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paper: Concrete Technology.

Q.No6 Part (b)

Concrete is required for the Internal Columns of the building. the Specified 28 day Strength is (x+y+15) Mpa (where x & y are the last digit of your Roll no.) the following equation may be used to find average Compressive Strength.

(i) $f_m = f_{min} + 7$ for $f_{min} < 21$ Mpa

(ii) $f_m = f_{min} + 8.5$ OR $1.1 \times f_{min} + 5$ for 21 Mpa < f_{min} 35 Mpa.

the slumps required is 50mm & Max size of Aggregate. the fine aggregate has a Fineness modulus is 2.60. preliminary tests Indicate that F.A & CA have a Specific gravity of 2.65 & 2.67, with 1 percent absorption in CA & 2% free moisture in F.A. the Bulk density of C.A is 1600 Kg/m^3. Find the required quantities of the Ingredient?

Sol.

Step I :→

Slump = 50mm

Step 2 :→ Max Size of Aggregate = 25mm

Step 3 :→ quantity of water = 180 Kg/m³.

Step 4 :→ AVarage Strength of Concrete. Last Digit of my ID = 8, 8.

28 day of Strength of Concrete = x + y + 15

= 8 + 8 + 15

= 31 Mpa

we can use the 2nd equation.

$f_m = 31 + 8.5$

$= 39.5$ Mpa → we can take this value.

OR

$f_m = 1.1 \times 31 + 5$

$= 39.1$ Mpa

~~[illegible]~~ Air Content = 1.5%

Step 5 : Water Cement ratio = ?

we can find from table 19.1.

$W/C = 0.41$

⇒ Cement quantity $= \frac{W}{w/c} = \frac{180}{0.41} = \boxed{439\ Kg/m^3}$

Step 6 Quantity of Course Aggregate= We can find from table 19.9

$C.A = 0.69$

weight of $C.A = 0.69 \times 1600$

$= 1104\ Kg/m^3$

Step 7 Quantity of F.A By Volume Method.

weight of $C.A = 2.65\left[1000 - \left[\frac{439}{3.15} + \frac{180}{1} + \frac{1104}{2.7}\right]\right]$

$+15$

$C.A = 2.65\left[1000 - 139.3 - 180 - 408\right] - 15$

$C.A = 2.65\left[257.7\right]$

$\boxed{C.A = 682.9\ Kg/m^3}$

Step 8

For 1% Absorbad $C.A = \frac{1}{100} \times 1104$

$\boxed{C.A = 11.04\ Kg}$

step 9 For 2% moisture present in F.A that will added after Mixer

$\frac{2}{100} \times 682.9\ Kg/m^3 = \boxed{13.65\ Kg}$

Net quantity of water = 185 + 13.65 - 11.04

= 187.61 Kg.

Net quantity of C.A = 1104 - 11.04

= 1092.96 Kg.

Net quantity of F.A = 682.9 + 13.65

= 696.55 Kg.

Final quantities

Cement: 439 Kg/m³

Water = ~~Kg~~ 187.61 Kg/m³

F.A = 696.55 Kg/m³

C.A = 1092.96 Kg.

Q.No6

part (a) what are the risk to Concrete Structure exposed ~~by~~ to Sea water? How do you Increase resistance of ~~Shrinkage~~ Concrete to Sea water.

Ans. The Concrete Structures built in marin Conditions are always exposed to Seawater either directly or Indirectly. The Coastal & offshore Structure are always in Contact with Seawater and there number of physical & chemical deterioration processes takes place. So, Concrete Structure effected by Seawater requires Speeial attention.

The Constituents of Seawater reacts chemically with Constituents of Concrete which result in Several ways. The magnesium Sulphate present in seawater react with Calcium hydroxide of Cement & forms Calcium Sulphate as well as magnesium hydroxide precipitation.

we can increase resistance of Concrete By using those Cement in which Sulphate are present. If we can use Sulphate Attack Cement than in our Concrete than we can Increase resistance of Concrete to Seawater.

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Q.No 4

Ans

Creep :→

Creep is defined as the elastic and long-term deformation of Concrete under Continous Load. Generally, a long term pressure change the shape of Concrete Structure. And deformation occurs along the direction of the applied load. When the continous load is removed, the strain is decreased Imediatly. the amount

of the decreased Strain is equal to the elastic Strain at the given age.

Factors Affecting Creep of Concrete:→

The factor that effect Creep of Concrete are to the factors affecting Shrinkage. Some Basic factor are the following.

(1) Influence of Mix proportions:→

The amount of paste Content and its quality is one of the Most factor Influencing Creep. A poorer past Structure undergoes higher Creep. therefore, it Can be Said that creep Increase with Increase in water/cement ratio. In other word it Can also be Said that Creep is Inversly proportional to Strength of Concrete. Broadly Speaking, all other factor which are affecting the water Cement ratio are also effect the Creep of Concrete.

(2) Influence of Aggregate:→

Aggregate undergoes very little Creep. It is really the paste which is responsible for the creep in Concrete. However, the Aggregate Influence the creep of Concrete through restraining affect on the magnitude of Creep in Concrete. The paste which is Creeping under load is restrained by Aggregate which do not Creep. The Stronger the aggregate More is the restraining effect and hence the less is the magnitude of Creep. An Increase from 65 to 75% of Volumetric Content of the Aggregate will decrease the Creep by 10%. The modulus of elasticity of Aggregate is one of the most factor Influencing Creep. it Can be easily Imagined that the higher the modulus of elasticity the less is the Creep. Light weight ~~Creep~~ Aggregate Show Substantially higher Creep than the Normal Weight Aggregate.

3 Influence of Age:→

Age at which a Concrete member is loaded will have a predominant effect on the magnitude of Creep. this Can be easily understood from the fact that the quality of gel improves with time Such gel Creeps less; whereas a young gel under load being not so Stronger Creep more. what is said above is not the very accurate statement B/c of the fact that the moisture Content of the Concrete being different ~~age also~~ at different age also effect the magnitude of Creep. etc.

Difference b/w Creep & Strain relaxation: →

Stress relaxation is the observed decrease in Stress in response to Strength generated in Structure. this is primarily due to Keeping the Structure in

Strained Condition for Some finite Interval of time and hence Causing Some amount of plastic Strain.

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Q No 1 (a)

Ans

Re-tempering :→

Re-tempering Can be defined as when water is added to a Stiffened Concrete or partially Set fresh Concrete in order to bring it back to the desired Consisteney or workability, than it is Called re-tempering of Concrete. The retempering of Concrete is done when the Concrete Come back to the desired Consistancy or workability.

The process of remixing of water to Concreter, in addition to required quantity of water known

Known as re-tempering of Concrete.

Q No 1 (b)

Ans ⇒

① Mixers generally run at Speed of 15-20 revolution per minute.

② Normal 25-30 revolution are required for a well designed mixer to Mix Ingredients properly.

③ Mixing time is usually 1.5 to 2.5 minute and depends upon Volumetric Capacity of mixer.

④ Batching plant takes 12 minutes to load a transit mixer of $6m^3$ Capacity.

Q No 2 (a)

Ans

Expected loss = ?

Concrete Strength = 3000psi

Curring is not

if we not Cure any Concrete it Strength loss upto 60%.

So Now

$$\frac{60}{100} \times 3000$$

$$= 1800 \text{ psi}$$

1800 psi loss in Concrete is occured due to no Curring.

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Q No2 (b)

Ans membrance Curing is 80% efficient as Compared to water Curring.

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Q No2 (C)

Ans Strength retrogression is defined as a Change in the hydration product that are formed when Cement is exposed to high temperatures (>110°C / 230°F). it Can be described as a decline

a decline of cement strength at elevated temperature where decreased strength is observed with increasing time. To get a highest strength, you may cure speciman in elevated Temperature in water or in oven.

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QNO3 (a)

Ans endurance level:→

Endurance (also related to sufferance, resilience, constitution, fortitude, and hardness) is the ability of an organism to exert itself and remain active for a long period of times, as well as its ability to resist, withstand, recover from, & have imunity to trauma, wounds or fatigue.

endurance level of Concrete & steel:→

Ramakrishan defined

The endurance limit for concrete as the stress level below which it can withstand the threshold fatigue life of 2 million ~~loading~~ ~~that Sample~~ cycles. They observed that the Sample which did not fail within 2 million cycles, even Sustained 4 million load cycles.

The fatigue limit, also known as the endurance limit or fatigue strength, is the Stress level which an infinite number of loading cycles. Can be applied to a meterial without causing fatigue failure. Ferrous alloys and titanium alloys have a distinct limit.

QNo3 (b)

Ans: Erosion is the deterioration of concrete Surface as a result of particals in moving water Scrubbing the Surface.

An attrition test is a test Carried out to measure the resistance of granular material to wear. An example of a meterial Subjected to an attrition. tast are stones used in Roads Construction, Indicating the resistance of the material to being broken down under road traffic.

Q NO5

Ans ⇒ if the Volume reduction occurs before the Concrete hardenes, it is called plastic Shrinkage.

~~volume~~

The Volume reduction that occurs primarily due to moisture loss after the concrete has harden is known as drying shrinkage.

The above is the

Main difference b/w drying Shrinkage & plastic Shrinkage

Steps for prevention of plastic shrinkage.

1 Avoid Overmixing.
2 place Concrete early in the morning or Late afternoon.
3 Construct temporary walls to reduce wind velocity.
4 Provide Sunshades for Concrete.

Is Shrinkage, in Concrete is Reversible process?

In dry shrinkage, the excessive water which has not taken part in hydration process would migrate from interior of concrete Cord the Concrete Surface. As a result of evaporation of the water of the moisture, the volume, of Concrete Shrinks, the reduction in Volume owing to moisture loss in termed shrinkage in fact, the aggregate in Concrete would not Cause Shrinkage, & help to resist the deformation.

If one the Concrete become Hard than
~~Hence~~ drying shrinkage & plastic shrinkage is irreversible.

Q NO3 "C"

The following steps improves the strength of reinforcement Concrete.

(1) Cement :→

Fineners Cement Ratio increase the strength of reinforcemet of Concrete.
⇒ Chemical Composition.
⇒ Type of Cement.

2 Water :→

Water Cement ratio Can also improve the strength of reinforcement of Concrete. The strength of reinforcement Concrete depend on the cement paste.

3 Admixture :→

it can also effect the strength of reinforcement Concrete.