catalogue can be summarised as:

To enable a person to find a relevant document of which

- The author; or

- The title; or

- The subject is known

 To show what the library has

- By a given author or authors

- On a given subject

- In a given kind of literature or form of material

 To assist in the choice of a document

- As to its edition

- As to its content and character

- As to its physical form.

Thus a library catalogue should convey full information to the users about the availability of the materials that are accessible through different approaches.

**Functions:**

The functions of a library catalogue are, in fact, more or less restatements of Cutter's objectives. A library catalogue must perform the following functions:

 To ascertain the availability of aparticular document in the library, which can be specified by its author or title or subject;

 To show the users the existing collection of the library which may be written:

- By a given author or authors

- On a given subject or subjects

- In a given kind of literature or form of material; and

 To assist the users in choosing a particular document from the large collection of the library as to its edition, content and character, physical form, new additions, etc.

According to Dr. S.R. Ranganathan the function of a library catalogue is to help the exploitation of library resources in conformity with the five laws of library science.

As such it should be so designed as to:

☐ Disclose to every reader his or her document (the document needed by the reader);

☐ Secure for every document its reader; and

☐ Save the time of the reader and staff.

Thus, a library catalogue should serve as the most effective and efficient instrument to retrieve all kinds of documents the library has.

**Types of catalogue:**

There are three types of inner forms of a catalogue, viz. alphabetical, classified and alphabetico-classed. Author, Name, Title, Subject and Dictionary catalogue fall in the category of an alphabetical catalogue. A Classified Catalogue is so named because it is arranged in a classified order. Classified order is an artificial order which may be difficult to use. Hence a classified catalogue has two parts the other part being alphabetical which is easy to use and leads the user to the classified part. Alphabetico-classed catalogue is a variation of the classified catalogue. It overcomes the shortcoming of the artificiality of a classified arrangement by making it classified alphabetically.

**Author catalogue:**

Author Catalogue Author is the person who is chiefly responsible for the intellectual thought content of a work. In simple words, author is the creator of a work. In an author catalogue, the entries of documents are under author's name and arranged alphabetically. It provides access to documents by the names of their authors. In other words, the leading section of an author catalogue would comprise the name of an author. An author is generally a person or a corporate body who is responsible for the thought contents of the document brought out under the name. Listing of personal names of author varies greatly because of the cultural traditions in the naming of person in different regions of the world. For example, names of persons in Western countries, Indic names, Muslim names, Chinese and Japanese names differ as per their own traditions.Which part of the names should be taken as the lead in a catalogue has been set by cataloguing codes and there are established practices. There are

also a variety of corporate bodies under whose names documents are published. Although we are not concerned very much with rendering of names in catalogue entries here, it is important to note that their filing position is determined by the rendering of names. Inaccuracies in the rendering of names would seriously affect the alphabetical arrangement of entries in the catalogue. The catalogues of the British Library, the Library of Congress, the National Library of India are some of the fine examples of author catalogues. Libraries may have author catalogues arranged in three different ways:

a) There may be an exclusive author catalogue without entries mixing it with any other entries such as titles, subjects, series, etc.

b) Author entries may form part and parcel of a dictionary catalogue.

c) Author entries may form part of the alphabetical index of a classified catalogue.

Irrespective of the form in which an author catalogue exists, it provides an important approach to a document. If the user approaches the catalogue with the correct name of an author, the catalogue immediately gives the person all the documents by the author. To help a user, the other variants of the name of an author are usually provided as cross-references in a catalogue.

**Advantages:**

1) It brings together the titles of books of the same author at one place in the catalogue

2) It helps a user to obtain at a glance what books are available in the library by a given author. This function, can however be fulfilled by author entries in other inner forms of a library catalogue. In a classified catalogue, this function is performed by the alphabetical index of dictionary part.

3) It ensures that there will be no scattering of works of the same author through the catalogue.

**Disadvantages:**

1) Approaches of readers under subject, collaborators, distinctive titles etc. cannot be satisfied.

However it requires that the reader must know the exact name of the author and title. In case the author is known by different forms of name or pseudonym, the reader may be helped with the use of see references.

**Name Catalogue:**

A name catalogue is a variation and extension of an author catalogue. It contains entries for works of one author and also for books written on him. All entries are arranged alphabetically by the name of the author. In other words, a name catalogue is a compound or mixed type of catalogue which combines the author and subject entries (the subject entries representing the author as a subject) into one alphabetical sequence. In this type of catalogue autobiography, biography and other critical studies, memoirs and diary of an author, are arranged along with his original work. The author entries include:

☐ Corporate authors, both as an author as well as a subject

☐ Name series

☐ Place name forming part of an author heading

The following examples, exemplify these points:

**Person as an author**

Nehru, Jawaharlal: Discovery of India

Nehru, Jawaharlal: Glimpses of World History

Nehru, Jawaharlal: Towards Freedom

Autobiography of Jawaharlal Nehru

**Person as subject**

Jawaharlal Nehru, Political Biography by F. Moraces

Jawaharlal Nehru: Biography by S. Gopal

Nehru: the Making of a Nation by M.J. Akbar

Name Series Oxford Historical Series

Madras University

Sir C.P. Ramaswami Aiyar Endownment Lecture Series

**Place name**

Bombay University

Calcutta University

Name catalogue serves as an author catalogue and also as a subject catalogue. Any reader interested in the works by or on an author may find this catalogue very useful to find specific material of his interest. In this type of catalogue, one can find the works of Rabindra Nath Tagore and works on him arranged in a single alphabetical order under Tagore.

Name catalogue seems to be almost confined to Great Britain. Such a catalogue outside Great Britain appears to be rare. The catalogue of the British library is near name catalogue which includes references from all names that occur in titles.

**Advantages:**

1) It is useful and valuable for collection of books of an author and books on her/him.

**Disadvantages:**

1) Subject entries are limited to personal and corporate names only.

2) There is no title entry in this form of catalogue so also under collaborator and series.

**Title Catalogue:**

In a title catalogue, the titles of documents occupy the leading section of entries, which are arranged in an alphabetical order. Queries of readers who remember only the exact title can be answered with the help of a title catalogue. However, it is noticed that many of the readers do not spell out a title precisely the way it appears on the title page, particularly non-fiction titles. To fulfil the title approach of readers, entries can be selectively provided in catalogues of public libraries for fiction and for those that are well-known by their titles. It is a part of a dictionary catalogue or part of the author-title index of a classified catalogue. This catalogue is somewhat preferred for books in classical languages, particularly Sanskrit and Pali.

**Advantages:**

1) Satisfies the approaches of readers, especially in cases for classical languages and fiction, drama, poetry and class literature.

**Disadvantages:**

1) It cannot alone satisfy all approaches of the readers except the title approach.

**Alphabetical Subject Catalogue:**

It is a list of books in a collection; each entered under the name of the specific subject as a heading, the entries being arranged alphabetically. Several books on the same subject will be brought together in the catalogue. When there is more than one book on one subject, the book's author is taken to determine the alphabetical order. If the author's name is common for several books, then the book's title is taken in to account for the arrangement of entries. The sample example of this type of catalogue is given below:

CHEMISTRY ORGANIC

Bahal, B S

Text book of Chemistry

DOCUMENTATION

Mukherjee, A K

Fundamentals of Special Librarianship and Documentation

ECONOMICS- INDIA

Ghosh, Alok

Indian Economics

This form of the subject catalogue is called an alphabetical subject catalogue, as the specific subjects are arranged alphabetically. If a reader approaches the catalogue intending to find books or books on a specific subject, it provides excellent service as s/he has to refer to it like a dictionary. However, suppose the reader wants to systematically see all the materials on a field of knowledge. In that case, the catalogue fails to respond to his query, i.e. a book on BOTANY will be separated from ZOOLOGY books. Similarly, books on CHEMISTRY will be separated from books on PHYSICS. Hence a reader has to look under separate headings at different places in the alphabet if all the materials available in a given field of knowledge are to be gathered.

**Features:**

i) The primary function of this catalogue is to know what books are on a particular subject in the library.

ii) In this catalogue, an entry is to be made under a specific subject term representing the book's specific subject matter.

iii) This catalogue is made under specific subjects and again arranged in alphabetical order, which is why it is named an alphabetical subject catalogue.

iv) This catalogue is prepared with the help of a Standard List of Subject Headings like Sears List of Subject Headings or Library of Congress List of Subjects Headings for consistency, uniformity and standardisation.

**Advantages:**

i) With this catalogue's help, readers' specific subject approach is satisfied.

**Disadvantages:**

i) The related subjects are scattered throughout the catalogue owing to their alphabetical arrangement.

E.g. Money and Banking, Electricity and Magnetism, Astronomy and Planet etc.

ii) The Standard List of Subject Headings failss to cope with the ever emergence of new subjects, and the new editionsmusto be brought out regularly; otherwise, the cataloguercannoto assign exact subject headings for newly published books.

**Dictionary Catalogue:**

It is a catalogue in which all the entries (authors, title, subject, series etc.) and their related references are arranged together in one alphabetical reference. It resembles entries in a dictionary where the words are strictly arranged alphabetically. The various entries of this catalogue are arranged just like a dictionary which is why it is called a dictionary catalogue.

**Features:**

i) It is a mixed type of catalogue, where we find two distinct approaches merged. It is a combination of two distinct and different approaches, the author and title approach for the reader who knows the book by the author s/he wants, and the subject approach of the reader

who does not know either the name of the author or title of the book but wants material on some definite subject.

ii) As a result of this type of arrangement, entirely unrelated headings will come together, and related headings will be dispersed (e.g. classification and cataloguing; flowers and rose will be dispersed.)

iii) It takes its name from its arrangement, which follows the simple alphabetical order of entries.

iv) So far, as the subject entries are concerned, they follow the principle of the specific subject heading. It should be entered under the specific subject.

v) Dictionary catalogue provides an elaborate scheme of cross-reference to bring together scatted related subjects and to correlate and unify the entries to bring systematic and logical order.

vi) A cross-referencing dictionary catalogue is called a syndetic or connective catalogue.

vii) A dictionary catalogue is divided into two files; one for author, title, series and collaborator entries and another for subject entries.

viii) Different types of entries in this catalogue are:
Main entry under- Author – Personal and corporate

b) Added entries under – Joint author, Translator, Editor, Compiler, Title, Series and

c) Subject Analytical entries – In case of collections of papers like conference and seminar proceedings, articles of journals etc. Author, Title and Subject Analytical entries are to be prepared.

d) Cross- reference – These are of two types, viz. (1) 'see' reference and (2) 'see also' reference from unused to used headings and from specific subject to general subject from narrower term to broader term( e.g. Roses see also Flowers) respectively.

**Advantages:**

i) It is the most popular form of catalogue used in public, school and college libraries, and even in university libraries. Its popularity is due to its arrangement like a dictionary, i.e. in alphabetical order.

ii) It can satisfy the different specific needs of the readers.

iii) The users need not know class numbers to refer to this catalogue.

iv) With the help of cross-references and general references, readers are guided from one heading to another heading.

v) Direct approach on any specific subject can be satisfied easily, e.g. if a reader wants books on " CRICKET" he will refer to the catalogue directly under this term and at once know all the books available on " CRICKET" in the library.

**Disadvantages:**

i) For readers who need information on a subject with all its ramifications, the dictionary catalogue is most challenging to use. It is slower in yielding information and less satisfactory in its result than the classified form.

ii) Extensive use of cross-references to bring together the related subjects results in the catalogue becoming bulky. Its maintenance is more complicated. Moreover, the cross-references often prove to tire some.

iii) It is a tedious and time-consuming affair for the readers to find out information on the various aspects of a particular subject and its related subjects from this catalogue.

iv) Dictionary catalogue suffers from all the consequences of excessive dependence on verbalisation.

v) Replacing the old subject terms with new subject terms is a tedious and time-consuming process

**Classified Catalogue:**

A classified catalogue provides access to information by subject. It differs from an alphabetical catalogue in that the arrangement is by class numbers. It brings an artificiality as the user is expected to know the classification scheme. To help the user, a classified catalogue is in two parts, the other being alphabetical, that guides the user in navigating through the classified part and reaching the desired information.

**Definition:**

According to the Encyclopaedia of Librarianship, it is "a catalogue of subject entries arranged in the systematic order according to a scheme of classification." Dr Rangnatham defines it as

"a catalogue in which some are numbered entries, and some are word entries". Consequently, a classified catalogue consists of two parts (i) the classified part and (ii) the alphabetical part.

**Classified Part:**

It is the arrangement of entries of documents by a class number that gives the systematic and structured display of subjects in a classified catalogue. It maps out the subordinate and coordinate subject divisions and puts them in a logical sequence. This systematic arrangement, to a certain degree, reflects the logical thinking of specialists in different subjects and gets their appreciation while displaying the entries in a classified catalogue; merely giving the class numbers would not be very helpful to catalogue users. The class numbers are not intelligible to persons who do not know the classification scheme chosen for the library. Therefore, while displaying the class numbers in guide cards, for entries under them, it is vital to give their verbal equivalents of the divisions of class numbers. These verbal equivalents provided for class numbers in a classified catalogue are known as 'Feature Headings'.

**Alphabetical Part:**

The alphabetical index to a classified catalogue, consisting of author, title( wherever necessary), subject entries and other entries for collaborators, series, editors of series and a host of cross-references, is meant to support the classified part of the catalogue. It can fulfil all the functions of a dictionary catalogue, i.e. collect an author's works together, bring all the different editions of a title, cross reference for subjects, etc. With the classified part bringing all the related subjects together and the alphabetical order bringing together all the distributed relatives, the classified catalogue can fulfil all the functions of a library catalogue.

**Features:**

1) It is a subject catalogue where entry is made under the class number, representing the book's subject matter.

2) It consists of two parts, namely the classified part (the number entries) and the alphabetical Part (the word entries), where the entries are made and arranged according to alphabetical order.

3) This catalogue's success depends largely upon the soundness of the classification scheme chosen and the extent to which subjects are collocated in that scheme.

4) As the classified catalogue is based on some classification scheme, all the entries are arranged from general to specific at all levels.

5) Any shortcoming in the scheme of classification reflects in the catalogue when the chained indexing prepares the subject entries from the class number of the document.

**Advantages:**

1) In a classified catalogue, the main entry not only falls under the subject with which a book deals but also near related subjects.

2) The logical or systematic arrangement of subjects is assumed because the catalogue is based on a recognised classification system.

3) The close identity of arrangement between catalogue entries and books on shelves tends to increase the readers' familiarity with a large number of books.

4) It discloses the strength and weaknesses of a library by subjects, broad and specific.

5) It is easy to bring out printed parts of a classified catalogue, class by class, with a consolidated index at the end of the volume when the parts are printed.

6) Specific sections of classes of the classified catalogue in an extensive library with a fairly balanced and representative active collection can be used as relative subject bibliographies.

7) The arrangement of entries according to the notation of the classification scheme makes it independent of natural language, which may lead to international standardisation and, ultimately, international cooperation.

8) A classified catalogue is beneficial for exhaustive literature searches as it offers all possible approaches. The classified part satisfies the linear approach. In the alphabetical part, it serves as a multi-dimensional verbal approach.

9) More readers can consult the catalogue at a time because of the facility of separate catalogue cabinets, both in classified and alphabetical parts.

10) Changes in subject terminology do not seriously affect the classified catalogue. Only the subject index cards in the alphabetical portion must be re-filed according to changed terminology.

11) The index entries of a classified catalogue are easier to use and consult.

12) Arrangement of entries in the classified part is the same as that of books on shelves. Arrangement in the alphabetical part is like a dictionary, which is easy to understand. Arrangements of multilingual entries do not present difficulties in the classified part, but multilingual entries can present difficulties in the alphabetical part.

**Disadvantages:**

1) In a classified catalogue, the reader has to consult the alphabetical part first; then, taking the call number, he has to go to the classified part for detailed information about the document.

2) The success of this catalogue depends on the classification scheme chosen. Because if there is any drawback in the classification scheme, it will be reflected in the catalogue.

3) Revision of classification scheme necessitates revision of the relevant part of the subject catalogue.

**Canons of classification:**

**Meaning of Canon:**

Canon of Classification is established general law, rule, principle, or criterion by which the classification judges something.

The first use of "Canons of library classification" by W C B Sayers. Then many library science professionals tried to develop Canons of library classification, such as E C Richardson, H E Bliss, etc. Dr S. R. Ranganathan, in his book "Prolegomena to Library Classification" in the year 1937, presented Canon as a classification method. Dr S. R. Ranganathan has given the subjects three levels to give scientific and systematic forms.

**Ideal Plane:**

It is a thinking, policy, and decision-making phase, a paramount plane which is both a map and foundation of the system's design. The quality of work done here genetically determines the quality of the ultimate product. Here intellectual analysis of the subject is done; characteristics are selected to break down the subject of the document into facets, and ultimately into isolates, arranged discretely and systematically into arrays and chains. An isolate is the smallest unit of knowledge in CC. In contrast, a facet is a group of isolates, denoted by an umbrella term, obtained by applying a single characteristic to a set of entities. The types and quality of characteristics, and the order in which these are to be applied, are

determined by the seven Canons of Characteristics. These canons mandate that characteristics chosen as the basis of division should be able to divide and be relevant to the ultimate purpose of classification, objective, and permanent; characteristics should be applied in order of general to specific and one by one in proximate steps.

Once the application of characteristics forms facets and their isolates, the function of the next set of canons is to arrange terms in arrays and chains. An array is a set of cognate entities of equal rank arranged in some systematic and predictable order. For this, Ranganathan formulated rules for the formation of arrays of entities. These are Canon of Exhaustiveness that an array should include all classes. Canon of Exclusiveness states that an entity should belong to one and only one array — it will avoid cross-classification. This is only required for shelf classification as cross-classification is a boon for classifying databases and designing Online Public Access Catalogues (OPACs). Cross-classification allows a virtual document to be kept in more than one place. Helpful Sequence canon means that facets and isolates of an array should be arranged in a predetermined logical or utilitarian sequence, or the one expected by most users. Historical events should be arranged chronologically, while UN member states can be alphabetical; living species may be arrayed in the order of their evolution (Principle of increasing complexity); atomic numbers can arrange chemical elements. Coins can be arranged at their face value. Geographical entities can be arranged by the principle of spatial contiguity, as in a map. Ranganathan discovered eight options to arrange entities in a helpful order. A chain is a sequence of entities in a constantly decreasing order of their extension. For example, World—Asia—South Asia—India—North India—Delhi is a chain of classes. The Canon of Decreasing Extension means a chain should move from broader to narrower or from general to specific classes, and the Canon of Modulation means no link in the chain should be missed. Division of a universe should be gradual, proximate and finely calibrated. We should not jump from India to Delhi in the above chain, omitting North India. At the end of the work here, we have a finely woven and exhaustive systematic network of all concepts with nodes and links. But still, all is nebulous and in an intangible and amorphous form.

**Verbal Plane:**

Then the theatre moves to the verbal plane — to articulate the findings of the idea plane in unambiguous language. As said by Dr Samuel Johnson (1709-1784), language is the dress of thought. Ranganathan (1962, Sec. A1) believed this and always exhorted librarians to learn

and use technical terminology for effective communication. Terms used to express a science or a phenomenon should be current and free of homonyms and synonyms. Ranganathan vehemently stated that terms used for a classification system should be made free of homonyms and synonyms; a term must be unique to the concept and should be expressed and read in context. He also said that the terms should mostly be neutral, not opinionated or critical, meaning that a classification term should not be value-ridden. As an example, classification systems should not use the terms major/minor authors to categorize them, as DDC did in its 14th edition (1942). Ironically, the terminology in the CC is now quite dated, which poses problems in chain indexing — a famous system invented by Ranganathan to derive subject headings from class numbers.

**Notational Plane:**

The notational plane is the most visible of the three planes, so much so that many people mistake it for the classification per se. Ranganathan expected much from a notational system in terms of its capacity and sophisticated multitasking to represent complex ideas. He vainly aspired that the notation should faithfully and comprehensively translate the subject of a document into a language of ordinal symbols. For him, classification was also a sort of translation. He overloaded his notation with arduous work and expected it to be very powerful but relegated it to be the servant of the idea plane. It is the faithful executor of the idea plane. However, he explained that notation in a class number should be brief, simple and easy to write, remember (for a short time), and pronounce. These are optional qualities not present in his system. More essentially, it should be expressive of subject structure (both hierarchical and faceted), and above all, it should be hospitable to new subjects. This latter quality in Ranganathan's notation is in abundance — achieved at the high price of being unwieldy and complex. Considered a high-water mark in the development of library classification notations, his notation is highly mixed and uses decimal, sector, and group notation. It is rigorously hierarchical, extraordinarily hospitable, and transparently depicts the facets and categories. His notation is highly mnemonic even down to the seminal level — e.g., unity, God, and world are always denoted by 1; diseases and mechanical breakdown will get the same number, as will medical cures and mechanical repairs in their different main classes. As another example, G; 3, I; 3, K; 3, and L; 3 represent general, plant, animal, and human physiology, respectively.

Similarly, fuel/energy (machines), feed (animals), and food (humans) may get the same number wherever they occur in different schedules. Ultimately the notational plane is frighteningly complex and was much ahead of its time for shelf classification. Nevertheless, it suits computerized databases where the notational complexity does not matter.

**Division of knowledge in CC:**

The CC presumes the entire body of knowledge woven into a system and considered an evolutionary unity. All knowledge is one, Ranganathan learnt from the Vedas (1700-500 BCE). The structure that ultimately emerges from CC is both traditional and revolutionary. But in the end, it is not Vedic or Eastern in its appearance or working. Ranganathan recognizes and uses the existence of time-honored main and canonical classes, making his scheme look steeped in the Western disciplinary tradition going back to Francis Bacon (1561-1626). Ranganathan identified three types of subjects in the universe of knowledge: basic, compound and complex, analogous to chemical substances. Basic subjects are unitary subjects, such as physics, thermodynamics, economics, Marxian economics, Homeopathy medicine, music, law, and library science. Compound subjects are basic subjects with subdivisions or additional facets, e.g., the velocity of light, transport economics, guitar music, the law of marriage, and libraries in India. Compound subjects of varying degrees are virtually infinite in number. Complex subjects are primarily interdisciplinary in nature, e.g., mathematics for engineers, geophysics, medical geography, or comparative physiology. Ranganathan postulated that every subject of any type or level has a primary subject that forms the first, or the base, facet in constructing a class number. CC further divides basic subjects into:

- Main basic subjects

- Non-main basic subjects

And further divides them into ten species. Based on their modes of formation, the following ten types of basic subjects have been identified (Satija et al., 2014):

**Main basic subjects**

Traditional (Law, Physics)

Newly emerging (Library & Information Science)

Fused (Biotechnology)

Distilled (Research methodology)

Subject bundles (Ocean sciences)

Agglomerates (Social sciences)

**Non-main basic subjects**

Canonical classes (Algebra, Geometry)

System constituents (Marxian economy)

Environment constituents (Desert farming)

Special constituents (Gerontology)

**Canon of ideal plane:**

**Canon for characteristic:**

The classification is arranged according to their likeness or dislike-ness. The principles that recommend specific characteristics to be selected for the classification process are called "canons for characteristics". Ranganathan has given the following four canons of characteristics:

- ❖ Canon of Differentiation

- ❖ Canon of Relevance

- ❖ Canon of Ascertain ability

- ❖ Canon of Permanence

- ❖ Canon of Consistency

- ❖ Canon of Relevant Sequence

**Canon of Differentiation**

In the classroom, the student may be divided into two groups: boys and girls, based on sex. Still, we cannot divide the class based on such attributes and students' possession of faces because all the individuals in the class share the attributes.

**Canon of Relevance**

The Canon of relevance stipulates that a characteristic of the term used as the basis for the classification of the universe should be relevant to the purpose of the classification.

For example, in selecting a Sportsman on the playfield, the colour beauty would be irrelevant, but physical strength and physical fitness are relevant characteristics.

Taking the book's universe suits the library's needs, reader, subject matter, language, Date of Publication, and the author's relevance. The Size, Pages, print, and format are irrelevant.

**Canon of Ascertain ability**

According to the Canon of ascertainability, a characteristic used and the basis for the classification of the Universe should be definite and ascertainable.

The classification must have an attribute that is fixed.

**Canon of Permanence**

The Canon Permanence state that characteristic used as the basis for the classification of the Universe should continue to be unchanged, so long as there is no change in the purpose of classification.

Like we would classify a rat by its species but not based on colour.

**Canon of Consistency**

The scheme should use some permanent characteristics according to their sequence.

**Canon of Relevant Sequence**

In this type of sub-formula, the ordering of the characteristics existing in the classification system of the world of knowledge should be in accordance with the objectives of the classification.

**Canons of Verbal Plane (Canon of Terminology):**

- ❖ Canon of Context
- ❖ Canon of Currency
- ❖ Canon of Enumeration
- ❖ Canon of Reticence

**Canon of Context**

According to the canon, the name or meaning of each word in a classification system should be determined by the same name used for the class in question, regarding different classes of the same initial link.

**Canon of Currency**

The term used in a classification scheme must be the one currently in usage among the Expert/ Users.

**Canon of Enumeration**

To understand or determine the meaning of a word in this canon, that categorical single or class (the hierarchical singles/sub-class has been enumerated)

They should be explained well, and on their basis, that word should be used. That is, the arrangement of each term in classification systems should be determined by enumeration from classes into categories and series.

**Canon of Reticence**

The term used in a scheme of classification should not be critical.

**Canon of Succession of Characteristic:**

According to Dr S. R. Ranganathan, there can be two or more hidden features to classify the universe of knowledge which can be used sequentially. Three canons have been used to determine the order of this characteristic.

- ❖ Canon of Concomitance
- ❖ Conon of relevant succession
- ❖ Conon of consistent succession

**Canon of Concomitance**

For classification, whichever attribute we have selected for classification, the same result should not be obtained; both attributes should be different. As the basis of age and date of birth will be the same, then it should not be used due to being the same.

**Conon of relevant succession**

Characteristics suitable for classification should be commensurate with their objectives. When more than one attribute is used for classification, their order should be determined.

For example, the decimal classification has chosen 'Geographical area' and period' as the required characteristics in the main class history. The users of decimal classification should follow the same characteristics in the same succession.

**Conon of Consistent Succession**

In any classification method, the sequence of characteristics prescribed should be followed so long as there is no change in the objectives of the classification. Maintains uniformity in classification method.

**Laws of cataloguing:**

The 5 Laws of Library Science is a theory proposed by S. R. Ranganathan in 1931, detailing the principles of operating a library system. Five laws of library science are called the set of norms, precepts, and guides to good practice in librarianship. Many librarians worldwide accept them as the foundations of their philosophy. Dr S.R.Ranganathan conceived the Five Laws of Library Science in 1924. The statements embodying these laws were formulated in 1928. These laws were first published in Ranganathan's classic book Five Laws of Library Science in 1931. These laws are:

1) Books are for use

2) Every reader their book

3) Every book its reader

4) Save the time of the reader

5) Library is a growing organism

All library activities revolve around the Five Laws of Library Science because these are the guiding principles for effective scientific planning of a library. Several guidelines are implied in these Five Laws enunciated by Ranganathan for preparing a practical catalogue.

'Books are for Use', the First Law implies the need to organise library collections for optimum utilisation by providing several physical facilities and reader services.

A catalogue's physical form should be flexible, can be kept up-to-date, is easy to consult, and allows a quick search. It allows the addition of entries for new documents as and when added

to the library. The users should know the scope, contents and coverage of documents by means of annotation and valuable notes in a catalogue to make appropriate choices among various documents. The catalogue is the only medium to bring together the users and the collections leading to maximum use and satisfying the thirst for knowledge.

The Second Law states, "Every Reader Her/His Book", which implies that various approaches of the users, i.e. search by author, subject and title etc., should be satisfied. Many books are composite. Neither the title nor the main entry may disclose the contents. This law requires that hidden contents be brought to the readers' notice by preparing subject analytical entries. So also, the Third Law, "Every Book its Readers," requires for preparation of analytical entries and cross-reference entries as and when necessitated, especially in the case of books published under the editorial direction (where several contributors contribute papers). Seminar/Conference proceedings and journals in which some of the articles/papers are highly needed by the readers are likely to miss the notice of the readers if only added entries are prepared. Instead, they will be helped if analytical entries are prepared.

The Fourth Law, "Save the Time of the Reader", ensures saving the users' precious time. A catalogue should be simple in its design and construction and up-to-date and communicable with detailed guides. For effective use of the catalogue, user education/orientation programmes should be organised for the users.

'Library is a Growing Organism' is the Fifth Law which implies that the catalogue also grows because of the addition of books to the library. Keeping in view the changes and growth in nature and variety of publications, other forms of documents, needs of users, and the advent of ICT has an enormous impact on changes in the physical form and internal structure of the catalogue. Change is a must, and the library should prepare to face such challenges. Hence, a physical form decision should be based on longevity, durability, space, simplification, portability, selectivity, flexibility and cost.

These laws of Library Science are the "fundamental laws" of Library Science. These apply to any problem in library science, library service, and library practice. These laws are like pots containing oceans. Prior to their enunciation, the subject of Library Science had no philosophy. These laws gave a philosophical base, guaranteeing an everlasting future to the subject of library science, the profession of librarianship, and the use of libraries. These laws have provided a scientific approach to the subject of library science. Even though S.R.

Ranganathan proposed the Five Laws of Library Science before the advent of the digital age, they are still valid and equally relevant today.

**Standard codes of cataloguing:**

**History of classification codes:**

The 19th century marks the beginning of code making. Since it is not easy to do a complete survey, we will introduce you to a select number of codes belonging to the Anglo-American family. We will also examine three other codes: a German Code (Prussian Instructions), an Italian code (Vatican Rules) and Ranganathan's Classified Catalogue Code.

**British Museum Cataloguing Rules:**

British Museum, Department of Printed Books. Rules for compiling books, maps and music in the British Museum. - Rev. ed. - London: British Museum, 1936. printed by the Trustees. In 1757, the Royal Library (merged earlier in 1753 with Cottonian, Harleian and Sloan Collections) was transferred to the British Museum. The library's total stock of books at this time touched the 5, 00,000 mark. Since the previously compiled catalogues of the British Museum (Librorum Impressorum qui in Museo Britanico Ad servantur Catalogus, compiled by P.M. Many, S. Harper and S. Ayserough, published in 1787) and the other collections were poorly planned and not well-executed lists, the trustees wanted to have a new alphabetical catalogue along with an additional general classed catalogue compiled. Accordingly, between 1813 and 1819, seven volumes of the alphabetical catalogue (updation of 1787 Librorum) were issued. Sir Henry H. Baber was the keeper of printed books at this time. The general classed catalogue had to be planned and executed. Thomas H. Horne made a convincing presentation of scientific classification in his Outline for the Classification of the Library (submitted to the trustees in 1825). He was therefore engaged, for a time, to accomplish the task. The project, however, failed, and it was suspended in 1834. But his ideas on classification and rules for bibliographic description, especially as they related to content notes, forms of authors' names and indexes for classified catalogues, proved a valuable addition to the literature on cataloguing. Baber, as the keeper, proposed a general alphabetical author catalogue and suggested that Panizzi be entrusted with the task of editing-it. He formulated sixteen rules for guidance and suggested using uniform slips for entries so that their arrangement and preparation of the manuscript for printing would prove easy. Baber's rules required-entry under author if it appeared either on the title page or elsewhere within the book, the form of the name taken on the same basis. Anonymous works were to be entered

under the prominent or the first word (not an article or preposition) of the title with the possible author's name added after the title within brackets. Pseudonymous works are similarly required-entry under the pseudonym with the real name added at the end of the title within brackets. Collections were to be entered under editor and translations under original author. The current emphasis on scientific classification with Home's advocacy of classified catalogue on the one hand and the adherence to the tradition with Baber's insistence on alphabetical catalogue also supported by Panizzi on the other ensued a spate of debates and arguments, of course, with no decisive results. Baber's proposal for a new alphabetical catalogue was finally approved by the trustees in1838 with the stipulation that it should be completed by 1840 and, instead, in the shelf by shelf order (as was originally suggested by Baber and Panizzi), the catalogue was to be completely alphabetized and issued in separate volumes for each letter of the alphabet. Panizzi was directed to write the rules for its compilation. Thus, came the famed British Museum Cataloguing Rules, also known as Panizzi's 91 Rules. Panizzi did not author the rules all alone and entirely by himself. The code resulted from a collaboration involving the concerted efforts of Edward Edwards, J.W. Jones, J.H.Parry and Thomas Watts, besides Sir Anthony Panizzi. Each one first compiled a code individually, which was then collectively studied and criticised to formulate rules by consensus to reflect the best in the cataloguing philosophy of the time. Initially, 79 rules were formulated, expanded to 91 rules in the final code published in 1841.These rules were written to provide for the catalogue of one larger library, the British Museum. They were not intended to be of general use, i.e., use in other libraries. Because the compilation of the catalogue and the formulation of the rules proceeded side by side, the first volume of the catalogue issued in 1841 proved unsatisfactory, marred by many omissions. The rules were applied partially. , A rash of criticisms and enquiries followed, requiring Panizzi to defend the rules. He questioned the feasibility of the project of a printed catalogue for such a large library as the British Museum Library. His testimony before the commissions presenting his• views was considered to constitute an excellent note to the rules and an excellent introduction to the foundations of cataloguing. The testimony covered many topics of recurring interest, such as an optimal level of bibliographical description and the relation of description to the objectives and functions of library catalogue; normalisation of names of persons and corporate bodies; problems of transliteration, title page transcription, etc.; entry for different forms of publications; treatment of modifications, adaptations, etc. of original works, anonymous publications, etc. Consistency and uniformity in the application of cataloguing rules, nature of cross-references, filing and arrangement of entries, and so on. It is perhaps for

this reason that Panizzi's name came to be identified rather singly with the formulation of the rules. The job was entrusted to him, and he led the team. The printing of the catalogue was given up with the first volume. However, the manuscript project continued. In 1849, a guard book catalogue with entries copied on slips mounted onto the pages of large registers was devised, which resulted in a 150-volume catalogue in 1851.Panizzi contended that the author catalogue served the users the best because most users preferred the author's approach as the basic approach. The rules, therefore, provided an author catalogue with an index of matter (alphabetical subject index based on the subject words picked up from titles) appended to it. The printed catalogue (in book format) cannot admit (fully descriptive) multiple entries lest it becomes impossibly bulky. As a measure of check against the bulk, one entry per book was the answer. Panizzi assumed that this single entry (under author) with sufficient description should serve as the principal/main entry with references (in lieu of added/additional entries) made to it To speak about the merits of the code, the British Museum Catalogue Rules continues the practices found as far back as in the catalogues of the medieval monastic libraries, some of which is reflected even in the present day practices as can be seen in AACR 2 and its 1988revision. Among these practices are punctuations of headings, the addition of qualifying phrases to names of certain classes of tided persons, recording of sizes (though the earlier designations were quite different) and, more importantly, the depth of description of a bibliographical item. The rules, particularly those which dealt with anonymous publications, meant that the catalogue should serve as something more than a finding list. For this and many other reasons, it is considered the founding code, which influenced the' formulation of rules in all the following codes. It also became the first major code to prescribe corporate entries. The rules sought corporate entry as default or as a means of organising publications of certain classes. Corporate publications were considered to form part of anonymous works. All anonymous works were sought to be separated into three groups: `corporate', `form' and what could be called `miscellaneous' headings groups. In the first group were included publications of a) assemblies, hoards and other corporate bodies and b) those of academies, universities and similar organisations, the former arranged in alphabetical order under the name of the country or place ("from which they derive their denominations or for want of such denominations under the name of the place from whence their acts are issued") and the latter under the form heading `Academies', sub arranged by continent and then country. The second group covered special types of materials (where the form was considered important)arranged under such headings as `Periodical publications' (for reviews, magazines, newspapers, journals, gazettes, annuals, etc. periodical publications), `ephemerides' (for

almanacs, calendars, ephemeride, etc.) `catalogues' (for anonymous catalogues, catalogues of public establishments and private collections, general and special catalogues, dealers 'catalogues, sale catalogues, etc.), `liturgies' (for missals, breviaries, offices, horae, prayer books, liturgies, etc.) and, `Bible' (for OT and NT and their parts).The third group comprised of miscellaneous publications (not covered by rules for personal or corporate works or other categories) was arranged in order of preference as possible alternatives: under person (if named in the title) or place name (if referred to in the title), substantive(if lacking both person and place) and under the first word (if not substantive in the title).In conclusion, it can be said that the code was certainly a pioneering attempt. However, it lacked guiding principles to ensure consistency as needed, especially for any subsequent formulation and addition of new rules for treating new types of materials, which contingency was admittedly anticipated by Panizzi.

**Jewett's Rules:**

Jewett, Charles Coffin. Smithsonian report on the construction of catalogues of libraries and their publication by means of separate stereotyped titles, with rules and examples. - 2nd ed. - Ann Arbor, Mich.: University Microfilms, 1961. - Reprint of the original 2nd ed. Published Washington, D.C.: Smithsonian Institution, 1853.A small pamphlet, this was first published in 1852 under the title, The Smithsonian Report on the construction of catalogues of libraries, and their publication by means of stereo-titles contained a proposal and a plan of action envisioning a unified system of cataloguing through the application of the technology of stereo-typed plates for producing and printing of library catalogues. The second edition, published in 1853, included 33 rules written by Jewett. The Smithsonian Institution (Washington) was established in 1846 with the bequest made by the English chemist James Smithson. The objective was to promote increasing and diffusion knowledge among men." What should be the means to accomplish this objective became a contentious issue. Charles Coffin Jewett, the librarian and assistant secretary of the institution, felt that the best means to accomplish the objective was to develop the Smithsonian into a national library with legal depository rights incorporating as well a union catalogue of the holdings of all the public libraries in the United States which would eventually become a universal catalogue. His passionate and eloquent assertion, "how much this would promote the progress of knowledge how much, by rebuking the rashness which rushes into authorship, ignorant of what others have written, and adding to the mass of books without adding to the sum of knowledge" is reflective of his strong conviction in his undertaking. Joseph Henry, a scientist, and the

secretary, Jewett's superior, held a different view altogether. He felt that the Smithsonian institution served the cause better by providing financial assistance to the scientists to carry out their research. This clash of interests and views is "emblematic of the antagonism between the two cultures, Jewett representing literature and Henry, science reached its denouement with Jewett's dismissal from the Smithsonian." Jewett's proposal envisioned a national system of centralised and cooperative cataloguing applying the then-available technology of stereotyped plates. The advantages claimed were economic in the cataloguing costs of individual libraries since printing and updating the book catalogues were costly while they remained less efficient. So it could be obviated if each bibliographical record were stereotyped on a separate plate, permitting mass production of catalogues at a relatively reduced cost. Further, it was said that the system would also ensure the elimination of duplicate efforts, a greater measure of uniformity, easy location of the source for the books, greater access to bibliographic information, possible exchange of materials among the libraries, an American national bibliography and a future universal bibliography. His plan called for the preparation and submission of entries by the individual libraries according to the rules (drafted by Jewett), getting every single entry stereotyped and producing catalogues on demand by simply interfiling the new entries and printing. The process was inexpensive so that every library could have the required version of the catalogue (i.e., either the classed or alphabetical catalogue) compiled and printed. Using stereotyped plates would further facilitate the compilation of the union catalogue. The Smithsonian Institution, the national library and central agency, would coordinate the entire programme. Besides maintaining the union catalogue, it would also bring out a monthly bulletin and annual and quinquennial catalogues for the books received by it through copy right. The idea was far ahead of the times, and for want of wide support and lack of proper technological means, the project did not succeed. According to Jewett, a library catalogue was a list of titles of books designed to show what the particular library contained. It was generally not required to give any more information "than the author gives or ought to give in the title page, and publisher, in imprint or colophon; except the designation of the form which is almost universally added. Persons who needed more information should seek it in bibliographical dictionaries, literary histories or similar works". He advocated minimum description in catalogues based on the title page so those who needed more bibliographical details would find them in bibliographical reference sources. Like Panizzi, Jewett preferred an alphabetical catalogue. His rules were the same as those of Panizzi, but for minor modifications; he established the concept of the corporate body more clearly and sought to place them in one category by providing for entry under the

name of the body instead of a place name or other, with cross-references made from important substantive/adjective to the principal word in the name of the body. To achieve uniformity, he wanted anonymous works to be entered under the first word of the title (not an article) with cross-references made from sought terms. Pseudonymous works required-entry under pseudonyms followed by the word pseudo. If the author had used his real name in any edition, continuation or supplement, the pseudonym would not be chosen for entry. Instead, the real name was preferred because the author's identity was no longer concealed. For Jewett, the anode was intended to promote uniformity in cataloguing among the libraries. He, therefore, intended his code to be adopted by all libraries. For this purpose, he prescribed style, extended the principle of corporate entry, preferred the use of a pseudonym (unless the real name also appeared in the publications) and required entry under the first word than the subject word of the title for anonymous works (because title subject words were not uniformly standard ones).He established a standardisation principle by stating that "the cataloguing rules must be stringent and should meet all difficulties of detail so far as possible. Nothing so far can be avoided should be left to the individual taste or judgment of the cataloguer". He favoured a legalistic approach, i.e., a rule to meet every cataloguing problem and appeared to have preferred an enumerative code. Suffice it to say that Jewett's rules, like other codes of the time, greatly influenced the future development of catalogues and catalogue codes.

**Cutter's Rules:**

Cutter, Charles Ammi. Rules for a Dictionary Catalogue. - 4th ed., rewritten. - Washington D.C.: Government Printing Office, 1904. - Republished: London: The Library Association, 1953. The US Bureau of Education commissioned Cutter to write a status report on the public libraries in the United States to commemorate the nation's centenary year. The report, Public libraries in the United States, prepared accordingly by Cutter, was published in1876 along with his code entitled, Rules for a Printed Dictionary Catalogue which constituted the second part of the report. Considered a "landmark work" and described as an "epitome of the cataloguing art of the period," the rules presented a consistent summary of the ideas and works of most leading librarians of the time, manifesting the influence of Panizzi, Jewett, Perkins, Poole and many others particularly. The first edition (1F contained 205 rules tested by applying to the Boston Athenaeum. The rules then were revised and expanded and continued through the fourth edition (the second edition published in 1889, the third in 1891 and the fourth posthumously in 1904). The fourth (and the final) edition contained 369 rules.

The Library Association (UK)later brought out at least three reprints of this final edition (1938, .1948 and 1953) which is proof enough of the popularity of the code even long after the author's demise. Ranganathan commenting about the code, had to say that "RDC [Rules for a Dictionary Catalogue] is indeed a classic. It is immortal. Its influence has been overpowering. It inhibits free rethinking even today. Being a one man's creation, it has been largely apprehended intuitively. This is why RDC is whole as an egg". Indeed, the value of the code has diminished the least even to this day. The chief merit of the code lies in the pragmatism applied by the author in the making of the rules and in setting forth "what might be called a set of first principles" to govern the creation of rules and their practical application. Although generally, many cite three principles as having been articulated by Cutter, he indeed postulated more than three. The first principle may be called the `principle of the convenience of the public.' Cutter declared that "cataloguing is an art, not a science. No rules can take the place of experience and good judgment, but some of the results of experience may best be indicated by rules." His emphasis was on pragmatism, i.e., practical experience and proper judgment. According to Cutter, the convenience of the public is always to be set before the ease of the cataloguer. In most cases, they may coincide. A basic rule without exceptions is not only easy for us to carry out but easy for the public to understand and work by. But strict consistency in a rule and uniformity in an application sometimes lead to practices which clash with the public's habitual way of looking at things. When the habits are general and deeply rooted, it is unwise for the cataloguer to ignore them, even if they demand a sacrifice of system and simplicity." He favoured, therefore, the flexibility of rules and sensitivity to user's requirements wherever needed. He opposed Jewett's legalistic approach (i.e., a cataloguing rule for every cataloguing problem), insistence on the strict application of rules and adherence to consistency. Consistency, no doubt, is a virtue, but it cannot be an absolute and inviolable principle. The second principle is the `principle of collocation.' Cutter, however, did not use the term collocation. He meant it by stating that the catalogue should facilitate the location of an author's books (i.e., entries for all books of an author) by bringing them together in one place. For, he believed that a catalogue was more than a mere finding list "for a given book by an author. "The third principle relates to subject entry/heading. This may be called the `principle of specific and consistent subject entry. 'Besides these three principles, a couple of principles may also be inferred and added. The fourth one may be termed the `principle of adequate description.' Cutter did not name it. A library could adopt the rules in a code wholly or partially (i.e., unvarying degrees of details) depending upon the nature and size of the collection as well as the library's

objectives; A further principle which can also be surmised is the `principle of possible association. 'The choice of entry (from among possible alternative methods), Cutter started, "choose that entry that will probably be 'first looked under by the class of people who use the library. Structurally, it is a well-laid comprehensive code, the rules covering the whole cataloguing procedures. It is organised in three parts. The first part constitutes the preliminaries or introductory notes. Cutter discussed in this part some basic issues, such as objects of catalogue, the means and me Library Catalogue Codes methods to attain them, definitions(of cataloguing terms) including a note on classification of particular value is the statement of objects, means and methods. Some claim this, too, as a set of empirical principles. It is as follows:

"Objects: 1. to enable a person to find a book of which either (a) the author, (b) the title, (c) the subject is known. 2. To show what the library has (d) by a given author, (e) on a given subject, and (f) in a given kind of literature. 3. To assist in the choice of a book (g) as to its edition (bibliographically) (h) to its character (literary or topical).Means: Author entry with the necessary reference (for a and d). 2. Title entry or title reference (for b.) 3. Subject entry, cross reference, and classed subject table (for c and e) 4. Form entry and language entry (for f) 5. Giving edition and imprint, with notes when necessary (for g). 6. Notes (for h)Reasons for choice: Among the several possible methods of attaining the objects, other things being equal, choose that entry (1) that will probably be first looked under by the class of people who use the library; (2.) that is consistent with other entries so that one principle can cover all; (3) that will mass entries least, in places where it is difficult to so arrange them` that they can be readily found, as under names of nations and cities.

"Although it is said that Cutter's code found refuge in tradition, it certainly helped a codification of policies needed by American Libraries. Many issues he raised became the subject of intensive debate in later periods. Akers' observation that after1876 "there has been no further development in principles although an enormous amount of work has been done in amplifying, codifying, and clarifying rules, which has contributed to a needed uniformity of practice" is a comment indeed on the positive as well as the opposing sides of the influence that Cutter's code exerted on the subsequent efforts of code making. This aspect will reveal itself as we progress in studying the later codes.

**AA Code of 1908:**

Cataloguing rules: author and title entries / compiled by Committees of the Library Association and the American Library Association. - English edition. - London: Library Association, 1908. - American edition: Chicago: American Library Association, 1908. At the turn of the present century, there were divergent codes in application among libraries both in America and England. American libraries used various codes such as Cutter's, ALA, Dewey's, etc. In addition, the introduction of printed card distribution by the Library of Congress made many libraries adhere to the LC's practice. In England, the BM rules, LA rules, Bodleian rules, etc., were in use among the libraries. There was a renewed debate over the need for a sound philosophy of cataloguing to find better solutions to the problems of bibliographic organisation and to establish cooperative and centralised systems for ensuring more excellent uniformity and economy in cataloguing practices. The aim was to meet the "requirements of larger libraries of a scholarly character". This set a precedent so that the following codes were similarly aimed at and were drawn mainly up primarily oriented to the needs of large research libraries. On account of practical considerations, the code had to work out a compromise between the differing practices of the LC and other American research libraries. Next, because the two collaborating American and British groups could not fully agree on all details, alternative rules were made to accommodate the British and American preferences that differed. As a result, the code was published in two somewhat differing texts (American and English texts). The code created a labyrinth of corporate entry and made the dubious distinction between society and association on one hand and institution (restricted to permanent establishments) on the other. However, it emphasized and broad application of the authorship principle. It presented a slightly better definition of the author than the one given by Cutter. It was an incomplete code without description rules, subject cataloguing and filing. Still, it came into wide use in the libraries in both countries, including in a few other nations where English was the library language.

**Prussian Instructions:**

The Prussian instructions. Rules for the alphabetical catalogues of the Prussian libraries were translated from the 2nd edition, authorized in 1908, with an introduction and notes by Andrew D Osborn. _ Ann Arbor Mich: University of Michigan Press, 1938. A committee was appointed to study the Royal Library Code (i.e., the modified Instructions of Dziaztko) to improve the bibliographical description. This resulted in the Prussian Instructions, i.e., Instruktionen fur die Alphabetischen catalogue der Prussian Bibliotheken, published in 1899. Its English translation rendered by A D Osborn was published in 1938. This code represented

the German practice which differed from the Anglo-American tradition, at least in two aspects. It prescribed a grammatical rather than a mechanical title. In the title entry, the first grammatically independent word instead of the first word (other than the article), as opposed to the Anglo-American practice, was prescribed. The second significant difference was that the code did not accept the concept of corporate authorship. It treated corporate publications as a class of anonymous publications.

**Vatican Rules:**

Vatican Library. Rules for the Catalogue of Printed Books I translated from the 2ndItalian edition 1938, by the very Rev. Thomas J. Shanahan, Victor A. Shaefer, Constantine T. Vesselowsky; Wyllis E. Wright, editor. -- Chicago: American Library Association, 1948. - 3rd Italian edition was published in 1949. The code resulted from a decision taken in 1927 to prepare a new catalogue of the printed books in the Vatican Library (Rome), which was in the process of reorganisation. Since the catalogue of the Original collection prepared at the end of the 17th century was incomplete and also outmoded, a new up-to-date catalogue was contemplated. Because of the involvement of the American experts and American-trained personnel, the code reflected American bias. Wyllis E. Wright, who wrote the foreword to the English translation of the code, claimed it as "the complete statement of American cataloguing practice. "Next to Cutter's rules, this was the other complete and comprehensive code covering all the aspects of cataloguing. It provided entry (author, title entries), description, subject headings and filing. The rules for subject cataloguing stated general principles and included instructions on forms and specific application areas. It is also claimed as an international code.

**Classified Catalogue Code:**

Ranganathan (Shiyali Ramamrita) (1892-1972). Classified Catalogue Code with Additional Rules for Dictionary Catalogue Code. Ed 5. Assisted by A Neelameghan. The first edition appeared in 1934 and was continued through five editions, the last (i.e., the 5th edition) in 1964. Each later edition was an improvement on the earlier one, the revision, addition or improvement made based on practical application and critical examination supported by teaching and reasoning. This empirical, analytical and critical approach shaped the code progressively. The second edition (1945) demonstrated the symbiotic relationship between classification and cataloguing and evolved chain procedure for subject cataloguing/indexing. Rules for the style of writing and alphabetisation correlating the two through Gestalt theory

of alphabetisation were other added features of this edition. Ranganathan's comparative study of classified dictionaries, catalogues and evaluation of Cutter's rules helped him publish his Dictionary Catalogue Code in 1945.The third edition (1951) added rules for compiling a union catalogue of periodical publications, abstracting periodicals and incorporating a glossary of English Sanskrit terms to help develop cognate terminology in other Indian languages. The fourth edition (1955) implemented the lay-out for a catalogue code (in the light of Heading and Canons), added supplementary rules for national bibliography, and rearranged the rules for determination of authorship, choice of heading and rendering of the heading. It also incorporated additional rules for style of writing, affecting corresponding changes in the rules for alphabetisation. This edition, as a result of his comparative study of five codes (Heading and Canons published in 1955), made necessary further corrections and alterations, eliminating the need for a separate dictionary catalogue code. The fifth edition of Library Catalogue Codes (1964) included new chapters on the Law of parsimony, physical form, centralized cataloguing, homonyms in class index entries and feature headings, and nonconventional documents. Typographical and simple errors were corrected, a little rewording was done, and better examples were added. While the codes for alphabetical, author and dictionary catalogues are quite large in number, the codes oriented to classified catalogues are few. Ranganathan's Classified Catalogue code (CCC) is one prominent code of these few. After Cutter's rules and the Vatican code, the CCC is the only complete code to cover all the cataloguing procedures and provide rules for entry, description, subject cataloguing/indexing and filing. Before Ranganathan, there were no catalogue codes ever produced In India. Neither was there an established bibliographic/cataloguing tradition? The code (CCC) is India's first and only code. It was mostly an intuitive effort but applying the scientific method to ensure precision and correctness. This, however, does not say that the code was entirely a product of spotless minds. Ranganathan, educated in England, had the benefit of exposure to western thought and practice, which provided the needed background to work out independently. There are, therefore, many influences. Yet the code is distinctively Ranganathan's own. What is his adds to the merit, and what is not to its weakness? Structurally, it is a well-laid code. The code can be divided into three units. The first nine parts/chapters (A to H and D form the approach. Many basic issues, more importantly, canons and normative principles; parts and physical forms of catalogue, centralised cataloguing; recording, style, language and script, arrangement of entries; conflict of authorship and resolution (determination of authorship); the name of the person, (i.e., structure, element, etc.) are dealt with. The next 11 chapters (K to N, P to V) constitute the

substantial part, i.e., rules for rendering names (persons, corporate bodies, geographical entities); preparation of class Index entries; main and book index entries for different categories of books and periodicals; additional rules for compilation of union catalogues of books and periodical publications; National bibliography; indexing periodical; abstracting periodical; and cataloguing of incunabula and non-book materials. The last part (W) constitutes the end matter (glossary of terms, bibliographic references and index).The rules are marked for their simplicity, clarity and brevity. The code distinguishes between a library catalogue and a bibliography. A detailed description is necessary for the bibliography and not in a library catalogue. Therefore, CCC does not prescribe recording of imprint, collation, details in notes, statement of responsibility in the title section, etc. The rules for determining authorship are based on problems explained as authorship conflicts. The rules relating to the rendering names/headings for persons, corporate bodies and geographic entities are based on language, nationality and cultural preferences, which are postulated through principles. The empirical approach and application of normative principles in drafting and arranging the rules have CCC as a model code. It does not cover the entire range of various types of material, making it a less comprehensive code. No code can be perfect in all details. CCC is no exception. It needs revision and rethinking to capture and respond to the many changes that have come about after its publication in 1964.

**ALA Rules:**

American Library Association. ALA catalogue Rules: Author and Title Entries. - Prel 2nd ed.- Chicago: American Library Association, 1941. Within two decades of implementing the joint code of 1908, libraries in America and England began voicing dissatisfaction. In America, libraries which received the LC printed cards (introduced in 1901) revised their existing catalogues to conform to the LC practice. Large research libraries found it challenging to apply the 1908 code to new classes of materials acquired by them because of the lack of rules covering such items. So, to respond to the demands of the libraries, further revision or recodification of rules had to be taken up. The rules were organised in two parts: entry and heading and description. The code followed the existing practices than prescribing the idel and the right. The attempt to render all the bibliographic variations into something like a statute law was stated as the principal fault of this draft code. The professional opposition to the code's size and complexity first manifested in the area of descriptive cataloguing and following, of course, the rules for author and title entries. Further improvement (revision work) on part 2(description) was deferred or given up.

**L C Descriptive Rules:**

Library of Congress. Rules for Descriptive cataloguing at the Library of Congress Adopted by the American Library Association. - Washington, D.C.: Library of Congress, 1949. As evident from the title, the American Library Association adopted it and received official recognition as the standard for descriptive cataloguing. As a natural consequence, it replaced the second part (i.e., descriptive rules) in the 1949 ALA rules, the 2nddefinitive edition, which the ALA also published in the same year.

**ALA Rules (2nd definitive edition):**

American Library Association. ALA cataloguing rules for author and title entries. - 2nded. / Clara Beetle, editor. - Chicago: American Library Association, 1949. The criticism of the 1941 draft code of ALA rules faulted the code in general and the descriptive rules in particular. The code needed revision, recasting and finalisation. This code (1949. ALA 2nd ed.) was limited to rules for entry and heading only. It represented somewhat an expansion and elaboration of the 1908 code. It did not state and applied any guiding principles. The code proved exceedingly complicated to use. For about a decade and a half (i.e., until the AACR I appeared), the arrangement of using the twin codes (the 1949 ALA 2nd ed. sand the 1949 LC rules) in conjunction with the American standards for cataloguing continued. But cataloguers always found it tedious and inconvenient to refer to one code for entry and heading work and another for description. Since the LC code of descriptive rules covered printed material only, it required the use of other aids by standards for describing other non-print items (e.g., LC's Motion pictures and film strips, Phonorecords, Picture designs and other two-dimensional representations - three separate booklets). Like the earlier preliminary draft second edition, the definitive second edition too was targeted for criticism. While the LC descriptive rules looked forward, the ALA code looked backwards. A more coherent and unified code, therefore.was demanded.

**AACR 1(1967):**

Anglo-American cataloguing rules / prepared by the American Library Association, the Library of Congress, the Library Association, and the Canadian Library Association. -North American ext.- Chicago: American library Association, 1967. - Reprinted with 1970with a supplement of additions and changes. - British text published: London Library Association, 1967. At this time, the long-cherished goal of the international code renewed itself and appeared a possibility. The International Conference on Cataloguing Principles convened in

Paris in October 1961, adopted and accepted a statement of principles in whole or part by delegations from 53 countries and 12 international organisations. The Report of the International Conference was issued in 1963. It drew upon Lubetzky's 1960 code and restated the objectives of both Lubetzky and Cutter. The statement of principles rested on the objectives and was expressed in specific terms. The importance of this report lies in its endorsement of corporate entry and establishment of natural rather than grammatical order of arrangement of title, thus, removing the significant differences between the Anglo-American and Germanic traditions of cataloguing. Following the International Conference on Cataloguing Principles, many other national catalogue codes were revised or developed, e.g., the German Code (Regeln fur die alphebetische katalogisierung, the Swedish code, the Danish code, etc.), levelling the differences between national practices. The new code (AACR 1) appeared in 1967 and was received by professionals with a mixed reaction. The rules in the code were organised in 2 parts, part 1 dealing with entry and 'heading consisting of four chapters, and part 2 covering description presented in 10 chapters. The code applied re-evaluation of the existing practices. It was seen as a better code in terms of its more logical grouping of the rules with emphasis on conditions of authorship rather than on classes of authors (married women, princes of the blood, etc.) and kinds of publications(Anna, dictionaries, encyclopaedias, etc.). It corresponded more than the earlier codes to the patterns of intelligent users instead of blindly ruling the preparation of entries, which may be precise, consistent and technically correct. It gave preference to the form of name preferred or used by the author than his real/official name. The title page of the item catalogued was prescribed as the source of information for cataloguing against the old practice of deriving details from outside sources. Similarly, in the case of a change of names of corporate bodies, entry was required under the changed/new name. The code further emphasised the function of assembling bibliographic units by providing uniform title entries more widely. But some of the vestiges of old practices remained. For example, the authorial status of editors and compilers and entry under place names for certain corporate bodies continued. On this and other points, since the American and British Committees could not agree, the code was published in two slightly differing texts, like the 1908 code. When work on AACR 1 began, books and periodicals were the primary and popular materials. The card catalogue was the norm. But when the code appeared in 1967, the situation changed vastly. As a result of technology, a variety of new media (non-book materials) found their way into libraries. Computer manipulation of data made possible other forms of catalogue. The need to integrate the descriptive records (catalogue entries) of different forms of material (book and non-book

items) necessitated studies to find analogies between their characteristics). IFLA brought out a document entitled International Standard Bibliographic Description (for single and multi-volume monographic publications) in 1971. This was later improved/revised and published in 1974 as ISBD (M): International Standard Bibliographic Description for Monographic Publications, 1st standard ed. along with another standard for serials, viz., ISBD(S) International Standard Bibliographic Description for Serials was also published. The AACR I incorporated these documents and revised chapter 6 (separately published monographs) in 1974, followed by chapter 12 (for audio-visual media and unique instructional materials) in 1975 and chapter 14 (for sound recordings) in 1976. IFLA's International standards for other kinds of material, including a general one, are followed in succession. This piecemeal revision was found unsatisfactory. It needed developing overall principles and integrating descriptive rules for various media. The expanded cooperation between the cataloguing agencies in Great Britain, America and other countries and the increase in the use of UK MARC and LCMARC brought about an agreement for a single unified text of code, and the ambiguities and differences were resolved.

**AACR 2 (1978):**

Anglo-American cataloguing rules/ Prepared by the American Library Association, the British Library, the Canadian Committee on Cataloguing, the Library Association, the Library of Congress; edited by Michael Gorman and Paul W. Winkler. 2nd ed. - London: Library Association; Chicago: American Library Association, 1978. This second edition proved superior revealing basic principles that provided the edifice of the code. It followed "the sequence of cataloguers' operations in most present-day libraries and bibliographic .agencies," i.e., first examining the item and describing it and then determining the access points. The code, therefore, presented the descriptive rules in part 1followed by rules for determining and establishing headings/access points in part 2. Part 1 begins with a general chapter which can be applied to all materials in general, followed by chapters on specific media, which are elaborations of the provisions of the general chapter. These rules were also based on ISBDs (the general and specific ones). In the description, the code permitted alternative rules and options to suit the library and cataloguing agencies' needs. The rules for access points worked out many terminological improvements to remove conceptual irritants, e.g., a statement of responsibility instead of a statement of authorship, corporate entry instead of corporate author, etc. It standardized punctuation to conform to the pattern established in ISBDs.

**AACR 2, 1988 revised:**

Anglo-American cataloguing rules/ prepared under the direction of the Joint Steering Committee for Revision of AACR, a committee of the American Library Association, the Australian Committee on Cataloguing, the British Library, the Canadian Committee on Cataloguing the Library Association, the Library of Congress; edited by Michael Gorman and Paul W. Winkler. - 2nd ed., 1988 revision. - Ottawa: Canadian Library Association; London: Library Association Publishing Limited; Chicago: American Library Association, 1988. The Library of Congress began the implementation of the AACR 2 (1978) code in Jan 1981. Like the earlier edition (AACR1), the second edition too appeared at a time when there were rapid developments taking place. More important and of greater immediate relevance was the emergence of many new forms of material still in shaping. Although the code (AACR2) resolved the problems of authorship more satisfactorily, the rules were found inadequate in dealing with new media. Some rules were presented as confusing, insufficient and complicated during the code implementation. This gave rise to differences in interpretation. Therefore, attempts were made to clarify, expand or alter rules in necessary cases. The Library of Congress notified the interpretations and modifications in its Cataloguing service bulletin. Three sets of revisions of AACR 2 comprising Geographical corrections, Textual amendments, and altered and additional rules were issued in 1982, 1984 and 1986. These were followed by a draft revision of chapter .9 for computer files. The code too came into broader use and found translations in many languages (e.g., Arabic, Bahasa, Malaysia, Chinese, Danish, Finnish, French, Italian, Japanese, Norwegian, Portuguese, Spanish, Swedish, Turkish, Urdu and possibly others) Given the changes and additions that were brought out and the growing popularity and use of the code, it was decided to revise it. The revised code was further decided to be named AACR 2, 1988 revision and not as 3rd edition. The revision sought to incorporate the additions and modifications already made as well as further revisions contemplated, viz., description of material for the blind (tactile), rethinking of the concept of separate bibliographical identities, treatment of titles, author headings, geographic names and corporate bodies, corrections, rewording and addition of new examples. Therefore, the revision did not result in the change of basic concepts, principles or structure. In comparison, the noticeable changes applied to computer files, other changes related to the material for the blind, sound recordings, music, etc. To achieve greater conformity in establishing headings, a few rules were changed. These changes include redetermining of title proper, redesignation of GMD in a few instances, the addition of

distinctions in the rules for choice of pseudonyms, deletion of option to qualify place names (by adding larger areas/ jurisdictions), the addition of geographical identifiers to identical corporate bodies, redefining the type 3 subordinate corporate body, recasting of uniform titles, entry additionally under the corporate name (other than publisher, distributor, etc.) in the case of some cartographic material, etc. The rules are presented in two parts (as in the 2nd ed). Part one consists of descriptive rules in 13 chapters. Chapter 1 has the general rules, which provide the general frame within which descriptive rules for specific classes of material follow. Chapter 13 also contains general rules for the analysis of specific types. These are as follows. Part 1 Description:

Chapters 1. General rules of description, 2. Books, Pamphlets and Monographs; 3. Cartographic Materials, 4 Manuscripts (including manuscript collections), 5. Music (Published music), 6. Sound Recordings, 7. Motion Pictures and Video Recordings, 8. Cartographic Materials, 9. Computer Files, 10. Three-dimensional Artifacts and Realia, 11. Microform, 12. Serials and 13. Analysis Part 2. Headings, uniform titles and references: Chapters 21. Choice .of Access Points, 22. Headings for Persons, 23. Geographic Names, 24. Headings for Corporate Bodies, 25. Uniform Titles, and 26. References. The third part constitutes the end matter.

Appendixes, A. Capitalization, B. Abbreviations, C. Numerals, D. Glossary, and an Index. Each part has one introductory chapter.

The rules in the 12 chapters of part 1(Description) have mnemonic numbering to facilitate to and fro reference to rules applying to appropriate areas. The descriptive rules are presented first because cataloguing begins with a description and then follows the tasks of determination and establishment of headings. So, rules for access points and choice of forms of headings are given in the second part. In both parts, the rules follow the order of general to specific. The code has provisions for optional and alternative rules- to accommodate the varying requirements of libraries.  The preface states that "cat Library Catalogue Codes a logging rules cannot be static; they must be allowed to respond to changing needs". What is meant by this is that revision does not stop at any time. It goes on.

Further revisions become necessary. So, for the present, AACR 2, 1988 revision is the latest in the Anglo-American family of codes. All the earlier ones stand superseded.

**Review questions:**

1. What is the purpose of cataloguing?

2. Name a few types of catalogues and explain them.

3. What are the standard codes of cataloguing?

4. Abbreviate CCC and AACR.

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# UNIT – 5

# SUBJECT CATALOGUING

**Objectives:**

- ➢ To learn in detail about subject cataloguing
- ➢ To learn about subject headings.
- ➢ To gain knowledge on bibliographic control.

**Introduction:**

The primary function of any library is to make available the information it possesses (documentary as well as other types) to the/users at their request. To fulfil this objective, each library maintains a properly organised catalogue. The catalogue is to be constructed on sound principles. You are positioned to construct a suitable catalogue to meet your library's needs. For a person needing information on a specific topic (i.e. specific subject), the library catalogue has to provide the facility of the subject approach to library contents. If this facility is provided in the catalogue, the library user, on his own, will be able to find the items available in the library on a given subject and items related to the subject of his interest. During the cataloguing process, the cataloguer must consider the dual manifestation of the items added to the library collection. That is to say; these items are both intellectual as well as physical entities. In descriptive cataloguing, the physical description pertains to the physical entity (document), while the subject catalogue provides access to the intellectual content of the entity. In practical terms, the subject catalogue is designed to provide subject access to the library's contents. Inquirers who need information on a certain subject will approach the catalogue with some questions formulated with their terminology. These terms must be translated into the pre-determined access categories of the cataloguing. Indeed,

communication between the inquirer and the catalogue usually occurs with the librarian's assistance.

The library catalogue constitutes a complete record of the library's collection of documents. Also, you have learnt that the essential functions of a catalogue and the principles upon which it is constructed are not affected by the physical form. Even so, the card catalogue has become the most popular form of a library catalogue. A document can have several representations in the card catalogue, though practical considerations limit this number. Each document representation (substitute) is in the form of a catalogue card, known as an entry. Each entry indicates some document characteristics, such as authorship or subject content. In other words, multiple access points are provided for a document in a catalogue. The entries that indicate the inclusion of documents in classes defined by subject content are known as `subject entries'. The process of preparing subject entries for documents and organising them for subsequent retrieval is called Subject Cataloguing.

**Meaning and purpose:**

Since an entry in the catalogue serves as a document substitute, it is necessary to provide relevant information for individualising it so that the document can be retrieved or located from the others belonging to the same subject category. This job is usually accomplished with the help of a call number assigned to the document. In addition to entries for individual documents, the catalogue also contains directions which refer the searcher from one heading to another heading under which potentially relevant information in the form of document entries can be found. Such entries in the catalogue are known as references. These references also help the searcher in locating information about the related subjects to the subjects of his interest. "The assigning headings and references, with the retrieval of documents through the medium of a catalogue, in response to a request for information on specific subjects is generally defined as subject cataloguing". Subject cataloguing forms an integral part of the total process. Therefore, there is little need to emphasise the important role of subject cataloguing in libraries. The potential use of library materials cannot be exploited without it, especially in large libraries. Also, the vast increase in the number of documents in every sphere of human activity, clubbed with the increased complexity of the pattern of knowledge, calls for a foolproof method of access to records on any subject. Thus, subject cataloguing is concerned with the subject description of documents.

**Objectives of Subject Cataloguing:**

All subject catalogues have a two-fold objective: first, to enable an enquirer to identify documents on a given subject, and second, to make known the presence of material on allied or related subjects. Shera and Egan (1956) summarise the objectives of subject cataloguing as follows:

☐ To provide access by subject to all relevant material;

☐ To provide subject access to materials through all suitable principles of a subject organisation such as matter and applications;

☐ To bring together references to materials, which treat substantially the same subject regardless of differences among groups of subject specialists and from the changing nature of the concepts with the discipline itself,

☐ To show such affiliations among subject fields, which may depend upon the use or application of knowledge;

☐ To provide entry through any vocabulary common to a considerable group of users, specialists or laymen;

☐ To provide a formal description of the subject content of any bibliographic unit in the most precise terms possible: whether the description is in the form of a class, number or symbol; and

☐ To provide means to the users to make a selection from among all terms in any particular category, according to any chosen set of criteria such as most thorough, most recent, etc

**Subject approaches:**

Most users approach information sources not with names of who might have been responsible for their creation but with a question that requires an answer or a topic for study. Users seek documents or information on a particular subject. To make provision for this common approach, it is necessary to arrange documents on the shelf and entries in catalogues so that items on a specific subject can be retrieved. In other words, it may be said that the subject approach is fundamental in accessing and exploiting documents in a library. Before discussing the methods librarians and information workers developed to meet this requirement, let us consider the question, " What is a subject?" While talking about a subject,

we usually refer to a given area of knowledge or the contents of a document of a given scope. A subject may be defined by

a) An area of interest,

b) An area in which an individual researcher or professional works,

c) An area in which an individual writes, and

d) An area of knowledge being studied

Let us consider a well-known area such as Physics. To understand this subject, let us first ask a student studying this subject what constitutes this subject. Also, let us find out the definition of physics from a few dictionaries and encyclopaedias. We may come across different definitions and boundaries for this subject area alone. We may also find that different users and separate pieces of literature hold different perspectives on one subject. The points of divergence in perspective can be categorised into two types:

Different labels (names) that are used for a subject, and

Different concepts about scope and associations with other subjects are evident. Essentially, these factors form the basis of problems in identifying a satisfactory subject approach and the need to have a vast array of tools to explain the subject approach to knowledge. It is possible and convenient to select a particular viewpoint on the scope, associations and labels for subjects which coincides with how subjects are handled in the literature. In libraries, most devices for the knowledge organisation concern themselves primarily with organising documents based on a literary warrant. This approach is known as the pragmatic approach. The main limitation of the approach is the time and collection dependency of the resulting tool. There is an alternative method for the design of subject retrieval devices, which is to build schemes which depend upon theoretical views about the nature and structure of knowledge. This theoretical approach is important in determining the nature of subject devices required for knowledge organisation. A subject device seeks typically to fulfil two functions

a) To show what a library or information centre has on a particular subject; and

b) To show what a library or information centre has on related subjects.

Different devices for the organisation of knowledge place different emphases based on the relative importance of these two functions. However, the two functions are

interdependent, and neither can be excluded without impairing the effectiveness of the other. A user who starts a search with a specific subject in mind may be seeking a specific subject which does not quite match his requirements. For example, a user might start looking for "growing of tomatoes". A document on `vegetable gardening' may contain equally valuable information on `growing tomatoes', but generally, he will not try to notice it because he believes that the more specific subject -` growing tomatoes,' will not be covered in the document `vegetable growing. Later, on examining the document, he may discover that the information he is looking for is available in the document on `vegetable growing. Thus, broader subjects may help the user even with a specific search. Classification schemes and alphabetical indexing systems attempt to fulfil the essential functions mentioned earlier. The distinction arises from different emphases. Classification schemes specialise in showing the network of subjects and displaying relationships between subjects,

In contrast, alphabetical indexing systems specialise in establishing specific labels for subjects and providing direct access to individual subjects. Also, it may be stated here that author and title catalogues enable the user to locate documents of which the user knows either the name of the author or the title of the documents. In contrast, subject catalogues enable him to find documents of interest even without knowing any of these information items.

**Alphabetical Subject Approach:**

There are different means of providing alphabetical subject approaches to documents and information. But, all these methods are confronted with some common problems. These problems are mainly concerned with the label (name) given to a subject in an alphabetical subject catalogue. Therefore, the fundamental problem pertains to the naming of a subject. Generally, a user-oriented approach should be followed in subject catalogues in naming the subjects. To achieve this objective, the various approaches of different users must be taken into consideration. Suppose a subject has more than one name. In that case, a library catalogue must bring all material on that subject together (within the limitations of the scope of the collection) under those names. Specific problems encountered in this connection are:

a) synonyms, b) homographs, c) singular and plural forms, d) multiword concepts, and e) complex subjects.

Understanding how the abovementioned aspects present problems to the subject cataloguer are crucial. First of all, let us briefly discuss them.

a) Synonyms are terms with the same or similar meanings. Such terms are present in every subject. Near synonyms are the most common. True synonyms, which mean the same thing and are used precisely in the same context, are instead- unusual. However, even near-synonyms are regarded as equivalent for some purposes. Some situations in which synonyms arise are:

i. In the case of subjects with one stem and several derivatives. For example, steriliser, sterilising, sterilised, or computing computed computation. Sometimes, it is acceptable to treat such words as equivalent to one another, and at other times it is essential to differentiate between them.

ii. Some subjects might have common and technical names, which must be recognised for subject cataloguing. Depending upon the clientele for whom the catalogue is meant, these are reflected in the catalogue. Examples are `Sodium Chloride' and `Salt', `radish' and `Raphanus sativus', etc.

iii. Using patterns of terms also presents problems to the cataloguer. The cataloguer should try to keep pace with changes in normal usage.

iv. Some concepts are defined differently in different versions of one language. American and English are examples of such differences in usage, for example, lift and elevator. In all such cases, the user should be guided from the heading that is not chosen to the one that is chosen (preferred) in the catalogue.

The merging of synonyms has implications for a library catalogue's effectiveness as a retrieval tool.

b. Homographs mean words which have the exact spelling but different meanings. In normal language usage, the meaning of such homonyms is established by the context in which the \ term is, used. But, in a catalogue, the term is used as a heading; therefore, it will be challenging to establish the interpretation of the homograph. In such cases, qualifying terms must be used to provide proper connotation to the homonyms in the catalogue. Once this is resorted to, then there might not be any ambiguity. Examples: 1) Pitch (Cricket), Pitch (Music), 2) Tank (Military vehicle), Tank (Water tank), etc

c. Use of Plural and Singular forms: Generally, the plural and singular forms of the same noun are regarded as equivalent, but there are some situations when it is necessary to treat them as distinct. In case only one form of heading is permitted in the catalogue. Then it is

common practice to adopt the plural form. However, specific rules are provided for the usage of singular or plural form

d. Multi-word Concept: Some subjects cannot adequately be described by one word and require two or more words to specify them fully. Examples are Information Retrieval, Country Walks, Underwater Colour Photography, etc.: In such cases, no matter which word (in the term) is used as the main approach point in the catalogue, the user might choose to seek the subject under the second or third word (in the multiterm) first. Therefore, providing access via all significant words in a multi-word concept is advantageous. In a multi-word concept, sometimes the terms are presented in direct order; at other times, the inversion of terms is also resorted to; for example, Military Hospitals can find a direct entry in a catalogue which treats Military Hospitals as a unitary concept, or it may be found in the inverted form as Hospitals, Military. Sometimes inversion may lead to grouping of like subjects. For example, inversion to Hospitals, Military will cause this heading to be filed along other headings starting with the word Hospitals. The primary disadvantage of the inversion method is that the catalogue user might not be able to predict the terms of a multi-word concept that may be inverted. Also, the word order in a multi-word concept may create some problems of uncertainty for the users.

e. Complex Subjects: Complex subjects contain more than one unit concept, and several terms may be used to descfully describe these concepts -Each concept might form a potential search key in a catalogue. With complex subjects, citation order becomes essential. By citation, `History of Science' is not the same as `Science of History. The same- two terms, `History' and Science', serve to describe two subjects, and it is only the order in which they are cited that determines the meaning; in the natural language, the connecting word `is/are' distinguishes statements of the two subjects. The occurrence of a variety of concepts in the statement of one subject area is referred to as a syntactic relationship. The syntactic relationships and the ways they can be handled are the distinguishing features between pre-coordinate and post-coordinate indexing systems

**Display of Subject Relationships:**

The important problem concerning the alphabetical subject approach is the subject naming (labelling) subjects. However, any tool, such as the library catalogue used to organise knowledge, must also consider the different relationships between the subjects. There are two main categories of relationships between subjects. These are known as syntactic relationships

and semantic relationships. For example, in a topic such as `Sugar and Health', the concept `Sugar' and `Health' are drawn together in a specific context. Any of these concepts may also be present in other contexts where the existence of relationships defined for the purpose may be irrelevant.

On the other hand, semantic relationships show aspects of genus-species relationships and are expected to reflect widely accepted subject relations. Entries should be made in the catalogue for linking such related subjects. This is typically achieved through references and other devices, such as alternative entries. These are some of the significant issues which cause problems in subject cataloguing, and the cataloguer must take these into account and try to provide suitable solutions by which these problems might be minimised, if not eliminated.

**Alphabetical indexing languages:**

In this section, let us look at the concept of indexing language, its categories and functional use. Let us begin with the meaning of `indexing language'. It is the language used to describe a subject or other aspects of information in an index or a library catalogue. The generally accepted difference between a library catalogue and an index is that an index entry locates a subject or a concept. In contrast, a catalogue entry includes some descriptive specification of a document containing the subject. But the line of demarcation is not, in practice, hard and fast. The indexing language can be alphabetical or maybe a classification scheme. But, our emphasis would be on alphabetical indexing languages. There are three main categories of indexing, languages. They are a) natural indexing languages, b) free indexing languages, and c) controlled indexing languages.

**Natural Indexing Language:**

One of the most significant hurdles in discussing natural indexing language is that it is not easy to identify or know what exactly constitutes a natural indexing language. We do not generally come across lists of natural indexing languages. A natural indexing language is the language of the documents indexed or catalogued for a library. Hence, it could be static as long as the document collection remains static. As soon as a new batch of documents is added to the library, the terms of the indexing language are changed to accommodate the new terms contained in the new set of documents. Each system will have a different indexing language, even if the documents cover the same subject area. Also, since the indexing language is derived from the documents, added to the library or input into the system of different records, even if they represent the same documents, they generate a different indexing language.

These variations affect the library catalogue's consistency and present many problems. Most of the natural indexing languages are based upon the language of title, abstract and other text of documents. There is a debate on the effective use of natural languages for indexing and subject cataloguing purposes. One school of thought believes that full exploitation of the opportunities offered by computer systems could only be done by recourse to natural indexing language.

In contrast, the other school believes that controlled indexing language is the only proper way to index documents. However, it may be mentioned that controlled indexing language is exceptionally time-consuming, costly and uneconomic. One of the applications of natural language indexing is the production of indexes based on words in the titles of documents, such as Key Word In Context (KWIC) indexes.

**Free Indexing Language:**

Free indexing is the nature that any word or term that suits the subject may be assigned as a subject heading in the catalogue or as an indexing term. The terms may be human or computer assigned, although free language indexing is -commonly used in computer-produced subject catalogues or indexes. The computer generates the list by indexing every word provided unless instructed not to do so.

**Controlled Indexing Language:**

In the preceding paragraphs, we have discussed the concept of an indexing language and the categories into which it falls. In the process, we have learnt the meaning of natural indexing and free indexing languages. Let us know some facts about controlled indexing languages and their use in subject cataloguing and indexing. Control is necessary regarding terms used as subject identifiers in a catalogue or index because of the variety of natural languages. Such control may involve barring specific terms used as headings or access points in a library catalogue or an index. The terms to be used are specified, and the synonyms recognised and, as far as possible, are eliminated. Preferred word forms are noted. The list of terms, thus, prepared constitutes what is called controlled indexing language. One of the methods by which such a language is formed is to list or store the acceptable terms in a vocabulary. Such lists contain specific decisions relating to the preferred words and the form of words to be used; for example, singular or plural, nouns or adjectives. There are mainly two types of controlled indexing languages in the verbal plane. They are subject heading lists and thesauri. These two types of controlled indexing languages have the following functions:

☐       to control the terminology used in subject catalogues and indexes; and

☐       to control the display of relationships in catalogues and indexes.

Subject heading lists are lists of index terms usually arranged in alphabetical order, which can be used to determine the terms to be used in a catalogue for describing subjects (i.e., subject headings) by cataloguers: These lists attempt to solve some of the problems concerning alphabetical subject approach. They serve as guides to the cataloguer and aid him in the task of subject cataloguing. The essential functions of a subject headings list may be stated in the following terms:

The list records terms used in a catalogue or database and indicates the form in which they shall be shown. It acts as an authority list for index terms and their form.

The list recommends using references to display relationships in a catalogue to guide the users in distinguishing associated terms.

'Sear's List of Subject Headings and `Library of Congress List of Subject Headings' are examples of popular lists of subject headings. These two lists have been the basis for discussion regarding alphabetical subject catalogues or, in other words, the theory and practice of subject cataloguing. We shall learn more about these two lists in Unit 15 of this course. It was mentioned earlier that controlled indexing languages are of two types. In the foregoing paragraphs, we have discussed one of these two types, namely `Subject Headings'. Let us now try to understand the second type, `Thesauri'.

**Thesauri:**

The dictionary meaning of the thesaurus is "a collection of words put in groups together according to likenesses in their meaning rather than an alphabetical list." However, in library and information science parlance, the word thesaurus means an authoritative list showing terms which may and sometimes may not be used in a catalogue or index to describe concepts. Technically, a `thesaurus' could be defined as "a compilation of words and phrases showing synonymous, hierarchical, and other relationships and dependencies, the function of which is to provide a standard vocabulary for information storage and retrieval systems" In a thesaurus, each term is usually given together with terms; which are related to it in several ways. The primary purpose of a thesaurus is to exert terminology control in choosing proper headings in subject cataloguing and indexing. This concept has been extensively used since the 1950s in many information retrieval systems and bibliographical tools. Several standards

have come into existence to provide guidance in the construction of thesauri. `Root Thesaurus' published by the British Standards Institution is one of the best models. Apart from this, several thesauri, such as TEST (Thesaurus of Engineering, Scientific and Technical Terms) and others concerned with INIS, INSPEC, AGRIS, etc., are being used in information storage and retrieval systems.

**Indexing systems:**

The preparation of a series of entries for inclusion in a subject catalogue or a printed index is known as indexing. An entry is a basic unit of a subject catalogue or an index. It consists of (a) a means of identifying an item in or a concept derived from the collection (i.e. the documents of a particular library) and (b) a means of locating the item or material relating to the concept. Indexing is a technique for providing service operation, and an index or a subject catalogue is a tool. It is a means to an end, never an end in itself. In other words, it is a communication link between a collection (of a library) and those who intend to obtain some information from it. The indexing process calls for sensitivity to users' approaches, intuition to select appropriate terms and skill to identify the terms and their relationship on the part of the indexer. The indexing process also requires creating and recognising patterns and rules, conscientiousness and adherence to them, and accuracy and precision. In other words, the process involves applying a model indexing system.

**Definition of an Indexing System:**

Let us now look at some of the definitions available in Library and Information Science literature. One such definition states that "an indexing system is a set of prescribed procedures for organizing the contents of records of knowledge or documents for retrieval and dissemination." Another definition reads, "an indexing system is the means whereby an indexing language can be applied to make an index." It appears that both these definitions have common roots. The only difference is that the first definition is somewhat broader in scope. It may be stated that the need for an indexing system stems out of the work of devising index headings. These index headings mainly relate to documents dealing with compound or multi-subjects, although elementary one-concept subjects are not excluded from the purview of an indexing system. For convenience, indexing systems could be divided into two primary groups pre-coordinates and post-coordinate systems. Based on experience, it may be stated that not every index necessarily exhibits all the features of either of these two types of indexing - systems, both types of indexing systems. However, this division helps understand

these two categories of indexing systems. A brief description of the pre-coordinate as well as post-coordinate indexing systems, is provided in the following sections.

**Pre-Coordinate Indexing Systems:**

Pre-coordinate indexing systems are conventional systems mostly found in printed indexes. In this system, a document is represented in the index by a heading or headings comprising a chain or string of terms. These terms, taken together, are expected to define the subject content of the document. The maximum term determines the position of the entry in the catalogue or index, while the other (qualifying) terms are subordinated to it. Let us consider the title of a document, "Use of Computers in Library and Information Activities". It might be represented by headings such as:

LIBRARY ACTIVITIES:      Use of Computers

COMPUTERS:                   Use in Library Activities

Since the coordination of terms in the index description is decided before any particular request is made, the index is known as a pre-coordinate index. One of the characteristics associated with a pre-coordinate index is that the headings in the index are relatively specific compared to one-concept headings such as LIBRARIES or COMPUTERS. Pre-coordinate indexes are most prevalent as printed indexes. For example, the indexes to abstracting and indexing journals, national bibliographies and subject indexes to library catalogues apply principles of pre-coordinate indexing in varying measures. Such indexes are compiled both manually as well as with the help of a computer. Two aspects are of great significance in relation to pre-coordinate indexes. The first aspect concerns the consistent description of subjects.

In the case of subject headings describing many concepts, consistency should be introduced into the terms used to represent individual concepts that constitute the multiple-concept heading. Also, the order in which the individual's terms represent the unit concepts of multiple concepts must be consistent. Some basic principles must be evolved and followed regarding an acceptable citation order of the terms. There must be a theoretical basis by which consistent citation orders could be achieved. Using such theoretical principles may result in deriving a structured system of headings with consistent citation order between similar yet distinct subjects. The citation order is less likely to be overlooked if some rationale determines such citation order which is to be followed. The second significant

aspect that requires the attention of subject cataloguers' or indexers is the need to provide access for those users who approach the subject under consideration from one of the secondary concepts. Since only one term can appear in the primary position in the prescribed citation order, the preferred citation order should be the one which caters to a majority of users. In this context, it may be stated that the same citation order, however well founded, will not prove suitable for every searcher. To prevent this problem, references or added entries should be provided in the catalogue or index. At least one added access is usually provided for each secondary concept in the preferred citation order. Generally, there is some pattern by which such references could be generated to an acceptable level: Both these aspects arise because pre-coordinate indexing systems are one-place systems. That is to say, these systems typically provide one main entry for each document and are primarily suitable for catalogues and bibliographies. These are very helpful to the searcher since several searches can be conducted by-tracing entries simultaneously under similar headings. Pre-coordinate systems find their application in printed indexes and library catalogues.

In summary, it may be stated that in all pre-coordinate indexes, the subject description is composed of a set of terms, which constitutes a summarization of the subject. Also, the assumption is that subject description reflects the most likely way in which the information concerned will be asked for. Thus, when a user asks for information on a particular compound (multi-concept) subject, the combination of the concepts involved will be easily matched in the index against an entry for the same combination. Because this method of indexing coordinates the elements of compound subjects before any particular request is placed for information on that specific compound subject, it is known as pre-coordinate indexing.

**Post-Coordinate Indexing Systems:**

These systems are also called coordinate indexing systems. As in the pre-coordinate systems, the starting point is identifying multi-concept subjects and their compound concepts from the documents to be indexed. Once the multi-concept subject is analyzed into its elementary compound concepts, entries are prepared under terms representing elementary concepts. In other words, by this method, only simple subject concepts are indexed. These concepts are not Subject Cataloguing - Problems coordinated at the time of preparation of catalogue or index. Since the coordination of concepts does not occur until the user requests information about a particular compound subject, this indexing method is called post-coordinate or

sometimes simply coordinate indexing. In its early stages, post-coordinate indexing employed subject concepts as they were expressed in the document for the index description of the document. Although indexing can thus be done in `natural language' (i.e., by using significant words taken directly from the document), in many cases, post-coordinate indexing language employs terms which primarily represent isolated concepts and are not in the form of compound subject headings. For example, if we have a document dealing with the compound subject "Computer Cataloguing in Libraries", the subject analysis of the document may consist of three simple concepts, namely,

COMPUTERS

CATALOGUING

LIBRARIES

The document is indexed under these simple concepts, and index entries are prepared. Thus, the compound subject of the document receives an index description consisting of their ideas entered individually in the index. If a user is interested only in documents dealing with the compound subject, then he has to coordinate all these terms at the search stage and retrieve the documents dealing with the compound subject. This is accomplished by retrieving documents containing standard document numbers under individual component concepts. Let us consider another document representing the subject `Torsion in the Reinforced Concrete in Service Cores in Tall Buildings'. This multi-concept subject may be analyzed into the following unit or elementary concepts:

Torsion

Reinforced Concrete

Service Cores

Tall Buildings

If it is intended to prepare a post-coordinate index for this example, we may have to prepare entries under the following index headings:

Buildings, Tall

Concrete, Reinforced

Service Cores

Torsion

**Online public access catalogue:**

By the late 1970s, libraries began to use computers for cataloguing purposes, and the idea of making a library catalogue available to its users online began to be accepted and implemented in several libraries. This computerised online catalogue, which can be searched by the users directly for the retrieval of records without the assistance of a trained intermediary, is commonly known as Online Public Access Catalogue (OPAC).

**MARC and the Subject Approach:**

The concept of MARC (Machine Readable Catalogue) has brought in a new era in the field of library and information services. MARC stimulated the development of library automation and information networks. Planning for MARC – I began in 1966 and concluded in 1968. For forms of materials other than books, the Library of Congress (LC) published formats for serials and maps in 1970, films in1971 and manuscripts in 1973. Designing of MARC – II was based on the experiences gained during the evaluation of the MARC - I format. The idea behind MARC - II was to develop one typical format structure capable of containing bibliographic information for all forms of documents. Not all the information in the MARC record is relevant to the subject of a document, but specific fields are likely to be more productive than others in providing a range of subject descriptions. Some fields are explicitly related to notation/class numbers derived from different library classification schemes, such as those of LCC, UDC, DDC and NLM; and others are related to alphabetical subject headings, such as those drawn from LCSH, PRECIS, and other alphabetical systems.

**Subject Access to OPAC:**

The typical OPAC interaction process requires the matching or crude translation of user vocabulary to system vocabulary. It became apparent that the amount of subject information included in standard MARC records is inadequate to meet the users 'subject approach to the OPAC. Online capabilities offer many possibilities for improved subject access. Two necessary search devices used in OPACs are discussed below:

**Boolean Search:**

Boolean search is the search process where the search terms are combined through Boolean Operators (AND, OR, NOT) Logical Product AND' Here, two or more terms are combined

by logical "AND "to formulate the search statement. If we formulate the search statement as A and B, we require that matching for both A and B in the index record take place. Thus, a search for `Electronic Scanner' seeks to formulate the search statement as `Electronic AND Scanner 'Logical Sum `OR': Here, two or more terms are combined by logical `OR'. Thus, a search for `Electronic Scanner' or `Electronic Searcher' seeks to formulate the search statement as `Electronic AND (Scanner OR Searcher)'.Logical Difference `NOT': Here, terms are combined by logical `NOT'. If we formulate the search statement as A NOT B, we require that, for matching, A must be present in the index, record, but B must be absent. Thus a search statement `(Automation AND Library) NOT Circulation' will retrieve all index records concerning `Library automation' except `Circulation'. In this connection, it is noted that different OPACs have their symbols used to indicate the Boolean operators (AND, OR, NOT) while formulating the search statement. The Boolean search method is also explained in BLIS - 06 and BLIS - 07 courses.

**Truncation:**

It is not necessary to specify complete words. The system may allow for `term truncation', where a fragment can be specified, and the computer will pick up any term containing that fragment. This device is also known as `Word fragment search'. Fragments may be truncated at either or both ends or the middle. For example, Type of Truncation Term Words captured by the term

Right truncation LIBR * Library, Librarians, etc.

Left truncation *OLOGY Zoology, Geology, etc.

Infix truncation P*DIATRICS Paediatrics, Paediatrics

Right-left truncation *Electric * Electricity, Electric conductivity,

Hydroelectricity, etc.

The sign `*' is used to indicate truncation. The sign may vary from one system to another system.

**Aids to Searching:**

Subject searching in OPAC creates specific problems for the users. Several OPACs have been developed to ease vocabulary selection and aid in searching. When the user is having trouble finding the correct controlled vocabulary term to use for searching, a display of

records with the message that the retrieved records have the subject words in their titles and their headings' will be helpful in the search. Subject headings on the forms help to find a controlled vocabulary for the desired topic. Thus, OPACs offer the opportunity to guide the users from natural language terms in titles to the controlled vocabulary used in subject headings.

**Problems with subject cataloguing:**

C.A. Cutter (1837-1903) first provided systematic guidelines for subject cataloguing in his famous work, Rules for a Dictionary Catalogue (1876, 3rd ed. 1903). Besides, pioneers like Julius Otto Kaiser (1868-1927) formulated basic but straightforward rules for subject indexing. To bring uniformity and consistency in subject cataloguing, some readymade lists of standardised subject headings were prepared. The pioneers in the ALA List of Subject Headings and the voluminous Library of Congress Subject Headings (LCSH) for essential and research libraries. Then came the Sears List of Subject Headings (SLSH) in 1923. The latter two lists are still popular. But it has been observed that no authoritative and consensual rules have been formulated for subject cataloguing to overcome the problems it usually poses. Subject cataloguing, being a highly intellectual work, is a field full of uncertainties. J. Mills (1992, p.307) aptly writes, "The failure of cataloguers to develop a consistent and coherent theory of alphabetical subject cataloguing is a notable feature in the history of cataloguing…".There are no concrete and unambiguous rules like the rules in AACR 2. It is a work of flair at best. Indeed, it is a work of skill and intelligence. Many librarians find it challenging to design subject catalogues due to a lack of expertise. Ranganathan considered the subject headings in dictionary catalogues illogical and relatively ineffective and saw no justification in continuing the use of headings that way. The subject headings lists give us only a choice among synonymous terms, and some current concepts are always missing, as if by default. But such lists do not present any uniform rule nor help select more specific headings. No help is provided in eliminating the wrong headings. Identical materials may get entered under different headings, and the users/cataloguers are led to different paths. Moreover, all such lists are heavily biased towards the country and culture of their origin. The indexers in other countries have to make many adaptations and additions to use them. Hence, there is widespread dissatisfaction with the subject headings due to numerous drawbacks. In many cases, the cataloguers will not be certain which titles the user would approach. See and See also references make the catalogue bulky, thus increasing the cost of cataloguing, especially in manual catalogues.

**Library of congress subject headings (LCSH) :**

The Library of Congress Subject Headings (LCSH), perhaps the world's most widely adopted subject indexing language, has been translated into many languages. This subject heading list was developed by the Library of Congress and is intended for more extensive libraries with fairly comprehensive collections. LCSH has been actively maintained since 1898 to catalogue materials held at the Library of Congress. Proposals for additions and changes are reviewed regularly at staff meetings in the Policy and Standards Division (PSD), and an approved list is published. The Library of Congress list is much more detailed and uses more complex terminology to describe subjects. It takes up five huge volumes and provides more ways of listing interrelated topics.

**Sears list of subject headings (SLSH) :**

It was first designed in 1923 by Minnie Earl Sears (1873-1933) to fulfil the demands of small American libraries for broader subject headings (SHS) in their dictionary catalogues. These libraries found the Library of Congress Subject Headings List (LCSH) too big and specialised. Since then, the Sears List has continuously been published by the H.W. Wilson Company, New York (Now the Company has been taken over by Ebsco), which are its proprietors and copyright holders. Its editor is an employee of the company. Its new editions are produced regularly to:

☐ incorporate new subjects;

☐ restructure the form of old headings based on the changing information needs and information-seeking behaviour of the users;

☐ give new terms to old subject headings based on current usage;

☐ delete the obsolete subjects; and

☐ discover new relations between subjects.

Orientation to the online electronic environment started with the 13th edition (1986). It was the first edition created as an online database for editorial use. It started changes in the form of de-inverting the inverted headings to suit searching OPACs and online databases. It was

believed that most library users search for subjects in an electronic database under the natural form of their names. For example, "Library, Public" was changed to "Public library"; similarly ", Chemistry, organic" was changed to "Organic chemistry". In the 15th edition (1994), edited by Dr Joseph Miller de-inversion process was completed.

Another significant change introduced since its 15th edition is its thesaurus format of listing subject headings using standard thesaural abbreviations, i.e. NT, BT, RT, USE and SA, instead of the earlier x, xx and SA codes. Thesaurus format conforms to the ANSI/NISO (American Standards Institution) (1993). Nevertheless, Sears remains on a list of subject headings. It is not a thesaurus. The 18th edition (2004) has been edited by Joseph Miller in association with Ms Joan Goodsell. Dr Miller retired in December 2012 after successfully editing six editions from the 15th (1994) to the 20th (2010). Its current editor is Ms Eve Miller, who brought out the 21st edition in May 2014.

**Bibliographic control:**

Suppose for any distinctive body of printed literature of the subject, or a physical or literary form - we can easily find complete and accurate information on all the items which may be asked. In that case, we say the bibliographic control for that group of documents is reasonable. But in actual practice, bibliographical control is seldom perfect, even when exerted over a subject of a narrow extension range. Bibliographical control would also be difficult enough if it was only concerned with writings printed as separate entities. But it is also concerned with those published as parts of separate publications - articles in periodicals and chapters or sections in books with multiple contributors.

Therefore, these concealed contributions to knowledge may be of great value but might be overlooked when they would be of particular use were it not for the initiative and industry of bibliographers. Bibliographical control can be defined as mastery over written or published records, provided by the purpose of the bibliography. Bibliographical is synonymous with adequate access through bibliographies. The sense of bibliographical control is the location of information sources or materials and the speed with which they can be located. Therefore, librarians should have access to complete records of human civilization and culture and the ability to organise them effectively for use.

Bibliographical control consists of four aspects:

A complete recording of all types of printed and other types of library materials;

The systematic acquisition of these materials in libraries and other information organizations;

Location of materials through union catalogue, union lists and like devices; and

Provision of subject bibliography in all areas.

For any distinctive body of printed materials, i.e., of a country, a subject or a physical or literary form, we can find the complete information required. One can say that the bibliographical control of that set of documents is excellent. But in reality, the bibliographical control of all types of materials is complicated, as we are concerned with publishing not only materials or printed materials but also parts of materials, articles in journals, and any other type of material published or not published. The bibliographical control became efficient or visible only after World War II due to the efforts of UNESCO, which emphasized the publication of national bibliographies by all the countries of the world. But the formal event considered a landmark was in 1974 when IFLA announced ` Universal Bibliographic Control as one of its core programmes. In the last decade or so, some of the limitations of bibliographical control have been overcome due to online computerised bibliographic records. The critical factors in bibliographic control are subject, form (physical and literary), place, time, scope (a bibliography may be selective or exhaustive) and the number of details given in the individual entries. The number of bibliographies is going to be very large if all the subject areas are to be taken into consideration. But in actual practice, this has limitations; otherwise, their use will be impossible. Therefore, for usage purposes, small bibliographies on many topics are prepared so that the publications are convenient.

Bibliography of Bibliographies:

These are lists of bibliographies to help users in choosing bibliographies. They help in tracing bibliographies. The bibliographic control of bibliographies presents many difficulties due to many reasons. The main reason being the total number of usable bibliographies is considerable. Besides this, it is difficult to determine whether a bibliography exists on a given topic, is suitable for a particular user, and whether getting hold of it is worthwhile if not in stock. The last reason is the cost, as significant bibliographies are expensive to buy and house. The bibliographic control of bibliographies thus is somewhat patchy. A very famous publication Besterman's World Bibliography of Bibliographies is presently outdated. The only choice left to the user thus is H.W. Wilson's half-yearly Bibliographic Index 1937. Many of the significant bibliographies in current use may be found in Walford's Guide to Reference

Materials or Sheehy's Guide to Reference Books. Shortly, many of our bibliographical queries may be satisfied entirely by online databases.

**Universal Bibliographic Control:**

The bibliographic control of documents at the international level has always been a problem. Librarians have been concerned about this problem which has been increasing over the last five decades due to the enormous increase in the number of publications and the variety of publications. The effort to compile a Universal Bibliography has already been mentioned earlier. Thus there are no known universal bibliographies as such. But after the Second World War, UNESCO took leadership and emphasised that if all nations maintain their current national bibliographies, it might lead to having effective control of the publications universally. Many years have passed, but nothing concrete has come out of this. The Universal Bibliographic Control (UBC) programme sponsored by IFLA in 1974 appeared to be far more realistic, as it was based on the recognition of the fact that effective bibliographic control must begin within individual countries and that the exchange of bibliographic information between them is facilitated if there is an international agreement on the bibliographical description. The UBC programme has since been merged with IFLA's other programme, namely the International MARC and is presently known as UBCIMP. 42 IFLA and. UNESCO have also been in collaboration in this regard, and their efforts have resulted in programmes like- International Standard Bibliographic Description (ISBD), Inter-national Serials Data System (ISDS), Cataloguing-in-Publication CIP), and Union lists of Serials.

**Bibliographical Activities in India:**

In India, many organisations presently provide bibliographic services at various levels. At the national level, organisations like National Library, Calcutta, INSDOC in Science and Technology, National Medical Library in Medical Information and NASSDOC in Social Sciences carry out various bibliographic activities involving international and national information sources. The National Library has brought out the Indian National Bibliography since 1957 as our Government recognized the importance of bibliographical control at the national level. INB has also compiled bibliographies of books in Indian regional languages. The Association of Indian Universities (AIU) has been bringing out a series of bibliographies on Doctoral Dissertations accepted by Indian Universities since 1957, thus providing bibliographic control on dissertations. NASSDOC has brought out bibliographies on various

subjects/topics in social sciences and is also carrying out indexing and abstracting services in these areas.

INSDOC has been bringing out Union Catalogues of Scientific Serials from various regions of India besides its popular periodical Indian Science Abstracts. The different computerised databases of INSDOC are also efforts to bring about bibliographic control in various S &T publications. NISSAT Sectoral Information Centres and Documentation Centres at special libraries in India have compiled various bibliographies for their clientele. Bibliographies of books in Indian regional languages have also been compiled. One of the examples of this nature is in the Marathi language. Shankar Ganesh Date gathered Marathi Grantha Sudhi covering 1832 to 1960, published in 2 volumes. After the death of S.G. Date, S.G. Date Suchi Mangal was established at Pane. This has also compiled a bibliography of articles published in the Marathi language in 6 volumes. Attempts are being made to compile bibliographies in other languages.

**International Standard Bibliographic Description (ISBD):**

Starting from the first ISBD on monographs, several ISBDs have been developed, including ISBD (G). These developments have been discussed in Unit 7 of this course. In 1973 the ISBD (M) text was adopted by several national bibliographies, and translations of the original English text into several other languages were done. By then, it was realised that the printed word is not the only means of documentary transmission through which the communication needs of individuals and institutions are met. And there was a need for a standardised descriptive structure for documentary materials other than books.

Consequently, the ISBD (NBM) International Standard Bibliographic Description for Non-Book Materials was published in 1977. "This ISBD contained provisions covering machine-readable data files. However, when the ISBD (NBM) was being reviewed, together with the ISBD (CM), ISBD (M), and ISBD(S), by the ISBD Review Committee formed by IFLA in 1981, it was decided that special consideration should be given to the rapidly increasing need for a separate ISBD for computer files [ISBD (ER), 1997]." With the development of programs and data files for smaller computers, the nature of the medium became more complex; in addition, this change resulted in physical items roughly comparable to other library materials being more widely added to library collections. Hence bibliographic control was needed for them. As a result, the ISBD (CF) Working Group was established in 1986. In 1990, the first edition of ISBD (CF) was formally brought out. With the emergence of

interactive multimedia, development of optical technology, availability of remote electronic resources on the Internet and World Wide Web, and reproductions of electronic resources, it was felt that ISBD (CF) should address the bibliographic implication of such developments. A Working Group was formed in 1994. In 1995, the Second Edition of the draft was prepared and distributed for worldwide review from individual readers, library associations and national libraries. As a result, many improvements were made, including recognising the need for a new term to characterise the material under discussion. Thus, the more appropriate term 'electronic resource' was chosen.

**Purpose of ISBD:**

The primary purpose of the ISBDs is to provide the stipulations for compatible descriptive cataloguing worldwide to aid the international exchange of bibliographic records between national bibliographic agencies and throughout the international library and information community. By specifying the elements which comprise a bibliographic description and by prescribing the order in which those elements should be presented and the punctuation by which they should be restricted, the ISBDs aim to:

• make records from different sources interchangeable so that records produced in one country can be readily accepted in library catalogues or other bibliographic lists in any other nation;

• assist in the interpretation of records across language barriers so that users of other languages can interpret records produced by users of one language;

• assist in the conversion of bibliographic records to electronic form.

**Review questions:**

1. What is subject cataloguing?

2. Explain SLSH and LCSH.

3. Define bibliographic control.

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