Concrete Technology
Final term Paper.

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1(a) What is re-tempering of concrete? In which case re-tempering of concrete done?

Ans. **RE-TEMPERING OF CONCRETE:**

It means the process of remixing water with concrete and also the required quantity of water is added is known as retempering of concrete.

In case of road construction and long tunnels etc, retempering of concrete is down due to undue stiffness of concrete or loss of workability.

(b) What is the normal RPM of the agitator of a transit mixer? What is the minimum limitation of total revolutions of agitator in a transit mixer set by ASTM before concrete placement?

Ans. The normal RPM of agitator of a transit mixer is about 15-20 RPM.

Generally 25-30 RPM are required for well designed mixer to mix the ingredients. Mixing takes less time and depends on the volumetric capacity of mixer.

The minimum limit of total rerolutions of agitator in a transit mixer set by ASTM before concrete placing is 300 revolutions.

2(a) What will be the expected loss in strength ~~concrete~~ of 3000psi concrete if it curing has not been performed at all?

Ans. There will be loss in gain of strength with passage of days as compared to when the concrete is cured.

(b) What is the percentage efficiency of membrane curing as compared to water curing?

Ans. Membrane curing efficiency is 80% more efficient than water curing.

(c) What is meant by retrogression of strength in concrete? Which method of curing promotes retrogression in concrete strength?

Ans. Retrogression of strength means high strength in early age due to heating but low strength in or at later age. Steam curing method promotes retrogression in strength of concrete.

3(a) What do you mean by endurance level? What is the endurance level of concrete and steel?

Ans. ENDURANCE LEVEL: The minimum value of fatigue strength at which failure does not occur is known as endurance level.

Concrete does not have minimum or low endurance level and for steel it is (0.5 x strength).

(b) What is the difference between attrition and erosion of concrete?

Ans. The difference between in them is that sliding and scraping of concrete surface cause attrition while erosion occurs in hydraulic structures under

the action of water.

(c) What steps should be taken to improve bond strength of reinforcement in concrete?

Ans. Following steps should be taken;

- The bond strength will increase with increase in compressive strength of concrete.
- Ribbed bars should be used to increase friction between concrete and reinforcement.
- The strength depends on friction between concrete and steel.

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4 What is creep? What are the factors affecting creep? What difference is b/w creep and stress relaxation?

Ans. CREEP:

It means the increase in strain of concrete with passage of time under the sustained stress is called as creep. It is not a completely reversible phenomenon.

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FACTORS:

- Creep is smaller when concrete is cured at high temperature because strength is higher when cured and loaded at higher temperature.
- Decrease in water cement ratio causes decrease in creep. In simple words strength and creep are inversely proportional.
- Creep is directly proportional to applied stress.

DIFFERENCE:

Creep is an increase in plastic strain under constant stress while stress relaxation is a decrease in stress under constant strain.

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5- What is the difference between drying shrinkage and plastic shrinkage? Is drying and plastic shrinkage reversible? (6)

Ans. If the volume reduction occurs before the concrete hardens, it is called plastic shrinkage while in the case when volume reduction occurs firstly due to moisture loss after hardening of concrete is known as drying shrinkage.

A part of drying shrinkage is reversible through moisture ~~content~~ movement from (40% to 70%) while plastic shrinkage is irreversible.

6(a) What are risks to concrete structure exposed to sea water? How do you increase resistance of concrete to sea water?

Ans. In addition to sulphates in sea water, chlorides are also present. The presence of chlorides prevents expansion, but increase porosity of concrete over time resulting in low strength. Expansion of concrete above high level of water due to crystallization of percolated salts

can occur.

These can be prevented by making the concrete impermeable. Concrete that is constantly wet is less affected. It should have W/C low than 0.45 and should be well compacted.

(b)

Numerical

Concrete is required - - - - - - - - - - - - Find the required quantities of ingredients.

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Sol Slump required → 50mm

Maximum Aggregate size = 25mm

Quantity of water, $W = 180 kg/m^3$, A.C = 1.5%

Average strength of Concrete from equation

$f_m = f_{min} + 8.5$

$f_m = 26 + 8.5$

$\boxed{f_m = 34.5 \text{ MPa}}$

$f_{min} = (8+3+15)$

$= 26$

Now

W/C Ratio from table it is an accurate value so,

$\boxed{x = W/C = 0.48}$

Now Quantity of cement

$$W/_{W/C} = \frac{180}{0.48} = \boxed{375\ kg/m^3}$$

Quantity of C.A from table

C.A = 0.69

Weight of C.A = 0.69 x bulk of C.A

$= 0.69 \times 1600\ kg/m^3 = \boxed{1104\ kg/m^3}$

Quantity of F.A by volume method:

$$\text{Weight of F.A} = 2.65\left[1000 - \left(\frac{375}{3.15} + 180 + \frac{1104}{2.7} + 15\right)\right]$$

$$\text{Weight of F.A} = \boxed{734.47\ kg/m^3}$$

Now for 1% absorption in C.A

we have $\frac{1}{100} \times 1104 = \boxed{11.04\ kg}$

For 2% free moisture in F.A

we have $\frac{2}{100} \times 734.47 = \boxed{14.68\ kg}$

Net quantity of water

$= 180 + 11.04 - 14.68 =$ **176.36 kg of water**

Net quantity of C.A

$= 1104 + 11.04 kg =$ **1115.04 kg**

Net quantity of F.A

$= 734.47 + 14.68 =$ **749.15 kg**

Water = 176.36 kg

C.A = 1115.04 kg

F.A = 749.15 kg

Cement = 378 kg
