
UNIT 10 DIFFERENT TYPES OF BINDING FOR LIBRARY DOCUMENTS

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10.0 OBJECTIVES

After reading this Unit, you will be able to:

- discuss different steps involved in binding;
- classify different types of binding process;
- differentiate between casing and binding; and
- elaborate the binding process of different types of library materials.

10.1 INTRODUCTION

Bookbinding is the process of collecting printed pages of a book together in correct sequence, and putting them between covers. Binding holds the pages together, protects them from wear and tear and makes their use easy. A tastefully designed cover makes the book attractive too.

“Binding of Library Books” and “Library Binding” are two terms having different connotations.

“Binding of Library Books” comprises different types of binding used for different types of materials having different physical forms and intrinsic value. But, “Library Binding” is a specific type of binding which adopts typical binding process, using materials of specified standard.

At this stage one more point requires clarification: Of the various types of materials which are acquired by the Library, the Journals, Periodicals and some such materials come in a form which requires binding in the true sense of the term, according to requirements. But in all other cases, the publications come with a binding/covering given to them by their respective publishers. In such cases the Librarian is concerned, not with binding as such, but with, what may be called ‘rebinding’ or ‘reinforced binding’.

10.2 BINDING

The first step of any binding process involves *folding*, *gathering* and *sewing*. Printing is done on large sheets of paper, several pages of the book printed on both sides of each sheet. After printing, the sheets are folded (*folding*). Each folded sheet comprising, usually 8 or 16 pages of the book (see terms viz., *folio*, *quarto*, *octavo* in the Key Words at the end of the Unit) is called a ‘forme’ or a ‘section’. For the convenience of binder in arranging these sections in the correct sequence, the first page of each section is marked at the bottom left corner with consecutive numbers or letters of the alphabet, known as ‘signatures’. These forme, or sections or signature are then arranged (*gathering*), ready for stitching (*sewing*), and after stitching, provided with appropriate covering.

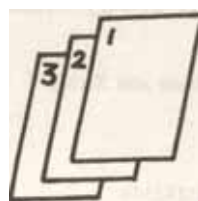


Fig. 10.1: Signatures

Self Check Exercise

- 1) Discuss the different steps of binding.

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

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

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10.3 CLASSIFICATION OF BINDING

The form of binding in which publications come to the library ranges from wire-stitched pamphlets having soft paper cover to elaborate leather binding (even with elaborate decorations). The different types of binding can be broadly categorised as follows:

10.3.1 Classified by Stitching Process Used

The pamphlet-type publications are generally released by their publishers in wire-stitched form, with a paper cover. If the number of pages are small, the printing is so done as to allow centre stitching with staple to attach the pages to the outer cover. But in case of pamphlets having more number of pages, comprising several sections, side-stitching becomes necessary.

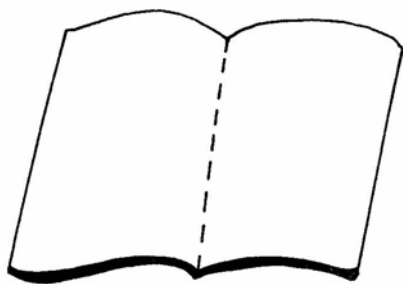


Fig.10.2 A: Centre-stitched (wire) Pamphlet

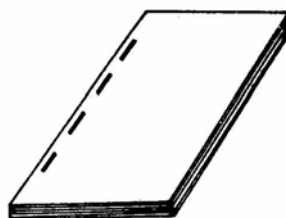


Fig. 10.2 B: Side-stitched (wire) Pamphlet

The staples/wires generally used, are galvanised or copper-plated, steel wires. Though this is a convenient, less expensive and fast process, it is an ill-conceived method of securing the sections. Wire-stitched books, unless centre-stitched, do not open easily; the staple-wires rust in due course, causing paper to disintegrate. This necessitates rebinding the volume sooner or later in a proper way.

Adhesive Applied Binding

In this process the backs of all the folded sheets (the sections) are cut, converting each page as a single leaf. A flexible adhesive is then applied to the freshly cut edges of the sheets. Each, single sheet is thus secured and the pages have the freedom of movement in opening and closing.

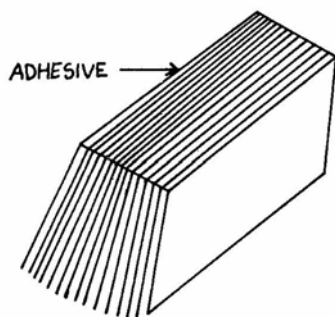


Fig. 10.3: Adhesive Applied Spine

Adhesive bound books using stable polymer glues are published these days in a very large number. These comprise not only fictions, or pocket-book editions, but also non-fiction books of long lasting value. This process has no doubt made mass-production of books cheap and rapid, but it is considered as a necessary evil. The pages of the books so bound come apart after a very little use, requiring re-binding for long-term use and preservation. In spite of this drawback, curiously enough this type of binding is known as *perfect binding*, which is far from being perfect.

Section-stitched Binding

In this process, also called “signature stitching”, the folded signatures are gathered together in correct sequence. These are subsequently sewn with thread and needle, the stitches fastening one signature to the other.

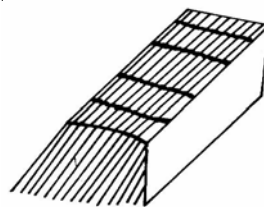


Fig.10.4: Section-stitched Book

If the publication is to be given a soft or a hard-cover casing (see 'casing' below) the sewn sections are pasted down with hinges and endpapers with the cover. But if stronger binding with hard-cover is required, the sewn signatures are also sewn on to pieces of cord or strips of white linen fixed or pasted across the spine. The projected parts of the cord or the tape in their turn are pasted down or laced into the covering boards later in the process. This process of stitching is a part of "binding" in the real sense of the term, as opposed to wire-stitching or adhesive binding discussed above. This will be further discussed in Unit 12.

Self Check Exercise

- 2) Classify different types of binding on the basis of their stitching.

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

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

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10.3.2 Classified by the Type of Covering Material Used

Soft-cover Binding

Pamphlets are generally published with soft covers made of thick paper or thin card sheets. The cover is stapled on to the folded sections.



Fig.10.5: Soft-cover Binding

Now-a-days more and more publications in soft covers are released by the publishers. These include pamphlets, fictions and even non-fiction books, pocket-book editions and student editions of standard books for being sold at affordable price. In this process single card-sheet are printed and cut to size to cover both the sides of the book. It is then

creased to accommodate the spine of the volume. The spine is guarded with thick paper and a strip of white linen, all of which are then sewn together with the sections of the book. The whole is then pasted on to the card-sheet cover with the help of end-papers. The linen reinforcement is also pasted down.

Books with this type of soft-cover binding are weak in physical get-up and require regular binding in due course, if long term use and preservation is required.

Hard-cover Binding

Hard-bound editions of books use heavy boards, such as:

- Straw boards: a cheaper quality card-board made of straw. These are generally used for smaller and cheaper books;
- Mill boards: made of jute, hemp or rags, properly calendered to make them tough;
- Grey boards: medium quality boards, compact and strong;
- Split boards: made by gluing thin black mill-boards. These are used for reinforced library binding.

The process is like this:

Two pieces of board, one for the front and the other for the back of the volume, are cut to size. These will be so cut as to overhang the pages of the volume at head (top) foot (bottom) and fore-edges (sides) and are laced on by the cord or tape-ends.

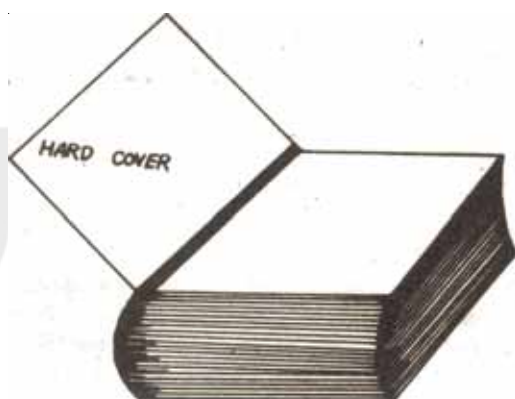


Fig. 10.6: Hard-cover Binding

After the boards have been laced to the book, these are covered with leather, cloth, rexine, leather like plastic, or paper, from which the following nomenclatures of the styles of binding are derived:

- Full leather Or Half-leather binding
- Full cloth or Full rexine binding
- Half and quarter cloth binding.
- and so on.

The terms full, half and quarter are used according to the width of the covering material.

10.4 CASING AND BINDING

10.4.1 Casing

It is also known as 'publishers' binding' or 'case binding' or 'edition binding', as distinct from hand binding or 'extra binding' or 'simply binding'.

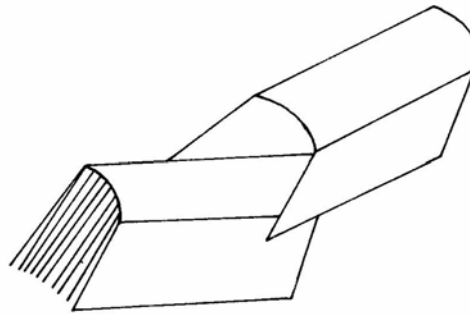


Fig. 10.7: Casing-in

In the casing process the covers or 'cases' are made as separate units and to them the sewn signatures (sections) are joined, usually without tapes or cords, by pasting down hinges and papers. It is a cheap, mass production process, and is called 'publishers' binding' because with the help of machinery or even without much of it, a large number of identical volumes are produced by the publishers at a very low production cost.

Casing, however, lacks durability. After some use the case gets separated from the book, and require rebinding.

10.4.2 Binding

As distinct from 'casing', 'binding' is the process in which the cover is woven with the book as its integral part, not just separately prepared and pasted on with endpapers. In binding, the cover-boards are laced in with the book. 'The term 'binding' in the real sense of the term applies to this process only, and it will be discussed in detail in Unit 12 of this course. It will, however, be in order to compare 'casing' with 'binding' at this stage.

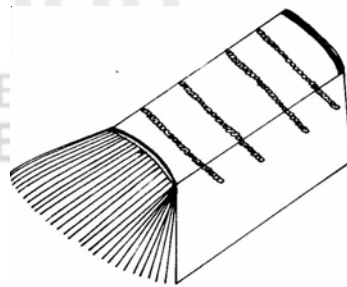


Fig. 10.8 A: Free Cord Ends to be Laced in with the Board

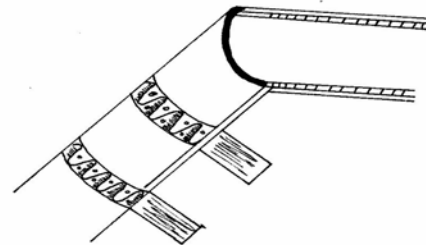


Fig. 10.8 B: Free Tape-ends to be Laced in with the Board

10.4.3 Casing and Binding Compared

Casing

- i) The cover is simply pasted on to the book, and is not an integral part of it.
- ii) The cover gets separated from the book after some use, requiring rebinding.
- iii) Useful for rapid mass-production at less cost with the help of machines, or without even much of it.
- iv) Commonly known as 'publishers' binding' or 'edition binding' applied to the

Binding

- i) The cover is an integral part of the book to which it is laced in.
- ii) The cover does not easily get separated and is long lasting.
- iii) Hand process, much costlier than casing.
- iv) Known as 'binding' in the true sense. Each book has to be treated separately.

production of a large number of similar volumes of the same book.

Exact similarity of all the volumes of the same book is difficult to achieve.

v) Appropriate for publications which are not for long term use and preservation.

v) Appropriate for publications which are for long term use and preservation.

10.5 BINDING OF DIFFERENT TYPES OF LIBRARY MATERIALS

10.5.1 Pamphlet Binding

As has been stated above, pamphlets are very thin volumes. These are generally issued by their publishers with paper covers, centre-stitched or side-stitched with staples, attaching the pages and the covers together. Those pamphlets which are considered worthy of preservation can be sewn after guarding the spine with two sheets of white cover and a strip of white linen. All these are then sewn together by strong thread and needle through the fold of a single section (Section stitching). The cover is separately made by using light boards and are joined by pasting quarter cloth along the spine end. The pamphlet is then placed in this cover-case and the end papers and reinforcements pasted down. The original paper cover is cut and pasted on the board, giving the same outer look as that of the original pamphlet.

10.5.2 Book Binding

Except for a selected few reference publications, books are by and large issued by publishers, either with soft covers or with hard-cover casings. Some are stitched in the conventional way. But most of the publishers, especially the foreign ones, issue their publications with adhesive pasting of the spine. All these types of publishers' binding disintegrate after some use and the Librarian has to get such volumes rebound in the proper manner. This involves section stitching, (or stitching of a few pages together as a section in the case of adhesive-pasted books), using cords or tapes affixed to the spine, which are in turn laced into the hard-board covers. There upon the boards are given appropriate coverings, using leather, cloth, rexine or even paper (full, half or quarter) depending on the intrinsic value of the book. The process will be discussed in detail in Unit 12.

10.5.3 Binding of Journals, Periodicals and Serials

As has been seen above, books are got rebound by the Librarian; but the journals/periodicals and serials are got bound in the correct sense of the term. In doing so, he/she has to apply his/her discretion judiciously to avoid wasteful expenditure. Some of the salient guidelines are given below:

<i>Type of Journal Material</i>	<i>Stitching</i>	<i>Covering</i>
i) Materials. likely to be sparingly used; having less intrinsic value. Single issue of a volume, if borrowing of journal is allowed for individual use or for inter-library loan.	Section Stitching in all cases <i>Stabstitching</i> (i.e., stitching from the sides of the spine) should be avoided.	Moderately thick board, 1/2 cotton or linen, buckram or strong paper pasted on sides.

Binding

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| ii) Volumes moderately used | ” | Moderately heavy board; full cloth or linen, or buckram cover. |
| iii) Heavily used volumes; volumes for long term preservation. | ” | Heavy board 1/2 leather or full rexine cover |
| iv) Immensely valuable, and heavy volumes | ” | Heavy boards, Full leather covering. |

Binding of journals/periodicals: should be such that the pages of the volume open fully and can lie flat for photocopying purposes. The binding should be strong enough to bear the continuous strain in use. If all the issues of a volume, collected together, turn out to be it volume thicker than 4" or so, it would be wiser to split the volume into parts so as to make each part easy to handle, and thus reduce the extent of strain *on it on* use. Other aspects, such as gold lettering of the spine and decoration of the binding will be discussed in Unit 12.

10.5.4 Binding of Manuscripts

The essential prerequisite of binding manuscripts is strengthening. This falls within the purview of the Archivist. Earlier, the process consisted of fastening piece of fine silk-net over the surface by means of carefully prepared chemical-free paste made of corn-flour. But now-a-days this process of strengthening of manuscripts has been totally replaced by the lamination process, using cellulose acetate film.

After strengthening, the edges of the manuscripts are guarded by putting strips of fine cloth; on which stitching is done. Thereafter the manuscripts are provided with laced-on paper-board covers and the boards given a suitable covering, as in the case of reinforced binding of books and journals.

10.5.5 Binding of Maps

In the real sense, maps are not bound; these are rather mounted and protected. Mounting is done by the use of linen or strong muslin, and often laminated with cellulose acetate film or simply varnished. Large, mounted map sheets, for convenient consultation are often folded and pasted on to a board cover cut into a convenient size.

Self Check Exercise

- 3) Discuss the binding process for manuscripts.

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

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

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10.6 SUMMARY

This Unit has discussed in detail the different types of binding processes used in the libraries. Binding processes has been classified on the basis of the stitching processes and the types of covering materials used. A clear-cut distinction has been made between the casing and binding process. Finally, an in-depth analysis has been made on different types of Library materials and their binding processes.

10.7 ANSWERS TO SELF CHECK EXERCISES

- 1) The major steps of any binding process involve folding, gathering and sewing. After printing is done on large sheets of paper, they are folded. Each folded sheet comprises eight or sixteen pages and these are known as forms or sections. All the sections are then gathered and made ready for stitching (sewing) and after stitching provided with appropriate covering.
- 2) Binding can be classified on the basis of their stitching into following types:
 - i) Wire stitched binding
 - ii) Adhesive applied binding
 - iii) Section-stitched binding
- 3) The process of binding of manuscripts— includes strengthening of the manuscript through lamination using cellulose acetate film. After strengthening the edges of the manuscripts are guarded by pasting strips of fine cloth, on which stitching is done. Then the manuscripts are provided with laced-on paper board covers and the boards given a suitable covering.

10.8 KEY WORDS

Binder's Board	:	A general term for pulped materials pressed into stiff, flat, smooth sheets of various thicknesses, used for the cover of a book, under the cloth, leather or any other material. Also called: <i>Book board</i> , or simply <i>Board</i> .
Book Jacket	:	A detachable protective wrapper for a book, also called <i>book wrapper</i> , <i>dust jacket</i> , or <i>dust wrapper</i> .
Buckram	:	Coarse linen or cloth stiffened with paste etc.
Case	:	A book cover that is made completely before it is affixed to a book. Pasting a book into its cover is expressed as ' <i>casing-in</i> '.
Edition Binding	:	The binding of an edition or a number of copies of the same book in identical style, usually by mass production methods and in relatively large quantities, as opposed to <i>hand-binding</i> or <i>utility binding</i> .
End Paper	:	A folded sheet of paper of which one half is attached to a board of the book and the other forms a <i>fly-leaf</i> . (See ' <i>fly-leaf</i> '))
Fly-leaf	:	A blank leaf at the beginning or end of a book, specially the free half of the end-paper (See ' <i>end paper</i> ').

Folio	:	A full sheet of paper folded once to give four pages. (See also <i>Quarto</i> , <i>Octavo</i> ,).
Fore-edge	:	The edge of a book opposite the spine (See also <i>spine</i>).
Hinge	:	The flexible part of the binding material (leather, cloth, rexine or paper) on which the book opens. Also called 'Joints'.
Mull	:	See <i>Super</i> .
Octavo	:	A full sheet of paper folded three times to give 16 pages.
Paste-down	:	The half of the fly leaf or end paper which is pasted down to the cover board.
Quarto	:	A full sheet of paper folded twice to give 8 pages.
Rexine	:	It is made of a strong, unbleached cloth into which a water resistant coating is applied. It is then calendered to give proper grainings.
Section	:	A sheet of paper consisting generally of 4, 8 or 16 leaves folded and ready to be incorporated in the main body of the book, also called 'signature' or <i>forme</i> (See text).
Spine	:	The edge of a book along with the sections are secured together in binding; also called <i>back</i> .
Square	:	Portion of binding cover that projects beyond leaves.
Super	:	A thin, loosely woven, open-meshed, starched cotton fabric used specially for reinforcing books; also called 'mull'.

10.9 REFERENCES AND FURTHER READING

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UNIT 11 BINDING MATERIALS

Structure

- 11.0 Objectives
- 11.1 Introduction
- 11.2 Sewing Material: Thread
- 11.3 Materials for Reinforcement
 - 11.3.1 Thread Gauge and Buckram
 - 11.3.2 Tapes and Cords
 - 11.3.3 Endpapers and Paper for Guarding
- 11.4 Adhesives
 - 11.4.1 Starch Paste
 - 11.4.2 Dextrine Paste
 - 11.4.3 Glues and Gelatins
 - 11.4.4 Synthetic Adhesives
- 11.5 Covering Materials
 - 11.5.1 Paper for Outer Cover
 - 11.5.2 Cloth and Other Fabric -based Products
 - 11.5.3 Leather
 - 11.5.4 Boards and its Varieties
- 11.6 Materials for Ornamentations
- 11.7 Summary
- 11.8 Answers to Self Check Exercises
- 11.9 Key Words
- 11.10 References and Further Reading

11.0 OBJECTIVES

After reading this Unit you will be able to:

- get an idea of various stages involved in the process of binding;
- know some salient characteristics of the various kinds of materials; and
- acquaint yourself with these materials while dealing with the binders.

11.1 INTRODUCTION

With the introduction of various sophisticated machines, publishers' binding has been revolutionalised. Most books of any importance are now issued with machine-made casings. This process has been greatly improved, particularly during the past few decades. Automatic machines have made possible mass production of books with casings at a very rapid rate;

so much so that a moderately equipped bookbinding plant can produce as many as 1,50,000 volumes a day.

In spite of this great spread in machine-bound books, the process of hand-binding has not lost its importance, especially in a library environment, where binding of individual books with comparatively little help from machinery is constantly required. The librarian is concerned with *rebinding* of books issued in publishers' casings, *binding* of journal volumes, serial publications, reports etc., and *reinforced binding* of precious volumes, whose original bindings have deteriorated. All this has to be done by the hand process alone.

As a prerequisite for better understanding of the actual process of binding, to be discussed in the succeeding Unit, the various types of materials used in hand-binding process, are being discussed here. In spite of revolutionary developments, hand-binding is still being done by methods and with simple appliances that have changed but little during the past 400 years; but there has been a much greater variety of materials which are now being put to use. These will be discussed under the following heads:

- i) Sewing Material
- ii) Reinforcement Material
- iii) Pasting Material
- iv) Covering Material
- v) Materials for ornamentation

11.2 SEWING MATERIAL: THREAD

The durability of binding greatly depends on the quality of the thread used in sewing. The thread should not be too thick or too thin. The thickness of the thread must be related to the thickness of the paper used in the book as well as the number of sections (i.e., the thickness of the spine) to be stitched together. If the thread is too thick for a thin volume, it may cause damage to the book itself. On the other hand, if it is too thin for a thick volume, there is the risk of its breaking, which will turn the binding useless in no time.

It is not the thickness alone that lends strength to the thread. The thread should be made of unbleached linen of good quality cotton. It should be unsized and of not less than three plies. It should be strong enough to withstand a breaking load of 2.5 kgs. for ordinary books and of not less than 5.0 kgs. for heavy reference volumes as well as for journal volumes of moderate thickness. The thread should be soft and without any manufacturing defect in the form of unevenness and knots; otherwise it may injure the paper at turns and even while stitching.

Apart from cotton or linen thread, or silk thread which also is sometimes used, thread made of synthetic fibre is now being used quite extensively. It is stronger than cotton or linen thread for the same thickness; more uniform and smooth; and less affected by dampness or atmospheric pollution.

11.3 MATERIALS FOR REINFORCEMENT

The following materials are used for reinforcement:

11.3.1 Thread Gauge and Buckram

To provide strength to the connecting cardboards and to increase the longevity of the binding, a closely woven cotton-mesh is pasted along the spine of the volume by means of

glue. This material is known as 'thread gauge'. The fabric used for providing strength to the connecting boards, as well as for reinforcement of the folds or end-papers or spine etc. should be of unsized cotton, which is free from manufacturing defects and loose threads. The fabric should be soft and pliable. The primary characteristics, as recommended by the National Archives of India are:

<i>Type of Cloth</i>	<i>Thread Count</i>	<i>Thickness (average)</i>
Long Cloth	160	0.15 mm
Malmal	160	0.10 mm
Gauge	40	0.15 mm

In the case of reinforced library binding of rare volumes, a strip of buckram, instead of thread gauge is placed between the edge of the pages and the binding, to hold the pages together firmly.

11.3.2 Tapes and Cords

The tapes and cords to be laced in to the cardboard should be made of unbleached linen or cotton of good quality; unsized and free from loose threads or other manufacturing defects. If cords are used (this is done only in rare cases of extra heavy volumes), their thickness should be very judiciously selected.

The thread gauge, and tapes and cords made of synthetic fibres are now-a-days available in large variety, and are being used instead of those made of cotton, linen or silk. These synthetic products, though more expensive, have been found to be much superior to the traditionally used materials prepared from natural fibres.

11.3.3 Endpapers and Paper for Guarding

Acid free handmade paper or bank-paper, or ledger paper of good quality should be used for this purpose. The paper should be smooth and strong and should not crack along folds.

Self Check Exercise

- 1) What are the basic materials used for reinforcement in the process of binding?

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

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

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11.4 ADHESIVES

Adhesives play a very vital role in the process of binding. The adhesive should, apart from its binding capacity, be such that it has a smooth and homogeneous consistency; should be soft at the raw state to allow free manipulation, and should dry quickly after its application.

The common varieties of adhesive used in book-binding work are:

11.4.1 Starch Paste

Starch paste has been traditionally used by binders. It is cheap, easy to prepare and is excellently suited to and compatible with paper, cloth, various cloth-based products like rexine and buckram, or leather. It is not easy to substitute well-prepared starch paste by any better product because of its cheapness and efficiency. Needless, however, to say that the paste should be acid free and have insect-repellant content.

To achieve this, 2-3 percent Formalin and }-3 percent glycerin is mixed with the paste, instead of copper sulphate; which the binders traditionally use.

According to Indian Standard: IS 3050(1965), the binders paste should be made from best -quality starch, mixed with insecticide conforming to Indian standard: IS 562(1962), not harmful to man.

11.4.2 Dextrine Paste

For repair work this paste, instead of simple starch paste, can better be used conveniently. Its formulation is as follows:

Dextrine	Water	Oil of Cloves	Saffron	Barium Carbonate
2.5 Kg.	5.0 Kg.	40 Gms.	80 Gms.	

11.4.3 Glues and Gelatins

Glues and gelatins are animal products. A very satisfactory glue for bookbinders has high gelatin content. A little phenol (Carbolic acid) to ensure preservation and to render insect repellent property, is added to it. This product is costly and is very sparingly used by binders for typical binding jobs only.

Other glues, such as, gum arabic, gum strip and rubber adhesives etc; are used for some miscellaneous binding jobs.

11.4.4 Synthetic Adhesives

Although it's long-term efficacy is yet to be properly established, it is now considered by many as a very satisfactory substitute for starch or dextrine paste. But it is still being used only for repair and mending jobs in archives and libraries mostly because of its higher cost.

11.5 COVERING MATERIALS

11.5.1 Paper for Outer Cover

Books issued in publishers' casings as well as in other cheaper editions are with paper coverings pasted on the boards. Papers used for this purpose are strong and with pleasant finish, on which titles of the books and also other decorative designs are printed. The paper cover is often laminated to give a bright, pleasant and glazy appearance. While the need for rebinding of such a book arises, efforts are made to retain this outer paper cover if it is in a good condition, by providing the volume with a 1/4 cloth spine, keeping the existing paper covered board intact; otherwise a fresh paper cover or cloth or rexin cover is provided to it.

'Linson' is one of the most commonly and widely used products. It is made of strong fibre as uncalendered paper is manufactured. An appropriate filler is squeezed into it. It is then

calendered to create suitable graining on the surface. It looks like cloth based product, but is weaker than that.

11.5.2 Cloth and Other Fabric-based Products

Cloth and cloth-based products, such as rexine and what is known as 'imitation leather', are now-a-days considered as the most useful and widely used covering material. These products are now coming up as strong competitors to leather. But these are more expensive albeit more durable than these products. Binding cloth and other cloth-based products are now available in large washable, water-proof, oil resistant, and in various colours, grains, thicknesses and strength.

The quality of cloth and cloth-based products is dependent on the strength and finish of the fabric. The fabric base should be of unsized, evenly woven cloth, but free from any manufacturing defects. It should be soft and pliable.

In preparing the cloth based products like rexine the fabric is first dyed in desired colour and then filled or coated, as the case may be. Filling is done by providing a starch-base. For appropriate coating a mixture of nitrocellulose and castor oil was used earlier, but now-a-days, various kinds of synthetic rexine are used for the purpose. After coating and drying the product should be free from stickiness when folded. It should allow satisfactory finishing and tooling by hand or with embossing machine.

11.5.3 Leather

Leather is considered, even today, as an ideal covering material for binding. It is pliable, and suitable for proper finishing, tooling and lettering purposes. It has the quality of being readily moulded to the shape of the book while wet, and by its toughness and flexibility it strengthens the spine of the book without impeding its opening. In spite of all our technological progress, this material used in book-binding is yet to be fully replaced.

The leather should, of course, be of good quality free from surface defects, of uniform thickness and have natural grains on its surface. It should be vegetable tanned, chrome tanned or a combination of both, and should be acid free.

Leather made of goat's skin is known as *morocco leather*. This as well as sheep's skin is commonly used in bookbinding. Morocco leather has long fibres and prominent grains on the surface. The sheep skin also is a quality product, soft, durable and of attractive colour. These two varieties, if properly tanned, are found to be most suitable for bookbinding purpose. The quality and finish should, however, conform to Indian Standard: IS 2960(1964):

Specifications for bookbinding leather

Apart from Goat's skin and sheep skin, calf leather, pig skin, and even seal skin had been used by bookbinders in the past. Calf skin is beautiful and delicate in appearance, but has not been found to be so durable. On the other hand, pig skin or hog skin, though attractive in appearance is thick and inflexible. Seal skin, which was used in certain countries in the past, is very costly because of its scarcity and is too tough to be given proper finish. These products are, therefore, very rarely used in bookbinding now-a-days.

11.5.4 Boards and its Varieties

During the early days thin wooden boards were used to give protection to books, specially, manuscripts. But now-a-days such wooden boards are very rarely used for the purpose, and have been completely replaced by paper-boards.

Paper-boards in a large variety are now available to suit all bookbinding needs. Among them the following varieties are most common:

Millboards: Millboards are made of jute or hemp wastes or cotton rags. These are highly calendered to make them tough. This type of boards is generally used for standard books and journal volumes.

Strawboards: Strawboard, as the name implies is made of straw and is cheaper than millboard. This variety is generally used for binding smaller and cheaper books.

The selection of the right kind of mill board and strawboard, according to actual requirement, can be made by keeping in view the following specifications prescribed by the National Archives of India:

			<i>Thickness</i>		<i>Level of Compression (Substance)</i>	
i) Millboard	Less	than	1.55mm	1500	GSM	(gm. per sq. mts)
	"	"	3.5 mm	3500	"	"
	"	"	4.5 mm	4500	"	"
ii) Strawboard	"	"	1.5 mm	1000	"	"
	"	"	3.5 mm	2000 -	"	"
	"	"	4.5 mm	3000	"	"

Splitboards: This is a costly product and is used only for reinforced library binding of very precious volumes. It is made by gluing together two millboard sheets - one thick and the other thin, one above the other.

Greyboards: It is a medium quality product, compact and hard wearing.

Except for Splitboard, which is composed of two layers, the other binding boards should be single-ply, hard pressed, uniform in thickness and should be flat on horizontal surface. Both the surfaces should be clean and free from loose fibres, lumps and mechanical indentations

Self Check Exercise

- 2) Write down the important varieties of adhesives and covering materials required for binding.

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

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

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11.6 MATERIALS FOR ORNAMENTATIONS

i) **Gold tooling:** For gold lettering and ornamentation on the cover of the bound volume, thin gold leaves were used in the past. The bright golden ornamentations were often so elaborate that the volume turned into a piece of art object. Now-a-days neither leaves of pure gold are used, nor are any elaborate ornamentation resorted to. Whatever gold tooling is now done is done with leaves prepared by an alloy of gold, copper and silver mixed in varying proportions, or even cheaper alternative.

The thin leaf is placed at the appropriate place on the surface of the binding and is embossed with hot metal die. Gold tooling now-a-days is mostly restricted to leather and rexine bound books and journals.

ii) **Silver tooling:** For this thin silver foils or palladium metal foils are used.

iii) **Printing:** Letterpress printing by using pigments of any chosen colour is being extensively used, particularly on publishers' casings and a cheap alternative to gold or silver tooling.

11.7 SUMMARY

This Unit entitled "Binding Materials" discusses the various stages and equipments required in the process of binding reading materials. The initial step of binding is sewing materials by thread. It may be cotton or linen or silk. The next step is reinforcement of materials through thread gauge and buckram, tapes and cords, endpapers and papers for guarding. The next step of binding is using adhesives. Its common varieties are starch paste, dextrine paste, glues and gelatins, synthetic adhesives. The third step is use of various kinds of covering materials such as paper, cloth, leather and boards. Finally, lettering and ornamentation on the cover of the board volume are made and it comes to a proper shape.

11.8 ANSWERS TO SELF CHECK EXERCISES

- 1) The basic materials used for reinforcement in the process of binding are (i) thread gauge and buckram (ii) tapes and cards (iii) endpapers and papers for guarding.
- 2) The important varieties of adhesives are (i) Starch paste (ii) Dextrine paste (iii) Glue and gelatins (iv) Synthetic adhesives.

But covering materials include paper for outer cover, cloth and other fabric based products, leather and boards.

11.9 KEY WORDS

Antique Leather	:	Leather, dyed unevenly to look antique.
Bleach	:	Removing or reducing discolouration in paper or cotton fabric by the use of acid or alkaline solution (<i>Unbleached</i> - without such a treatment)
Buckram	:	A coarse, stiff cloth made by gluing two fabric pieces together. A thin transparent material is glued to stiff fabric. In reinforced binding it is placed between the edges of the pages and the binding to hold the pages firmly together.

Dextrine Glue	:	Water soluble gum prepared with dextrine mixed with water and other materials.
Endpapers	:	Sheets of paper provided by the binder at the beginning and the end of a bound volume, one half of which is pasted On to the inside of the cover board and the other half is left free.
Rexine	:	A fabric based product. Thick and strong fabric is given a thick surface coating, and then calendered to create grains on the surface.

11.10 REFERENCES AND FURTHER READING

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UNIT 12 BINDING PROCESS

Structure

- 12.0 Objectives
- 12.1 Introduction
- 12.2 Binding Process
 - 12.2.1 Preparation of Material for Binding
 - 12.2.2 Sewing
 - 12.2.3 Forwarding: Cutting and Trimming
 - 12.2.4 Rounding and Backing
 - 12.2.5 Marbling, Gilding, Colouring of Edges
 - 12.2.6 Fixing Head-bands
 - 12.2.7 Cutting and Attaching Boards, Gluing
 - 12.2.8 Covering
 - 12.2.9 Finishing; Lettering and Ornamentation
- 12.3 Binding Routine,
 - 12.3.1 What is to be Bound?
 - 12.3.2 What Type of Binding, for What Kind of Material?
 - 12.3.3 Administrative Procedures
- 12.4 Summary
- 12.5 Answers to Self Check Exercises
- 12.6 Key Words
- 12.7 References and Further Reading

12.0 OBJECTIVES

After reading this Unit, you will be able to:

- explain the binding process and the various steps involved in it from the preparations of material for binding to the finishing stage;
- identify type of binding materials required; and
- know the administrative procedures involved with the binding.

12.1 INTRODUCTION

As we have seen in the, earlier Unit, the reasons, for which a book is bound are two-fold: to preserve it for the posterity and to keep it in, a usable state for today's users. We have also learnt that book-binding is the art of attaching stout cover to the book by means of cords or tapes laced to the sewn sections of the book for protection of the pages and ,convenience of handling.

Binding, and for that matter re-binding of a library book poses certain constant problems, which the librarian has to tackle satisfactorily. The problems arise because of the varied

nature of the reading materials, their physical structure and condition, and, also the nature, extent and intensity of their use.

Added to these, is the perennial financial problem, which most of our libraries suffer from. This problem often seriously restricts the binding activity in a library, especially because of the rising cost of binding materials and labour.

All these problems make it imperative for the librarian to take discreet and judicious decisions as to whether a particular volume is to be bound or rebound at all or not; if so, what kind of binding - full, half or quarter leather, cloth or rexine, or simple paper, binding - should be technically appropriate and economically feasible.

Some of the criteria, among others, for deciding whether a particular volume should be bound or not, are:

- The intrinsic value of its content: present and anticipated;
- Existing physical condition of the volume;
- What kind of readers will use it, in what way, and how frequently;
- Can the volume be replaced easily now or in near future, and if so;
- Whether it would be cheaper to buy a new copy than to rebind the old one.

Each piece of material has to be weighed in terms of the above criteria. The basic guiding principle should be to derive maximum value of the money spent in binding/rebinding. On taking the appropriate decisions in this respect, the volume concerned is passed on to the binder with appropriate instructions for the required type of binding

12.2 BINDING PROCESS

Library binding process proceeds according to the following steps:

12.2.1 Preparation of Material for Binding

- i) *Folding*: As has been stated in the earlier Unit, in machine binding the sheets of the printed pages are folded by the folding machine in signatures (Sections) of 16 pages, which is very common, or of 8, 12 and 32 pages, depending on the measurement of the broad sheet used in printing and on the desired format of the book.

In the process of hand binding of a freshly printed book, folding is done by hand. In rebinding of an already folded and bound volume, which has to be done by hand only, the process of folding actually means refolding if the existing folding of certain pages had not been done correctly. This is necessary to avoid flaws in the rebound volume.

- ii) *Gathering*: The signatures (sections) of the folded or refolded sheets, as the case may be, are gathered together, one section below the other is in correct sequence. In the case all superfluous pages, such as advertisements etc. are to be discarded, and all wire-stitching, if any, removed at this stage before gathering.

- iii) *Collation*: To prepare a volume for binding it is important that it is collated properly to ensure correct sequence of pagination, and that no page is either defective or missing. Collation of journal volumes demand additional care, because the pagination of issues of a volume of some journals run in issue-wise separate sequences. In the care of a journal volume it is, therefore, important, not only to be sure that none of the pages are damaged, missing or mutilated, but also to ensure that all the issues of the volume are

intact and arranged in correct sequence. It is also important to ensure that each volume has the title page and the index, the former to be included in the beginning of the volume, and the latter at the end. For those journals which do not publish volume-wise index, the content-page of each issue are to be collected, arranged, sequentially and included in the volume.

iv) Repairing: If any defect is noticed in the collation process, it has to be rectified. The process of repairing may involve:

Flattening of wrinkles: This can be achieved by moistening the wrinkled page with a wet sponge and flattening with a moderately heated iron.

Guarding: This is to strengthen the folds or the edges of the damaged leaves by pasting thin tissue paper or linen strips. This should, however, be done very judiciously because excessive guarding will produce a much swollen spine, which in turn will produce a weak binding, susceptible to damage in handling.

Sizing, washing, mending: If the surface of paper of an old volume for rebinding appears to be of weak; wooly texture, it should be given a sizing; if there are stains, the paper should be washed in an appropriate chemical solution; and if certain leaves are torn, these should be mended. There are prescribed archival techniques to take care of such jobs. Except for routine mending; all such jobs involving precious volumes should be got undertaken Under the supervision of a qualified Archivist.

12.2.2 Sewing

After proper collation and necessary repairing, the collected signatures are then placed on a 'sewing frame' with sheets of end-papers on the top and the bottom. The back of the collected sections are then marked by pencil lines to guide as to the location of each band. This process is called "marking up". Instead of simple 'marking up' process, sometimes 'saw-in' method is adopted. In this process saw-cuts are made on the back to accommodate the bands, the sewing thread and its knots. This method is generally avoided now-a-days because saw-cuts weaken the back to an extent, and what is more important, saw-cut stitching hampers opening of the volume right up to the back.

Generally, for a book of normal thickness and spine length, five bands are used at equal distance. For sewing, the marked-up sections are placed on the platform of the 'Sewing Frame'. The 'Sewing Frame' consists of a bed with two reprints and a cross-bar, which can be raised and lowered as required. These are all made of wood. To setup for sewing, as many loops of cords, called 'lay cords' as these are to be bands, are threaded to the cross-piece and fastened to form the bands.

On the platform of the 'Sewing Frame', the first section is so placed that its spine presses against the vertically set cords, each of which must coincide with each pencil marking on the spine. The needle carrying the stitching thread is carried in and out of the section, starting with a kettle stitch and passing round each upright cord. The second section is then placed on the first (which has already been stitched), and stitched the same way, tying it with the loose end of the beginning of the first section with a kettle stitch. The third and all the subsequent sections are stitched in the same way, one after another. Thus, all the sewn sections of the volume pile up on the platform of the 'Sewing Frame'. After stitching of each section, it is knocked down by a loaded stick so that even tension may be had all through the sewing and kettle at the ends.

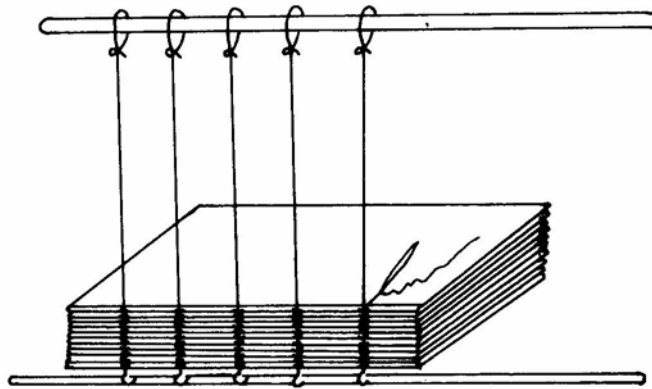


Fig. 12.1: Sewing on a Sewing Frame

12.2.3 Forwarding: Cutting and Trimming

When all the signatures are sewn, as above, the cords are cut, so that short lengths extend at each side. These are to be laced into the boards later. These short lengths of cord extending at each side are called 'slips'.

The volume is then placed on, what is called, a Laying or Cutting Press. Keeping the volume properly clamped and under pressure, its edges are neatly trimmed.

12.2.4 Rounding and Backing

After trimming of the edges, the volume is clamped in such a way that the spine projects over the edge of the press. It is then hammered to give the spine a smooth round shape.

This 'backing process' is to create a groove on both sides of the back. The depth of these grooves should be just enough to accommodate the thickness of the covering boards, to be used.

This rounding and backing processes are meant to control swelling of the spine of the volume caused by the stitching process.

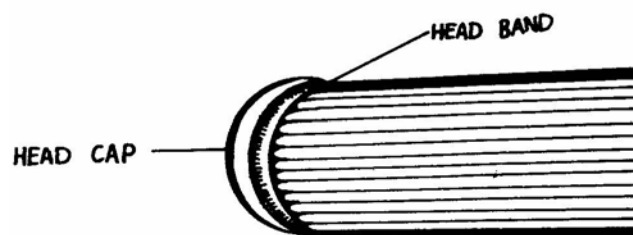


Fig. 12.2: Rounding and Backing

12.2.5 Marbling, Gilding, Colouring of Edges

In the earlier days, these processes were applied at this stage, to give a pleasant look to the bound volume.

Marbling: Edges of the volume were dipped in prepared colours, mixed with gum. After the excess gum was wiped off and the colour dried up, the edges were burnished. This process gave a pleasant look to the edges.

Gilding: The edges of the volume were sized heavily with a preparation of albumen on which thin sheets of gold-leaf were laid. When dry, it was burnished to give a bright golden look to the edges of the volume.

Coloured edges: Aniline colours mixed with alcohol was applied to the edges of the volume under pressure. When dry, the coloured edges were burnished.

Today, these processes of decorating the edges of the volume are applied very rarely and if so, only in very special cases.

12.2.6 Fixing Head-bands

While pulling out a volume from the shelf, the user does so by applying hill figures at the top edge of the spine of the volume. This gradually reduced the strength of the top-edge of the spine. It starts sagging and may eventually crack. To protect the volume against this kind of damage to the binding, headbands are affixed at the top- and bottom of the spine. These are generally made of strong cotton, or coloured silk cords. Such, head band's were very ornamental in the past, but now-a-days these are not as decorative as before. (See fig.12. 2)

12.2.7 Cutting and Attaching Boards, Gluing

Two pieces of board of selected quality, one for each side of the volume, are now cut to size. The size of the pieces should be such that there are projected ends at the head (top), foot (bottom), and fore edge. The pieces of board so cut are called 'squared'.

The board-pieces are now laid on the book and are marked with pencil according to the positions where the slips (vertically set cords fixed to the spine: see 'sewing') are to be inserted. Pair of holes is made by the binder's bodkin for the purpose, at appropriate locations so that the slip-ends can be inserted (laced) through them. The free ends of the inserted slips are then cut to appropriate short lengths and hammered, so that these are riveted into the board.

If, instead of cord, tapes are used, it becomes necessary to use split boards. The tape ends are inserted into the layers of the split board, which in turn are glued together, with the tape ends embedded in between the two layers.

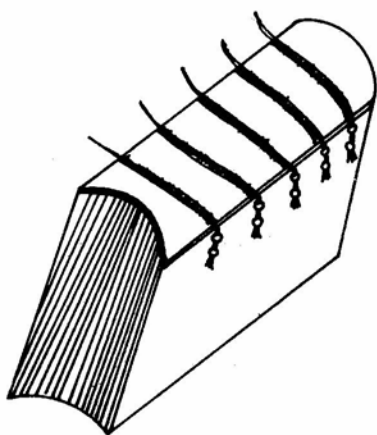


Fig. 12.3: Cord Laced into Boards

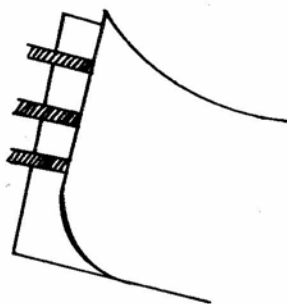


Fig. 12.4: Tapes Inserted in between Split Board Plies

Gluing up: After attaching the boards, the back along with the boards is screwed up on the laying press and hot, but not very thick, glue is applied to the spine in such a way that the glue reaches every section uniformly.

12.2.8 Covering

After the boards have been fixed to the volume and its spine glued and dried, the boards are covered wholly or partially by leather, cloth, rexine, leather-like plastic or paper, whichever is selected as per requirement. If the back is fully covered along with full, 1/2 or

1/4 of the cardboard, the binding, depending on the covering material used, is known as Quarter, half and full' leather, cloth, rexine (etc.) bound volume. Even in case of volumes other than full-leather binding (having 1/2 or 1/4 leather binding) the corners of the cardboard are given leather covering for better protection of the corners, which are susceptible to damage.

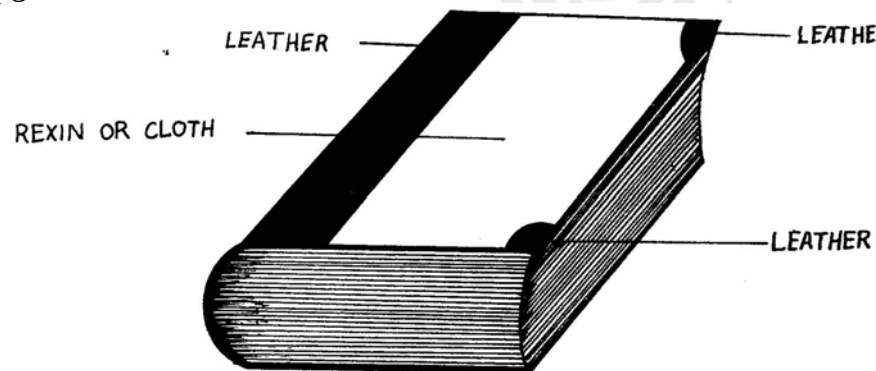


Fig. 12.5: Covering of Cardboard

If the covering material is not attached directly to the spine we have a bound volume with a hollow back. Otherwise we have the volume with flexible back. Flexible back is better, because it will make the pages of the two halves of the open volume to lie flat.

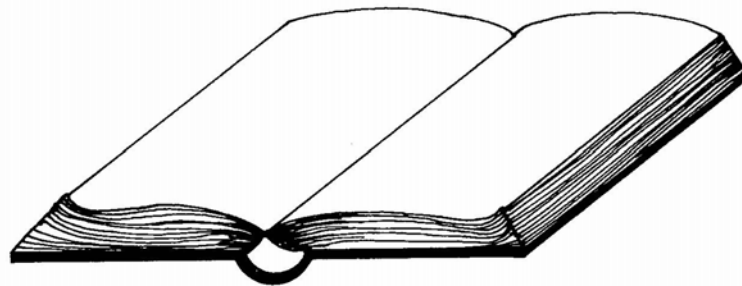


Fig. 12.6: Hollow Back.

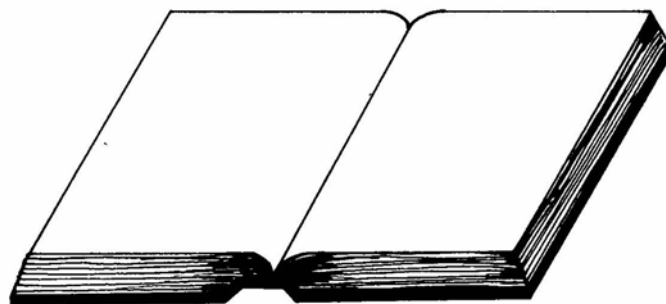


Fig. 12.7: Flexible Back

12.2.9 Finishing: Lettering and Ornamentation

This is the last step, where the end-papers are pasted on to the cardboards and thereafter the bound book is put -under some pressure so that a smooth and curve less binding is ensured.

Finishing also involves lettering and decoration with decoration design of the bound volume. In gold-lettering (see 11.6 of Unit 11) lettering done by using gold leaf, for silver lettering, silver or palladium fill is used. The binder's metal type are set up in a pallet or a stick; the types are heated; the heated type stick is passed on the spine the front-board on which gold, silver or palladium foil is placed, If any design tooling is wanted, design is drawn on paper and it is subjected .to tooling.

Now-a-days there is another method of lettering by inscribing individual letters by an electric stylus. In this process, the leather is smoothened by a heated polishing iron on its surface and the surface cleaned before lettering.

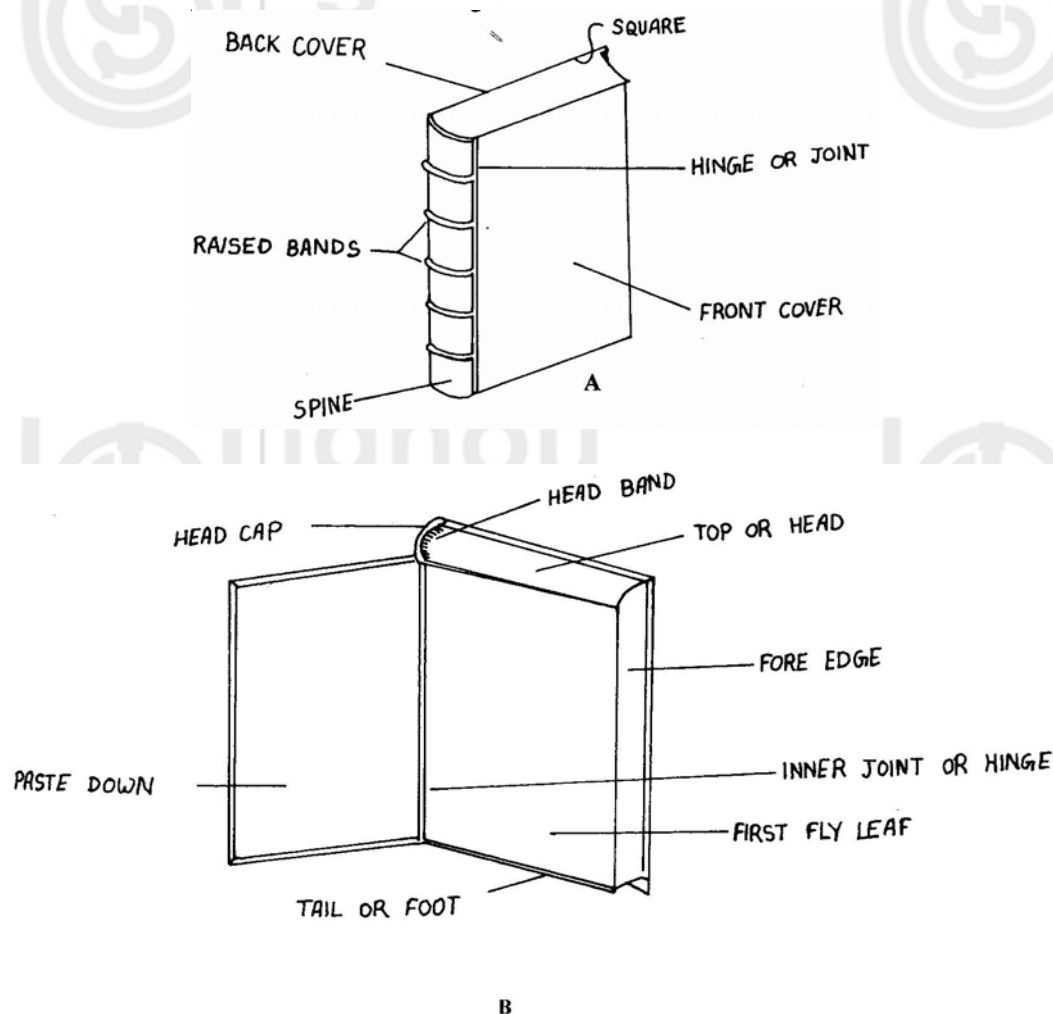


Fig. 12.8 (A & B): Parts of a Bound Book

Self Check Exercise

- 1) Enumerate the various steps involved in the binding process.

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

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

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12.3 BINDING ROUTINE

12.3.1 What is to be Bound?

At first, decision on what is to be got rebound has to be taken. The need for rebinding or simple mending of a deteriorated binding is to be decided in a judicious manner. There are

varieties of reading materials in library, such as, fictions, non-fiction books, journal volumes, monographs, reports and pamphlets, rare volumes, heavy reference volumes for constant use, and so on. Each piece of publication has to be considered on its merit, in the light of such factors as its physical state and characteristics, its use pattern, the value of its' content and so on.

Books are published in different editions, such as, popular edition, student edition, paper back edition, or library edition. The books proposed to be sent out to the binder are to be sorted out in categories like: fiction, non-fiction, rare volume, journal volume etc.

Fictions: In so far as fictions are concerned, if a particular volume is found very badly soiled, or its overall condition too fragile, there are three alternatives available for consideration, depending on the situation.

If the volume is worth preserving because the demand for it from the readers is fairly constant, efforts can be made to acquire a new copy or a new edition to replace it, provided such a copy is available for about the same cost as of the original, or even at a marginally higher cost.

If for such a volume a new replacement copy is not available, or even if available, but the quality of production is too poor to preserve and rebound in future, the original, volume has to be got properly repaired and rebound by a competent binder, even at a higher cost.

On the other hand if a fragile volume does not justify its preservation because of its lack of use, or because its content is already included in an anthology available in the library, or because it has no special artistic or historical value, it may be wiser to discard it. There is hardly any point in storing such a fiction volume as a dead stock in the library.

Non-fiction books

Apart from the considerations that apply in the case of fictions, in the case of worn-out nonfiction books, the guiding factors are:

Whether the subject-matter of the worn-out edition has been treated in a better way in a newer available edition, rendering the content of the older edition out-of-date.

Whether the book is out-of-print and the original book is still important enough on some consideration or other, to be preserved for further use.

It should be noted that there is no rule-of-thumb in this regard. The decision as to whether a volume is to be got rebound or whether some mending of the existing binding will serve the purpose, or whether a volume has to be weeded-out has to depend solely on each such volume on its own merit. It is often a difficult job which the librarian is called upon to handle meticulously and objectively. More difficult is to decide about discarding; because weeding out is in fact a process of book selection in the reverse.

Journal volumes and rare books

Journal volumes are for long term use and rare books are precious. These materials, therefore, deserve durable binding/rebinding. These are to be treated separately. Unlike general books, question of procuring replacement copies or discarding worn-out volumes does not generally apply in these cases.

12.3.2 What Type of Binding for What Kind of Material?

Reinforced binding: In the case of rebinding it involves strengthening of the structure of a weakened volume by strengthening the hinge with cloth, reinforcing delicate pages by using tissue. The volume is to be reserved and the covering material should be of a superior

standard. This type of binding is 'library binding' in the real sense of the term, as is applied to valuable publications.

Full-leather binding: In this class of binding the whole of the card-board is covered with leather. This is adopted for rare and costly volumes and also for heavy volumes which are liable to wear and tear owing to their constant heavy use. Since this type of binding is quite costly it should be adopted very discreetly.

Half-leather binding: In this class of binding the spine of the volume and half of the cardboard is covered with leather, while the rest of the card board is covered by cloth or rexine. The corners of the cardboard are also covered by leather, because these are the portions of the volume which are constantly subjected to strain. This class of binding is generally adopted for binding journal volumes as well as heavily used reference volumes like dictionaries, atlases etc.

Full-cloth or full-rexine binding: In this case the cardboards are fully covered with cloth or rexine of superior quality. This type of binding is moderately strong, and is generally used for standard textbooks. The cost of such binding is moderate.

Half-cloth or half-rexine binding: In this type of binding the spine and corners of the volume are covered with cloth or rexine and the rest of the cardboard with strong paper. This type of binding is generally adopted for books which are cheaper, and also for thinner publications like monographs and reports etc., for which often quarter-cloth binding is adopted. In quarter-cloth binding, the spine and one-quarter of the cardboard are covered with cloth and the rest with paper.

12.3.3 Administrative Procedures

After taking decision on the above, the volumes to be bound are collected. If any repairing is found necessary and can, be managed in-house, this should be done, as discussed in para 12.2.1 (iv) above. The journal volumes are arranged sequentially with title pages and Indexes and tied up volume-wise.

Decision regarding the covering materials, the quality and colour of the leather, rexine, cloth or paper, as the case may be, has to be taken. This is necessary for maintaining uniformity of colour of the volumes on the shelf.

All the above decisions have to be recorded on a binding slip in duplicate, together with the exact letterings to be done on the spine and/or front-cover, as the case may be. One copy of the same is to be tied with the concerned volume and the other copy is to be filed for checking after the volume is returned by the binder.

- Binding information is to be recorded in the Binding Register or Cards, indicating:
- Call No. of the book or volume No. and year of the Journal.
- Author and title of the book/title of the Journal
- Binding specification
- Colour of the spine
- Date on which the volume is handed over to the binder
- Date on which the volume is returned by the binder
- Cost
- Payment information (Voucher No. and Date)

When the volumes are returned by the binder, these are thoroughly checked to find out that there are no inaccuracies in binding and lettering and the job has been done in accordance with the prescribed specification. Any deficiency noticed is communicated to the binder for necessary correction before the payment is made.

Self Check Exercise

- 2) How will you decide in a library, what is to be bound?
- 3) Describe the administrative procedures involved in the binding of the materials in a library.

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

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

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12.4 SUMMARY

The criteria for deciding whether a particular volume should be bound or not has been discussed in this Unit. The various steps involved in the binding process have been described which include preparation of materials for binding, sewing, forwarding, rounding and booking, marbling, fixing head-bands, attaching boards, covering and finishing.

The volume is ready for binding, what is the administrative procedure involved has been described in the Unit. The details about type of binding a material required have been dealt in detail.

12.5 ANSWERS TO SELF CHECK EXERCISES

- 1) The various steps involved in the binding process are:
 - Preparation of material for binding - This means getting material ready for binding, for a new printed pages of books it starts from folding, gathering and collation. Repairing in this take care flattening of wrinkles, pasting of broken pages and removal of stains.
 - Sewing - All the pages put together and the side is marked with bands at equal distance on spine so as to carry stitching section wise.
 - Forwarding - The process puts the pages together in a clamp and cutting and trimming done so as to get proper size of the volume.
 - Rounding and Backing - The spin is rounded to hold covering and top and bottom side edges are projected so as to hold hard board in proper place.
 - Marbling, gilding and colouring - Give the pleasant look to the bound volume.

- Fixing Head-bands - This is to, give strength of the top-edge of the spine.
 - Attaching boards and covering - The hard boards are then put on the book and proper cloth or rexin, leatherite is put to get proper binding. And in the last step lettering and other beautiful pastings are done.
- 2) The decision on what is to be got bound and rebound has to be taken depending upon the following:
- use of the material in a library;
 - the value of the content;
 - physical state and characteristics of the materials etc.

Some time there is need for rebinding or simple mending of a deteriorated binding is to be decided in a judicious manner. The journal volumes, paper back edition and fictions are to be given preference after seeing their use.

- 3) After deciding that these are the volumes to be bound, the covering materials, quality and colour of the binding has to be decided. Exact letterings on the spine and or front-cover may be recorded. In case of journal volumes, these are arranged sequentially with title pages and indexes and tied up volume wise. Binding information must be recorded in the Binding Register or Cards along with payment information etc. finally when the volumes are returned by the binder, these are thoroughly checked to see whether work is done as per requirements and any deficiency noticed must be told to the binder before the payment is made.

12.6 KEY WORDS

Cutting Press	: See 'Laying Press'.
End Paper	: A folded sheet of paper of which one half is attached to the covering board (See 'pastedown') of the book and the other half forms a fly leaf (see 'Fly leaf').
Finishing	: This Comprises lettering, tooling and polishing.
Fly-leaf	: A blank leaf at the beginning and at the end of a book.
Fore-edge	: The edge of a book opposite the spine (see: 'Spine')
Forme	: See 'Section'
French Joint	: See 'Hinge'
Hinge	: The flexible part of the covering material (leather or rexine) on which the book opens (also called 'Joint')
Head Band	: This is a hand made of strong cotton of coloured silk cards, and are fixed at the top and bottom edges of the spine to protect the binding from sagging in constant use (particularly in the case of a heavy volume).
Joint	: See 'Hinge'
Kettle Stitch	: A stitch made at the head and tail of the book to fasten one section to another when a book is being sewed.

Laying Press

- : Also known as 'Cutting Press', on which the edges of the bond volume are trimmed.

Paste-down

- : The half of the fly-leaf or end paper which is pasted down to the cardboard cover.

Sewing Frame

- : It consists of a bed with two uprights and a cross bar which can be raised or lowered as required. The volume to be bound is set on the bed for sewing.

Signature

- : A sheet of paper consisting generally of 4, 8 or 16 leaves folded and ready to be incorporated in the main body of the book. Also known as 'Section'

Slips

- : The ends of the tape on which the book is stitched, that are attached to the board. Also known as 'back'

Split Board

- : The board used in reinforced library binding, made by two millboards - one thick and the other thin - being glued together, except in the portion to be kept split. The depth of the split portion shall be not less than one-sixth of the width of the board.

Square

- : The portion of the cardboard covers that project beyond the leaves.

12.7 REFERENCES AND FURTHER READING

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UNIT 13 STANDARDS FOR LIBRARY BINDING

Structure

- 13.0 Objectives
- 13.1 Introduction.
- 13.2 Standards for Library Binding
 - 13.2.1 Assembling
 - 13.2.2 Reinforcing
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 - 13.2.4 Sewing.
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 - 13.2.9 Styles and Colour
- 13.3 Summary
- 13.4 Answers to Self Check Exercises
- 13.5 Key Words
- 13.6 References and Further Reading Appendix

13.0 OBJECTIVES

After reading this Unit you will be able to:

- know the standards for binding for different types of library items and to get an idea about the material quality and workmanship;
- give suggestions and recommend some guidelines in the selection of the right kind of binding materials; and
- describe the various elements in the process of book-binding.

13.1 INTRODUCTION

Dr. S.R. Ranganathan in his book “Social Bibliography or Physical Bibliography for Librarians” viewed book-binding as a chain of eleven links, represented diagrammatically as follows:

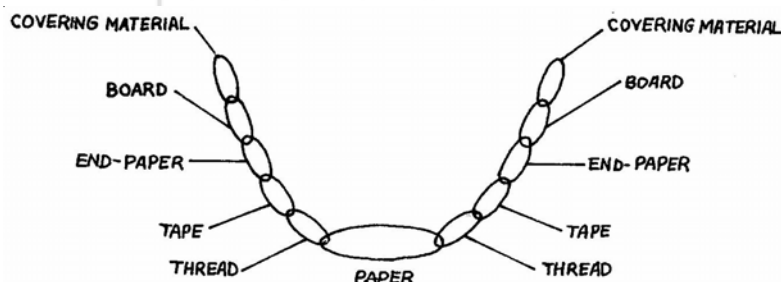


Fig.13.1 : Ranganathan's Representation of Book-Binding as a Chain of Eleven Links.
(Source: Indian Standards IS 3050-1965)

It is a symmetrical link; the collection of the printed pages which constitutes the book lies at the centre of the link.

The strength of the weakest element of the chain determines the total strength of the binding. For example, if all the elements of the chain, except the stitching thread, are pretty strong, the binding will still be weak and will break when the weak thread gives way. Likewise, same situation will arise when anyone of the other elements of the chain is weak.

There is, therefore, hardly any justification to make any element or elements of the chain disproportionately stronger than the others. There should be a balance of compatibility.

Again, the quality of each of the elements of the chain should be commensurate with the inherent durability of the central link, that is, the paper which constitutes the book. If the paper itself is very weak in texture or of a poor quality otherwise, even the best quality of all binding material used will eventually turn in fructuous. Where the librarian may have some say in matters concerning selection of the right kind of binding materials subject, of course, to their availability, he/ she has very little control over the quality of paper used for the book by its publishers. He can at best put forward his suggestions and recommend some guidelines in this respect, but the publishers may not be willing to accept them on purely commercial considerations. .

If, therefore, the librarian has to consider rebinding of a book, the paper of which is of poor quality and texture, he will be left with two alternatives:

- i) If the book is worth long-term preservation, suitable reinforcement methods to strengthen the paper before rebinding has to be adopted. Proper reinforcement will, no doubt, be expensive.
- ii) On the other hand, if the content of the book does not justify expenses on reinforcement, the book should be given a cheaper binding (other than standard library binding),

Unfortunately, binding materials, such as, leather, buckram, cardboard, tapes and cards, of right strength and quality are not always available in the market. To recommend standards for these items for library binding is one thing, but to make these available for actual use is another. The Librarian is, more often than not, constrained to accept leather of inferior variety, straw boards of weak texture, calico or cloth of indifferent quality and so on. This is, not only always because of the library's financial constraints, but also, and mote often, of the non-availability of materials of the desirable quality.

Of late, a variety of new synthetic materials, of which mention has been made in the earlier Unit (Unit 11), have started coming in the market and are being used by be binders. Cost-wise, most of these are cheaper than the materials, which are being traditionally used by our binders. But the suitability of their use in reinforced library binding is yet to be conclusively established and their quality yet to be standardised in India.

What has been stated above constitutes a general background, which has to be kept in view' while studying the paragraphs that follow.

13.2 STANDARDS FOR LIBRARY BINDING

The standards for library binding have two aspects:

- i) Quality of materials used; and
- ii) The workmanship

There are a number of prescribed standards covering various aspects of binding. Some of these standards are:

- a) *American Standards*: Durable hardcover binding for books; prepared by the American National Standards Institute (ANSI) and National Information Standards Organisation (NISO). This set of Standards (1992) incorporates those prescribed earlier by the Joint Committee of the American Library Association and the Library Binding Institute. ANSI/NISO Z39.78-2000 by National Information Standards Organisation and the Library Binding Institute.
- b) *British Standards*: Created by the British Standards Institute (BSI), 1980 with amendment (2002). These Standards take note of the various recommendations made in Brown's Manual of Library Economy and other standard British books on Library binding.
- c) *Indian Standards*: Code of practice for reinforced binding of library books and periodicals IS 3050 (1965) with amendment of February 1968. This incorporates the recommendations made by S.R. Ranganathan in his book: "Social Bibliography or Physical Bibliography for Librarians". This was further reaffirmed in 2003.

The following paragraphs are, in fact, a synthesis of the various prescriptions mentioned in the above standards, laying special emphasis on the Indian Standards (IS), which have been incorporated at the end of this Unit as an Appendix.

Synthesising several sets of prescriptions has not posed any difficulty because of the fact that these are basically akin, having no *inter se* contradictions. These in fact compliment each other.

We may now discuss the prescribed standards according to job-sequence.

13.2.1 Assembling

The procedure should follow the following steps:

- a) All books should be carefully assembled (collated) to detect any missing or damaged leaves or any peculiarities of paper or constructions that might make rebinding inadvisable. Whether the book will stand rebinding should be determined before actually sending it out to the binder.
- b) In case of periodicals or books published in installments, all the issues of a volume and the sections making up the title, contents pages and indexes should also be collated and assembled' in the proper sequence.
- c) Cover and advertisement sheets in periodicals should be removed unless these are included in the pagination of the text and/or these are required to be retained on other consideration.
- d) As far as possible, assembling into volumes more than 7 cm. in thickness should be avoided.

13.2.2 Reinforcing

The process of reinforcement is as follows:

- a) The first and the last sections of all books should be suitably guarded at the back by pasting linen or muslin strips.
- b) All sections, broken at the back, should be strengthened by providing lining inside and outside along the, fold with strips of rag, tissue paper, or unsized muslin or linen strips. The strips so pasted should preferably be serrated, The width and the weight of a strip of linen or muslin, if used for fold mending, will be governed by the nature of the repair. The warp should be paralld to the binding edge.

- c) All torn pages should be joined with tissue paper or similar material such as Japanese tissue (which is not easily available in India) or onion-skin bond (which is quite expensive). Whatever material is chosen; it should ensure that after it has been pasted, the readability of the text is not affected.
All tears in the margins should also be repaired with bond paper of suitable weight.
- d) When the paper of the volume is soft, spongy or brittle, the pages should be reinforced by pasting transparent tissue paper or similar material, which does not affect readability.
- e) All folded plates, maps, plans and other extended sheets, not forming part of a normal section should be mounted on guards of linen or muslin or tough paper. Pasting of leaves larger than the format of the volume should not be done. All extended sheets should be reinforced at the folds.
- f) The art-plates, if any in the volume, should be guarded by inserting a sheet of transparent tissue paper or similar material between the text and the front side of each plate.

13.2.3 Affixing Pockets, End-papers and Tapes

Pockets: Sometimes there are maps, charts or such other material which accompanies a volume, but cannot be bound with it because of their format. A separate pocket should be secured at the end of the volume for such material in such a way that the overall shape of the volume is as near to the normal as possible.

Endpapers: There shall be endpapers, one at each end. Each end-paper shall consist of a section giving four leaves.

The machine direction of endpapers should be parallel to the binding edge. These should be provided with strong linen or cloth joints.

Endpapers should be made of good, thick, strong paper with high *folding strength*, but their *stretch and contraction* characteristics should not differ greatly from those of adjacent papers.

The construction of endpapers should be such that the sewing will go through the reinforcing fabric the same way as through the section of the book; and each of the endpapers should be sewn on as a section.

The endpapers should preferably be coloured, marbled or printed paper with at least one white leaf before and after the printed matter. The endpapers should match the text in colour.

Tapes: Tapes made of unbleached linen or cotton should be used. The width of the tapes should be 2 cm. There should be two kettle-stitches each at a distance of 2.5 cm. from the head and tail of the volume.

13.2.4 Sewing

The method of sewing will depend on the style of binding. Nevertheless, the following basic points should always be taken into account:

- a) the need for the greatest possible strength;
- b) the thickness of the chosen thread;
- c) thickness, bulk or swelling of spine;

d) the ease with which the volume will open.

Whichever the method used, the tension of the sewing should be kept even. In rebinding the existing sewing holes should be used, if possible. (BSI Standards).

Sewing should be all along one section at a time, except where thickness of paper makes it necessary to sew two sections on. Sewing should be done with thread of suitable thickness. The thread should be strong and durable and should be of linen or unbleached cotton. It should be soft enough, preferably waxed (BSI Standard), so that it does not injure the paper. (For quality of thread see Unit 11: Binding Material, paragraph 11.2)

Sewing should be so done that when the volume is opened, the pages of its two halves i.e., flat on a flat surface.

13.2.5 Boards

Varieties of boards used by binders have been described in Unit 11. Split boards, though costlier than other varieties, is the most suitable variety for reinforced archival binding of thick volumes. While using split boards, the thinner layer of the board should be closer to the book.

Split board of standard quality is in very short supply in India. Moreover, it should be used in very special types of binding. For normal good quality library binding, the binders in India and abroad generally use mill boards.

The mill board used should be of appropriate thickness in conformity with the size and weight of the book. It should be of good quality and finish, single ply, hard rolled variety and acid free (PH between 5.0 and 9.0 according to BSI Standard). This kind of board is commonly known as “binders’ board”.

13.2.6 Forwarding

Cutting Edges:

A volume, after stitching, should be trimmed as slightly as possible. Its edges should be cut accurately leaving margins, as wide as possible. Cutting should never affect the printed portion.

A Deckle-edge Book: should not be trimmed at the fore-edge and tail-edge. The top-edge should, however, be trimmed.

Edges may be sprinkled, stained or left plain, as per choice.

Rounding, Gluing, Backing and Lining:

Rounding and backing are used together to help keep the volume in shape.

The spine of the volume should be well-rounded: The rounding should be proportionate to the thickness of the spine. For thinner volumes the rounding should be kept very low and should be increased proportionately for thicker volumes.

Volumes made up of very thin paper should be better rounded and backed, and volumes made up of very thick paper should better be left flat, Left not rounded and backed.

The rounded spine should be glued and lined with muslin extending to within 5 mm of head and tail of the volume. The lining should cover a considerable portion of each end-paper.

The glue used should be mixed with insecticide conforming to Indian Standard IS 562; 1962, reaffirmed in 1987.

Attaching Board:

In attaching the boards French Joints should be used. French joint enables the boards to swing back more freely than *if* they were fixed closely to the spine. French joint gives greater area of the covering material to stand the strain of closing and opening of the volume.

If split board is used, each slip of tape should be firmly inserted in between the plies of the board. The outermost end-paper at each end should be cut to the necessary width and inserted into the split board; or otherwise, simply pasted firmly on the inner side of the board at each end. The outermost end-paper at each end should then be pasted on the board (Paste-down).

13.2.7 Covering and Fixing Headband

covering: .If leather is used as covering material its specification should conform to Indian Standards IS 2960, 1964, reaffirmed in 1990. “Specification for book binding leather”.

The leather should not be pared too thin; this will affect its strength. It should not be attached too tightly. This is necessary to allow required flexibility within the French joint.

The covering material, whether it is leather, or cloth, or rexine, should be attached directly to the spine of the volume. This will make the pages of the two halves of the open volume to lie flat.

The covering material fixed to the spine should extend over the boards to various widths depending on the desired style of binding but in any case it should not be less than one-third of the width of the volume.

The covering material should be neatly folded, and not *mitred* (see Key words) on the corners of the board which are slightly rounded for better protection.

Headband: Headbands, generally made of strong cotton or coloured silk cords should be affixed .at the top and bottom of the spine, or pieces of strong strings may be inserted into the turning of the leather (or ‘other covering material used) at the head and tail in the place of headbands. The strength of the headband should be commensurate with the weight of the volume. (The need for fixing headbands has been discussed in Unit 12).

13.2.8 Finishing

Lettering

- i) The lettering should be *durable*, in fast colour of gold or silver, as desired.
- ii) It should be easily *readable*: the title of the volume normally 25 mm below the head, the author’s name on the upper half of the spine at least 25 mm below the title, and the bottom line of the call number on the spine normally 25 mm above the tail. Lettering done along the spine should be such that it is directly readable when the book is lying flat, front cover up.
- iii) About the size of the letters, the Bureau of Indian Standards is silent. The Librarian has to apply his judgment, keeping in view the legibility and elegance factors.

Varnishing: The cover surface may be varnished with shellac of cellulose acetate, or any other suitable material not harmful to the covering material, for better protection of the binding.

13.2.9 Styles and Colour

Styles: The Bureau of Indian Standards has prescribed the various styles of book binding and the particular use to which they are put by the librarian. (See Article 3.1 of 183050 in Appendix).

Colour: The colour of the covering material should be fast and soothing to the eye. In case of journals, serials and multivolumed books, the colour chosen should be the same for the entire set, to ensure uniformity.

Self Check Exercise

- 1) Describe the views expressed by S.R. Ranganathan on book-binding.
- 2) Discuss the process of reinforcement mentioning the quality of materials used in book-binding.
- 3) What is headband? Describe how headbands are fixed in the book-binding.

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

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

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13.3 SUMMARY

The view expressed by S.R. Ranganathan that book binding as a chain of various links and the strength and quality of each element in the chain determines the total strength of the binding has been discussed in the Unit. Standard for library binding in respect of quality of materials used and the workmanship have been described standards according to the job sequence in book-binding have been enumerated. The procedure involved in the process of assembling; reinforcing, affixing pockets, endpapers, tapes; sewing; bonds; forwarding, covering and fixing hardboard; finishing; and styles and colour has been dealt in detail.

13.4 ANSWERS TO SELF CHECK EXERCISES

- 1) S.R. Ranganathan viewed book-binding as a chain of eleven links and the printed pages which constitutes the book lies at the centre of the link. The strength of each element of the chain determines the total strength of the binding. There is no justification to make any element(s) of the chain disproportionately between them. Further, the quality of each element lies with the durability of the central link i.e., the paper quality of the book.
- 2) The process of reinforcement takes care about the strength of the all sections, pages folded plates and art-plates in the book. The first and the last section of all books

should be guarded by posting lines or muslin strips. Sections broken at the back should be strengthened by providing lining with strip of rag, tissue paper. All torn pages should be joined by Japanese tissue or onion-skein bond, when the pages are soft and brittle, these should be reinforced by pasting transparent tissue paper which does not affect readability. Folded plates, map etc. should be mounted on guards of linen or muslin or tough paper. The art-plates if any should be covered with a sheet of transparent tissue paper. .

- 3) Headbands are strong protection given at the top and bottom of the spine. Headbands are made of strong cotton or silk cords fixed inside the turning of the leather at the top and bottom of the spine. The strength of the headband should be more if the weight of the volume is high. While taking the book out of the tight shelf one puts the finger on the top of spine and try to pull out the book, here only strong headband protect the book-binding.

13.5 KEY WORDS

Deckle-edge	:	Book released by the publishers with rough uncut edges.
Folding Strength	:	The basic material that create paper is fibre. The length, intrinsic strength and the direction of the fibres relative to the line of folding are the factors which determine the strength of folding of a sheet of paper.
Machine Direction of Paper	:	In the process of manufacturing machine-made paper, the fibres mostly get set along the direction in which the pulp runs. If the machine direction of the finished paper is set parallel to the binding edge the stitching thread which will run across the fibres will ensure better grip.
Mitring	:	A joint at 45 as in the leather or the inside of the boards.
Serrated	:	Of roughened surface having rows of small projections like teeth of saw.
Stretch and Contraction	:	Paper, like any other material, has inherent characteristics like flexibility and tensile strength - however small. These factors determine its stretch and contraction characteristics.
Warp	:	In a piece of fabric there are two sets of thread laid, one across the other, and woven together. The set of threads stretched in loom, called the warp, is to be crossed by the other set, called weft. When the piece of fabric is laid with warp parallel to the binding edge, better strength is achieved.

13.6 REFERENCES AND FURTHER READING

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INDIAN STANDARD IS : 3050 - 1965 (Incorporating Amendment N.I February 1968)

CODE OF PRACTICE FOR REINFORCED BINDING OF LIBRARY BOOKS AND PERIODICALS

(**Note:** This excludes introductory paragraphs, and diagrams. It also excludes the Appendix the content of which has been covered in the Glossary appended to the texts of this and other previous Units)

1. *Scope*
 - 1.1 This code covers terminology, styles, operations and materials employed for reinforced binding of library books and periodicals. .

2. *Terminology*
 - 2.1 For the purpose of this standard, the definitions given in Appendix A shall apply. (See note above)

3. *Styles and Colour*
 - 3.1 Styles - The various styles of book binding and the particular use to which they are put by librarians are given in Table 1.

Sl.	Style	Recommended Use
i)	Full morocco	Rare books and books of permanent value
ii)	Half morocco and linen or art canvas	Periodicals and books in constant use
iii)	Full linen or art canvas	Periodicals and books not in constant use
iv)	Half linen or art calico and marble	Pamphlets and books with weak paper

- 3.2 Colour - the colour of the covering material should be fast and soothing to the eye.

4. *Assembling .*
 - 4.1 Collating - All the sections of the book shall be examined in respect of their sound condition, and collated and secured in proper sequence.

- 4.1.1 Whether the book will stand rebinding should be determined before the order for rebinding is given.

- 4.1.2 In the case of a periodical or a book published in installments, all the issues of a volume and the sections making up the title, contents pages and indexes shall also be collated and assembled in the proper sequence.

- 4.1.3 Cover and advertisement sheets in periodicals shall not be bound unless (a) they are included in the pagination of the text, and (b) they are required to be retained for other reasons.

- 4.1.4 As far as practicable, assembling into volumes more than 7 cm. in thickness should be avoided.

5. *Preparation for Sewing*
 - 5.1 The first and the last sections of all books shall be enclosed at the back in linen or muslin strips.

- 5.2 All sections broken at the back shall be lined inside and outside at the fold with strips of rag, tissue paper; or with unsized muslin or linen strips, preferably serrated.

- 5.2.1 All tom pages shall be joined with transparent tissue paper or similar material without prejudice to readability.

- 5.2.2 When paper of the volume has deteriorated and brittle, it shall be reinforced with transparent tissue paper or other similar material without prejudice to readability.

- 5.3 All folded plates, maps, plans and other extended sheets not forming part of a normal section shall be mounted on guards of linen or muslin or tough paper. Pasting of leaves larger than the format of the book shall not be permitted. All extended sheets shall be reinforced at the folds.

- 5.4 All folded plates, maps, plans and other extended sheets shall be reinforced and, where necessary, be mounted on jaconet or thin linen or muslin of good quality.

- 5.5 Pockets -To hold maps, charts and other similar materials which cannot be bound with the volume, a separate pocket shall be secured at the end of the volume in such a way that the overall shape of the volume is as near to the normal as possible.
- 5.6 End-Paper - There shall be end-papers one at each end. Each end-paper shall consist of a section giving four leaves. The end-papers shall be cut across the machine direction from head to tail. The end-papers shall be provided with strong linen or cloth joints.

6. Sewing

- 6.1 Books printed on paper of good quality shall be sewn all along one section (except where thinness of paper makes it necessary to sew two sections)with thread of suitable thickness over linen or cotton tapes.
- 6.2 Each of the end-papers shall be sewn on as a section.
- 6.3 (As amended in February 1968)

Unbleached linen or cotton tapes shall be used. The width of the tape shall be 2 cm. There shall be two kettle stitches, each at a distance of 2.5 cm. from head and tail of the book. The number of tapes will depend upon the height of the book as shown below:

Height (cm.)	Number of Tapes (Min.)
Below 25	2
25 and above but below 35	3
35 and above but up to 50	4

For books of greater height, the number of tapes shall be increased suitably. The tapes shall be equally spaced between two kettle stitches.

- 6.4 Straight line machine stitching shall not be used.
- 6.5 Sewing shall be so done that when the book is opened, the pages of its two halves lie flat on a flat surface.

7. Split Board

- 7.1 The thinner layer of the board shall be closer to the book.

8. Forwarding

- 8.1 Cutting Edges “- The edges of the book shall be cut accurately leaving margins as wide as possible. In no case, the cutting should affect the printed portion.

8.1.1 A deckle- edged book should not be cut at the fore-edge and the tail-edge, but the top edge should be cut.

8.1.2 Edges shall be sprinkled, stained or left plain, as instructed.

- 8.2 Gluing, Rounding, Backing and Lining - The spine shall be well rounded and backed. For thinner books, the round should be kept very small and increased proportionately for thicker books. In other words, the depth of the joint should be the same as the thickness of the boards.

8.2.1 The spine shall be glued.

8.2.2 The spine shall be lined with muslin extending to within 5 mm of head and tail of the book and well to each end-paper.

- 8.3 Attaching the Boards.

8.3.1 French joints shall be used in binding.

8.3.2 Each slip of the tape shall be firmly inserted into the split board.

8.3.3 The outermost end-paper at each end shall be cut to the necessary width and inserted into the split board.

8.3.4 The surviving outermost end-paper at each end shall be pasted on the board.

- 8.4 Covering

8.4.1 Leather used as covering material shall neither be pared too thin nor stretched too tightly; the former for consideration of strength and the latter to allow for play within the French joint.

8.4.2 The covering material shall be attached directly to the spine of the book.

8.4.3 The covering material of the spine shall extend over the boards to at least one-third of the width of the book.

8.4.4 The boards shall be slightly rounded at the corners. The covering material shall be neatly folded and not mitred.

8.5 Headbands - Headbands may be worked or pieces of string may be inserted into the turning of the leather at the head and tail in place of headbands.

8.6 Irregularities on the spine shall be smoothened.

9. *Finishing*

9.1 Lettering

9.1.1 The lettering shall be durable and easily readable.

9.1.2 The lettering may be in fast colour or gold, as desired.

9.1.3 The title in the lettering shall normally be 35 mm below the head.

9.1.4 The name of the author shall be on the upper half of the spine of the book at least 25 mm below the title.

9.1.5 The lettering done along the spine shall be such that it is directly readable when the book is lying flat, front cover uppermost.

9.1.6 The bottom line of the call number on the spine of the book shall normally be 25 mm above the tail.

9.2 The surface may be varnished with shellac or cellulose acetate or any other material not harmful to the covering material.

10. *Materials*

10.1 Board - The board shall be of good quality, single ply, acid-free binder's board with qualities approximating to those of mill board.

10.2 Linen - Unbleached book cloth made of flax.

10.3 End-Paper - Shall be made of good, thick, strong paper with high folding strength.

10.4 Glue - Best quality flexible glue mixed with a suitable insecticide conforming to IS : 562-1962, not harmful to man.

10.5 Paste - Made from best quality starch and mixed with a suitable insecticide conforming to IS: 652-1962, not harmful to man.

10.6 Leather - Only leather from mature animals shall be used. It should be vegetable tanned and not acid tanned. It should not be artificially grained or dyed. Goatskin, also called morocco, is recommended. The leather shall further conform to the requirements prescribed in IS : 2960 - 1964.

10.7 Tape - Shall be of linen or unbleached cotton.

10.8 Thread - Shall be strong and durable and shall be of the linen or unbleached cotton and soft enough not to injure the paper at any time.

Note: Wire stitching should not be used.