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Section A

Department civil engineering

Paper Concrete technology

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

Ans: # Re-tempering of Concrete:

The process in which remixing of water to Concrete, In ~~which~~ addition to required quantity of water is known as re-tempering of Concrete. Sometimes, extra cement is also added while retempering.

(*) Retempering is done owing to loss of workability (or) undue stiffness of Concrete at actual side in case of long tunnels road construction etc. Where batching plant is few kilometer away.

Part b: What is normal RPM of agitator of a transit mixer? What is the minimum limitation of total revalutions of againstagitator in transit mixer set by ASTM befor Concrete placement?.

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

(+) Transit mixer have capacity of ranging from 4-7m^3. Speed of agitator varies from 2 to 5 rpm. A limit of 300 revaluation has been set by ASTM befor placing.

Q: 2:- a) What will be the expected loss in strength of 3000 psi concrete if it curing has not been perfomed at all?

Ans: It will take longer than 28 days for the concrete to cure and will produce a weaker and easier to scare structure if it was not cured properly. When concrete is not cured properly, its durability, strength and abrasive resistance are affected. When the surface of the concrete is not kept moist within the 1st 24 hours after the casting, the evaporation from the exposed horizontal surface results in plastic shrinkage cracks and ar weak & dusty surface.

Part b: What is the percentage officiency of membranes curing as Compared to water curing?.

Ans: Mambranes curing is 80% officient as Compared to water curing.

Part C: What is meant by ~~retogration~~ retrogression of strength in concrete? Which method of curing promotes retrogression in Concrete Strength?.

Ans: Strength retrogression:

Change in the hydration products that are formed when cement is exposed to highe temprature (110°C / 230°F). It Can be described as a decline of cement Strength at elevated temprature where decreased Strength is absorved with increasing time.

* Steam curing at ordinary temprature promotes retrogression in Concret Strength.

Q.4) What is creep? What are the factors affecting creep? What difference b/w Creep and Strain Retracting?

Ans: Creep:

The increase in Strain of Concrete with in passing of time under Sustained Stress is known as creep all materials exhibits the phenomenon of creep, but in Concrete it considerably more.

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 inversly proportional
- Creep is Smaller When Concrete is cured at high temprature because Strength is higher than when

cured and loaded at high temprature.

- Creep also depend upon the applied stress. The relationship is directly proportional.
- Creep also depends on the type of cement. High alumina cement experiances less creep as compared to ordinary portland cement.

Difference:

- The deformation of material under design stress is termed elastic and the subsequent increase in deformation under sustained design stress in creep.
- Of Stress remain constant while Creep manifest itself in

the form of progressive decrease in stress over time.

- Creep is not a completly reversable phenomenon.

Q.③ What do you mean by endurance level? What is the endurance level of concrete & steel?

Ans: Endurance level:

Endurance level is defined as the maximum value of completly reversed bending stress that a material can withstand for a finite number of cycles without a fatigue failure. Endurance also related to Sufferance, resilience, Constitution, fotitude, and hadiness which is the ability of an organism to exert itself and remain active for a long period of time, as well as its ability to resist, withstand, recover from, and have immunity to

trauma, wounds, (or) fatigue.

* Endurance level of Concrete:

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

* Endurance level of steel:

An endurance limit which is defined as the maximum stress below which the steel could presumbly 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 relation slip works upto ultimate Strengthes of 150000 psi (or) 150 ksi. A fatigue limite of 100 ksi appears to be maximum value that can be

obtained for steel. For a large number of steels, there is a direct correlation b/w tensile strength & fatigue strength. Higher tensil strength steel have higher endurance limits. The endurance limits is normally in the range of 0.35 to 0.60 of the tensile strength -

Part b: What is the difference b/w attrition & erosion of concrete?

Ans: Attrition of concrete:

An attrition test is a test carried out to measure the resistance of granular material to wear. The test itself involves agitating the particles, typically by thumbling with in a drum, vibration or with jets of gas to simulate a fluidized bed. After a specified time, the material is sieved and the sieved material weighed to measure the proportion of material which

has been reduced to below a certain size. An example of material subjected to an attrition test are stones used in road construction, indicating the resistance of the material to being broken down under road traffic.

* Errosion of Concrete:

Errosion is the deterioration of Concrete surface as a result of particles in moving water scrubbing the surface. Errosion is one form of wearing of Concrete that is observed in Contact with flowing water. The water body that results errosion may carried solid particles which leads to serious errosion to concrete.

Part C: What steps should be taken to improve bond Strength of rainforcement in Concrete?

Ans: Proper rainforcment placement is

critical for many reasons, including Concrete Bond.

Bond strength increased with increasing methylcellulose amount.

The combined use of silica fume (15% by weight of cement) and methylcellulose (0.4% by weight of cement) as admixture was found to give concrete that exhibited high bond strength to steel rainforcment reported high tensile modules, tensile ductility, flexural strength and flexural toughness; The bond strength attained was higher than that attained by using either silica fume (or) methylcellulose as admixture.

Q.(5) What is difference b/w Drying Shrinkage & plastic Shrinkage? Is drying & plastic Shrinkage are revesible?

Ans: Drying Shrinkage:

Drying Shrinkage is similar to creep in many ways. I common with creep, drying shrinkage is initiated by volume changes that results from the consumption and arrangments of moisture within restrained Concrete. Drying Shrinkage is a very important property of cementitious Composites influencing their diaability. Drying Shrinkage results from the loss of Capillary water from the hardend Cement mixture, leading to contraction and crack formation within Concrete. The quality of aggregate will have a Significant effect on drying Shrinkage.

as well. Because the aggregate provides internal restraint, it makes sense that the stronger & sounder the aggregate, the more cracking from shrinkage is mitigated.

Plastic Shrinkage:

Plastic shrinkage occurs in a freshly mixed concrete. With loss of water by evaporating from its surface, after placing and before hardening of the concrete. This can lead to plastic shrinkage cracking if the rate of evaporation is higher than that of the bleeding water rising to the surface of the concrete. It has been suggested that the aggregate saturation condition of RCA also has an effect of the plastic shrinkage of concrete.

* Is drying & plastic shrinkage are revesable?.

Ans: Drying & plastic shrinkage are approximatly 60% revesible. Drying shrinkage gradiants through the depth of a concrete slab can be divided into permanent and transient component because a portion of shrinkage is reversable approximatly 30% Shrinkage was reversible for standerd pawing mixture exposed to cyclic wetting and drying, regardless of the type of aggregate used. However, The level of revesible Shrinkage increased significantly under long-term initial moisture curing.

Q(6) Part A: What are risks to concrete structure exposed to see water? How do you increase resistance of concrete to see water?.

Ans:- Mixed with fresh water and cured in seawater. The compressive strength and subsequantly the other related strengths of concrete were shown to increase for specimens mixed and cured in seawater at early ages up to 14 days. While a definite decrease in the respective strengths was observed for ages more than 28 days and up to 90 days. The reduction in strength increases with an increase in exposure time, which may be due to salt crystallisat formation affecting the strength gain.

6.

Part b)

(1) Slump required = 50 mm

(2) maximum aggregate size = 20 mm

(3) W = 185 kg/m³ ; A.C = 2%.

(Table 9.4)

(4) Average Strength of Concrete.

f_{min} = 8 + 2 + 15 = 25 mpa.

$f_m = f_{min} + 7$

$f_m = 25 + 7$

f_m = 32 mpa.

f_m

(5) w/c ratio Table 11.2 & interpolation.

$$\frac{33.6 - 20.7}{0.65 - 0.57} = \frac{32 - 20.7}{0.65 - x}$$