

## **Construction Materials and Construction Practice**

### **UNIT I 1.1 INTRODUCTION**

Physical properties of materials – Density, Bulk density, Specific gravity, porosity, water absorption, permeability, chemical resistance, fire resistance, weathering resistance, thermal conductivity, Durability. (Definitions only)

### **1.2 ROCKS AND STONES**

Rocks – Classification of Rocks – Geological, Physical and Chemical classification – Uses of stones – Requirements of a good building stone – Natural and Artificial stones for flooring- Examples (Detailed description not required)

### **1.3 BRICKS**

Definition – Brick earth – Composition of good brick earth – Manufacturing process – classification of bricks – properties of bricks – special types of bricks and their uses – compressive strength of bricks – Tests on bricks -grades and corresponding requirements of bricks as per BIS

### **1.4 LIME AND POZZOLANAS**

Sources of lime – classification lime – Fat, Hydraulic and Poor lime - uses of lime, Pozzolan materials – Surki, Flyash, Ground blast furnace slag, Rice husk ash – Advantages of adding pozzolanas to cement.

### **1.5 CEMENT**

Definition – Composition of ordinary Portland cement – Functions of cement ingredients – Different types of cements – Grades of cement (33,43 and 53) – Storage of cement – Tests on cement – objects of each test – Test requirements/ BIS specifications of OPC - Admixtures – Definition –types and uses.

### **1.6 WATER**

General – Requirement of water used in construction works – Use of sea water in construction works- Permissible limits of deleterious materials in construction water as per BIS- Effects of Sulphates and Chlorides in ground water – Minimum pH value.

### **1.7 GLASS**

Definition – Constituents of glass – Classification of glass – Functions and Utility – Types of glass – sizes and thickness – uses in buildings.

### **1.8 CERAMIC PRODUCTS**

Definition – Earthenware, Stoneware, Porcelain, Terracotta, Glazing, Tiles (Definitions only) – Types of Tiles – Clay Terracing tiles – Thermal care tiles – Glazed Ceramic tiles – Fully Vitrified tiles – Roof tiles – special requirements for floor, wall and roof tiles– Sanitary appliances.

### **UNIT II 2.1 MORTAR**

Definition – Properties and uses of mortar – Types of mortar – Cement and Lime mortar – Mix ratio of cement mortars for different works.

### **2.2 CONCRETE**

Definition – Constituents of concrete and their requirements – uses of concrete – Types of concrete: Lime concrete, cement concrete and light weight concrete.

### **2.3 PAINTS AND VARNISHES**

Definition – Functions of paint – Types of paints and their uses - Oil, Enamel, Emulsion, Distemper, Cement, Aluminium, Bituminous and Plastic paints - Varnishes – Definition – Characteristics of a good varnish – Ingredients of varnish– Types of varnish and their uses – Oil, Turpentine, Spirit and water varnish

### **2.4 METALS AND PLASTICS**

Types of metals used in construction – Cast Iron ,Steel, Aluminium, G I, Stainless steel– Market forms of steel – Steel for reinforced concrete - steel for pre stressed concrete –Hot rolled steel sections – cold formed light gauge section.- Plastics – Characteristics and Uses of plastics – Types – Thermoplastics and Thermosetting plastics – Various plastic products: pipes, taps, tubs, basins, doors, windows, water tanks, partitions – sizes , capacity and uses - Advantages and disadvantages of Plastic products – UPVC pipes and fittings - Asbestos - uses of asbestos.

### **2.5 TIMBER AND TIMBER PRODUCTS**

Types of Timber – Teak, Sal, Rosewood, Mango, and Jack – Defects in timber – seasoning of timber - objectives – Timber Products – Veneers, Ply woods, Particle Board, Fibre board, Hard board, Block board, Laminated board – Uses.

### **2.6 ROOF COVERINGS**

Definition – objectives and uses -Mangalore tiles – AC Sheets – FRB Sheets- G.I. sheets- Shell roof – R C C roof – Advantages – Types.

### **UNIT III 2.7 DAMP PROOFING MATERIALS**

Materials used for damp proofing – Properties and functions of various types of water proofing materials commonly available – chemicals used for grouting / Coating porous concrete surfaces – Admixtures for cement mortar and cement concrete – Functions of Admixtures – Accelerators, Retarders, Air repelling chemicals.

### **3.1 INTRODUCTION TO STRUCTURES**

Permanent and temporary structures – Life of structures – Sub structure – super structure – load bearing structure – framed structure – concept of framed structure – advantages of framed structure.

### **3.2 FOUNDATION**

Definition – objectives of foundation – Bearing capacity of soil – Definition – maximum/ultimate and safe bearing capacity - Bearing capacity of different types of soils – Factors affecting bearing capacity – Requirements of a good foundation – Types of foundations – Shallow foundation : Spread foundation, Isolated column footing, combined footing, continuous footing,

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Raft foundation – Deep foundation: Pile, Stone columns – Types of piles : Bearing pile, Friction pile, under reamed pile – Causes of failure of foundation – Remedial measures.

### **3.3 STONE MASONRY**

Definition – Common terms used : Natural bed, sill, corbel, course, cornice, coping, weathering, throat, spalls, quoins, string course, lacing course, through stone, plinth, jambs – Classification of stone masonry – Rubble masonry : Coursed, un coursed & Random rubble masonry – Ashlar masonry– points to be considered in the construction of stone masonry – Tools used – Trowel, square, spirit level, plumb bob, chisel line & pins, spall hammer, punch, pitching tool.

### **3.4 BRICK MASONRY**

Definition – Common terms used – Header, stretcher, bed joint, lap, perpend, closer, king, queen & bevelled, bat – permissible loads in brick masonry - Bond - Types – Header, stretcher, English bond & Flemish bond – one brick thick and one and a half brick thick– ‘T’ junction in English bond –Points to be considered in the construction of brick masonry – Cavity bond masonry- Defects in brick masonry – Maintenance of brick masonry.- Reinforced brick masonry – purpose – Its Advantage with respect to strength and Earthquake resistance.

### **3.5 PARTITION**

Definition – Requirements of good partition wall – Types – Brick, Concrete, glass, Aluminium frame with Glass sheet, timber, straw board, wood wool, Asbestos Cement board and plastic board partitions.

### **3.6 WATER PROOFING AND DAMP PROOFING**

Dampness – Causes of dampness – Effects of dampness - Damp proofing – Damp proof courses (DPC) — Method of mixing – Bad effects of excessive Admixtures in RCC – Water proofing coats for sump / overhead tank wall – Methods of grouting.

## **UNIT IV 4.1 DOORS, WINDOWS AND VENTILATORS**

Standard sizes of doors and windows – Location of doors and windows – Different materials used – Doors – Component parts – Types – Framed and panelled – gazed, flush, louvered, collapsible, rolling shutter and sliding doors – Windows – Types – Casement, Glazed, Bay, Corner – Pivoted Circular and Dormer windows – Ventilators – Definition – purpose – Types - Ventilator combined with windows / doors.

### **4.2 HOLLOW BLOCK CONSTRUCTIONS**

Hollow blocks – Advantages of hollow blocks – load bearing and non load bearing hollow blocks – Open cavity blocks – face shells, web, gross area, nominal dimensions of blocks, minimum thickness of face shells and web, grades of hollow concrete blocks -Materials used, admixtures added – mixing, moulding, placing and compacting, curing, drying – Physical requirements – Use of light weight aggregates -Hollow concrete (Hollow Block) masonry – Construction of walls– Advantages of hollow concrete masonry.

#### **4.3 STAIRS**

Definition – Terms used – Location of stair – types – Straight, Dog legged, Open well, bifurcated and spiral stairs – Moving stairs (Escalators) – Lift – components – uses and advantage of lifts over stairs.

#### **4.4 FLOORS AND FLOORING**

Floors - Definition – Types – Timber, Composite, RCC floors – Flooring - Definition- Materials used – Selection of flooring – types – Construction Methods (As per C.P.W.D / P.W.D Specifications) - Mosaic, Granolithic, Tiled, Granite, Marble, Pre cast concrete flooring, Plastic & PVC tile flooring- – Carpet tile& Rubber flooring.

#### **4.5 ROOFS**

Definition –Types of roof – Flat roof – RCC roof – Pitched roof – Tile roof – Shell roof – Technical terms - Steel roof truss – Types: King post, Raised chord, Howe truss, Fan, fink, north light and Modified north light trusses.

#### **4.6 WEATHERING COURSE**

Weathering course –Purpose-Materials Required- Brick Jelly Concrete preparation – Laying procedure- Preparation of mortar with Damp Proof materials for laying pressed clay tiles- Pointing and finishing of clay tiles - Use of Thermal Resistant Weathering Tiles.

### **UNIT V 5.1 POINTING**

Objectives – Mortar for pointing – Methods of pointing (As per C.P.W.D. / P.W.D Specifications) – Types of pointing – Flush, recessed, weathered, keyed or grooved pointing.

#### **5.2 PLASTERING**

Definitions – Objectives – Cement mortars for Plastering - Requirements of a good plaster – Methods of Plastering- Defects in plastering- Stucco plastering –Acoustic plastering – Granites silicon- plastering – Barium plastering – Asbestos marble plastering – Facade finishing (Structural Glazing) Sand faced – Pebble dash – Wall paper finishing–Wall tiling.

#### **5.3 WHITE WASHING, COLOUR WASHING, DISTEMPERING, PAINTING & VARNISHING**

White washing – preparation of surface – Application of white wash – Colour washing - Distemping – Preparation of surfaces – Application of distemper- Painting & Varnishing - Preparation of surface – Application of Painting & Varnishing.

#### **5.4 ANTI-TERMITE TREATMENT**

Definition – objectives and uses – Methods of termite treatment.

#### **5.5 SCAFFOLDING, SHORING AND UNDER PINNING**

Scaffolding – Definition – Component parts – Types – Single, double & Steel scaffolding, Shoring – Definition – Types – Raking, flying and dead shores – Underpinning – definition – Purpose – Types – Pit Methods – Pile Method.

#### **5.6 FORM WORK**

Definition – Materials used – Requirements of a good form work – Form work for column, RC beams and RC slab.

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**Reference Book:**

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7. Ashokkumar Jain, "Building Construction", Laxmi publications (p)Ltd Chennai.
8. I S 2185 Part I & II
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