

25CE301 BUILDING MATERIALS AND CONCRETE TECHNOLOGY

Unit -II BUILDING MATERIALS - II NOTES 1. PAINTS

Definition

Paint is a liquid composition applied on surfaces to protect and decorate them.

Functions of Paints

- Protects surfaces from weathering
- Prevents corrosion of metals
- Improves appearance
- Increases durability
- Provides smooth finish
- Prevents decay in wood

Characteristics of Good Paint

- Should dry quickly
- Should adhere well to the surface
- Should be waterproof
- Should resist weather effects
- Should provide smooth and durable finish
- Should not crack or peel off

Constituents of Paint

Constituent	Function
Base	Main body of paint
Pigment	Gives color and opacity
Vehicle/Binder	Holds ingredients together
Solvent/Thinner	Reduces viscosity
Drier	Speeds up drying
Extender	Reduces cost and improves finish

Types of Paints

1. Oil Paint

- Made using linseed oil
- Durable and glossy
- Used for wood and metal surfaces

2. Emulsion Paint

- Water-based paint
- Quick drying
- Used for interior walls

3. Enamel Paint

- Hard and smooth finish
- Used for metal and wood

4. Cement Paint

- Water resistant
- Used for exterior walls

5. Aluminum Paint

- Reflects heat
- Used for roofs and tanks

6. Bituminous Paint

- Waterproof
- Used for pipes and underwater works



Defects in Painting

- Blistering
- Peeling
- Cracking
- Fading
- Flaking

2. VARNISHES

Definition

Varnish is a transparent protective coating obtained by dissolving resins in oils or solvents.

Properties of Varnish

- Transparent

- Hard finish
- Durable
- Water resistant
- Improves appearance

Types of Varnishes

1. Oil varnish
2. Spirit varnish
3. Acrylic varnish
4. Polyurethane varnish

Uses of Varnish

- Furniture
- Wooden floors
- Doors and windows
- Decorative wood works

3. DISTEMPERS

Definition

Distemper is a water-based paint made from chalk, lime, pigments, glue, and water.

Composition

- Chalk
- Lime
- Pigments
- Glue
- Water

Advantages

- Economical
- Easy application
- Smooth appearance

Disadvantages

- Less durable
- Cannot resist moisture

Uses

- Interior wall finishing
- Ceilings
- Decorative works

4. GLASS

Definition

Glass is a transparent material obtained by melting silica with soda and lime.

Properties of Glass

- Transparent
- Hard and brittle
- Weather resistant
- Non-absorbent
- Good insulating material

Types of Glass

Type	Uses
Sheet Glass	Windows
Plate Glass	Shop fronts, mirrors
Tempered Glass	Doors and partitions
Laminated Glass	Safety glass
Frosted Glass	Privacy areas
Wired Glass	Fire-resistant works
Insulating Glass	Thermal insulation

5. PLASTICS

Definition

Plastics are organic polymer materials that can be molded into different shapes.

Types of Plastics

Thermoplastics

- Soften on heating
- Can be reused
- Example: PVC, polyethylene

Thermosetting Plastics

- Harden permanently
- Cannot be reused

- Example: Bakelite, epoxy

Properties of Plastics

- Lightweight
- Corrosion resistant
- Waterproof
- Durable
- Good electrical insulation

Uses

- Pipes
- Water tanks
- Flooring
- Electrical fittings
- Doors and windows

6. ASPHALT AND BITUMEN

Asphalt

Mixture of bitumen and aggregates used mainly for road construction.

Bitumen

Black sticky material obtained from petroleum refining.

Properties of Bitumen

- Waterproof
- Adhesive
- Durable
- Flexible
- Thermoplastic

Uses

- Road construction
- Roofing
- Damp proofing
- Waterproofing

7. ADHESIVES AND SEALANTS

Adhesives

Definition

Materials used for bonding two surfaces together.

Types

- Epoxy adhesives
- Resin adhesives
- Rubber adhesives

Applications

- Furniture works
- Tile fixing
- Structural bonding

Sealants

Definition

Materials used to seal joints and prevent leakage.

Properties

- Flexible
- Waterproof
- Durable

Applications

- Expansion joints
- Glass fixing
- Sanitary fittings

8. MODERN BUILDING MATERIALS **GFRP (Glass Fiber Reinforced Polymer)**

Properties

- High tensile strength
- Lightweight
- Corrosion resistant

Applications

- Reinforcement bars
- Structural panels
- Bridge decks

GEOSYNTHETICS

Definition

Polymeric materials used in geotechnical engineering.

Types

- Geotextiles
- Geomembranes
- Geogrids

Applications

- Soil stabilization
- Drainage systems
- Erosion control
- Road construction



AAC BLOCKS (Autoclaved Aerated Concrete) Properties

- Lightweight
- Thermal insulation
- Fire resistant
- Easy to cut

Advantages

- Faster construction
- Reduced dead load
- Energy efficient

Uses

- Partition walls
- Residential buildings
- Multi-storey structures

9. CEMENT

Definition

Cement is a finely powdered binding material that hardens after mixing with water.

Types of Cement as per IS Codes

Cement Type	IS Code	Uses
OPC 33 Grade	IS 269	General works
OPC 43 Grade	IS 8112	RCC works
OPC 53 Grade	IS 12269	High strength works
PPC	IS 1489	Mass concreting
PSC	IS 455	Marine structures

Composition of Cement

Compound	Formula	Function
Tricalcium Silicate	C_3S	Early strength
Dicalcium Silicate	C_2S	Later strength
Tricalcium Aluminate	C_3A	Initial setting
Tetracalcium Alumino Ferrite	C_4AF	Hardness and color

Hydration of Cement

Hydration is the chemical reaction between cement and water.

Effects of Hydration

- Formation of binding material
- Strength development
- Heat generation

Hydration Products

- Calcium Silicate Hydrate (C-S-H)
- Calcium Hydroxide

TESTS ON CEMENT

1. Consistency Test

Purpose

To determine water required for standard consistency.

Apparatus

- Vicat apparatus

Standard Consistency

Usually 26–33%.

2. Setting Time Test

Initial Setting Time

Time taken for cement paste to lose plasticity.

Requirement

Minimum 30 minutes.

Final Setting Time

Time taken for cement to harden completely.

Requirement

Maximum 10 hours.

3. Strength Test

Purpose

To determine compressive strength of cement mortar.

Method

- Mortar cubes are prepared
- Tested in compression testing machine

Testing Periods

- 3 days
- 7 days
- 28 days

IMPORTANT DIFFERENCES

Paint vs Varnish

Paint	Varnish
Opaque coating	Transparent coating
Contains pigments	No pigments
Decorative and protective	Mainly protective

Thermoplastics vs Thermosetting Plastics

Thermoplastics	Thermosetting Plastics
Reusable	Non-reusable
Softens on heating	Harden permanently

Thermoplastics Thermosetting Plastics

PVC

Bakelite

IMPORTANT 10-MARK QUESTIONS

1. Explain constituents and types of paints.
2. Write notes on varnishes and distempers.
3. Explain types and applications of glass.
4. Discuss plastics and their uses in construction.
5. Explain properties and uses of bitumen.
6. Write notes on adhesives and sealants.
7. Explain GFRP, geosynthetics, and AAC blocks.
8. Discuss composition and hydration of cement.
9. Explain different types of cement as per IS codes.
10. Explain various tests conducted on cement.



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