Name M.Moizzam Khan
ID 16096
Section A

(Q1a) What is re-tempering of concrete? In which case re-tempering of concrete done?

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

Ans (a) Re-tempering of concrete:

When water is added to a stiffened concrete or partially set fresh concrete in order to bring it back to the desired consistency or workability then it is called re-tempering of concrete.

The cases in which re-tempering of concrete is done are:

1) Due to hot weather.
2) Delay in delivery.

Ans (1) (b) Agitating speed is usually about 2 to 6 revolutions per minute, and mixing speed is generally about 6 to 18 revolutions per minute. Mixing for long period of time at high speed, about 1 or more hours.

The minimum limitation of total revolutions of agitator in mixer set by ASTM before concrete placement is 300 revolutions.

Q.2(a) What will be the expected loss in strength of 3000 psi concrete if it curing has 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 ~~its durability strenght and the~~ if it not cured properly.

When the concrete is not cured property its durability strenght and abrasive resistance are the effected.

When the surface of the concrete is not kept moist with in the 24 hour after the casting the evaporation from the exposed horizontal surface results in the plastic shrinkage cracks in weak dusty surface.

Q2(b) What is the percentage of efficiency of membrane curing as compared to water curing?

Ans Results indicate that, using membrane curing compounds, an efficiency of 80-90% can be achived as compared to Conventional water curing.

(c) What is meant by retrogression of strenght in concrete? Which methode of curing promotes retrogression in concrete strenght?

Ans Strenght retrogression: is defined as a change in the hydration products that are formed when cement is exposed to high temperature (>110°C/230°F). It can be described as a decline of cement strenght where decreased strenght is observed with increasing time.

(1) 3(a) What do you meant by endurance level? What is the endurance level of concrete and steel?

Ans(a) Endurance level:

It is defined as the maximum flexural fatigue stress at which the beam could stand with a million cyles of non-reversed fatigue loading.

The endurance level of concrete is in the range of 0.~~33~~ - 0.06 tensile strenght.

The endurance level of concrete is in the range of 0.35 - 0.60 of tensile strenght.

(b) Difference between attrition and erosion:

Attrition: is the resistance of material to being booken down under certain load.

Erosion: Erosion is the mechanical damage of concrete by water wave due to which concrete is washed away, and it become weak.

(c) Steps to improve bond strenght of reinforcement in concrete:

The following steps can be used:

1) By adding methylcellulose (0.4% to 0.8%)
2) By weight of cement as an admixture in cement Paste of concrete.
3) The combined use of silica fume and methylcellulose can also improve the strenght
4) By adding steel fibers.

Q4 What is creep? What are the factors affecting creep? What is the difference between creep and stress relaxation?

Ans **Creep:** The increase in strain of concrete with in passage of time under sustained stress is known as creep. All materials exhibit the phenomenon of creep, but in concrete its considerably more The formation of material under design stress is termed elastic and the subsequent increase in deformation under sustained design stress in creep. If a loaded concrete specimen is obtained in such a way that strain over the remains constant, creep will manifest itself in the form of progressive decrease in stress over time. This is term as relaxation.

Factors affecting creep:

1) Stiffer the aggregate lower the creep. More the content of aggregate per unit volume of concrete lower the creep.
2) Decrease is W/C causes decrease in creep. In other words strength and creep ~~are~~ is ~~higher~~ are inversely proportional.
3) Creep is smaller when concrete is cured at high temperature because strength is higher ~~that~~ than when cured ~~and~~ at high temperature.

4) Creep also depends upone the applied stress. The relation ship is directly proportional.

5) Creep also depends on the type of cement.

Difference between creep and stress relaxation.

Two terms are sometimes used interchangeably, 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. Creep is an increase tendency toward more strain and plastic deformation with no change in stress.

Q.S What is the difference between drying shrinkage and plastic shrinkage? Is drying and plastic shrinkage reversible?

Ans If the volume reduction occurs before the concrete hardens, it is called plastic shrinkage. The volume reduction that occurs primarily due to moisture loss after the concrete has hardened is known as drying shrinkage. It can be significant in concrete with a very low water - cementitious materials ratio.

Is drying and plastic shrinkage reversible:

Yes drying and plastic shrinkage reversible.

Q6(a) What are risks to concrete structure exposed to sea water? How do you increase resistance of concrete to sea water?

Ans It increase the risk of corrosion of the embedded reinforcing steel, if the structure is to exposed to air in service. The most damaging effect of seawater on concrete structures arises from the action of chlorides on the steal reinforcement and the buildup salts.

Increase resistance of concrete to sea water:

Good compaction and well-made construction joints in the structure helps the concrete structure to withstand against expansion caused by sea water. Use of ~~port~~ pozzolanic material in the preparation of concrete is good against salt water. For increasing resistance following some steps are taken.

1) cement with low C_3A content should be preferable to make concrete.
2) The admixtures should not contain chloride in any form otherwise corrosion of reinforcement take place.
3) Use of pozzolanic material in the preperation of concrete is good against salt water. etc.

Q6(b)

Sol^n

Slump required → 50mm

maximum aggregate size → 25mm

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

Avg Average strength of Concrete from equation

$$f_m = f_{min} + 8.5 \qquad f_{min} = (8+3+15) = 26$$

$$f_m = 26 + 8.5$$

$$f_m = 34.5 MPa$$

Now W/c Ratio from table it is an

$$n = W/C = 0.48.$$

Now Quantity of cement

$$W/w/c = \frac{180}{0.48} = 37.5 kg/m^3$$

Quantity of C.A from table

$$C.A = 0.69$$

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

$$= 0.69 \times 1600 kg/m^3 = 1104 kg/m^3.$$

Quantity of F.A by volume methode:

$$\text{Weight of F.A} = 2.65\left[1000 - \left(\frac{37.5}{3.15} + 180 + \frac{1104}{2.7} + 15\right)\right]$$

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

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 $\frac{2}{100} \times 734.7 = \boxed{14.68 kg}$.

Net quality of water = 180 + 11.04 - 14.68

$\boxed{= 176.36 kg \text{ of water}}$

Net quality of C.A

$= 1104 + 11.04 = 1115.04 kg$

Net quality of C.A = 734.47 + 14.68

$= 749.15 kg$

Water = 176.36 kg

C.A = 1115.04 kg

F.A = 749.15 kg

Cement = 375 kg