EASY , , ACE , KREATRYX

ESE , GATE, BEST Y KW , / E E

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,GATE , TEST @

- –W / & D /
- GATE
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W / /K K -

EASY , ,ACE ,KREATRYX ,GATE / , ,GK

, YADAV, KD D , &K E /KE , –GRAW , D ,W KE...K s

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R.C.C

8826630002 MK. singh.

GATE + ESE

1. Basic properties
2. Working stress method (SRB/ WSM) - concepts
3. Limit state method (LSM) - concepts
   a) Single Reinforced
   b) Doubly Reinforced
   3) T/L sections.
4. Shear & Torsion
5. Bond & Dev. length
6. Beam & Lintels
7. slab
8. Column
9. Pre- stressed concrete.
   a) Material Properties
   b) Analysis of stress
   c) Losses
   d) Slope & Deflection
   e) Design of PSC member

ESE syllabus + addation to GATE + ESE

10. Foundation
11. stair case
12. Retaining wall
13. Water Tank
14. Masonary structure
15. Earthquake Engineering

Important in codes

1. IS 456 — 2000 : Design of RCC structures.
2. IS 1893 : Earthquake Resistant design of structure.
3. IS 13920 : Design & Ductile detailing of RCC structures.
4. IS 3370 : Pt I to IV — Design of water tanks.
5. IS 1343 : Pre stressed concrete.
6. IS 1905 : Design of load bearing walls (masonary wall)

Important in Handbooks

Design Handbooks :-

* 1 SP 16 → 1980 Design Aids for RC to IS 456
* 2 SP 23 → 1982 Handbook — Concrete Mixes
* 3 SP 24 → Explanatory Handbook — IS 456 - 1978
* 4 SP 34 → Handbook — Concrete Reinforcement and Detailing.

Basic Properties of Cement Concrete and steel

RCC (Reinforced Cement concrete) :-

① Cement concrete – * mainly for compression
– * Tensile strength is very low.

② Steel Reinforcement – * for resisting mainly tension
– * as well as compression

Cement concrete

*→ Mixture of Water, Cement, Sand (Fine Aggregate), Stone (Coarse Aggregate) & Admixtures.

* Cement concrete with Reinforcement is called Plain Cement concrete.

Cement Mortar = Cement + Sand + Water

Cement concrete = Cement + Sand + Water + stone aggregate + admixture.

Cement concrete →

Cement concrete reinforced by steel is called RCC (Reinforced cement concrete).

Plain cement concrete (PCC) is without steel

① Water for concrete → Pg

* Water fit for human are good for concrete
* Water used for concrete should be clean &
  → free from oil, salts, sugar, organic materials etc.
  → that may not harm concrete.
* Sea water should not be used for RCC.
* Salt of sea water is harmful for concrete.

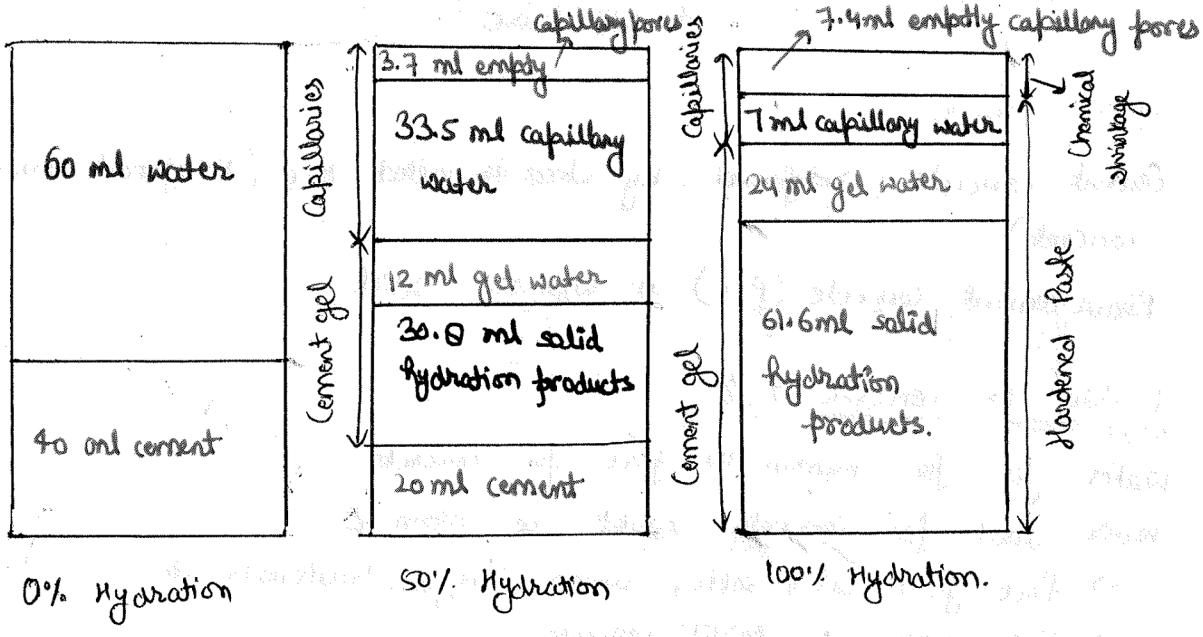
* In extreme case it may be used for PCC
* The pH value of water shall not be less than 6.
* pH <6 → Highly acidic :- Not acceptable
* pH = 6 → acidic :- Acceptable
* pH = 7 → Neutral :- Best water for concrete.
* pH >7 → Slightly alkaline water is also acceptable.

Water in Cement Concrete is for :-

① Combined water → Chemically combined water with the cement for hydration. it is non-evaporable.

② Gel water → Held physically or adsorbed on the surface area of the 'cement gel'. A fraction of gel water is evaporable.

③ Capillary water → Occupies the 'capillary pores' that constitute the space in the cement paste. This water is easily evaporated.



Q Maximum limit of suspended matter in water

a) 200 mg/ Litre
b) 2000 mg/L ✓
c) 3000 mg/L

Q Maxm limit of Organic matter in water

a) 200 mg/L ✓
b) 2000 mg/L
c) 3000 mg/L

Permissible Limits of Solids in water

Tested for	Permissible Limits
* Organic	200 mg/L
* Inorganic	3000 mg/L
* Sulphates	400 mg/L
* Chlorides	2000 mg/L — for PCC 500 mg/l — for RCC
* Suspended matter	2000 mg/l

② Cement

① OPC ordinary Portland cement →
a) 33 Grade OPC
b) 43 grade OPC
c) 53 grade OPC

② Rapid Hardening cement — Becomes hard rapidly

③ Portland Pozzolana cement — Use Pozzolana

④ Hydrophobic cement — water repellent

⑤ Low Heat cement — Produce less Heat

⑥ Sulphate resisting Portland cement.

③ Aggregates →

a) Fine Aggregates = Sand (up to 4.75 mm size)

b) Coarse Aggregates = Stone chips of mixed sizes
4.75 mm to 20 mm or
4.75 mm to 40 mm.

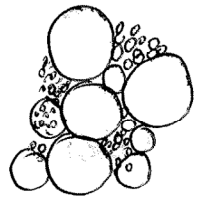
* Size > 4.75 mm & larger
* Angular are better than rounded aggregates.
* for RCC – 20 mm aggregates are generally used.
  → (size 20mm or less – mixed sizes)
  → Well graded stone aggregates are better
  → Uniformly (Poorly) graded not suitable.
* 10mm size – for closely placed steel sections.
* 40mm size – for PCC etc.

Classification of Aggregates →

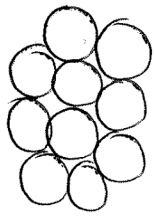
① Fine Aggregate → Sand and/or crushed stone
→ < 4.75mm
→ Fine Aggregate usually 35% to 45% by mass or volume of total aggregate etc.

② Coarse Aggregate → Gravel & crushed stone
→ > 4.75mm
→ Typically b/w 9.5 & 37.5mm

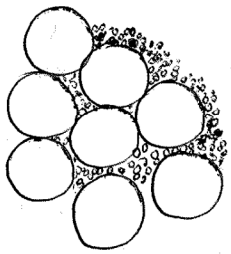
Types of Aggregates :-



Well Graded



Poorly Graded



Gap Graded.

NOTE → Concrete Pump used for Pumping Concrete.
Concrete vibrator used for proper compaction of concrete.