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

Ans: Re-tempering of concrete:

The process of remixing of water to concrete, in addition to required quantity of water is known as retempering of concrete. Sometimes, extra cement is also added while retempering.
Retempering is done owing to loss of workability or undue stifness of concrete at actual side in case of long tunnel, road construction etc. where batching plant is few kilometers away.

b) What is the normal RPM of the agitator of a transit mixer?

Ans: For agitating, a range from 2 to 6 rpm is sufficient. For mixing, the concrete drum turn faster, with a maximum of 12 to 18 rpm.

What is the ~~minimum~~ minimum limitation of total revolutions of agitator in a transit mixer set by ASTM before concrete placement?

Ans: Transit mixer have capacity ranging from 4-7 m^3. Speed of agitator varies from 2 to 5 rpm. A limit of 300 revolutions has been set by ASTM before placing.

Q(2) b) What is the percentage efficiency of membrane curing as compared to water curing?

Ans. Using membrane curing an efficiency of 80% can be achieved as compared to water curing.

c) What is meant by retrogression of strength in concrete?

Ans Retrogression is defined as a change in the hydration products that are formed when cement is exposed to high temperatures (>110°C). It can be described as a decline of cement strength at elevated temperatures where decreased strength is observed with increasing time.

Which method of curing promotes retrogression in concrete strength?

Ans Steam curing at ordinary pressure can promotes retrogression in concrete strength.

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

Ans: It will take longer than 28 days for the concrete to cure and will produce a weaker and easier to scar structure if it was not cured properly. When concrete is not

cured propely, its durability, strength and abrasive resistance are affected. When the surface of the concrete is not kept moist with in the first 24 hours after the casting, the evaporation from the exposed horizontal surface results in plastic shrinkage cracks and a weak and dusty surface.

Q(4) What is creep?

Ans The increase in strain of concrete with in passage of time under sustained stress is known as creep. A material exhibit the phenomenon of creep, but in concrete its considerably more. The deformation of material under design stress is tamed elastic and the subsequent increase in deformation under sustained design stress in creep.
If a loaded concrete specimen is retrained in such a way that strain over time remains constant, creep will manifest itself in the form of progressive decrease in stress over time. This is term as relaxation.
Creep is not completely reversable phenomenon.

Factor affecting creep?

★ Stiffer the aggregate lower the creep. More the content of aggregate per unit volume of concrete,

lower the creep.

* Decrease in W/C causes decrease in creep. In other words strength and creep are inversely proportional.

* Creep is smaller when concrete is cured at high temperature because strength is higher than when cured and loaded at high temperature.

* Creep also depends upon the applied stress. The relationship is directly proportional.

* Creep also depends on the types of cement. High alumina cement experiences less creep as compared to ordinary Portland cement.

What is difference between creep and strees relaxation?

Ans Two terms are somtime used interchangibaly although they are really different. Creep is an increase in plastic strain under constant stress. Stress relaxation is a decrease in stress under constant strain, and plastic deformation with no change in stress.

Q(3) a) What do you mean by endurance level?

Ans: Endurance level is defined as the maximum value of completely reversed bending stress that a meterid can withstand for a finite number of cycles without a fatigue failure. Endurance also related to sufferance, resilience, constitution, fortitude, and hardiness which is the ability of an organism to exert itself and remain active for a long time, as well as the ability to resist, withstand, recover from, and have immunity to trauma, wounds or fatigue.

What is the endurance level of concrete?

Ans: The endurance limit for concrete as the stress level below which it can withstand the threshold fatigue life of 2 million loading cycles. They observed that the sample which did not fail with in 2 million cycles, even sustained 4 million load cycles.

Endurance level of steel:

An endurance or fatigue limit which is defined as the maximum stress below which the steel could presumably endure an infinite number

of cycles is discussed. A simple rule of thumb calculation for the fatigue limit is one-half of the ultimate tensile strength. This relationship works up to ultimate strengths up of 150,000 psi or 150 ksi. For a long number of steels, there is a direct corelation between tensile strength and fatigue strength; higher tensile strength steel have higher endurance limit. The endurance level is normally in the range of 0.35 to 0.60 of the tensile strength.

b) What is difference b/w attrition and errosion of concrete?

Ans: **Attrition of Concrete:**

An attrition test is atest carried out to measure the resistance of a granular material to wear. The test itself involves agitating the particles, typically by tumbling within a drum, vibration, or with jets of gas to simulate a fluidized bed. After a specified time, the meterial is seived and the sieved meterial weighed to measure the proportion of material which has been reduced to below a certain size.

Erossion of Concrete:

Erosion is the deterioration of concrete surface as a result of particle in moving water scrubing the surface. Erosion is one form of wearing of concrete that is observed in contact with flowing water. The water body that results erosion may carry solid particles which leads to serious erosion to concrete.

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

Ans The following steps should be taken to improve bond strength of reinforcement of concrete.

i) By using different types of admixture ie chemical and mineral admixture.

ii) The use of methyl cellulose (0.4% to 0.8% by weight of cement) It will increase the shear bond strength with steel reinforcing bar.

iii) Use salica fumes. Increasing the matrix modulus inforcement of concrete.

iv) Crush aggregate gives high flexure strength.

v) Curing also improve its strength.

Q(5) What is difference between drying shrinkage and plastic shrinkage?

Ans: **Drying shrinkage:**

The volume reduction that occures primarily due to moisture loss after the concrete is hardened is known as drying shrinkage. It can be significant in concrete with a very low water cementitious materials ratio.

Plastic shrinkage:

If the volume reduction occures before the concrete harden, it is called plastic shrinkage.
Plastic shrinkage increase with increase in temperature and rate of evaporation.

Is drying and plastic shrinkage reversible?

Ans Yes, drying and plastic shrinkage is reversible through moisture movement (40 to 70%).

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

Ans: Sulfates attack the concretes and cause expansion but due to the presence of chlorides in sea water the swelling of concrete retards. The deterioration of concrete structures by seawater is more due to leaching rather than expansion of concrete. It contains about 3.50 percent of dissolved salts. The approximate percentages of dissolved salts are 78% of sodium chlorides, 15% of manesium chloride and magnesium sulphate and the rest 7% of calcium sulphates, potassium sulphate etc. It is found that the sea water does not lead to the corrision of reinforcement, provided the concrete is dense and there is enough cover to the reinforcement.

The minimum cover over the reinforcement for concrete permenently under sea water should by 75mm.

b) 1) Sump requirement → 50mm
2) Maximum aggregate size — 20mm
3) weight = 185 kg/m³ · AC = 2%
(table 19.4).

4) Average strength of concrete