ROOM FURNITURE FOR STUDENTS' HOSTELS.

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1972-73

room furniture fo
students' hostels
diploma project 72-73
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Design of Room Furniture for Student's Hostels

Diploma Project

Submitted in partial fulfilment of
the requirements for the postgraduate diploma
in Industrial Design

by

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1971-73

APPROVAL SHEET

Diploma Project entitled

'DESIGN OF ROOM FURNITURE FOR STUDENTS' HOSTELS'

by Suhas S. Kakde is approved for the postgraduate diploma in Industrial Design.

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My acknowledgements to

Shri A. Gopinath Rao

Shri U. A. Athavankar

Prof. V. N. Adarkar

Prof. S. Nadkarni

Shri M. C. Chattopadhyay

Technical Staff

Harsh Bhasin and my other friends.

c o n t e n t s

i n t r o d u c t i o n

The monkey relaxing on a twig of a trea with its back against some vertical branch might have inspired man to produce furniture, long before history begins. Many of the Ramayana and Pre-Ramayana episodes took shape with a throne - an ornomental piece of furniture placed centrally. Since then wood and metals were engaged in this business. Today furniture has become an expression of style of life. With wide variety of materials, many forms, feelings and facilities are possible. Cost is the chief criteria.

Unfortunately one cannot sit in some chairs which are attempts to express and combine the character of hard plastic with good design. A few of them have sculptural values but less mobility and comfort. Also many times they limit our human freedom of movement. Whatever may be the material and the form of the furniture it must be ergonomical and economical.

In these years, furniture has become a concept in practically all urban hostels. This does not mean that the application has been correct or that it has fulfilled the demands made on it.

The age of technology offers us advantages that

should be expressed in our surroundings; so that experiments with form and construction are adjusted to contemporary technical and social realities. The careless and rough handling of furniture by students at their school-homes, the average standard of living of our average society, very obvious expectations from the things in use, simple expectations about comfort and beauty call for extremely sturdy, economic, functional and ergonomic set of furniture respectively.

The design also depends upon environment. In remote rural areas, schools can afford to have spacious rooms for hostels but then they may face the problem of skills to convert the available raw material into the needful set of furniture. In this context my design is based on standard industrial inputs.

The existing sets and possible designs are analysed from need, structure, function, ergonomics, aesthetics and material points of view so as to reach the standard, exact and optimum design - constraints, in the following pages.

Finally let me humbly state that my design may not be the last solution or design.

1.0 problem statement

To design a room furniture for students' hostels mainly for male students in urban areas, with special emphasis on comfort, sturdyness, appearance economy, and flexibility of use.

2.0 information

The data relevant to the problem statement was collected and rearranged in following categories,

2.1 Student's activities

2.2 Market

2.3 Ergonomist

2.4 Socio-psychological aspect

The detailed information is as followed.

2.1 Student's activities

2.1.1 Study

This is one of the major activities carried out in the room by the student. In day time table as a support for study equipment and seat (chair) as a support for student, are the main furnitures.

During night a source of illumination is required and it is a table lamp in the most of the cases. The working environment is also a deciding factor. It is very obvious that bad environment will produce lack of concentration in studies. So this activity invites the presence of -

2.1.1.1 Seat and table

2.1.1.2 Light source or Illumination.

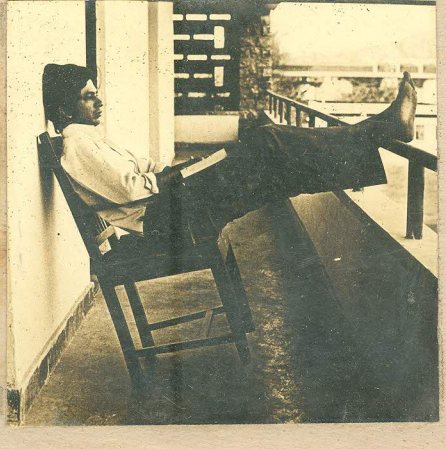
2.1.1.3 Environment

2.1.1.4 Book rack on or near the table or a similar equipment to store the necessary study-equipment with ease in accessibility.

2.1.1.1 Seat and Table

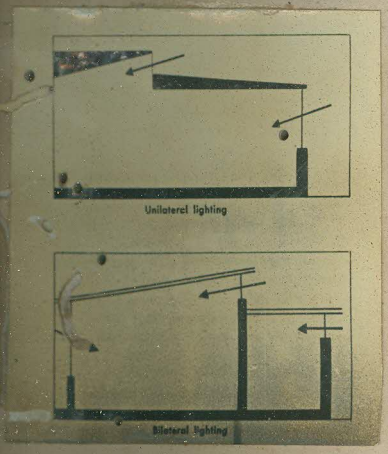
Subactivities and postures.

The picture exactly conveys the position of different limbs with respect to table and chair. The careful study of these postures is very important. They are about just sitting, reading and writing.



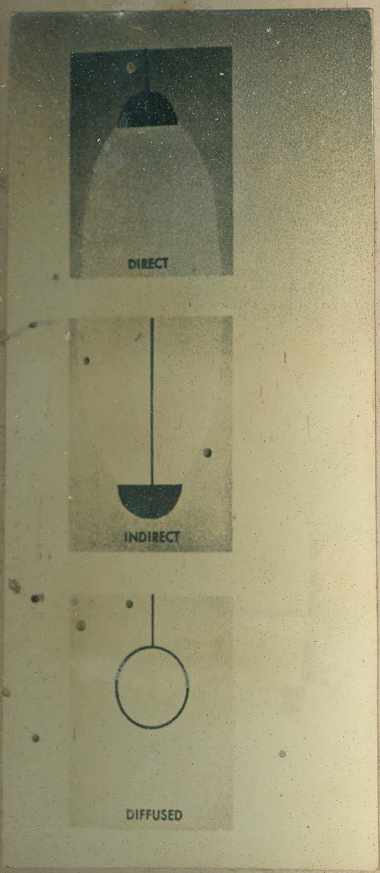
2.1.1.2. Light source or illumination

Good illumination is not attained merely by adding light in large quantities. It is difficult to specify exact levels and limitations. Generally students study by night.



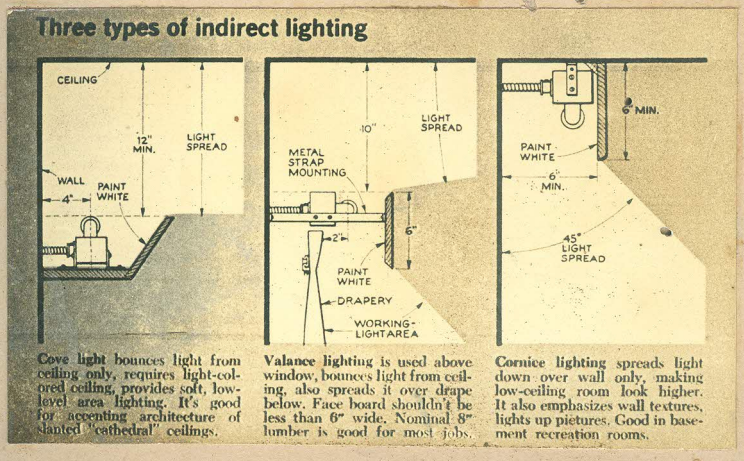
Natural Daylight Systems :

- Unilateral lighting is most desirable from north facing windows but, whatever the direction, seating should be arranged so the light is from the left.
- Bilateral lighting, seating should be arranged parallel to the windows.



Artificial Lighting Systems :

- Direct lighting : undesirable brightness ratios, shadows and glare are the most prominent faults of this type.
- Indirect lighting : more uniform and without shadows.



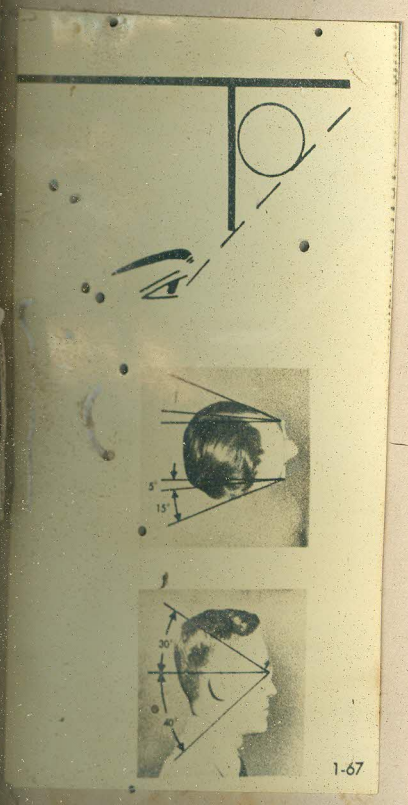
Diffuse Lighting :

Scattered evenly in all directions causes some glare.

Glare - an undesirable factor :

It is the most harmful effect of illumination.

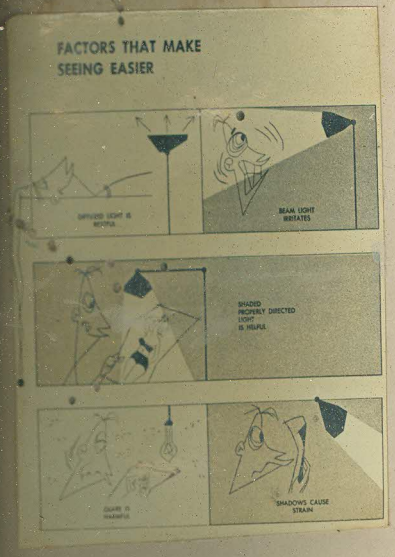
Direct glare must always be avoided.



Positions of Light-sources

30° or more above line of sight 40° or more below line of sight, or outside the two 15° zones.

Factors that make seeing easier.



2.1.1.3 Environment

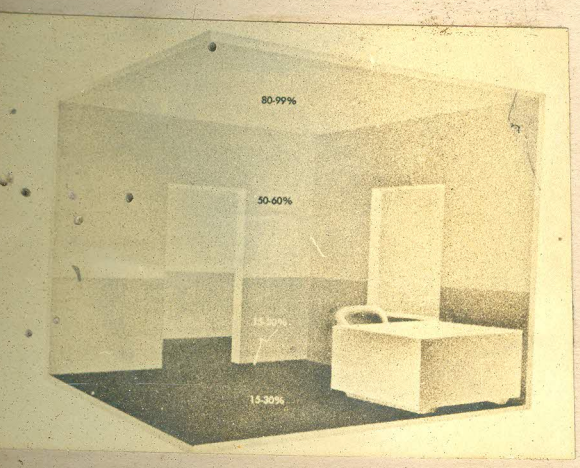
This point comes under ergonomics indirectly but it is an environment which governs the student's study activity largely.

. Colour : Principles of colour scheme in this context follow. utilitarian rather than easthetic standards. Eye comfort is the main criteria.

Ceiling : High reflectance factor equal to 80 - 90%, matte finish to avoid glare, white ivory cream and buff are satisfactory colours.

Upper Walls : light, pale green, buff, grey or blue in order not to contrast greatly with ceiling or window areas and should also be of matte finish RF - 50 - 60%.

Lower Walls : should be darker than upper walls but should not be of too great contrast - medium shades of green, brown, grey or blue are acceptable. RF - 15 - 20%.



COLOR	PER CENT OF REFLECTED LIGHT	COLOR	PER CENT OF REFLECTED LIGHT
White	85		
Light		Dark	
cream	75	gray	30
gray	75	red	13
yellow	75	brown	10
buff	70	blue	8
green	65	green	7
blue	55		
Medium		Wood finish	
yellow	65	maple	42
buff	63	satinwood	34
gray	55	English oak	17
green	52	walnut	16
blue	35	mahogany	12

Wood work : may be gloss for easy cleaning and may either match or constrast with wall colours, if constrasting they should be light, a uniform white, ivory, cream or grey RF - 15 - 20%.

Flooring : should have RF - 15 - 30% should not be too dark.

Note : Study room furniture should be light in colour. RF - 30 - 50%. Metal desks with dark tops such as seen in many modern offices, are to be avoided.

. Temperature :

The effect of temperature upon human performance are still not thoroughly understood. Still some guideliness are established as under.

120° F Tolerable for about 1 hour, but is far above physical or mental activity range (160° F for ½ hour).

85° F Mental activities slow down — slow response, errors begin.

75° F Physical fatigue begins.

65° F Optimum condition.

50° F Physical stiffness of extremities begins.

65° to 75° F Summer comfort zone.

63° to 71° F Winter comfort zone.

Humidities between 30 and 70 per cent have been found comfortable by most people.

. Mosquito : Many hostels face the severe problem of mosquitos. Because of hot climate studont prefers to wear very light clothes, which is no barrier for mosquitos. Hence lot of disterbance. The remedy is to attack the mosquito colonies to finish them or to use wire meshes at windows which prevents mosquitos and let breeze.

2.1.1.4 Shelves : Shelves are most useful when their contents can be both seen and reached.

2.1.2 Dwelling, storing and maintaining.

2.1.2.1 Average content

Books, note-books, pens, pencils, scales, drawing instruments. Bed, bedsheets, pillow, chaddar and blanket. Clothese, hangers, soaps, oil, face-powder and other toilet items, tooth brush, paste, comb, gum, ink, lotion, files, papers and such stationary, table-lamp. Shoes, rain-coat and or umbrella, brush. Suit-case, bucket, mug, glass, playing racket etc.

2.1.2.2 Dwelling and maintaining :

For the student his room is home. He makes at more attractive or living by using pictures

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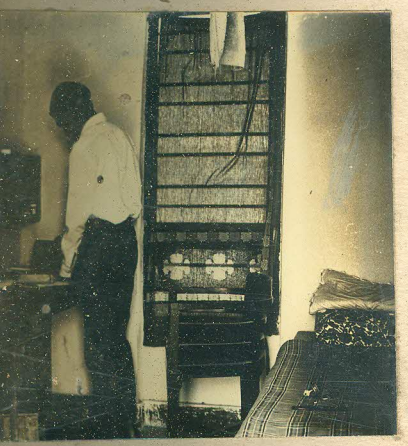
on wall, curtains - on doors and windows. This causes dirtying of wall by gum or nails, adhesive tapes some times.

To sweep the room - floor, as far as possible very less material or furniture should be directly in contact with floor, otherwise it accumulates dust and dirt around furniture supports.

The wet clothes kept or hung for drying occupy considerable space in room. Many times the water drops percolating through wet clothese wet the room floor or other equipment. The clothes are hung on plastic string running across two walls of the room. Table edge, chair hands and back, cot - rods etc are also used for this purpose.



Many students smoke and they do not mind to throw the ash on the ground of the room, which joins the accumulated dust.

The habbit of keeping the foot-wares on, all over in the room makes the room more dirty during rainy-season.

2.1.2.3 Storing

The content of the room is to be stored in proper order. The commonly found solutions are -

- Wardrobes for clothes
- Cupboards, racks or shelves for books, stationary and other equipment.
- Shoe rack and some other chests

Different compartments can be worked out for different equipment according to activities.

2.1.3 Sleeping :

The use of bed and some cot like platform are the standard supports used for this purpose. Mosquito curtain, supported by vertical rods is also used. The bed, bed-sheet, pillow, chaddar and or blanket; mosquito curtain are the things required for the purpose of sleeping.

The space below cot is used to store bags, trunks or suitcases. The dust accumulates in this space.

2.1.4 Relaxing, Chit-chatting :

Though this activity should come after a lot of study or hardwork, still it is very much common and of longer duration. Unfortunately majority of students spend their important time in relaxation and chit-chatting. Anyway undoubtedly there is some place for relaxation and chit-chatting, individually or collectively in hostelbound students life-

- Lying down on bed in any posture.
- Inclined back seeking support of wall.

or pillow and legs extended.

. Legs extended right up on table and back resting against inclined chair's back.

. Smoking. Tuning to radio - or T.V., keeping engaged in favourite hobby or reading of some non-textural book or novel.

. Sleeping or very private habbits.

. Going out of room for outdoor hobbies, plays.

. Rocking in arm-chair or rocking chair, etc.

Chit-chatting is an activity between two or more students. This includes indoor-playing also. viz : Carrom, chess, cards etc. The available furniture is very roughly used during this activity. All participants take support of say cot, table, chair and sometimes bring the chairs from neighbouring rooms.

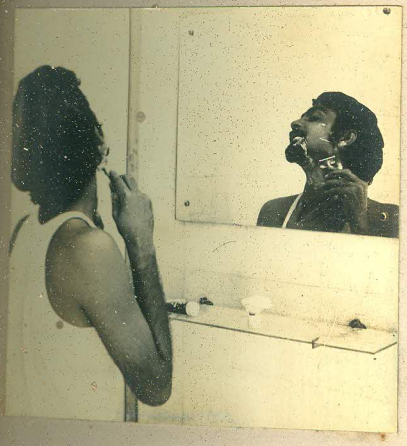
In such a case there is no wonder if the cot has to bear the load of seven or eight guys. So these two activities require the standard furniture and an easy chair or rocking chair if possible or zoola.

2.1.5 Accommodating guests occasionally

Usually guests are not permitted to stay in hostels. But apart from this so called rule, sometimes guests are accommodated in room. In that case student usually suspends his other main activity like study. Such guest is accommodated in room for a limited time. During night one of the two occupants would be sleeping on a bed spread on floor, and the other on cot. An extra mattress is required then, in this case.

2.1.6 Dressing

For male students dressing up or off is not a big problem. It can be done in room or toilet-room without any difficulty. Shaving is one of these activities. For female students, in our country hostels are situated separately and exclusively for girls. Hardly any outsider is allowed in girls' hostel. Girls like to have a dressing table in their rooms. Dressing table consists of a big verticle mirror, a bottom platform then a drawer and some compartments to keep hair-oil, cosmetics, hair-pin etc. Dressing seat is also different than standard chair. The dimensions of dressing table and seat are related to each other.



2.2 Market

2.2.1 Types : There are thousand types of furniture according to form, style, uses, material, manufacturers, traditions etc. Still for hostels chairs, tables, are more or less of the same type through out. Wardrobes and cabinets are built in wall with masonary work and wood in most of the hostels. Cots also hardly differ in form and material. We can categorise furniture from material point of view-viz.

2.2.2 Material :

- Synthetic : made up of plastics. Light, costly. It has very high rate of production and free profile form. High initial cost of tools. Unrepairable. Polyprophylene, PVC and FRP products are in market to substitute the plundering of natural resources.
- Steel or Aluminium : This is also costly. High initial cost is required for equipment. Repairable. High heat conductance is annoying factor. Metal tubes as structural members is a common practice in furniture.
- Wood : It is a traditional material. Comparatively cheap, wide variety of

Wood is available. Soft-feel, and low heat conduction are salient features. This material is handled almost everywhere in the world by very small carpenter to a big manufacturer. Combination of antique interiors with modern design is possible in this material. In mechanised production coarse work is carried out by machines, but each article is given a craftman finish to achieve the high standard of quality and workmanship. This type of factory Taaru (meaning wood in Sanskrit) is run in Delhi by group of designers. Laminated wood is stronger than natural wood, partly because it is a more homogeneous material. It preserves positive qualities of wood, ease of processing which allows free profile form, low heat conduction and the softness of surface that makes the furniture good to have about one. The lay of the fibre means so much for wood strength that lamination makes it possible to use construction forms only possible otherwise with steel.

The steambent beechwood chair is another fascinating design. It is

120 year old model to create atmosphere and its unusual robustness under the roughest conditions of Irani hotels in cities. The density of timber for furniture should not be less than 720 Kg/m^3.

2.2.3 Price : Standard hostel furniture

	Rs.
- Wooden chair with arm and nylon cane seat (in Indian teak wood)	24 to 100
- Wooden cot with mosquito poles (Indian teak wood)	127
- Steel folding cot (18 gauge) with legs of 1/4" steel flat	199
- Table (wooden)	35 to 90
- Redining chair (Lounge chair)	65 to 80
- Nylon caning charge (average life is ore year)	5
- Teak wood, per Cu.m	1150
Treated non-teak wood	750
Plywood 4 mm (2 ply)	10
(per sq. m. rates) 6 mm (3 ply)	14.50
9 mm (4 ply)	17.50
12 mm (5 ply)	23.00
19 mm (5 ply)	35.00
25 mm (7 ply)	44.00
Teak wood plank (1" thick) per sq. foot	2.50

- Pre-cast slab (2" thick)

  per sq. foot 4.00

- Decorative Veneer Boards per sq. m.

  .4 mm 25.00

  5 mm 27.00

  12 mm 40.00

- Skilled labour - 6 man-hours

  per chair 6.00

  8 man-hours

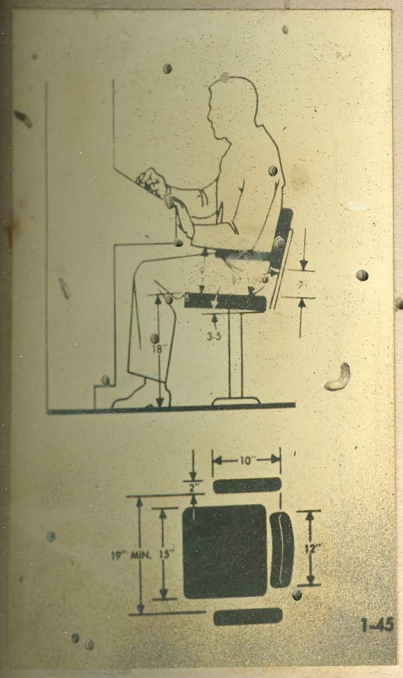
  per table 8.00

2.2.4 Manufacturer : Every big town like any district place, has its manufacturer. In Bombay there are many manufacturers, the wellknown concerns are Godrej, Khira, Wood and Cloth Fabricating Syndicate Ltd., Shree Prakash Furnitures, etc.

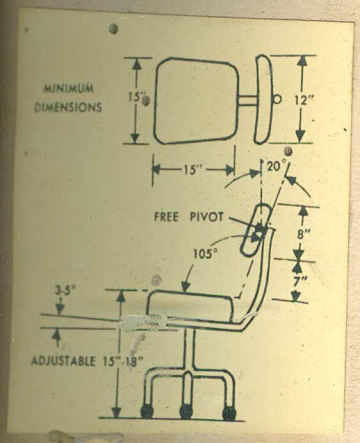
2.3 Ergonomist :

2.3.1 The general suggestions are as under

- Furniture should be easy to move about and keep clean and easier to live with.
- Sharp and harmful edges or corners should be avoided.
- Light colours and polishes having reflectance factor between 30 - 50% should be applied to the furniture.
- Noise prevention pads should be fitted to the furniture legs.

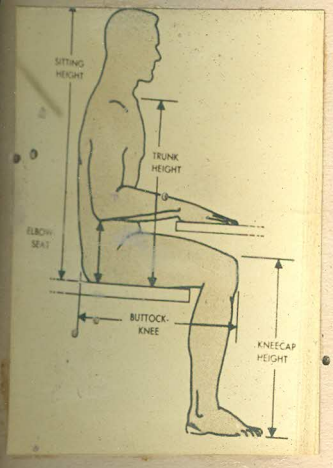


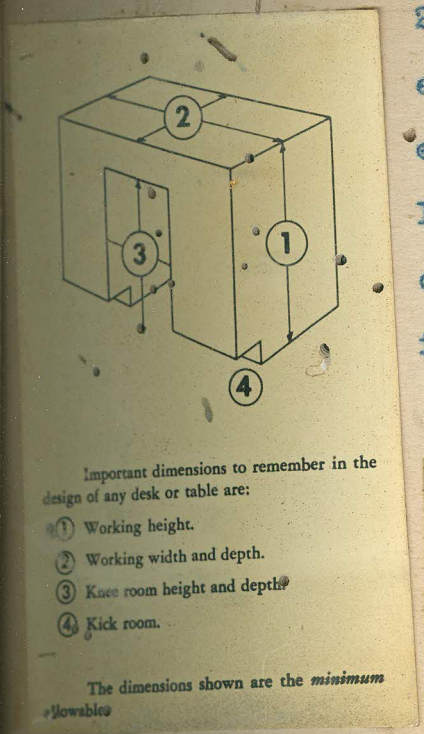
2.3.2 Chair : Gives a rigid support to the body to effect relief on the body weight. Body members, particularly pelvis, thorax, foot and arm should be supported. More uniform distribution of body weight, more is the comfort. The dimensions of ergonomical chairs are given in neighbouring sketches. The chair seat shall not be hard or upholstered but shall preferably be of woven material to ensure ventilation and slight yielding when in use, it also allows wind and warmth to pass through.



Chair components are-

- Seat : size and surface.
- Back rest : Angle, shape.
- Foot rest : Angle, size.
- Arm rest : Height size.
- Head rest : Height shape.





Important dimensions to remember in the design of any desk or table are:

① Working height.

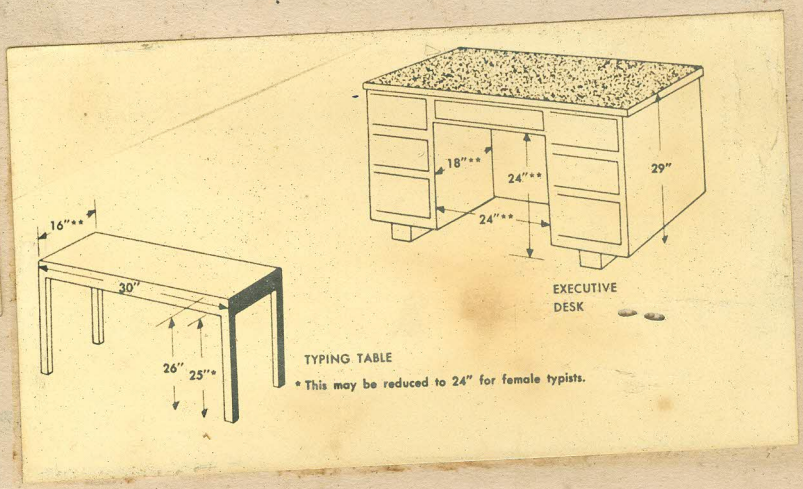
② Working width and depth.

③ Knee room height and depth.

④ Kick room.

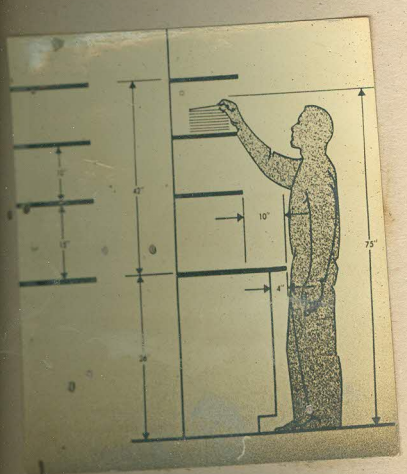
The dimensions shown are the *minimum* allowables

2.3.3 Table : The table top should be at elbow-level height. Abnormal heights reduce efficiency and hasten fatigue. Insufficient leg and foot room causes poor posture and constant irritation. The argonomical table is as illustrated.



2.3.4 Cot : If it is also used as seat then its height should be equal to the height of the chair. Also plain surface is preferred to the strapped surface.

2.3.5 Cabinet and Shelves : They are most useful when their contents can be both seen and reached. The top shelf should be no higher than 76 inches and the depths should be determined by considering the unit size of their contents - for example, clothes on hanger require deep shelves, books relatively shallow shelves.



2.4 Socio-psychological aspect

- There can be thousand good solutions but the problem will be whether we could afford it or not. The product with least possible price and mediocre utility is quiet significant in this respect.
- Habbits of students depend largely on their family backgrounds, region and class to which they belong. In general it is futile to expect students to behave with responsibility. They will throw waste papers out of window or door, they will spit out of window, they will hardly keep there rooms clean and things at proper place, when in group they will hardly keep silence on the contrary they will shout, sing a loud. They are not keen to preserve the social wealth and values, means they will hardly be disturbed on violation of vital social values, e.g. They won't mind to steal or others stealing public property like an electric lamp from railway train.
- The major habbits are mentioned in the 'activities' i.e. in 2.1.
- Still there is always a tribe of responsible and dutiful students. They behave neatly. They study regularly. They discuss seriously. They work dutifully and keenly. In tur sense they aspire to be a responsible citizen of modern India.
- Students handle all equipment roughly.

3.0 a n a l y s i s

The furniture items are analysed on following basis :

3.1 Make and cost

3.2 Structural

3.3 Need and functional

3.4 Ergonomical and

3.5 Visual cum formal.

The case analysis is of the furniture supplied to the I.I.T. Bombay, hostels.

3.1 Make and Cost

It is made up of Indian teak wood.

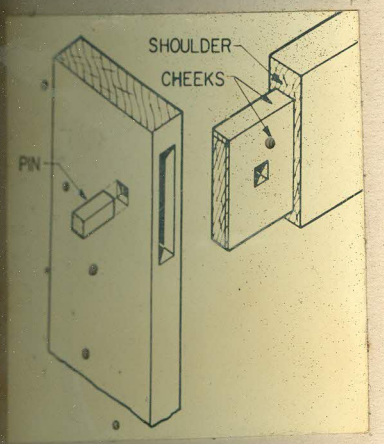
Prices are -

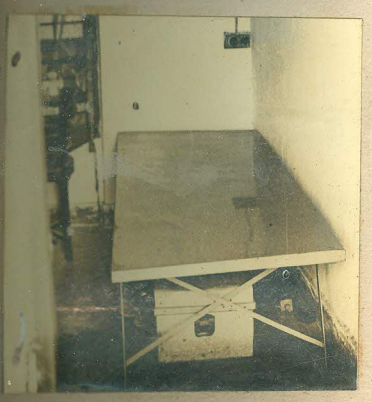
		Rs.
. Table	-	35
. Chair with arm	-	28
. Cot (single bed) (m.s. 18 gauge)	-	199

other items built in wall during construction are -

. Wall cabinet

. Wall shelf.





3.2 Structural Analysis

3.2.1 Table : It is all in Indian teak wood, a simple structure. Table top is 915 x 550 mm. It is made from 20 mm thick 3 planks, each not less than 150 mm wide. They are dowelled together to give one top. The gaps are filled with wooden putty. On an average four dowels are placed between two planks. Six nails each are hammered through all the four sides of top to fix it against its structure. Its structure is also simple. Four legs between ground and horizontal table top, are framed with planks and I type base frame. Joins are mortise and tennon joints with wooden dowels. Table height is 750 mm.

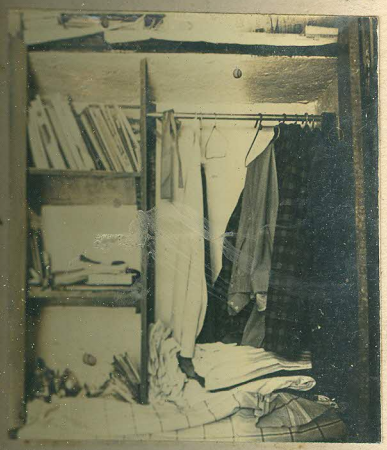
3.2.2 Chair

It is all in wood except seat is inplywood or natural wood. The main frame is just below the seat surface. The legs are free at the base. Joints are mortise and tennon. There is provision of arm rest. Back legs of chair extend upwards to provide back rest. Seat is 505 x 470 mm in area and 450 mm high from ground. Other dimensions are standard ergonomical ones.

3.2.3 Cot

It is made in 18 gauge m.s. sheet. Two

reinforcing sheet sections with 20 mm depth and 100mm width run along its length. They are spot welded. All the edges of cot are bent to 35 mm deep rib. This gives strength to the cot, against the safe load of two men. Four steel plates 30 x 6 x 225 mm are housed in the sheet edges to accommodate legs of cot. They are pivoted with the help of 10 mm ϕ vivet. The legs of each end are given rigidity frame of steel-plate having section of 18 x 5 mm. They are welded to the legs. When many persons sit on the cot it is permanently deformed. Also it makes a denting noise when man lying on it moves from one contact line to the other.



3.2.4 Wall Cabinet

It is built in wall with all four sides in masonary work. Horizontal partitions are made in pre-cast slab and central cabinet is made in teak wood. Wooden frame has mortise and tennon joints, and doors are of plywood. Central cabinet is 1020 x 1150 x 540 mm deep.

3.2.5 Shelf

Built in wall with pre-cast concrete slabs of 35 mm thickness. It is 540 x 240 x 210 mm deep. It projects out of the wall by 120 mm.

3.3 Need and Functional Analysis and Problems

3.3.1 Table : Primarily it provides a horizontal surface for study equipment. secondarily it provides foot rest and some times a cabinet-built-in-table provides storing facility for equipment like files, papers, books, pen, pencils etc.

This table does not provide any cabinet, drawer or extra surface for the said equipment, which is most essential. Table surface can serve as drawing board if properly finished.

3.3.2 Chair : Provides one movable seat with a back to it for sitting and reclining on respectively. As a secondary need arm-rest supports the elbow and forearm. The wooden frame-joints become loose and then chair can be rocked to and froe. This reduces life and reliability of chair. Arm rests are used as a support for seat though it is not meant for that, then they collapse. It is unavoidable so they should be made stronger. The seat-surface made in nylon cane provides comfort.

3.3.3 Cot : provides a surface to sleep on for one person. During chit-chatting, some-times cot provides seats for as many as six

3.4 Ergonomical Analysis

3.4.1 Table : The sharp corners and edges are harmful. The overall dimensions are ergonomical.

3.4.2 Chair : is ergonomical.

3.4.3 Cot : Height is multipurpose - so surface also serves as seating area. The plain sheet metal surface is comfortable to sleep on.

3.4.4 Wall Cabinet : All except depth for books is ergonomical. The compartment for books is too deep to reach.

3.4.5 Wall Shelf : It is at convenient height.

3.5 Visual cum Formal Analysis :

Table ; chair and wooden cot are finished and polished in walnut colour. It should be polished or painted in colour with reflectance factor between 30 - 50%. There is mediocre unity in all forms, except intricacy incorporated with chair arm. All items look purely functional, rigid and heavy. The colour with very low reflectance factor is one of the causes. Finish is again mediocre but it is justified by the cost.

4.0 h y p o t h e s i s

4.1 The cost of whole set of furniture should be within Rs. 250/-. Wood may be the right material.

4.2 Maximum facilities should be provided by the set of furniture. So some useful accessories might be provided to the main set of furniture which may or may not be added in the set. That means furniture should be designed on system concept. Easily detechable ash-pots should be accommodated in set.

4.3 The set should be extremely sturdy, stable and well constructed. The joints should not yield. Noise prevention pads should be fitted to the legs of furniture.

4.4 Each item should be separate, structurally independent of other item. It should be easy to move about and keep clean and easier to live with. It should help create atmosphere of study.

4.5 Sharp, harmful edges or corners should be avoided. There should be enough clearance from ground so as to maintain the room and floor clean.

4.6 The set should be constructed by batch production process and switchover to mass production process should not be difficult.

4.7 All forms should suit to the function and manufacturing process and there should be smooth transition and merging of forms.

4.8 Light colours or polishes having reflectance factor between 30 - 50% should be used.

4.9 In short common sense about structure, strict adherence to human dimensions and a good, sound design attitude must be employed in creating a successful set of furniture for hostelites. Ergonomics, cost, sterdiness and simplicity are the factors of prime importance.

4.10 Table :

- It can be made in wood, steel, alluminium or plastics. Price is the limiting factor - it should be around Rs. 55.
- Apart from top surface there should be provision of more surfaces and space for books, note-books, pens, pencils etc.
- Table lamp may be accommodated permanently in the construction of table itslef.

- Space below it should be used as room for chair when not in use. It is constraint for table structure.
- Its width should be less than width of a standard door.

4.11 Chair :

- It should be ergonomical. Light construction of nylon-cane for seat and back allows the wind and warmth to pass through. Also its slight yielding when in use makes sitting comfortable.
- Any material could be used but cost is limiting factor, it should be around Rs. 40/-
- Some additional parts could be used to provide more surface area very near the chair.
- For reclining on chair and for seeking the comfortable support for legs something may be provided which when not-in-use can be compacted in the space below chair. Also when required extension of backrest could be used as support for reclined head.

4.12 Cot :

- Cost should be around Rs. 140/-
- It should be multipurpose. Space below it should wisely be planned for better

and cleaner utilization.

- Some accessory may be built in which would help during reading while lying down on the bed.
- It could be made compact or foldable.

4.13 Wall Cabinet :

- When built in wall its price is reduced.
- Clothes and books require different depths. To keep them separate could be the better way.
- Toilet tray should be designed which could be stored in the cabinet and could also be carried to the toilet room.
- It can be made slidable (movable) and so can be arranged accordingly in room-space. In this case its form is equally important as its function. This partition may add in privacy of the room.

4.14 Shelf :

- It could be built-in wall or could be provided as a separate piece, then it could be used as extra seat or an extra surface to keep the things on.

5.0 design decisions cum synthesis

5.1 Cost and Material.

The price of existing set is widely ranging from Rs. 350/- to Rs. 2000/- per room. Average investment on furniture per single seated room is approximately Rs. 350/-. This is going to be the limit for present design also. Within the limit of this price wood is the suitable material. Particle wood or plywood is chosen as material. The table top and arm rest of chair are covered with venier while all the edges with 1/4" thick wooden batten. Rubber rounds are fitted to the bottom of the furniture. This reduces noise and friction while furniture is pushed or pulled. Brackets and some other supports are made in natural teak wood. In a small room if the cupboard or cabinet is placed in the open space of the room instead of placing it close to the wall room looks crowded and freedom movement is limited. Also capital cost and maintenance of masonary work is less than usual furniture type work. It is through this point of view, cabinet is built in wall. The cabinet layout is suggested in the drawing.

Rack seeks support from wall. It is fitted on wooden batten fixed on wall. Number of racks supplied per room may be more than one, since it can be placed anywhere on the walls of the room at the height of 115 cms from ground.

Table and cot can also be hung on walls. Though all legs are avoided and keeping the room clean is easier, in this case possibility of many more layouts is limited. Resistance to such type of furniture by students as well as management will also be considerable. However, the idea is illustrated in the last drawing.

Cost estimation (anticipation)

. Table	Rs. 75.00
. Chair	Rs. 55.00
. Bed	Rs.110.00
. Stool	Rs. 20.00
. Rack and batten	Rs. 30.00
Total : (approximately)	Rs.290.00

This includes material, labour and profit, and excludes transport and taxes.

5.2 Salient features of the design.

5.2.1 Made up of particle wood or plywood which have uniform properties and standard sizes. Particle board can be manufactured at lesser cost since its ingredients are chips and adhesives. This design gives additional facilities at more or less the same price as that of existing furniture. It looks simple.

5.2.2 Can be mass or batch produced. Production can be automatic or labour oriented.

5.2.3 The set of furniture can be assembled in site as plane components can be transported from factory with ease and economy. In this context this is the set of furniture without joinary. The components are assembled by using adhesives, dowels, nails or screws and brackets. It is sturdy and stable. For assembly work on site very limited skilled labour is required. Hence reduction in the cost.

5.2.4 Each item is a separate piece and satisfies ergonomical standards of dimensions.

5.2.5 In small room visual unity of the set of furniture is very important. Different

forms based on different basic forms would be distracting, like a table with round steel-pipe legs won't go with chair having square wooden section as legs. For big halls it might be different. To avoid monotony different groups of furniture, each having different form may be used. In this case a solid continuous plank, in each of the article imparts unity to the whole set.

5.2.6 To avoid chipping, corners are rounded, edges are protected and decorated by plane wooden battens, which hides edge texture of particle board.

5.2.7 Varnish is used as the finishing coating.

5.2.8 Foot board of the table is hinged to its support and it attains different inclinations for different postures.

5.2.9 Space below table provides housing for the chair when not in use. This facilitates for more room for activities other than study.

5.2.10 Chair has variable-inclination back which adds in comfort.

5.2.11 Space below chair accommodates the steel when not in use. So chair and stool both can be compacted in space below table

when nothing of them is required.

5.2.12 Stool is multipurpose. It is an extra seat. It provides additional surface for keeping the things on when required. Each of the two sides serves as surface for keeping glasses or tea-cups on and to take support for shoe during shining or putting on, respectively. The seat is having ergonomical height and can also be used as support for extended legs during relaxation on chair.

5.2.13 Storage rack is a modular unit. It can be placed anywhere on the wall where wooden batten, as its support, runs horizontally at convenient height. It can be one or more than one in each room. It serves as book and file rack near table, bedside storage unit near bed, or shoe and toilet-equipment rack near door.

5.2.14 Bed is useful in two ways. One standard utility is for sleeping on and the other is for reclined posture during relaxation.

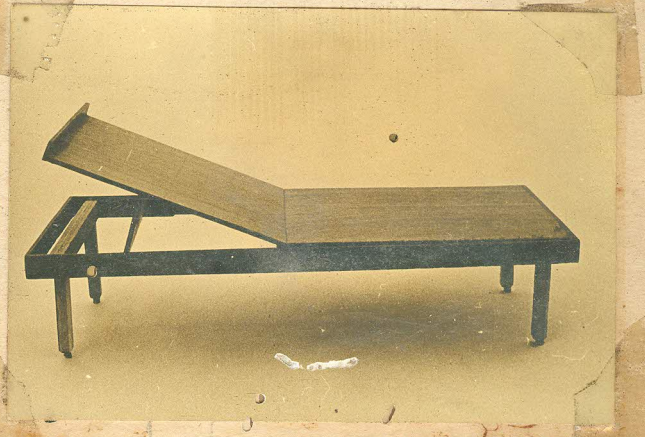
6.0 communication

No.	Item
6.1	Table
6.2	Chair
6.3	Bed
6.4	Bed (reclined)
6.5	Stool (Seat)
6.6	Stool (Shelf)
6.7	Rack
6.8	Different layouts

6.1

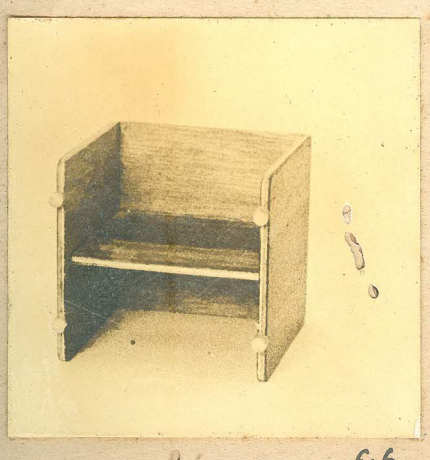
6.2

6.3



6.4

6.5



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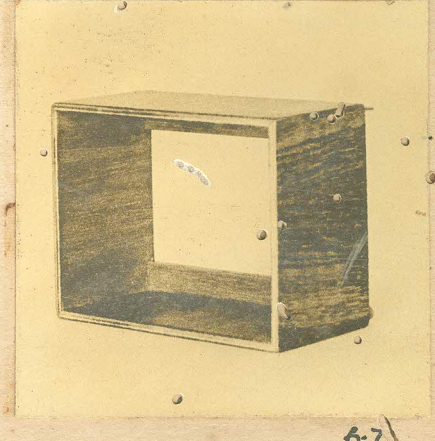

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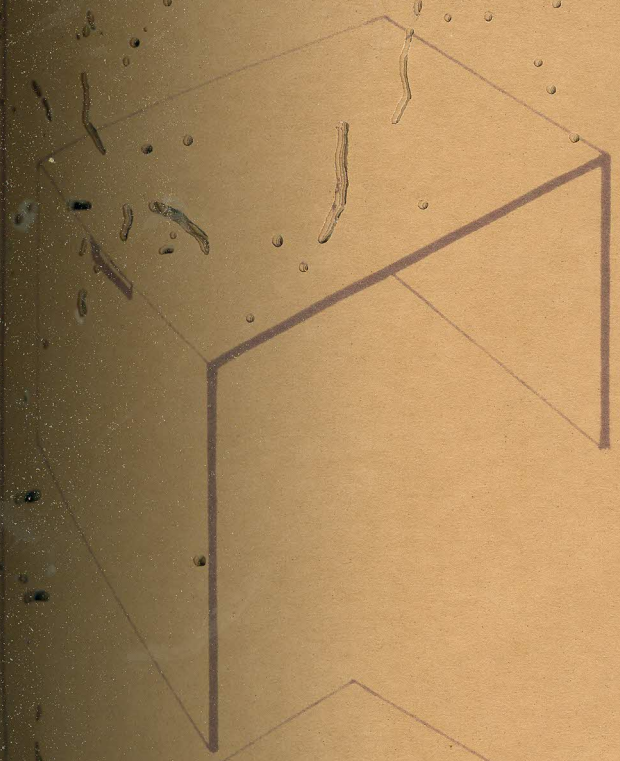
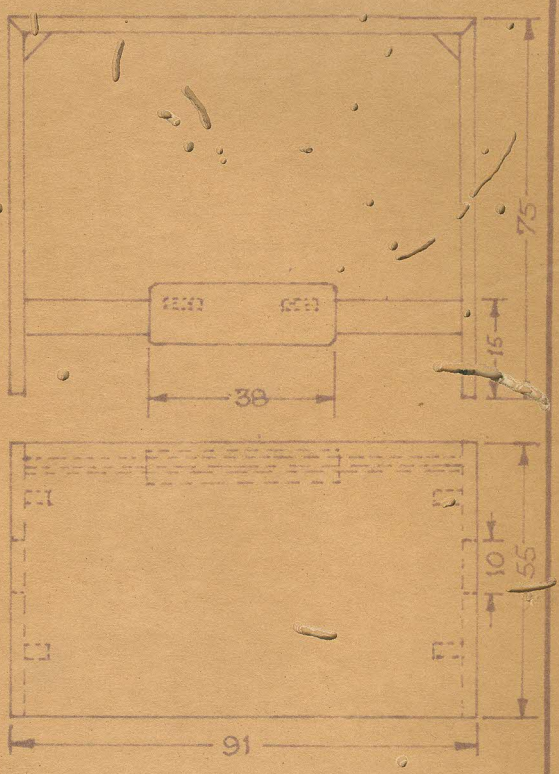
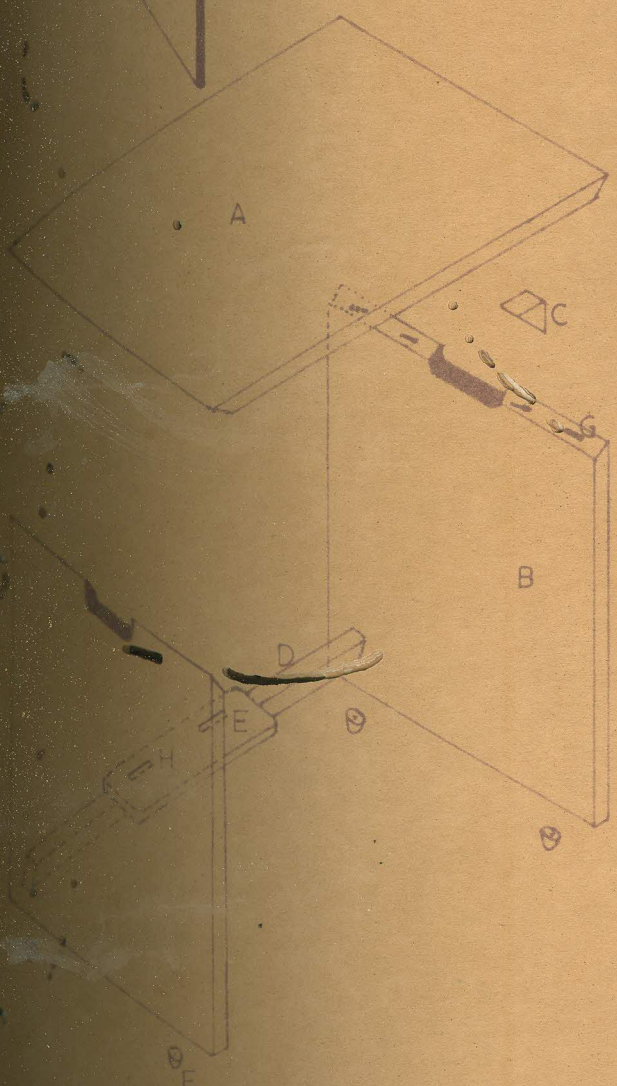




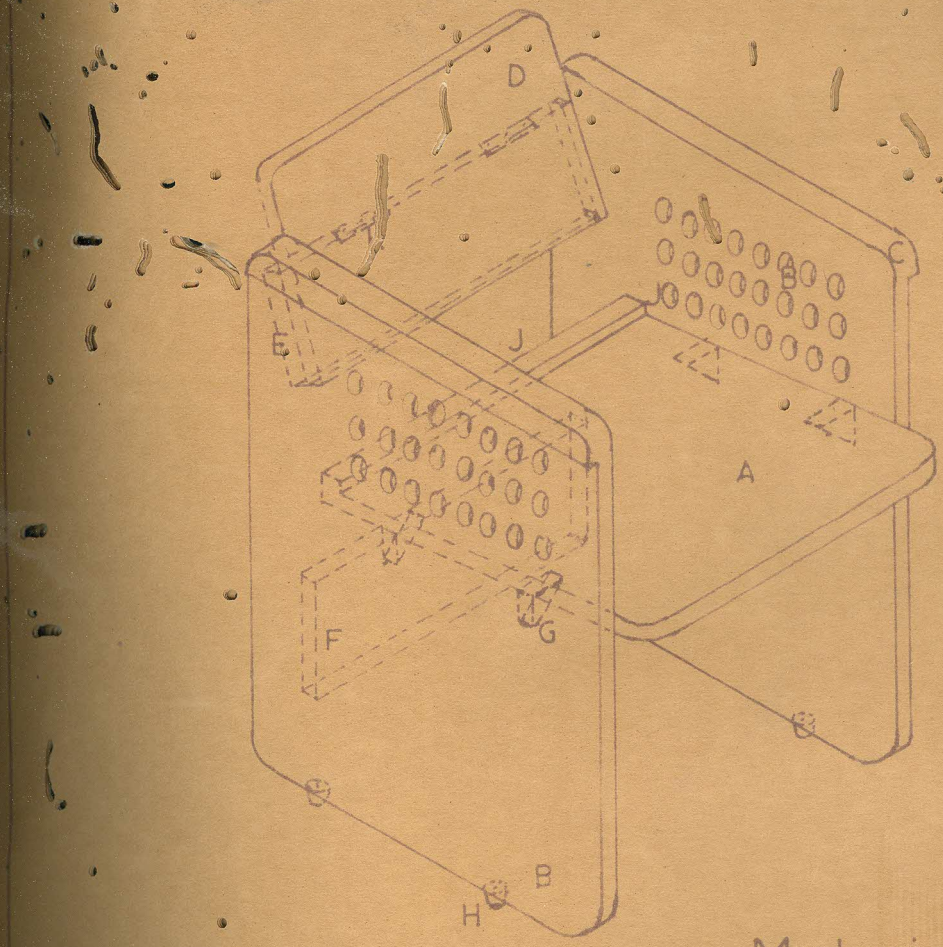


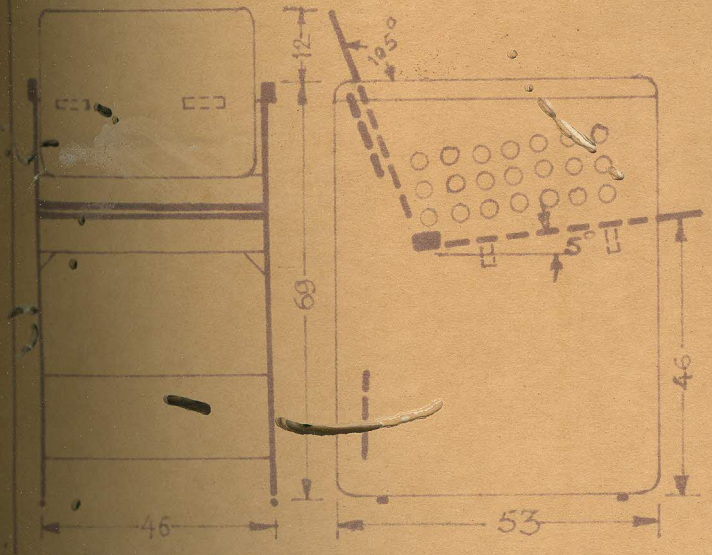
Material

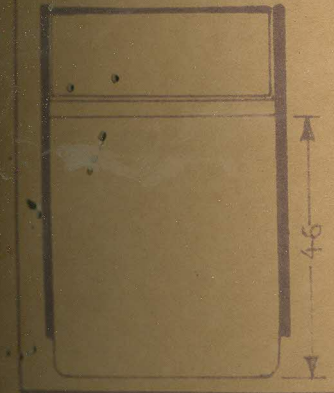
PART	NO	FUNCTION	DIMNS. W x L cm	
A	1	TOP	91	55
B	2	SIDE	55	75
C	4	BRACKET	3	6
D	1	SUPPORT	6	86
E	1	FOOT REST	15	38
F	4	RUBBER PADS		
G	12	DOWELS		
H	2	HINGES	2"	

NOTE: All edges are covered with wooden battens, 1/4" thick.

1 TABLE	1" Particle Board, or Plywood 20mm





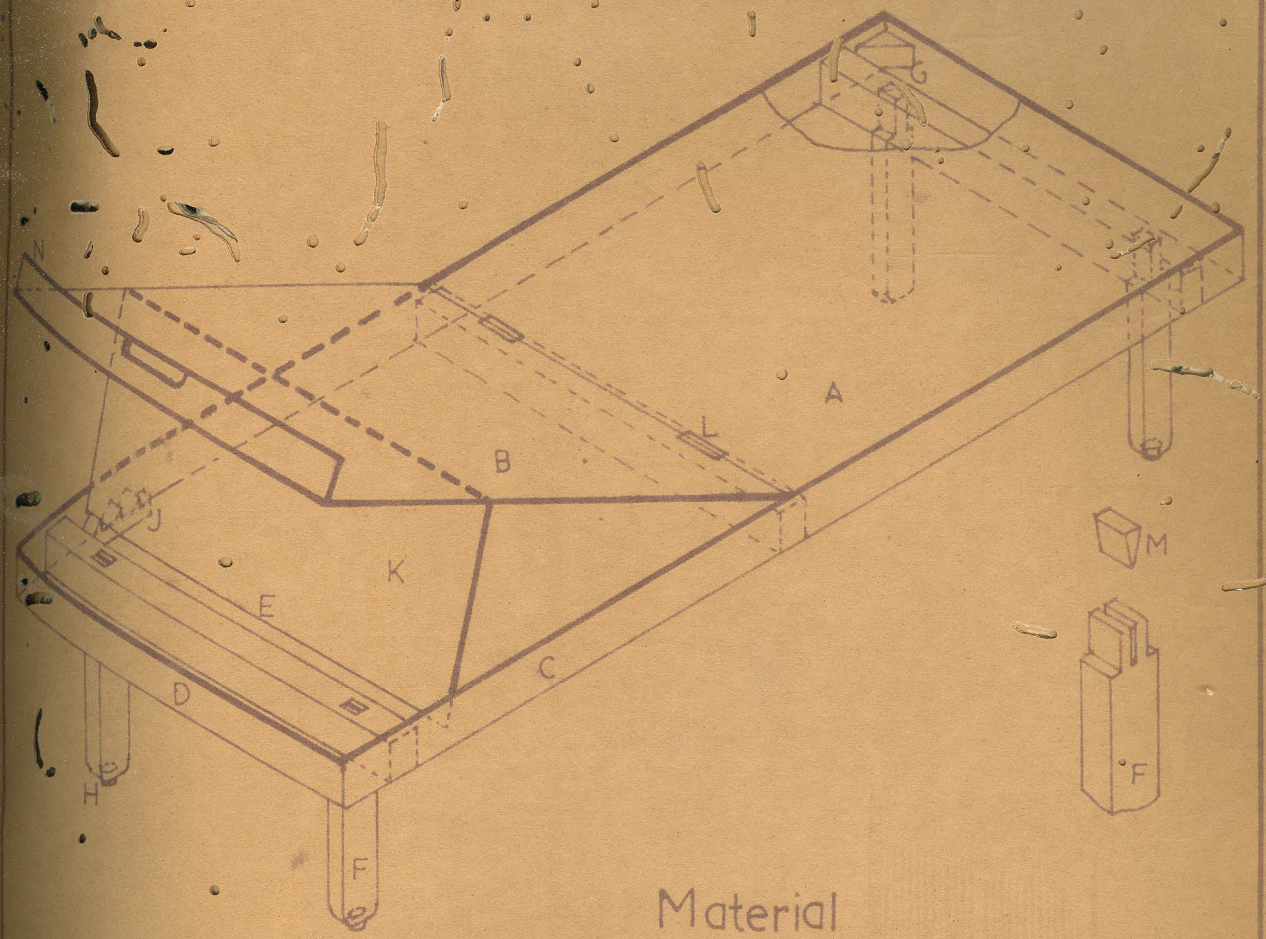


Material

PART NO.		FUNCTION	DIMNS. w x L cm	
A	1	SEAT	46	46
B	2	SIDE	53	69
C	2	ARM REST	3	53
D	1	BACK REST	28	45
E	1	BACK	15	46
F	1	SUPPORT	15	46
G	4	BRACKET	3	6
H	4	RUBBER PAD		
J	1	SEAT END	3	46
K	2	HINGE	3"	
L	16	DOWELS		

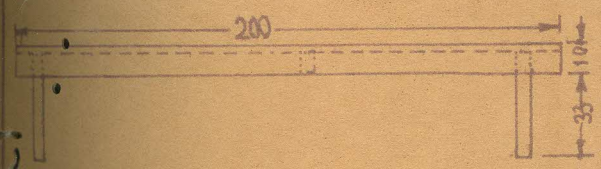
2 CHAIR

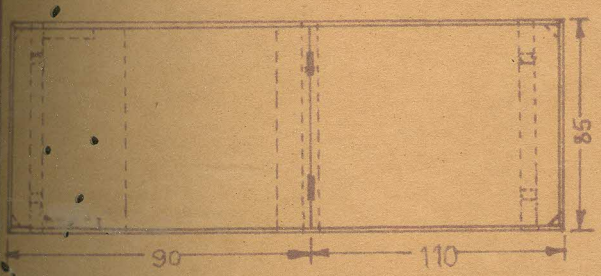
1" Particle Board or Plywood



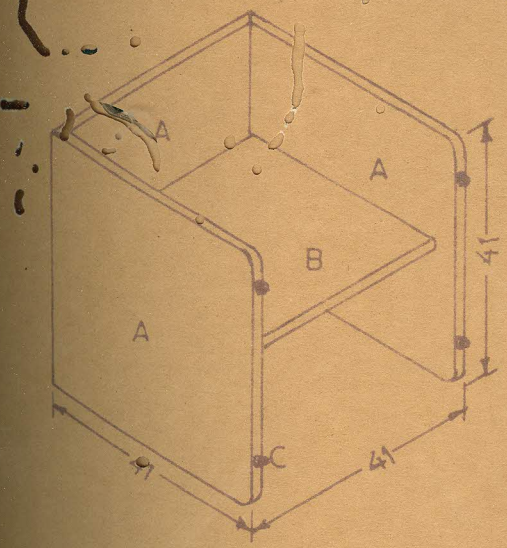
Material

PART	NO	FUNCTION	DIMNS W x L cm
A	1	TOP	83 x 110
B	1	TOP	83 x 90
C	2	SIDE	9.2 x 203
D	2	SIDE	9.2 x 88
E	3	SUPPORT	8X5.5 x 83
F	4	LEG	3X5.5 x 40
G	4	BRACKET	3 x 6
H	4	RUBBER PAD	
J	2	NOTCHED SUPPORT	3X6 x 24
K	1	INCLINED SUPPORT	45 x 82
L	4	HINGE	3"
M	4	WEDGE	
N	1	HEAD BOARD	10 x 83





3 BED	12mm Plywood and Teakwood

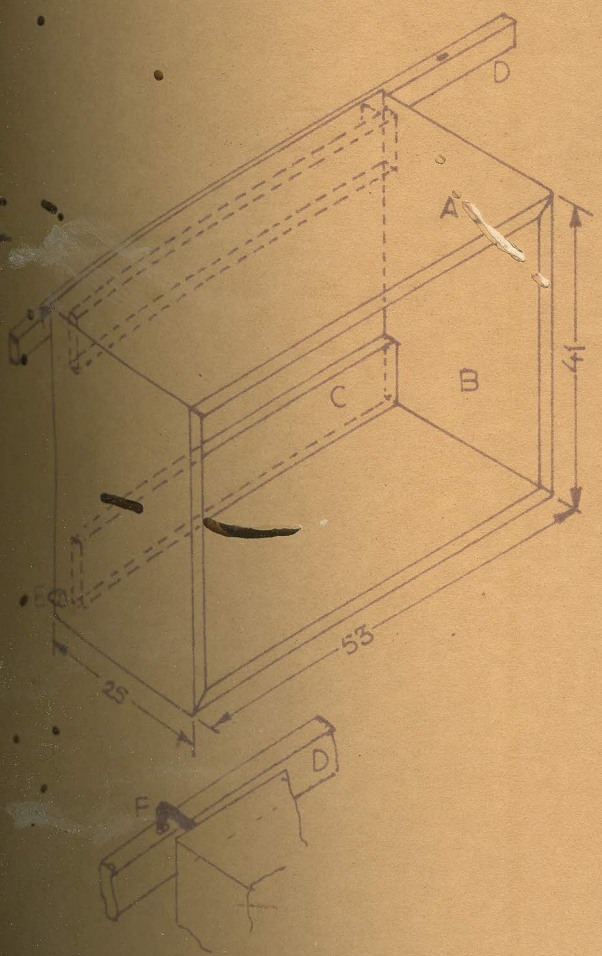


Material

PART	NO	FUNCTION	DIMNS cm W	X	Z
A	3	TOP & SIDES	41		41
B	1	SUPPORT	36		36
C	4	RUBBER PAD			
D	12	DOWELS			

4 STOOL

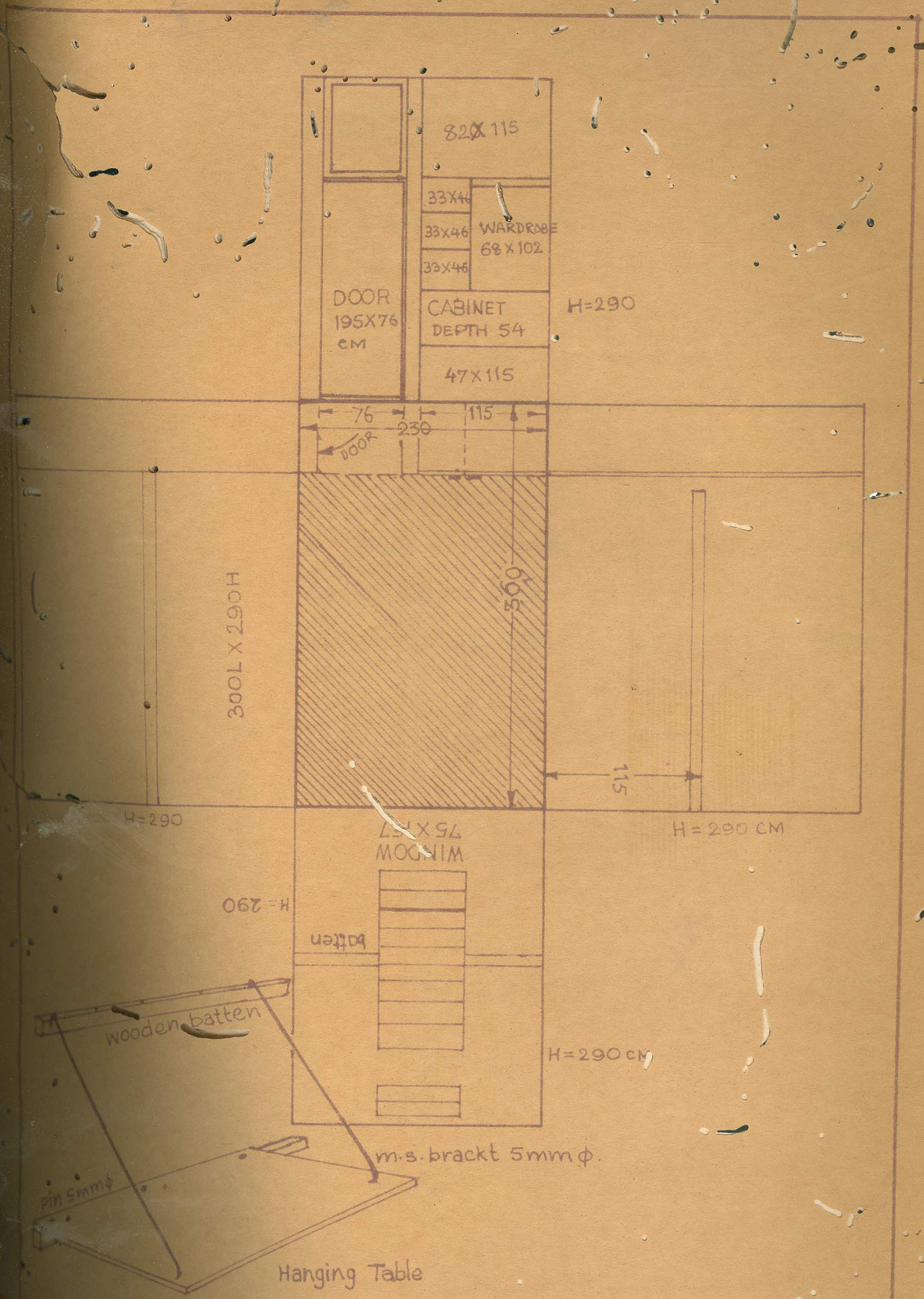
1" Particle Board or 12mm Plywood



			cm	
A	2	SIDE	25	53
B	2	SIDE	25	41
C	2	BACK	10	53
D	540 CM	BATTEN	2.5	3.5
E	2	RUBBER PAD		
F	2	HOOKS	0.5 ø cm	

5 RACK

1" Particle Board or 12 mm Plywood



6 ROOM & built-in-cabinet	Masonry, Pre-cast concrete

B I B L I O G R A P H Y .

1. Human engineering guide for equipment designers - Wesley E. Woodson.
2. Report of the committee on students welfare and allied matters - UGC.
3. Student welfare in Indian Universities - UGC.
4. ISI Furniture No. 5807, 3845, 4116, 4126.
5. Popular Science, Sept. 1965 and others
6. Books on Furniture by Mario Dal Fabro.
7. Magazines viz : Japan Interior Design
   Mobilia
   Ottagono
   Industrial Design
   Domus
   etc.