USES OF STONES, LIME, MORTAR, CONCRETE, PLASTICS, ASBESTOS, HOLLOW BLOCKS &LIFTS

STONES

1. To build dwellings
2. To build monuments
3. As Foundations
4. As columns, pillars, beams, lintels, floors and roof
5. Aggregate for concrete
6. In ornamental works

MORTAR

1. For binding building units
2. To carry out Plastering and Pointing
3. To prepare moulds
4. As matrix for coarse aggregate
5. To form joints of pipes
6. To form bedding layer
7. To improve structure appearance

LIME

1. For treatment of water and waste water
2. As Matrix for concrete and mortar
3. For plastering of walls and ceilings
4. As refractory material
5. Used to produce glass / artificial stone and lime sand brick
6. For white washing and base coat in distempering
7. For soil stabilisation nd improvement
8. As flux in metallurgy industry

ASBESTOS

1. Cheap, Strong, Durable, light weight, fire resisting, sound proof and impervious
2. Maintenance cost is less
3. Does not corrode
4. Pleasing appearance
5. Used for factories, workshops, big halls etc.,
6. Not affected by acids / fumes and temperature
7. These sheets can be sawn and screwed
8. No need for protective paints and cannot be eaten by vermin.

PLASTICS

1. Plastic Pipes used in water supply
2. To carry sewage
3. For insulation of electric cables
4. Acid resistant plastics used in Chemical industry
5. Used as Drainage pipes
6. Bath and sink units
7. Corrugated / plain sheets
8. Water tanks, floor tiles
9. Decorative laminates and mouldings
10. Lighting fixtures
11. Paints and Varnishes

HOLLOW BLOCKS

1. Large size makes work faster and consumes less cement in joints than brick work
2. 1 m^2 wall requires 10 blocks(with 13 L Cement mortar) instead of 115 bricks (with 45 L CM)
3. For compound walls and non load bearing walls
4. Cost of plastering is reduced
5. Can be made strong by reinforcing with steel
6. Environment friendly (no fertile soil excavated)
7. Good thermal and acoustic insulation
8. Special Hollow blocks used for load bearing walls
9. Dead load is less, Cost is reduced.

CONCRETE

1. In foundations
2. In walls, retaining walls
3. In Terrace roofs and floors
4. In Arches, Dams , Bridges

LIFTS

1. Useful for aged and differently abled people
2. Consumes less power and saves time
3. Quick vertical transportation
4. Used when traffic is heavy between floors

ADMIXTURES

1. Used to modify property of concrete
2. Used on surface of concrete to protect it during or after its setting
3. Used for easy mould of concrete
4. Used for bond/repair of broken/chipped concrete
5. Accelerators reduce setting time of cement
6. Retarders increase setting time of cement
7. Plasticizers offers Easy Workability

POZZOLANAS

1. Economical (10-25% of costly cement replaced with waste products like flyash)
2. They are very fine and fill up concrete pores and reduces permeability.
3. Free lime in cement reacts with these materials and forms dense mass, hence considered as Admixtures
4. Addition to fat lime allows formation of cementing compounds by chemical action

GLASS

1. ***Sheet glass*** is used in small panels of doors and windows. AA or Special quality used as mirrors, A or selected quality used as safety glass, B or ordinary quality used for glazing and C or green house quality used for making frosted g***lass***
2. ***Plate glass*** are stronger, transparent and used for large size panels
3. ***Float glass*** is used in modern large sized shop windows and façade because of their uniform thickness with optical clarity and appearance
4. ***Wired glass*** are fire resistant and used for skylights
5. ***Translucent glass*** is used in doors and windows for bedrooms, bathrooms etc. they resist dust collection and easy drainage of water
6. ***Glass blocks*** have high degree of thermal insulation and noise reduction
7. ***Laminated safety glass*** is used in automobiles for windows and windshield***s***
8. ***Coloured glass*** used in facing portion of buildings
9. ***Tinted glass*** absorbs 30 to 40 % of solar radiation
10. ***Bullet proof glass*** is 200 mm thick

Requirement / Properties / Functions / Characteristics of

PARTITION WALL

1. It should be Strong enough to carry its over load
2. It should be Strong enough to resist impact
3. It should be as light as possible
4. It should be as thin as possible
5. It should act as sound barrier
6. It should be fire resistant
7. It should be stable and strong to support wall fixtures, wash basin etc
8. Capable to support decorative surface

GOOD PLASTER

1. It should adhere to surface and resistant to adverse weather
2. It should be fire resistant and offer sound insulation
3. It should provide smooth, non absorbent and washable surface
4. It should not crack while setting
5. It should provide surface with required decorative effect and durability

BUILDING STONE

1. Strong, hard and durable to withstand weathering action
2. Pleasing appearance and preserve colour for a long time
3. Hardness coefficient > 17
4. Specific gravity > 2.7
   Crushing strength > 1000 kg/cm^2
5. Fire resistant
6. It should not absorb more than 5 % of weight of water
7. It should be well seasoned for 6-12 months before usage
8. Pleasing structure and free from cracks
9. It should facilitate easy dressing, cutting etc.,

Characteristics of PLASTICS

1. It has good chemical resistance
2. It has good dimensional stability
3. They are good insulators
4. They are durable if protected
5. Easy to be used for fabrication
6. Take good finishes
7. Light in weight
8. Easy to maintain
9. Stable under low temperature
10. They can be made in attractive colours

VARNISH

1. They should dry quickly
2. Should form hard, tough and durable film
3. Should retain colour and give good gloss
4. Should possess weathering resistance
5. Should be uniform and pleasing when dry and should not shrink / crack

PAINTS

1. It should have good body (high connecting power)
2. It should have good fluidity to spread evenly in thin coat
3. It should not crack in drying
4. It should dry quickly and appear uniform
5. It should not show brush marks when dry
6. The colour should not fade
7. It should be rough and durable

Foundation

1. Stable and safe agaibst failure
2. Settlement must be within reasonable limits
3. Differential (uneven) settlement is limited so as not to cause damage to structure
4. The bearing pressure of foundation should be within allowable soil pressure

FORMWORK

1. Strong enough to resist pressure/weight of fresh concrete and superimposed loads
2. Rigid enough to retain shape without deformation
3. Should not allow leakage of cement
4. Should not warp, bend, bulge or sink
5. Smooth inner surface to give good appearance to resulting surface
6. Should be economical
7. Should be easily dismantable

MORTAR

1. Durable 2. Workable 3. Strong 4. Cheap 5.Should stiffen easily 6. Water retentivity 7. It must have good bond with bricks 8.Compatible with types of painting work 9. Should prevent seepage of rain water.

BRICKS

1. Sound, Compact, free from cracks and flaws
2. Regular in shape and uniform in size
3. Length = Twice the width + one Mortar joint
4. Uniform colour (Deep red/ copper)
5. It should not absorb water more than 1/6 of its own weight (when soaked for 24 hrs)
6. Crushing strength > 55 kg/cm^2
7. On striking, should give ringing/metallic sound
8. Hard and no impressions left when scratched
9. It should not break when struck against each other or dropped from a height of 7')

CEMENT

Physical properties

1. IST not less than 30 min
2. FST not more than 10 hrs
3. Compression strength (7 days) not less than 22 N/ mm^2
4. Tensile strength (7 days) = 2.5 N/ mm^2
5. Expansion not more than 19 mm (by Le-Chattier method)
6. Residue by weight should not exceed 10% (by IS 90 micron sieve)

Chemical properties

1. Sulphur content < 2.75 %
2. Weight of insoluble residue < 1.5 %
3. Weight of magnesia < 5%
4. Total loss on ignition < 4%
5. Ratio of % of Alumina to Iron oxide > 0.65
6. Ratio of % of Lime to Alumina, Iron oxide and silica in range of 0.66 to 1.02.

OBJECTIVES

FOUNDATION	**SEASONING OF TIMBER**
1.To distribute load form structure on a large area (so that intensity of load does not exceed SBC of soil) 2. To distribute load of structure on soil uniformly and to prevent unequal settlement 3. To provide levelled and hard surface 4. To give stability to structure against disturbing forces	1. To impart hardness, stiffness and strength to timber 2. To make timber workable 3. To make timber safe from insects and fungal attack 4. To decrease weight of timber and to lower transportation and handling cost 5. To reduce tendency of timber to crack, shrink and warp 6. To increase resisting power of timber against decay (since it is caused by moisture) 7. To maintain size and shape of timber products 8. To make timber fit to receive paints, varnishes etc., 9. To allow timber to burn readily, if used as fuel.
POINTING	**PLASTERING**
1. To improve appearance of structure 2. To protect exposed surface from atmospheric actions 3. To rectify defective workmanship 4. To improve appearance where surfaces exhibit pattern of joints	1. To hide defective workmanship 2. To corner-up unsold and cheap quality material 3. To provide base for decorating the surface by white washing, colour washing, distempering or painting 4. To protect the surface from atmospheric action 5. To provide even, smooth, clean and durable surface

DEFECTS

PLASTERING

1. Blistering of plastered surface (small patches swell out)
2. Cracks
3. Effloresence (whitish crystalline appearance due to presence of salts)
4. Flaking (formation of small loosemass on plastered surface)
5. Peeling (portion of plaster coming off)
6. Popping (conical hole on plastered surface)
7. Rust-stains (caused when plaster applied on metal lath)
8. Softness (excessive dampness makes the portion of surface soft due to thin finishing coat and presence of salts)
9. Uneven surface (due to poor workmanship)

Brick Masonry

1. Depressions, expansion and cracking at points where inferior quality bricks are used
2. Expansion of mortar joints when sulphate is present in mortar
3. Failure of brick work (when Sulphate in bricks reacts with Aluminium of Portland Cement in the presence of water)
4. Disintegration of brick work
5. Cracking resulting from increased volume due to corrosion of steel in reinforced brickwork.
6. Cracking resulting from increased volume due to freezing of water in snowbound area
7. Shrinkage cracks allow rain water seepage resulting in deterioration of brick work

PAINTS

1. Chalking or rubbing off the clothes (due to insufficient oil to oxidise and form a film to hold white lead – Remedy is weighing the materials as per formula)
2. Slow drying (inferior quality Oil and poor weather)
3. Running and sagging (caused by using slow drying paint / excess drier / applying paint too thickly / temperature and humidity / Painting over glossy surface – overcome by lightly sanding glossy surface and dusting it off)
4. Loss of gloss or spotting (due to ageing or usage of excess drier)
5. Blisting (bubbles formation under film of paint caused by trapped water vapour)
6. Bloom (foundation of dull patches due to defect in paint / bad ventilation)
7. Fading (gradual loss of colour due to sunlight effect on colouring pigments)
8. Flaking(due to poor adhesion, portion of paint becoming loose)
9. Saporification (formation of soap patches due to chemical action of alkalis)
10. Wrinkling (occurs when horizontal surface is too thickly painted)

Timber (with sketches)

1. Knots (dark hard rings at portion where branch is removed from tree)
2. Ring galls (curved swellings due to improper cut of a tree)
3. Shakes (cracks that separate fibres of wood)

a. Cup shakes (due to rupture of tissues in circular direction)
b. Heart shakes (due to shrinkage of interior part of tree dividing into 2 or 4 parts)
c. Ring shakes(cup shakes over entire ring)
d. Star shakes(cracks extend from back towards sap wood due to extreme heat/frost)
e. Radial shakes (fine, numerous and irregular star shakes with annual rings)

4. Twisted fibres (by twisting of young tress by wind)
5. Upsets or rupture (discontinuity of fibres due to injury to tree by wind/bad cutting)
6. Wind cracks (interior surface shrinks when wood exposed to atmospheric agencies)
7. Water strain (discolouring of wood when contact with water)
8. Burls (irregular projection on timber)
9. Callus (soft tissues covering wound of a tree)
10. Course grain (widened annual rings)
11. Dead wood (timber obtained from dead standing tress)
12. Droxiness (white decayed spot by fungi)
13. Foxiness (due to poor ventilation / decay)

Very Important 'Part B' questions

Unit I

1. ***Manufacturing of bricks (with sketch of Pug mill and Hoffman's kiln-plan)
2. Classification of rocks
3. Uses of stones and requirements of a good building stone
4. Classification of lime
5. Types of cement
6. Types of glass
7. Classification of glass
8. Limits of deleterious materials allowed in water for construction
9. ***Refer simplified table for Requirements, Properties, Functions, Objectives, Uses and Defects of various construction materials/ practices for all Units***

Unit II

1. Properties , uses of mortar (Refer simplified table)
2. Types of mortar
3. Types of concrete
4. ***Types of paints and varnish
5. ***Types of metals used in construction
6. ***Defects in timber and Seasoning of timber (with figure)
7. Various plastic products
8. AC, FRB and GI sheets
9. Shell and RCC roof (briefly)

Unit III

1. ***TYPES OF SHALLOW OR DEEP FOUNDATION (with sketch)
2. ***Causes of failure of foundation and its remedial measures
3. ***Bonds in Brick Masonry (with sketches)
4. Types of Partition (with figure)
5. Causes and effects of Dampness
6. Methods of grouting
7. Points to be considered in the construction of BRICK / STONE MASONRY
8. Defects in brick masonry

Unit IV

1. ***Types of doors with sketch
2. Types of windows and ventilators
3. Types of stairs
4. Types of floors and flooring
5. Types of roof
6. Technical terms/ components of king post roof truss
7. Advantages of Hollowblock

Unit V

1. ***Types of Scaffolding
2. ***Types of Shoring and Underpinning
3. Types of Pointing
4. Methods of anti termite treatment
5. Application procedure of white wash / Distemper / Paints and Varnish

6. Objectives of pointing and plastering and Defects in plastering(refer table)
7. Types of plastering
8. Methods of pointing and plastering

Construction Materials and Practice

Saathi

Date / / 1.1 Introduction

Engineering Structures are made of different materials. These materials are known as Engg materials (or) Building materials.

Basic Concept of Civil Engg is the design, construction, supervision & maintenance of diff. types of structures such as Buildings, bridges, canals, tubewells, water tanks, roads, etc. these practice is to deal diff. types of materials

These study of aspects of materials & their application in construction in very importance for civil Engineers. Some Engineering materials are available from natural sources & some others can be manufactured. Engg materials having natural properties which can't be easily altered. Artificial Engg materials may be manufactured such a way.

1.1.1 Physical Properties of materials:

construction material required physical & chemical properties.

1) Physical properties:

Specific gravity, density, bulk density & Porosity.

2) Incorporates properties:

which show how a building materials behave when affected by water & frost such as water absorption, hygroscopic and Permeability to water.

3) Mechanical properties:

Strength, hardness, resistance to abrasion.

Date __/__/__

Saathi

4) Behavior of materials:

affected by fire, heat & sound.

a) Density (P):

Mass per unit Volume of homogeneous material. Density = kg/m^3.

b) Bulk density:

Weight Per unit volume of a material in natural State, including Pores & voids. kN/m^3.

c) Specific gravity (Sg) or Relative density:

Ratio of weight of unit volume of material is an absolutely dense state, without Pores or voids to the weight of an equal volume of water.

d) Porosity:

Ratio of the volume of voids to the total volume of the material sample, expressed in %. Material Strength, bulk density, durability thermal Conductivity depends on it.

e) Water Absorption:

Ability of a material to absorb and retain water in Pores. It depends on porosity, Swelling capacity & water receptivity of material.

f) Permeability:

Ability of material to transmit water under Pressure.

g) Chemical Resistance:

Property of material to withstand the action of any Chemical Substance or other Chemical Compounds.

Saathi

Date __/__/____

h) Fire Resistance:

The ability of materials to withstand the influence of high temp. but without destruction, during Fire

i) Weather Resistance:

weathering quality of a material is its power to resist the destructive action of weather, such as air, rain, frost e

j) Thermal capacity: (J/N)

Property of a material to absorb heat

$T = \frac{H}{M(T_2 - T_1)}$, H = Qty of heat req, increase temp of Material from T_1 & T_2 in J. M = mass, T_1 = Temp. of material befor heating T_2 = after heating.

k) Durability:

Property of a material to resist the combined action of atmospheric & other natural factors

1.2 Rocks & STONES

1.2.1 Rocks

Stones are derived from rocks on the earth's crust & have no definite shape or chemical composition but are mixture of two or more minerals.

Classification of Rocks:

(1) Geological classification
(2) Physical classification
(3) Chemical classification

Geological classification:

(i) Igneous rocks
(ii) Sedimentary rocks
(iii) Metamorphic rocks

Igneous Rock:

Formed by cooling of molten lava, released during a volcanic activity. These stones are very strong & durable. Many temples of South India are made by Igneous rocks.

Page No.

Date __/__/____

Saathi

There are 3 types of formation of these rocks.

i) Volcanic action Solidfied above the earth. Basalt, Andesite Trap & Rhyolite are example.

ii) Below the earth's surface & exposed by erosion Granite Diorite and Gabbro.

iii) They can Result from major intrusions dykes and sils, quartz, Dolerite, Gneiss.

2) Sedimentary Rocks:

Limestones, Dolomite and Sandstones are the Examples of Sedimentary rocks. Sedimentation in water followed by intense Pressure which converts Sediments into rock

3) Metamorphic Rocks:

Slates and marbles are these rocks. They are Igneous (or) sedimentary rocks. They changed due to either Pressure (or) heat (or) both. The changes that can happen by this action.

(a) Sandstone into quartzite.

(b) Limestone into marble.

(c) Shale into Slate.

(d) granite into gneiss under heat (or) pressure.

Physical Classification:

Rocks are classified on their Physical Properties of the manner & arrangement of different particles & mass forming Stones.

Physically the rocks are classified as

(i) Stratified rocks.

(ii) unStratified rocks.

1) Stratified Rocks:

Those rocks which exhibit distinct layers, which can separated. The layers can be carried out is called Cleavage plane. Ex. Lime stone, Slate & Sandstone.

Saathi

Date ___/___/_____

2) Unstratified rocks:

These rocks do not show any signs of Starta & cannot be easily split into slabs. It may be crystalline or granular.
Ex: Granite, trap, marble. etc.

Chemical classification:
(1) Silicious Rocks
(2) Argillaceous Rocks
(3) Calcareous Rocks

1) Silicious Rocks:

Silica in free state called Sand and in combined state as Silicate. Combined form are likely to be disintegrated.
Ex: Sand stone, Quartzite, etc.

2) Agrillaceous Rocks:

These are clay or alumina as their main component. These rocks are dense, compact & they are brittle & cannot withstand shocks. slates, laterite. etc.

3) Calcareous Rocks:

These rocks have Calcium Carbonate in main. The durability depends on atmospheric constituents they acted upon by hydrocholoric acid.
Ex: marble, lime stone, etc.

Uses of stones:

(1) used for road concrete
(2) foundation, walls, dams, bridges.
(3) Flags (or) thin slab for paving.
(4) Ornamental works.
(5) Roofing tiles (6) Lime for manufacturing Cemen

Saathi

Requirements of Good Building Stones.

A Stone Should have Primarily.

1) Crushing Strength → Greater than 100N/mm²
2) Appearance → Decorative & Facing Work
3) Density. → Dense & Sp-gr greater than 2
4) Durability. → Exposed Condition
5) Easiness of dressing → facing work easy to dress
6) Fire resistance → Lime stone → upto 800°C, granite with quatraz → up to 600°C
7) Fracture. → Cemented & Sharp (Examine fractured surface)
8) Impact resistance → Toughness of stone (19 13 good, 13 bad)
9) Hardness. → Resistance against wearing. above 7 is good, less 4 is poor.
10) Resistance to wear, → low as 3, ∴ higher value is needed
11) Seasoning. → 6 to 12 months for Proper seasoning.
12) Texture: → Pleasing texture & free from crack & cavities
13) Water absorption: → Durability → less than 6%.
14) Weathering. →
15) Percentage of water. → =3% is tolerable.
16) Dressing. → uniform texture & softness is

Natural Stones for flooring:

1) Cuddapah Slab 2) Kota Stone 3) Shahabad stone. 4) Sand Stone. 5) Granite 6) Marble.

Cuddapah Slab:

Natural Stone available in Andhra, Karnataka, Rajasthan, like a Sedimentary rock, in Various thickness. Common thickness 15 to 50mm.

flooring Interior Pleasant look, used as dinning tables, Kitchen Sinks, Wall faces, Cooking Plat form.

Kota Stone

Naturally good Strength, used as a Slab 55 x 55 cm, 30 x 55 cm, 45 x 45 cm.

It is hard, sound, dense & durable, machine polish.

Page No.

Saathi

Date / /

C.M 1:9. thickness 25 to 40mm.

Shahabad Stone:

Naturally available, It contains allumina & silica a small % of quartzite. deep colour, hard, durable & atmospheric condition. ornamental designs.

Sandstone:

Sedimentary rock of Silicious variety. Contains Sand & quartz cemented by lime, mica, magnesium, alumina, oxide of iron or by a mixture of clay & siliceous Sandy grains, Sp. gs - 2.25, crushing strength 35 to 40MN/m

Granite:

Igneous rock. Minerals are quartz, feldspar & mica sp. gs - 2.64, absorption less than 1%, used in bridge abutments, Silica 60 to 80%. crush strong 110 to 140 MN/m

Marble:

Metamorphic rock, of calcarious variety, change from Lime stone.

Sp. gs. 2.72, crush strength - 50 to 60MN/m², Ornamental & superior work, high cost.

Artificial Stones

Terrazzo and mosaic, cement concrete under this class Smaller stones & stone chips for specially constructed moulds

Cement Concrete → fine agg, coa. agg & water, widely used.

Mosaic Tiles → Pre cast concrete with marble chips at top surface

Terrazo → Marble chips & cement, used for bathrooms, residential, temples, etc.

Victoria Stone → Crushed granite & portland cement, 4:1 are mixed with req. quantity of water, used for paving, window sills, copings, stairs, facing.

Date __/__/__ 1.3 Bricks

Saathi

Commonly used building material constructing walls, columns, roofs, Paving floors and as coarse aggregate for Concrete work in foundation, Under-floor don't need dressing & Simple art of laying brick with unskilled labours.

Brick Earth:

from igneous rocks, Potash, felspars, orthoclase (or) microcline for yielding clay mineral in the earth Mineral decomposes, from yield kaolinite, Silica & alumina which hydsate give a clay deposit $Al_2O_3 2H_2$ Kaolin.

Earth brick is pure clay, easily moulded and dried without cracking or warping with small quantity of

Composition of Goods Brick Earth

1) Alumina or clay - 20 to 30% weight.
2) Silica or Sand - 35 to 50% wt
3) Silt - 20 to 25% wt
4) Iron oxide
   Magnesia (Mgo)
   Lime (Cao)
   Sodium Potash
   } - 1 to 2% wt

Manufacturing Process

1. Selection of Site.
2. Preparation of brick clay or brick earth
3. Moulding.
4. Drying and
5. Burning.

Selection of Site: Availability of Suitable Soil & other making (water, fuel at selected site) reduce cost of labour & Transport cost.

Saathi

Date __/__/____

(2) Preparation of clay:

i) Un soiling:

20cm Soil remove from top of soil surface

ii) Digging:

clay dug out & laid on bed ground.

iii) Cleaning:

cleaned impurities like Stone, Pebbles, Vegetable matter Lumps form reduced to Powder form.

iv) Weathering:

Spread to 60cm to 120cm thick layers for exposure to weather for few months.

v) Blending:

mixing of clay, Sand & other material

vi) Tempering:

clay thoroughly broken up, watered, Pressed under the feet of ment to become homogeneous

Pug mill - grinding clay with water & making Plastic State.

Iron tube has upright Shaft ie vertical shaft Horz. blades are fixed to the shaft & blades carry numerous Steel Knives.

It should be rotated by bullocks or mechanical power

well mix the clay & clay in plastic state collected to the bottom tub.

Moulding:

(1) Hand mould, (2) Machine mould

i) Ground mould

ii) Table mould

Page No.

23/8/22.
Tues day

Classification of bricks

1. Sun dried (or) katcha bricks.
2. Burnt (or) pucca bricks.

Burnt Bricks :-

i) First class Brick.
ii) Second class Brick.
iii) Third class Brick.
iv) over burnt Brick.

Properties of Bricks :-

1) size & shape.
2) Colour.
3) Soundness
4) Structure.
5) Hardness.
6) Porosity.
7) strength.
8) Resistance of fire
9) Efflorence.
10) durability.

24/8/20
Wednesday.

LIME & Pozzloans

Lime → Binding Material.

Lime Mortar.

Source of Lime :

(i) From lime stone hills.

(ii) found in bed of old rivers.

iii) Kankar in below ground level.

iv). shells of Sea Animals

Classification of Lime :

(i) Fat lime. – Rich lime, high Calcium

ii) Hydraulic lime. – Water lime, clay & ferrous oxide.

iii) poor lime – Megre lime, 30% of clay, setting time very high

OF SHALLOW
UNDATION

IS1 Classification of Lime :-

1] class A
2] class B
3] class C
4] class D
5] class E

Class A.

i] Structural purpose.
ii] Eminety hydraulic lime.
iii] Supplied hydrated lime.

Class B.

i] Semi hydraulic lime.
ii] Contains both hydraulic & fat lime.
iii] Mortar in Masonry work.
iv] Supplied as both hydrated lime or quick lime.

class e :

i) fat lime as admixtures such as & pazzloan Materials.
ii) finishing Coating in plastering
iii] Supplied as hydrate lime & quick lime.

Class

i] Same as fat lime Contains small amount of Magnesium oxide

ii] Supplied in hydrated lime.

Class E:

i) Kankar lime used in Masonry Mortar.

ii] Supplied in hydrated lime.

25/8/22

Uses of lime:

(*) used as a binding Material.

(*) used in glass Production

(*) " " Cement Production

(*) " for plastering wall's and interior designing.

(*) " in Soil Stabilization.

used as a Base Coat in white washing for walls.

Pozzolanics Materials

Reaction of silica & Aluminium as a binding Materials

* Surki → Brick Powder
* Fly ash → Burnt ash
* Ground blast furnance slage. → steel slag
* Rice Kash → Burnt Rice Kash

Advantage:

1) Economic.
2) Reduce Permability.
3) Addition of fat Lime.

Chemical Components of Cement.

Lime - 63 %.
Silica - 22 %.
Alumina - 06 %.
Iron oxide - 03 %.
Gypsum - 01 to 4%

CHAPTER 1.5

CEMENT.

Cement is the mixture of calcareous, siliceous, Argillaceous and other substance. Cement is used as binding material in mortar concrete. etc.

TYPES of Cement :

1. Ordinary Portland Cement.
2. Rapid Hardening Cement.
3. Extra Rapid Hardening Cement.
4. Sulphat Resisting Cement.
5. Quick Setting Cement.
6. Low Heat Cement.
7. Portland Pozzolano Cement.
8. Portland slag Cement.
9. High Aluminium Cement.
10. Air Entraining Cement.
11. Super sulphated Cement
12. Masnory Cement.
13. Expansive Cement.
14. Colored Cement.
15. White Cement.

Storage of Cement.

WATER

- Should be Above 7 to 8
- should be pure.
- Free from impurities.
- Total solid waste constant with a 9 Litre of water
- It should be certain production.

LIMIT of Acidity :-

- 100 cc to 5 cc. should need Costic Soda

0.0f

Percentage of solids:

1. Organic solids = 0.02 % Mg Per Lit.

2. In organic solids = 0.03 %. "

3. Sulphate = 0.042% Mg "

4. Chloric Acid = 0.2 %. Mg Per Lit

VSUES OF BRACK'S WATER :

(SEA)

1. When we use of scarcity of down water.

ESTImation of sulphate.

2. 184562000.

3. PH = 6 to 7 And 7 to 8

19/2023

Glass.

Types of Glass.

1] Annealing Glass :

2] Sheet Glass

(x) used in Hallow Cylinder.

3] Plate glass :

(x) Heavy

(x) Hot glasses

(x) Iron table.

(x) Rolling Process.

4] Ground Glass :

(x) ventilators

(x) Heavy in thickness.

5] Wired glass :

(x) inserted wired glass.

6] Ho Safety glasses :

(x) colour less

(x) Heat Resistance

(x) Plastic bond

UNIT-II

Mortar:

Paste like substance.

acquired amount of water to obtain

like

1) mud mortar.

2) lime mortar.

3) cement mortar.

Properties of a good building mortar:

1) easy, workable.

2) strength in tension, compression is bond for the work.

3) durable.

4) set quickly.

5. cheap.

Uses of Mortar:

1) Masonry for binding the stones or bricks.

2) bed for stones or bricks.

3]. Plastic wall surfaces.

4]. Reveals smooth & rough surfaces.

5] Prepare moulds.

Types of mortar:

1] Lime of mortar.

2] Surki mortar.

3]. Lime, Surki mortar & Sand.

4]. Combination mortar (or)
Ganged mortar.

5]. Cement mortar.

6]. Mud mortar.

7]. Gypsum mortar.

Cement Mortar:

CM 1:2 to 1:6

Cement
Sand
water

Lime Mortar

LM - 1:2 or 1:3

Lime
Sand

Sand

water.

Preparation of Cement Mortar:

1) In dry condition, sand will be well mixed.

2) Added water to make paste.

3) 1 bag Cement → 50kg → $0.035 m^3$ (Volt)

4) Sand → box $0.035 m^3$

5) C.M → Sand 3 to 8 parts : 1 Cement Part.

Mixing

Hand mixing

Machine Mixing

Precautions of Cement Mortar:

2.2. CONCRETE:

P.C.C - Plain Cement Concrete.

R.C.C - Reinforced Cement Concrete

Mixer of Cement, Sand Aggregate, water and Admixture

Cement

Sand

Aggregate

water

Admixtures.

Uses of concrete.

1] foundations.

2] Building.

3]. Road.

4]. Air field.

5] water retaining Structures.

6] Pool's.

7] Dam's.

8] Bridges.

9] Bunkers.

10] Silo etc.

Types of Concrete:

1] Lime concrete

2] Cement concrete.

3] Slurk: Concrete.

4]. Composite mortar concrete.

5]. Red cement or slurk mixed cement concrete

6]. Roller or rolled concrete.

7] Vibrated concrete

8] Precast concrete.

9] vacuum concrete.

10]. ferro - concrete

11) Pole structure.

Uses of Cement Concrete :

1. Beams, Columns, footing, foundation & roofs.
2. Retaining walls as pressure.
3. Lintel, arches.

Lime Concrete :

Lime — commonly used for beams
Stone — Slab foundations.
Surki
Sand
Water

Light weight Concrete :

Bulk of ordinary concrete. → 23 kN/m³

light weight concrete → 5 to 18 kN/m³

1) Binding Material

Lime - Slag.
Lim - Cinder

3] Steel

4] water.

Ready mix concreate:

Concreate will be prepared.

Concreat mixing plant.

It should be reading avai

1] Proportion Ingredients:

2] Measurment of material 6] Compacting

3] Mixing 7] Curing

4] Transporting 8] Finishing.

5] Placing.

2] Aggregate:

natural River's aggregate.

3] Steel.

4] water.

Ready mix Concrete:

Concrete will be prepared.

Concrete mixing plant.

It should be roading available

1] Proportion Ingredients:

5] Measurment of material 6] Compacting

5] Mixing 7] Curing

4] Transporting 8] Finishing.

5] Placing

20/9/22

UNIT-III Foundation & Masonry.

Foundations ⟹ Base of the building.

Structure of the building

1] Permanent Structures

2] Temporary structures.

Life of structure :- Maximum 100 years

A

1]. Sub Structure. - Foundation, Footing basement.

2]. Super structure → column, beam Roof, Linter.

3] Framed Structure.

4] Load bearing Structure.

3.2 Foundations:

Objectives of Foundation:

1] Transfer Load to ground.

2]. Load distribute uniformly to the ground.

3] To Avoid unequal settlement

Bearing Capacity:

B.C = ultimate load

Bearing area of the soil.

Safe bearing capacity. [SBC]

S.B.C. = Max. Bearing load

Factor of Safety.

15/10/22

FLOORING:

FLOOR FINISH: Sub Flooring

Bedding:

Screeds:

TYPES of GROUND FLOOR'S :

Minium / Mud floor's.

Brick floor's.

Tiles FLOOR'S.

Flag stone floor's.

Cement concreate floor's.

Terazzo floor's

Mosaic floor's.

- BABOO FLOORING.
- CORK FLOORING.
- RUBBER FLOORING.
- Terrazo FLOORING.
- SUSPENDED FLOOR.

TYPES OF SUSPENDED FLOOR

- Timber Floor
- Steel joists floor
- RCC floor's.
- Reinforced brick