

Assignment - 1

Building Services

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11. What are the different types of escalators? Describe the components of an escalator?

An escalator is a moving staircase - a conveyer transport device for carrying people between floors of a building.

- Types of escalator :

1. Parallel
2. Criss cross
3. Multiple parallel
4. Curved escalators

- Components of escalator

1. Landing platforms :

These two platforms house the curved section of the tracks, as well as the gears and motors that drive the stairs.

2. Truss :

The truss is a hollow metal structure that bridges the lower and upper landings.

3. Steps :

The steps are solid, one piece, die-cast aluminum or steel. Yellow demarcation may be added to clearly indicate their edges.

4. Tracks :

The track system is built into the truss to guide the step chain, which continuously pull the steps from the bottom and back to the top in an endless loop.

5. Hand rail :

The handrail provides a convenient hand hold for passengers while they are riding the escalator.

2. What are the different types of lifts? Explain the components of a lift system.

Vertical transport equipment that efficiently moves people between floors of a building, vessel or other structure.

Lift categories According to the function:

1. Trade Lift - crucial to the good performance to clients of the building.

e.g. offices, shopping mall and hotels

2. Hospital Lift - used in hospital & treatment center.
• speed of elevator 100 - 350 ft/min.

3. High Residential Lift - for high rise residential buildings such as flat or apartment.

4. Institution Lift - used in library, office, classroom or lecture.

5. Store Lift - used to transport heavy goods but depends on types of goods.
5000 lbs - load hauls 20000 lbs.

6. Lift of cars - used specifically to lift a car in multi-storey car park or showroom.

Components of Installation of Lifts

Lift sub-System

control Motion - includes motor, gear, engines, brakes and power supply.

control System - to get control the movements of the lift.

Door Control - contained motor connecting lift a car doors, platform gates and door safety devices

safety Control - contain the safety gear, speed controller for the first balance, head and lack of power

Explain various factors to be considered in an escalator design?

Physical factors

- physical factors like horizontal and vertical distance to be spanned must be considered.
- These factors will determine the pitch of the escalator and its actual length
- Escalators should be situated where they can be easily seen by the general public.

Traffic patterns

- Traffic patterns must also be anticipated in escalator design.
- In some buildings the objective is simply to move people from one floor to another, but in others they may be more specific requirement, such as funneling visitors towards a main exit or exhibit.
- The number of passengers is important because escalators are designed to carry a certain maximum number of people.

Safety:

- Safety is also major concern in escalator design.
- fire protection of an escalator floor-opening may be provided by adding automatic sprinklers or fireproof shutters to the opening, or by installing the escalator in an enclosed fire protected hall.
- To limit the danger of overheating, adequate ventilation for the spaces that contain the motors and gears must be provided.
- It is preferred that a traditional staircase to be located to the escalator if the escalator is the primary means of transport between floors.

Differences between Transaction Lift and My.

- Transaction Lift**
- Lifted by ropes, which pass over a pass wheel attached to an electric motor above the elevator shaft.
 - Used for mid and high-rise applications, much higher travel speed than hydraulic.
 - principle : see-saw
 - Components : control system, sheave motor, counter weight guiding rail.
 - The machine room is located at the upper most level.
ie. - on the terrace.

- Hydraulic Lift**
- Supported by a piston at the bottom of the elevator that pushes the elevator up as an electric motor forces oil or another hydraulic fluid into the piston.
 - Used for low-rise applications for 2-8 stories.
 - principle : Pascal's pressure principle
 - Components : Tank; motor, valve, actuator.
 - The machine room is located level adjacent to the elevator shaft.

5) Describe the major Advantages and Disadvantages of having automated closed doors and collapsible gates for lifts.

Advantages :

- Enhanced convenience and efficiency;
- Automated doors open and close without manual effort improving user convenience, especially for people with disabilities or those carrying heavy weights.

2. Improved safety :

Automated doors ensure that the lift is properly closed before it starts moving, minimizing the risk of accidents caused by open doors during operation.

• Collapsible gates, in particular, can add an extra layer of safety in high-traffic areas, preventing people from accidentally falling out when the lift is in motion.

3. Energy Efficiency:

Modern automated doors are designed to be energy efficient with sensors

4. Reduced Wear and Tear

Automated systems often operate more smoothly and require less manual intervention, leading to less wear and tear compared to manual doors.

Disadvantages

1. Higher Initial Cost:

The installation of automated doors and collapsible gates can be more expensive.

2. Maintenance and Repair Costs:

Automated systems require regular maintenance and when they malfunction, repair costs can be higher.

3. Dependency on Technology:

If there is a power failure or technical malfunction, leading to a loss of convenience.

4. Space Constraint:

Some lift designs might face space limitations for installing automated doors or collapsible gates, especially in older buildings where infrastructure is not designed to accommodate them.

5. Complex Repairs:

Automated systems require regular maintenance to ensure proper functioning.

UNIT-II

What are the causes of fire accidents in modern high-rise buildings?
The most common causes of fire disasters can be classified into the following:

a) Faulty appliances and leads:

Faulty equipment and weak wiring can cause large number of fires in homes, offices and other establishments.

b) Faulty fuel supply/ leak:

Leakage in gas/fuel supply lines cause fires which prove to be difficult to subdue. They may also be caused by acts of arson.

c) Misuse of equipment or appliances:

Placing flammable articles too close to heat may cause over heating and fires.

d) Human error:

Human actions like smoking, overheating of electrical appliances, lack of knowledge of correct procedures for use of flammable materials cause fires to occur with regular frequency. High density urban living then acts as a catalyst to spread the fire.

e) Accident/collision related fires:

Vehicular accidents or collisions may cause local fires which may then spread to other areas. Mine fires are also accidental fire disasters.

f) Natural and climate causes:

Natural weather phenomena like lightning, extreme heat with low humidity cause fires.

Lightning may cause forest fires, which may then spread to inhabited areas. Earthquake induced fires or those caused by volcanic eruptions are other fires caused by natural causes.

2. Explain the role of fire alarm system in minimizing effects caused by various fires?

Fire alarm system play a crucial role in minimizing the effects of fires by detecting, warning and helping manage the situation to protect both people and property.

1. Early Detection
2. Immediate warning
3. Automatic Activation of Suppression
4. Limiting smoke spread
5. Minimizing property damage

Early Detection :

Fire alarms are designed to quickly detect the presence of smoke, heat or fire. Early detection is key to minimizing damage as it allows for a prompt response before the fire spreads.

Immediate warning :

Once a fire is detected, fire alarm systems provide immediate alerts through audible alarms or visual signals.

Automatic Activation of suppression Systems:

In many modern buildings, fire alarm systems are connected to fire suppression systems.

Limiting smoke spread :

Some systems also control the movement of smoke within buildings, activating smoke control systems that close fire doors or adjust ventilation to prevent smoke from spreading to non-affected areas.

Minimizing property damage :

By detecting fire early, fire alarm systems can reduce the amount of damage to a building's structure, equipment and inventory, which helps in recovery and limits financial losses.

3. What is fire load? classify them according to Indian Standards.

Fire load is the amount of heat liberated per square meter of the floor area of any compartment by the combustion of the contents of the building. It is expressed in terms of kilocalories (kcal) per square meter. The amount of heat is used as the basis of grading of occupations.

Eg: Area = 80 sqm

WEIGHT OF COMBUSTIBLE MATERIALS = 1200 kg
CALORIFIC VALUE = 4000 kcal/kg

$$\text{FIRE LOAD} = \frac{1200 \times 4000}{80} = 60000 \text{ kcal/m}^2$$

Standards (IS : 1641 - 1988) has provided the grading the fire loads in three classes.

- Low fire load : Here the value is not exceeding 275000 kcal/m². It is applied generally to domestic buildings, hotels, office buildings etc..
- Moderate fire Load : In this case fire load value is between 275000 - 55000 kcal/m². It is applied to trading establishments and factories.
- High fire load : Here the value exceeds 55000 kcal/m². It is applied to godowns and similar structures.

Passive fire protection (PFP) & Active fire Protection?

Passive protection are those which are taken care-off during designing of a building structure and does not need any energy consumption.

following passive fire safety aspects are to be taken care of:

1. Internal hazard

- a. The fire resistance of building structure
- b. Fire integration of building
- c. Compartmentation
- d. Fire and smoke venting for smoke extraction.

2. Personal hazard

3. Exposure hazard - the internal means of a evacuation

- a. Isolation from neighbouring structures
- b. Access for outside emergency services
- c. site planning.

Active fire Protection (AFP)

Systems which require a certain amount of motion / action in order to work properly.

The active fire security methods can be in general divided in following heads:

- portable fire extinguishers
- fixed first-aid fire fighting equipment like hose-heels.
- Fixed automatic fire fighting systems
 - Water sprinklers and emulsifier systems
 - CO₂ fire fighting system
 - Halon fire fighting systems
- Fire salvage corps
- Mobile fire fighting systems and fire brigades.

5,

Draw the symbols and explain the classification of fires according to Indian Standards?

What

Classification of Fires (As per IS 15683 : 2018)

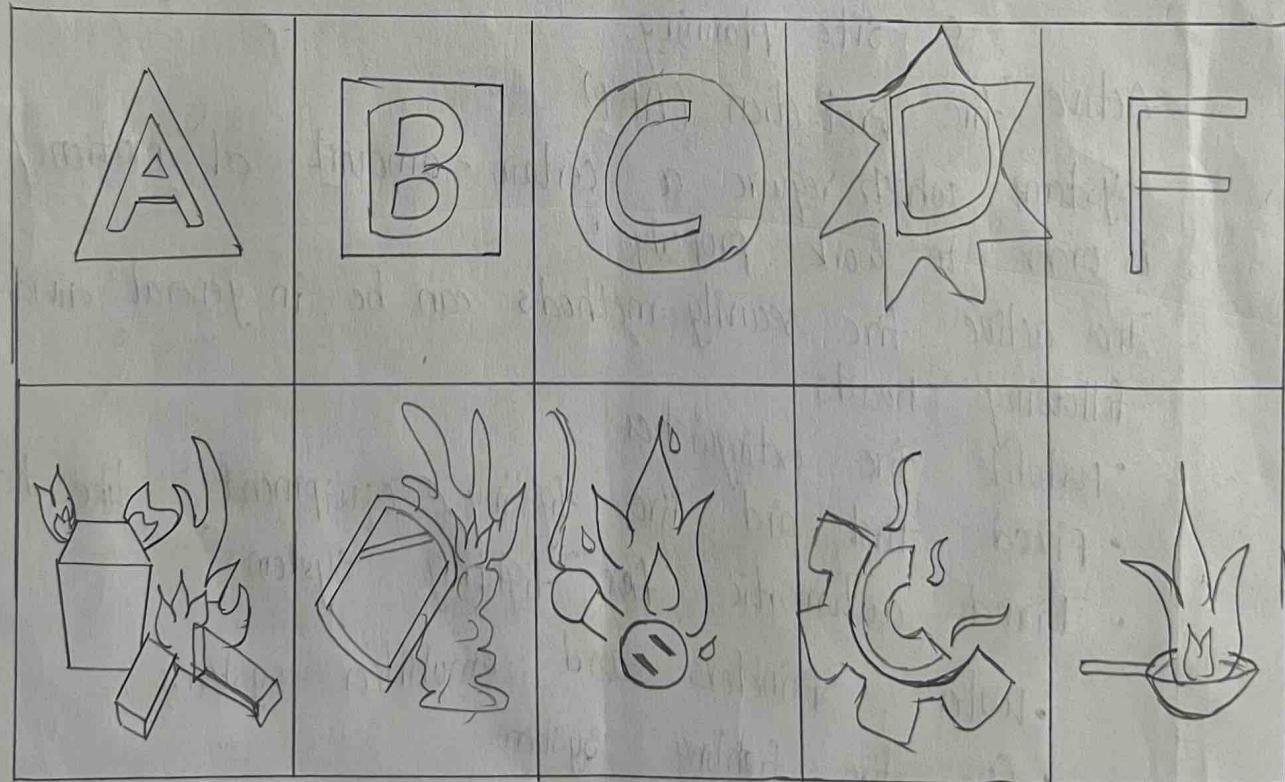
Class A - Fires involving solid combustible materials of organic nature such as wood, paper, rubber, plastics, etc.

Class B - Fires involving flammable liquids or liquefiable solids.

Class C - Fires involving flammable gases under pressure including liquefied gases.

Class D - Fires involving combustible metals such as magnesium, aluminium, zinc, sodium.

Class F - Fires involving cooking media in cooking appliances and may be called kitchen fire.



UNIT - III

What is residential Trap? Explain different types of traps used in a building?

A plumbing trap is a device in a plumbing system that traps a small amount of water in a bend in a pipe to prevent gases from escaping into a building.

Types of Traps:

1. Gully Trap - These plumbing traps are built external to the building to carry wastewater released from sinks, washbasins, restrooms,

3 types - P - trap
Q trap
S trap



2. Bottle Trap - A bottle plumbing trap is given to get squander from the wash basin, kitchen sinks and different machines where the apparatuses don't have an underlying cap

3. Intercepting Trap:

Intercepting plumbing Trap types are given into the Intercepting Manhole. An Interceptor sewer vent is provided at the interference of building sewer and public sewer



4. Grease Trap:

This trap is provided on the floor to collect wastewater from the bathroom, sink, shower and washbasin, etc.. These are available in upvc or cast-iron material and have removable grating on the top of the trap.

5. Floor Trap or Nahi trap:

It is introduced in the wasteline from at least one installation to isolate grease from the fluid and hold it. This kind of trap is a gadget to gather the grease substance of waste and can be cleaned from the surface.

2. Describe various plumbing fixtures that are in general use in building?

System of pipes and fixtures installed in a building for the distribution and use of potable (drinkable) water and the removal of waterborne wastes.

Types and functions of plumbing fixtures:

1. Bathtub

2. Washbasin

3. Water closet

4. faucet

5. Sink

6. Flushing cistern

1. Bath Tub - Installed in bathroom, it is made up of vitreous material, enameled iron, plastic, marble, etc..

- Its length varies from 1.7 cm to 1.85 m, the width is 70 cm x 75 cm and the depth varies from 43 cm to 45 cm to the outlet end.
- Cold and hot water taps are provided for filling the tank.

Washbasin:

- It is provided for washing hands, face, etc.. These are generally made of vitreous china, brunt fireclay, ceramic, enamel over steel, marble, glass, etc..
- Washbasins are available in different shapes, size.

Water closet:

- It is provided to receive human excreta directly from the user. It is connected through a suitable trap to the soil pipe and finally to a municipal sewer or septic tank.

The excreta is flushed with the help of water from the cistern tank. There are 2 types.

1. Indian type
2. Western type

Faucet :

- It is a device that controls the flow of liquid, especially water, from a pipe. It is also called a water tap.
- It is available in bathroom, kitchen or sink as per use.

Sink :

- It is a rectangular, shallow, waterproof tank made of concrete, vitreous china, fireclay or stainless steel.
- It is used for cleaning utensils, clothes, etc.
- The flow of a sink is provided with a hole for fixing a waste coupling and a waste pipe.

flushing cistern:

- It is a small tank holding water for flushing urinals and water closets.
- It is made of cast iron, glazed earthenware, glazed vitreous or any other material.
- Depending upon its size, a cistern can hold the following quantities of water - 5 liters, 10 liters and 15 liters.
- A 10 litre cistern is most common.

What are the Advantages and Disadvantages of Trap?

Trap- A plumbing trap is a device in a plumbing system that traps a small amount of water in a bend in a pipe to prevent sewer gases from escaping into a building.

Advantages of a trap:

1. prevents sewer gas entry:

The primary function of a trap is to hold a small amount of water, creating a barrier that stops foul-smelling sewer gases from entering the building.

2. Hygiene and health benefits:

By blocking sewer gases which contain harmful substances like methane and hydrogen sulphide (H_2S), a trap contributes to better hygiene and health standards within a building.

3. Essential for plumbing fixtures:

sinks, tubs and showers require a trap to prevent sewer gas

Disadvantages of a trap:

1. clogging Potential:

Debris can accumulate in the trap's curved section, leading to clogs that may require professional cleaning.

2. Maintenance required

periodic checks and cleaning of traps are necessary to ensure they are functioning properly or not.

3. Potential for leaks

over time, the trap's seal may deteriorate, leading to leaks around the fixture.