Syllabus

• Planning:- Elementary principles and basic requirements of a building planning, layout of a residential buildings.
• Construction:- Classification of building based upon occupancy and structure, Design loads, Common building components, their functions, and nominal dimensions. Elements of building drawing. Introduction to bylaws.
Elements of Building Construction

Construction

Part-1
Common Building Components

Basic Building Components

Super Structure

Substructure
Super Structure

- The superstructure is that part of the building which is above the ground and which serves the purpose of building’s intended use.
- It includes
  - Plinth
  - Wall and columns
  - Beams
  - Arches
  - Roofs and slabs
  - Lintel and arches
  - Chajjas
  - Parapet
  - Steps and stairs
Substructure

• The substructure is the lower portion of the building, which is located below ground level which transmits the load of the superstructure to the sub soil.

• it includes

• Foundations
### Nominal Dimensions of building components

<table>
<thead>
<tr>
<th>Building component</th>
<th>Nominal Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plinth (Height)</td>
<td>30, 45, 60, 75, 90 cm</td>
</tr>
<tr>
<td>Wall thickness</td>
<td></td>
</tr>
<tr>
<td>Partition wall</td>
<td>10 cm</td>
</tr>
<tr>
<td>Load bearing wall</td>
<td>20, 30, 40 cm</td>
</tr>
<tr>
<td>Lintel (thickness)</td>
<td>15 cm</td>
</tr>
<tr>
<td>Chajja Projections</td>
<td>30, 45, 60, 75, 90 cm</td>
</tr>
<tr>
<td>Slab thickness</td>
<td>0.1 to 0.15 m</td>
</tr>
<tr>
<td>Parapet wall thickness</td>
<td>10 cm</td>
</tr>
<tr>
<td>Parapet height</td>
<td>1 m</td>
</tr>
<tr>
<td>Door width</td>
<td>0.8, 0.9, 1.0, 1.2 m</td>
</tr>
<tr>
<td>Door height</td>
<td>1.8, 2.0, 2.1 m</td>
</tr>
<tr>
<td>Sill height</td>
<td>0.07 to 0.1 m</td>
</tr>
<tr>
<td>Lintel height</td>
<td>2.0 m from floor level</td>
</tr>
</tbody>
</table>
## Nominal Dimensions of building components

<table>
<thead>
<tr>
<th>Building components</th>
<th>Nominal dimensions</th>
</tr>
</thead>
</table>
| Column size         | Square 20 x 20, 30 x 30 cm  
                       | Rectangular 20 x 30 cm  
                       | Circular 20Φ, 30Φ |
| Column footing      | 1x 1 x 1 m below ground |
| Depth of beam       | 30, 45, 60 cm |
| Steps               | No of risers= Height of Ceiling + Slab thickness/ Riser Height |
|                     | No of treads= No of risers-1 |
| Riser height        | 15 to 20 cm |
| Tread width         | 25, 30, 35 cm |
| Width of steps      | Minimum 1 m |
Foundation

- The basic function of foundation
- To Transmit the load from building to the subsoil, in such a way that
  - settlement are within permissible limit
  - the soil does not fail in shear
- Reduce the load intensity
- Even distribution of load
- Provide level surface
Types of foundation

• Foundations may be broadly classified as
  • (a) shallow Foundation
  • (b) Deep foundation
  • (a) Shallow Foundation
    ▪ Spread footing
    ▪ Combined footing
    ▪ Strap Footing
    ▪ Mat Foundation or Raft Foundation
Types of Foundation

- **Spread Footing:** Spread footings are those which spread the super-imposed load of wall or column over larger area. Spread footing support either column or wall.

- It may of following kinds:
  - Single footing for column
  - Stepped footing for a column
  - Sloped footing for a column
  - Wall footing without step
  - Grillage foundation
Grillage Foundation

- Iron plate
- Column
- Steel beams (grillage)
- Concrete pad
• **Combined Footing:** A spread footing which supports 2 or more columns is termed as combined footing. The combined may be of following kinds

- Rectangular combined footing
- Trapezoidal combined footing
- Combined wall footing

Section 1-1, 2-2, 5-5, and 6-6 are sections for critical moments. Section 3-3, 4-4 are sections for critical shear (one way). Section for critical two way shear is abcd.
Trapezoidal footing

Trapezoidal combined footing
Fig. (32)
• **Strap Footing:** If a Independent footing of two columns are connected by a beam, it is called a strap footing. A strap footing may be used where the distance between the column is so great that trapezoidal footing becomes quite narrow. The strap does not remain in contact with soil and does not transfer any pressure to the soil.

![Diagram of Strap Footing](image)
• **Raft foundation:** A raft Foundation is a combined footing that covers the entire area beneath a structure and supports all the wall and column.

• They are used in areas where the soil masses contain compressible lenses or the soil is sufficiently erratic so that differential settlement would be difficult to control.
Raft Foundation

Flat plate

Flat plate thickened Under columns
Raft foundation
Deep Foundation

- Deep foundation may be of following types
- Pile foundation
- Pier
- Well or caissons
**Pile Foundation:** Pile Foundation is that type of foundation in which the loads are taken to a low level by means of vertical members which may be timber, concrete or steel. Pile foundation may be adopted when no firm bearing strata is available and the loading is uneven.

- Piles may be of following types
- End bearing piles
- Friction Pile
- Compaction pile
Types of Piles

1. End-Bearing Pile
2. Friction Pile
3. Combination End-Bearing & Friction
Compaction Pile

- Concrete pile
- Wood pile
- Pile cap
- Lowest ground water level
Piles

Diagram a) shows a concrete pile and a wood pile, with the lowest ground water level indicated.

Diagram b) illustrates a pile cap.

The right side of the diagram shows two types of piles:
- End Bearing Pile
- Skin Friction Pile
• **Pier foundation**: A Pier foundation consist of cylindrical column of large diameter to support and transfer large superimposed load to the firm strata below.

• Generally, pier foundation is shallow in depth than the pile foundation.
• **Well Foundation**: Well Foundation or Caisson are box like structures which are sunk from the surface of either land or water to the desired depth. They are much larger than the pier foundation or drilled caissons. Caisson foundations are used for major foundation works like
  • Bridge piers
  • Docks
  • Large water front structure such as pump house.
Well foundation
Super structure

- **Plinth**: Plinth is that part of the building between the surrounding ground surface and floor space immediately above the ground. Plinth resists the entry of rain water entry inside the building, entry of animals, insects & Rodents.

- General plinth height is 45, 60, 75, 90, 120 cm
• **Wall:** The walls are building blocks of bricks or stones. They divide the building space into various space into various rooms. They support slabs and beams. They safely transmits the loads coming on them from beams and slabs to the foundation. They provide privacy and protection against heat, cold, rain, noise, dust winds. They offer resistant to firewalls may be of

• Brick masonry

• Stone masonry
Walls
• **Columns** are vertical members along which beams and slab /roof is supported They are square, rectangular and circular in shape in C/S

• **Floor:** A floor is a plane area to support occupants, furniture's, and equipments.

• **Roof:** The upper most part of the building constitutes the roof. The Slab and roof encloses the space and offers protection from rain, heat, snow, wind, sound, fire. Slabs are 10,12,15 cm the.
Columns
Roof/ slab
Floor
Doors and windows

- A door provides a connecting link between rooms, allowing easy free movement in the building. Window are opening provided in walls. Doors and windows provide lighting and ventilation. The provide resistance to weather, sound and heat. They provide security and privacy.
Sizes of Doors

- For Residential Area
  - Internal doors 0.9 x 2.0 m
  - External doors 1.2 x 2 m
  - Door for bath and w.c. 0.75 x 2.0 m
- Industrial Buildings
  - Width 1.5, 2.0, 2.5 m
  - Depth or height 2.0 m, 2.5 m
Types of Doors

- Battened and ledge door
- Battened and braced door
- Battened and framed door
- Battened, ledge, and framed door
- Framed and paneled door
- Glazed door
- Flush door
- Louvered door
- Wire gauged door
- Revolving door
- Sliding door
- Swing door
- Collapsible steel door
- Rolling shutter door
- Mild steel sheet door
- Hollow metal door
- PVC door
Battened and ledge door
Battened and braced door
Battened, ledge, and framed door

styles and top rail say 125 x 45.
tongue and groove matchboards 12 to 15mm thick "vee" jointed
style rebate to depth of the boarding
mortise in the normal way
bottom and mid rails say 30 thick creating a barefaced tenon allowing the boards to run over

inside
outside

bottom and middle rail thinner than the styles by the thickness of the boards
Framed and paneled door
Glazed door
Flush door
Louvered door
Revolving door
Sliding door
Collapsible steel door
Rolling shutter door
Hollow metal door
PVC door
Sizes of Windows

- Sizes of Windows: 0.6, 0.75, 0.9, 1.0, 1.2, 1.5, 1.8m
- Depth: 0.6 0.75, 0.9, 1.0, 1.2, 1.5, 1.8 m
- Size of Ventilator: Width= 0.3, 0.45, 0.6, 0.75, 0.9 m
Types of Windows

• Fixed
• Pivoted
• Double hung
• Sliding
• Casement
• Sash
• Louvered
• Metal
• Bay
• Corner window
• Dormer window
• Gable window
• Lantern
• Skylight
Pivoted window

AW 006
Double hung
Sliding window
Casement window
Sash window
Louvered Window
Bay Window
Dormer window
Gable window

Decorative octagonal gable window, 15½\times15½"

Single hung window with shutters and screen, 18\times27"

Insulated double hung window with screen and shutters, 28\times38"
Skylight window
Lantern window
Corner window
Sills

• Sills are lower portion of window and ventilator opening
Steps and Stairs

• Steps and stairs are meant to provide access between different levels. Stairs should be properly located to provide easy access and fast services to the building.

• In one flight maximum 8 steps should be provided for more than 8 steps it is recommended to provide them with lending.

• Generally for residential building width of stair is 1.0 m and 1.2 m

• No of risers= Total height of floor/ Height of riser

• No of tread= Number of riser-1
Steps and Stairs
Steps and Stairs

Stair Terminology

- Total rise
- Rise of flight A
- Rise of flight B
- Run of flight B
- Tread
- Riser
- Landing
- Floor level

1½” min. clearance
Handrail section
1¼” to 2” wide

1½” max.

Riser (tread)
Rise (riper)

A minimum of 3 risers per flight is recommended.
Beams

• Beams are horizontal members above which the slabs are provided. The beams are instead supported on walls and columns.
• They are generally 20, 39, 45, 60 cm thick and deep members as per structural design.
Beams
Lintels and arch:

- Lintel is a horizontal member which is placed across the opening.
- An arch is normally a curved member comprising of wedge shaped building blocks holding each other with mutual pressure.
Chajjas:

• Chajjas are provided on external wall opening to get protection from rain, snow and heat. They are weather sheds. Their thickness tapers from 100 to 75 mm and projection is 30, 45, 60, 75, 90 cm
Parapet

• Parapet: Parapet is generally 10 cm thick partition wall constructed above slab to enclose the terrace open to sky. Thickness is 10 to 15 cm height is 1.0 m to 1.2 m
Different types of buildings

• Buildings are classified based upon its occupancy and structure
• Building are classified based upon occupancy as
• Residential Building
• Educational Building
• Institutional Building
• Assembly building
• Business buildings
• Mercantile buildings
• Industrial Buildings
• Storage buildings
• Hazardous buildings
• **Residential Building:** Buildings in which sleeping arrangements are provided with or without cooking arrangement. It includes single or multi-family dwelling, apartments, lodgings, restaurants, hostels, dormitories and hotels

• **Educational building:** These include any building used for school, college, education purposes.

• **Institutional Building:** these buildings used for different purposes, such as medical or other treatment. They include hospitals, sanatorium, jails, asylum
• **Assembly Buildings:** These are the buildings where group of peoples meet or gather for amusement, social, religious, political, civil, travel and similar purposes. E.g. theatres, motion pictures, houses, assembly halls, restaurants assembly halls.

• **Business buildings:** These buildings are used for transactions of business, for keeping accounts and for similar other purposes.

• **Mercantile building:** These building are used as shops, stores, market for display and sale of merchandise either wholesale or retail, office, shops, storage services.
• **Industrial Buildings:** These are buildings where products or materials of all kinds and properties are fabricated, assembled, manufactured or processed

• **Storage buildings:** these buildings are used primarily for the storage or sheltering of goods, wares or merchandise, vehicles and animals, grains

• **Hazardous buildings:** These buildings are used for the storage, handling, manufacturing or processing of highly combustible or explosive materials or products
Classification based on structure

- Load bearing Structure
- Framed structure
- **Load Bearing Structures**: In this type of structures loads from roof slab or trusses and floors are transmitted through walls to the firm soil below the ground. This type of structures are adopted where hard strata are available at shallow depth. The structural elements like beams, slabs rests directly on the walls.
ArchICAD STUDENTEN-Version. Weiterverkauf oder kommerzieller Einsatz nicht erlaubt.
• **Framed Structures:** Reinforced cement concrete structures are the most common type of construction today. They consist of a skeleton of beams & columns. The load is transferred from beams to the columns and column intern transfer the load directly to the sub soil through footing. Framed structures are suitable for multi-storey building subjected to variety of extreme loads like compressive, tensile torsion, shear along with moment.

• The open spaces in the skeleton are to be filled with brick walls or glass panels.
Types of Loads

• Various loads are taken into account while designing the foundation of a structure.
• Dead loads;
• Live load;
• Wind loads;
• Earthquake loads;
• Erection loads; and
• **Dead Load**: Dead load comprises of the weight of all walls, partitions, floors and roofs including all other permanent construction in the building

• **Wind load**: It is considered as basic wind pressure which is equivalent static pressure in the direction of the wind

• Wind pressure = $k v^2$

• Where $k$ = co-efficient, 0.006

• $V$ = wind velocity

• Wind pressure always acts in the vertically exposed surface of the walls and columns.
• **Snow load**: Actual load due to snow depends upon the shape of the roof and its capacity to retain the snow. The load due to snow may be assumed to be 2.5 kg/m³ per cm depth of snow.

• **Earthquake load**: an earthquake load produced waves in every possible direction below ground. As per intensity or scale of earthquake, jerks and shocks are acting on the earth. As per the location of the building in the prescribed zone of earthquake coefficients of earthquake loads are decided.
• **Live Load**: Live Loads consist of moving or variable loads due to people or occupants, their furniture, temporary stores, machineries.

• **Erection Load**: All loads required to be carried by the structure or any part of it due to storage or positioning of construction material and erection equipment including all loads due to operation of such equipment, shall be considered as ‘erection loads’
Elements of Building Construction

Part-2
Planning
Planning

• Elementary Principles and basics of a building planning, layout of residential and industrial buildings
Principles and building planning

• The term planning of a building refers to mean the arrangement of all the units of a building on all the floors and at all the levels.

• There are certain general principles which as a engineer should bear in mind while planning a building.
The general principles are

- Aspect
- Prospect
- Privacy
- Grouping
- Roominess
- Flexibility
- Furniture requirements
- Circulation
- Elegance
- Economy
- Sanitation
Aspect

- **Aspect:** different rooms of the buildings are placed and located accordingly to the functional utility in such a way that maximum advantage of natural elements like sun, wind, can be obtained. To obtain sufficient sunlight inside the room windows are placed in external walls.

- **Kitchen aspect:** Kitchen should have window in east, because morning sun kills the germs. So kitchen should have *eastern* aspect.

- **Bed room aspect:** Bed room is a unit of residential building generally used in night time, for sleeping so evening sun rays, which are cool in nature should enter the bed room to create cheerful atmosphere. So bed room should have *western aspect, south-western or north-western aspect*.

- **Drawing room aspect:** It is a room which is used by the occupants for maximum hours of the day. To achieve good sunlight it should be placed in south or *south-east* or *north-east*. Windows should be provided in external walls.

- **Study room aspect:** Windows in this room should be in *northern* side to obtain sufficient light throughout the day. So aspect of this room is north.

- **Verandah:** there should be sufficient light in the above unit throughout the day so they should be placed with opening in *north-direction*.
Kitchen (Eastern Aspect)
Bed Room (Western South western, North western Aspect)
Drawing Room (South East or North East Aspect)
Study Room (Northern Aspect)
Verandah (North Direction)
Prospect

• it is related with the views as seen of the outside from doors and windows in the external wall. For pleasant atmosphere view of a garden, hill and a river, etc is a good prospect. Towards these objective doors and windows should be provided in the external wall of the building. Undesirable views like a small nallah, slum area, drainage disposal unit, garbage collection centers should be concealed by not providing windows in that direction.

• Prospect of living room should be toward the main road to keep control on the plot. Prospects of bed should be on the rear side of the building so that to avoid disturbance due to noise.
Privacy

• This is very important factor to be considered while planning both residential as well as public building Privacy of one room from another in a building as well as privacy of the whole building with other building should be achieved.

• The privacy of residential building as a whole can be achieved by planting trees, and by providing entrance. Even the compound wall of required height can be constructed to provide privacy of trespassers.

• Privacy in different rooms can be achieved by providing doors in such a way that minimum view of room is seen when shutter is opened. Privacy is very important in bed rooms and wick. and the view of bed room should not be visible from any other room.
Grouping

• It is the arrangement of various rooms with respect to their functions. In case of residential building to achieve maximum efficiency of the plan the grouping should be done as follows
• Verandah should be the first unit after the entrance of the house
• Living room and dining room should be close next to verandah
• Kitchen and dining should be close to each other
• Sanitary arrangements should be close to bed rooms.
• Staircase should be approachable from each room
• Passages connecting various rooms should be well lighted and ventilated
Roominess

• This principle of planning is directly related to dimensions of the room. A rectangular room is found more convenient as compared to a square room of the same size. Hence length to width ratio should be 1.2 to 1 or 1.5 to 1 if the ratio is greater it will give a tunnel effect to the room. Height of doors and windows, ceilings, floorings, color treatment also affect the roominess of the building unit. Light color give effect of more space whereas dark color makes the room look smaller. Height of ceiling should be low as more height gives a feeling of a cave.
Flexibility

• Flexibility means a room which was planned for one function can be used for other, if so required. If rooms are big enough and are having a minimum width of 3m are more flexible and even the activities of various rooms can be exchanged.
Furniture requirement

- One of the most important requirement of a building planner, is to know how much space is needed by each function in a particular building. The room sizes for a particular function can be completed on the basis of permanent furniture's to be used in the room. Hence while planning a building furniture arrangement must be shown.
GROUND FLOOR PLAN

AREA = 81.63 M²

SCENIC

FIRST FLOOR PLAN

AREA = 39.27 M²

TOTAL AREA = 1300 SQ.FT

Dimensions may vary during construction - All Dimensions are in centimetres.
Circulation

• Circulation is the access into or out of a room. It is the internal movement inside the building and the area earmarked for it.
• Circulation area should be straight, short, bright, lighted.
• Circulation should nor affect the privacy of a room nor interfere with the utility space
• Circulation in a building is of two types
  • **Horizontal circulation** and **vertical circulation**
  • Circulation within a floor is called horizontal circulation
  • And circulation between different floor is called vertical communication.
Lighting

- It can be natural light as that obtained from the sun during the day or artificial light. Adequate illumination is essential in day to day activities to execute the safety and comfort and efficiency.
- Good visibility is a must for accident prevention, comfortable watching and reading to reduce fatigue, avert confusion, and efficient security.
Elegance

- Elegance refers to the planning of elevation and layout of the plan to give an impressive appearance to the building. The proper width, height, location of doors and windows, materials employed in construction of exterior walls etc create elegance. The result of elegance is aesthetics of building
Economy

• Building planning should be carried out in the financial limit of the client. An engineer should know in advance, the client intends to spend for the building and accordingly material of construction, finishing items, stage of construction should be suggested. By estimation proposed amount should be derived and as per that progress should be followed to avoid delay in work progress
Satisfied Owner
Sanitation

• Provision for cleanliness, lighting and ventilation in sanitary units avoid growing of bacteria's, and spread of diseases and give hygienic condition. In bath and w.c. glazed tiles and dado should be provided on wall to maintain clean condition. The ventilator in bath, w.c. permit sunlight and air collation to maintain hygienic condition. The flooring material s should be easy to clean, skirting's should be provided in rooms. Bath tubs, w.c. , kitchen sink should be made of ceramic material to maintain clean easily.
Building bylaws

• During planning and construction of any building, certain regulations are laid by Municipal bodies, authorities, and other government departments as town planning so as to prevent haphazard development of city such rules and regulations are called as building bylaws.
Objectives of Building bylaws

• Building bylaws allow disciplined and systematic growth of buildings and towns and prevent haphazard development
• Building bye-laws protect safety of public against fire, noise, health and structural failure.
• They provide proper utilization of space, hence maximum efficiency in planning
• They provide health, safety, and comfort to peoples living in the building.
Different bylaws

• **Building frontage:** It is the margin to be left beyond the extreme edge of the road to the front of the building line.
• It depends upon Status of area, Nature of Road.
• Residential building requires minimum clearance. Public building requires more clearance.
• The purpose of this frontage is to facilitate
• Widening of road in future
• More sight distance at corners
• Minimum sound pollution
## Frontage based on type of building

<table>
<thead>
<tr>
<th>Type of residential Building</th>
<th>Plot size m²</th>
<th>Frontage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached Building</td>
<td>Above 250</td>
<td>12 m</td>
</tr>
<tr>
<td>Semidetached Building</td>
<td>125-250</td>
<td>8-12 m</td>
</tr>
<tr>
<td>Row type building</td>
<td>50 to 125</td>
<td>4.5 to 8 m</td>
</tr>
</tbody>
</table>
Open spaces

- Open spaces are essential to satisfy the lighting and ventilation requirement.
- Outer open space: They are additional margins to be left within the plot to isolate the building from road and neighboring buildings.
- Inner open space: They are open spaces within the building. They are needed in heavily congested area to
  - Provide lighting to the interior rooms
  - Create inner courtyard
Exterior open space

- Exterior open space maybe in front, rear or sides of the building.
- Front open space: Every building fronting a street shall have a front space.

<table>
<thead>
<tr>
<th>Width of street</th>
<th>Front open space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 7.5 m</td>
<td>1.5 m</td>
</tr>
<tr>
<td>7.5 to 18 m</td>
<td>3 m</td>
</tr>
<tr>
<td>7.5 to 18 m</td>
<td>4.5 m</td>
</tr>
<tr>
<td>Above 30 m</td>
<td>6.0 m</td>
</tr>
</tbody>
</table>
Rear open space

• Every residential building shall have a rear open space of 3 m and in no case it should be less than 1.8 m.

• Side open space: Detached building should have a minimum 3m side open space at both the sides, whereas semidetached building will have 3m on one side only.

• The open spaces mentioned are for residential building up to height 10 m
Minimum standard dimensions of building elements

- Area requirement
- The limitation of area is achieved by satisfying floor space ratio. FAR
- Floor space Ratio:
- FSR: Total area covered area of all floor
  - Plot area
- It ranges from 1 to 2
Height of Building

• The height of Building are related to FAR and provision of open space
• The maximum height of building should not exceed two times the width of road + front open space
## Minimum sizes of rooms

<table>
<thead>
<tr>
<th>No</th>
<th>Name of Room</th>
<th>Minimum area</th>
<th>Minimum size of sides</th>
<th>Minimum Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HABITAT ROOM, BED ROOM, LIVING ROOM, DRAWING ROOM, DINING ROOM, STUDY ROOM</td>
<td>9.5 m²</td>
<td>2.4 m</td>
<td>Should not be less than 2.75 m</td>
</tr>
<tr>
<td>2</td>
<td>KITCHEN</td>
<td>5 m²</td>
<td>1.8 m</td>
<td>Should not be less than 2.75 m</td>
</tr>
<tr>
<td>3</td>
<td>BATHROOM, W.C</td>
<td>1.8 m²</td>
<td>1.2 m</td>
<td>Not less than 2 m</td>
</tr>
<tr>
<td>4</td>
<td>STORE ROOM</td>
<td>3 m²</td>
<td></td>
<td>Not less than 2.2 m</td>
</tr>
<tr>
<td>5</td>
<td>GARAGE</td>
<td>12.5 m²</td>
<td></td>
<td>Not less than 2.2 m</td>
</tr>
<tr>
<td>6</td>
<td>STAIR CASE</td>
<td></td>
<td></td>
<td>The minimum width of stair is 1.0 m</td>
</tr>
</tbody>
</table>
Sizes of rooms

• **Drawing room**: Drawing room should be the very first room of a house as we enter
• The minimum area should be 15 to 20 sq m
• General sizes: 3.5m x 5.5 m
  • 5m x 6 m
  • 7 m x 9 m
• **Ventilation in Drawing rooms**: Minimum window area should never be less than 10 % of floor area but 20 % is preferred
• **Dining room**: It is a place where families take their breakfast, lunch, dinner.
  - Size: 4 m x 3 m
  - 4 m x 5 m
  - 5 m x 6 m

• **Kitchen**: A Kitchen is a place where food is prepared and stored for consumption
  - Sizes: 1.5 m x 3m
  - 3 m x 5 m
  - 4 m x 6 m

• Ventilation in kitchen: window area should be at least 15% of floor area
• **Bed room:** A man spends major part of the day in the bed room either sleeping or relaxing.

• A minimum floor area of 10 sq m should be provided

• Sizes: 4 m x 3 m
  • 5 m x 4 m
  • 3 m x 3m
  • 4 m x 4 m

• **Ventilation:** Minimum window area of 10% of floor area.
• **Bath and W.C.:** Bathroom is a place where inmates take bath and the waste water is collected and conveyed off.

• Water Closet is the place of collection of human discharge.

• A minimum floor area of 1.8 sq m.

• Floor area of Bath and w.c should not be less than 2.8 m² with minimum width of 1.2 m.

• W.C should have a minimum width of 0.9 m and minimum length of 1.2 m.

• A minimum floor area of 1.1 sq m is to be provided for w.c.

• Ventilator of 500 mm x 300 mm is to be provided at a height of 1.8 from floor area.

• Sizes: 1.5m x 2 m

• 2m x 3 m

• 3m x 4m
• **Store Room:** It is to store items like food grains, cylinders, utensils, etc.
• Floor area 15 sq m to 20 sq m
• **Verandah:** It is an area open on 1 side, 2 sides, or 3 sides.
• Minimum width 1.5 m not greater than 4 m
• Minimum Height of verandah 2.1 m
• **Pooja Room:** Many people perform pooja in houses. It is quite a calm space to perform pooja.
• It should be located in N-E corner of the building
• Sizes: 2.1 m x 2.1 m
• Roughly 4 m² in area
• **Study room:** It is a place where study material is stocked and read
• Area of study room should be 10 m² to 12 m²