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SFI GEC PALAKKAD

Module 1

It deals with the planning, design, construction, and maintenance of buildings, roads, railways, airports, seaports, dams, canals, bridges, water supply and sewerage systems.

Disciplines

1) Structural engg.
2) Geotechnical engg
3) Transportation engg
4) Environmental engg
5) water resources engg
6) Earth quake engg
7) Construction engg
8) Hydraulic engg
9) Surveying and remote sensing

Impact of infrastructural development of a Country

- Increase in food production.
- Protection from drought, famine, flood.
- Healthy and comfortable housing facility.

- Safe domestic and industrial water supply
- Safe and scientific waste disposal
- Improvement in communication & transportation.
- Generation of ~~ele~~ electricity from, nuclear, hydel, thermal, solar or wind energy.
- Improved weath, prosperity, std of living.
- Overall growth of a nation.

Surveying

Determine the relative positions of points on above or beneath ~~below~~ the surface of ~~ea~~ earth by means of direct or indirect measurements of distances, elevations & directions.

Main ~~inst~~ instruments are - chain, levelling instrument, theodolite, tacheometer, total station etc.

Buildings

It is a man-made structure with proper foundation, ~~w~~ walls, roof and other building services.

~~Cla~~ Classified according to - occupancy,

load transfer, materials used and fire resistance

Occupancy - Purpose served by buildings.

Group A - Residential buildings. - sleeping accomodation
" B - Educational "
" C - Institutional "
" D - Assembly "
" E - Business "
" F - Mercantile "
" G - Industrial "
" H - Storage "
" J - Hazardous "

Group - A
A-1 - Lodging and rooming houses.
A-2 - 1 or 2 family private dwellings.
A-3 - Dormitories.
A-4 - Apartment houses (flats)
A-5 - Hotels
A-6 - Starred hotels.

Group B - for schools, colleges or other training insti
B-1 - Schools up to senior secondary level with not less than 20 students.
B-2 - All other training instn with not less than 100 students.

Group - C. - for medical or other treatment or care of persons suffering from phy & mental illness.

C1 - Hospitals and sanatoria

C-2 - Custodial instt ~~(prison~~.

C-3 - Penal (Jail) & mental instn.

Group D - Amusemant,

D1 - building having a theatrical stage and fixed seats for over 1000. persons.

D-2 - less than 1000

D-3 - without a permanent stage having accomodation for 300 or more person but no permnt seating arrngt.

D-4 - " for less than 300.

D-5 - All other structures designed for people who do not belong to D1-D4

Group - E - transaction of business. for keeping of accounts and records.

E1 - Offices, banks,

E_2-2 - Laboratories, out patient clinic.

E-3 - Electronic data processing centre.

Group F - Shops, stores, market

F_1 - Shops, " area up to 500 m^2

F-2 - ~~Sho~~ " more than 500 m^2

Group G - manufactured, processed, fabricated assembled. industries

G-1 - used for low hazard industries

G-2 - " moderate "

G-3 - " high "

Group H - ware houses, cold storage, freight depots, storhouses, garages.

Group J - Storage, handling, of highly combustible or explosive materials, or products which are liable to burn.

classification according to method of Load transfer

Load bearing structure - The load of roof & floors is transferred to the walls. foundation by thick walls.

framed structure - transferred to the foundation through pillars (column) and footings. Walls serve as partitions only

Buildings - classification according to materials

RCC structure
Steel "
Composite "

Classin according to fire resistance - Type 1, 2, 3

Selection of sites for buildings

factors

1) Site should be fairly level with good quality of soil.

2) Location should be calm with reasonable development.

3) It should be well connected by the road and other modes of transport

4) Its should have good commmunity facilities.

5) Electricity, water, sewer line should be available.

6) away from hazardous industries.

7) Flood prone areas., water logged areas and reclaimed land should be avoided.

8) good natural ventilation and lighting.

9) Amenities like schools, hospital, recreation centres, ~~hospitals~~ should be ~~nearer~~ nearer.

10) have good drainage properties.

11) may have regular shape with sufficient foontage.

12) Sufficient for present and future devpt.

13) Places prone to air and water pollu. avoided.

14) Proper ownership and legal matters have to be checked before buying.

15)

DIFFERENCE

Load bearing structure.	Framed structure
• Cost is less	• Cost is more.
• Suitable upto 3 stories	• Suitable for any number of stories.
• Walls are thicker, hence floor area is reduced.	• Walls are thinner, hence more floor area available for use.
• Slow construction.	• Speedy construction.

Components of a Building

- Sub structure or foundation (Portion below the ground)
- Plinth
- Super structure.

~~Sub~~ Foundation

- It is the lowermost part of building.
- It is below the ground level.
- Purposes are.
  - to distribute the load of the superstructure to the soil below.
  - give the stability to the ~~&~~ building.
  - To prevent the overturning of

- Requirements :-
  - The Pressure exerted on the soil should not exceed the safe bearing capacity of the soil.
  - foundation should be rigid

Plinth

- It is the portion b/w ground floor level and ground floor level.
- A damp proof course is provided at the top of the plinth. to prevent entering of water

Coloumn :

- These are the vertical members which transfer the load from the top to the bottom member.
- It can be of timber, steel steel or concrete.
- It may be circular, rectangular & or square stucture

Wall

Wall is also constructed to transfer the load from top to the bottom member.

- function of giving protection from to the inhabitants from rain, wind etc. and also privacy.
- Load bearing & non load bearing.

* Functional requirements.
  - strength & stability.
  - fire resistance.

. Thermal insulation.

. ~~Thermal~~ sound insulation.

Lintel :- It is a small beam provided over window and door openings to transfer the load from above. It can be of wood, steel, RCC. The width of the lintel will be that of the wall.

Door and window :- A door is provided to get access the room and also to lock it for safety.

- Window is provide in the exterior wall to have light and air circulation. The window area should be 15-20 % of the floor area.

Floor

The number of floors depend on the height of the building.

- The lowermost - ground floor.
- It is prepared by filling the basement with soil and then compacting it.
- Top is made by marble, tile or stone.
- Upper floors are

- The thickness of the slab will depend upon the span and the load it is subjected to.

Stair - Stair is constructed to go from one floor to the other.

Roof :- Topmost part.

It serves as a cover for protection from rain, wind and sun rays. Roof can be flat or sloping. It should be leak proof.

Building services

The essential building services are,

Water supply, sanitary fittings and connections,

Building Rules

National Building Code (NBC)

It is the national instrument providing guidelines for regulating the building construction activities across the country.

Code has 11 parts

Part 0 - Intgral approach.

" 1 - Definitions.

" 2 - Administration

" 3 - Devlpmt control rules & general buildings

requirements

- 4 - Fire and safety
- 5 - Building materials
- 6 - Structural designs
- 7 - Construction practices & safety
- 8 - Building ~~serives~~ services
- 9 - Plumbing services.
- 10 - Landscaping, signs and outdoor display structures

Relevance of NBC

- NBC controls all construction activities in our country.
- Provide guidelines for ~~to~~ regulations to building construction etc
- Information and mendatory practices available in NBC
- Dvlpt and building plannings - building materials, safety, sustainable approach
- Structural Design aspects
- construction and Asstet / Facility management
- Building services.
- Plumbing services & solid waste managemat.

Kerala Building Rules (KBR)

For urban areas - Kerala Municipal Building Rules (1999)

For rural areas - Kerala Panchayath " (2011)

Terminology

Permit - A permission or authorization in writing by the authority to carry out work.

Site - A piece of land enclosed by definite boundaries, It is also called as plot.

Set back line - The distance from the property line that you are not allowed to build on.

Open space - An area forming an an integral part of the plot left open to the sky.

Front open space, rear, side open space

Building area terms

Plot area - Area enclosed b/w plot boundaries.

Covered area - Ground area covered by the building immediately above the plinth level.

Plinth area - The built up covered area measured at the floor level of the basement

or of any storey.

Floor area (built up area) - The built up area in all floors including basement floor

Floor area ratio

$$FAR = \frac{\text{Total floor area of the floors}}{\text{Plot area.}}$$

Carpet area

The covered area of the usable rooms at any floor level (excluding area of the wall)

Carpet area = Plinth area - Circulation area
- area occupied by walls

Coverage - covered area of building. Normally expressed as the percentage of plot area

Open space requirements.

- Exterior open spaces are necessary for proper light and ventilation requirements

Exterior open spaces (set back.

10m height, front yard of 3m depth
rear
back - yard of 2m depth.

side - 1.2 m.