

# Concrete Technology Final Term Examination

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Section A

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Semester 2nd

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

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 "Retempering of concrete"

1) Hot weather Concrete Casting causes slump loss.

2) Delay in delivering ready mixed concrete causes slump loss.

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

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

(i) About 15 to 20 revolution per minute.

(ii) 300 Revolution.

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

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

"80%" can be achieved as compared to water curing.

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(2c) What is meant by retrogression of strength in concrete?

Which method of curing promotes retrogression of strength in concrete?

(i) High strength in early age due to heating but loss in strength at later age is known as retrogression of strength in concrete.

(ii) Steam Curing at Ordinary Pressure.

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

The maximum ~~flexure~~ flexural fatigue stress at which the beams could with stand 2 million cycles of non-reversed fatigue loading.

The endurance level of steel is in range of 35-0.60 of tensile strength

The endurance level of concrete is 0.22-0.66 of tensile strength.

3b) What is the difference b/w attrition & erosion?

Attrition ✓

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

## Erosion

The mechanical damage of concrete by water waves due to which sand and aggregates are washed away.

(3c) What step should be taken to improve bond strength of reinforcement in concrete?

- By adding methylcellulose (0.4% to 0.8%) by weight of cement as an admixture in cement paste or concrete.
- The combined use of silica fume and methylcellulose can also improve the bond strength.
- By using latex (30% by weight of cement) as an admixture.
- By adding steel fiber or carbon fiber as an admixture.

Q4) What is Creep? What are the factors affecting creep? What difference is between creep and strain relaxation?

### Creep:-

The increase in strain of concrete with in passage of time under sustained stress is known as creep.

### 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 in w/c cause decrease in creep. In other words strength and creep are inversely proportional.
- 3) Creep also depends upon the applied stress the relationship is directly proportional.

## Difference

Stress relaxation describes how polymers relieve stress under constant strain.

Creep is an increase in plastic strain under constant stress.

(5) What is difference between drying shrinkage & plastic shrinkage? Is drying & plastic shrinkage reversible?

(i) 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 is hardened is known as drying shrinkage.

(ii) Drying shrinkage is reversible but plastic shrinkage cannot be reversed.

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

- In addition to sulphates present in sea water, chlorides are also present. The presence of chlorides prevents expansion of concrete unlike sulphate attack.
- Expansion of concrete above high level of water due to crystallization of percolated salts can occur which can be prevented by making concrete impermeable.
- Concrete exposed to sea water should have w/c below 0.45, it should have low permeability, it should be well compacted with good workmanship.

(ii) Increase Resistance



- 1) Cement with low  $C_3A$  content should be preferable to make concrete.
- 2) Prepare rich concrete with low water cement ratio which makes the concrete impervious.
- 3) The admixture should not contain chloride in any form otherwise corrosion of reinforcement takes place.
- 4) Adequate cover should be provided for reinforcements in concrete structure to enhance durability.
- 5) Use of pozzolanic material in the preparation of concrete is good against salt water.

(b)

B) Numerical.

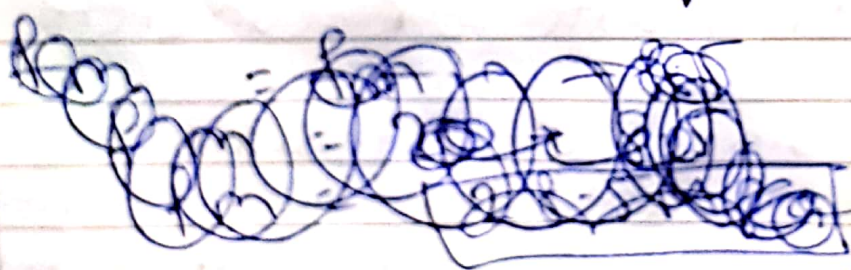
Concrete is required ---  
--- Find the required quantities of ingredients!

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Slump required  $\Rightarrow$  50mm  
Maximum Aggregate size = 25mm

Quantity of water,  $w = 180 \text{ Kg/m}^3$ ,

Average strength of Concrete from equation  $AC = 1.5\%$



$$f_m = f_m + 8.5$$
$$f_m = 30 + 8.5$$

$$f_{min} = (7 + 8 + 15)$$
$$= 30$$

$$f_m = 38.5 \text{ MPa}$$

Now

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

$$\boxed{w = W/C = 0.86}$$

Now Quantity of cement

$$W/W_c = \frac{180}{0.86} = \boxed{209 \text{ Kg/m}^3}$$

Quantity of (F.A) from table

$$C.A = 0.96$$

Weight of (F.A) =  $0.96 \times \text{bulk of (F.A)}$   
 ~~$0.96 \times 1600 \text{ Kg/m}^3$~~

$$= 0.96 \times 1600 \text{ Kg/m}^3 = \boxed{1536 \text{ Kg/m}^3}$$

Quantity of (F.A) by Volume method

$$\text{Weight of F.A} = 2.65 \left[ 1000 - \left( \frac{209}{2.15} + 180 + \frac{1536 + 15}{2.7} \right) \right]$$

$$\text{Weight of F.A} = \boxed{830.23 \text{ Kg/m}^3}$$

Now for 1% absorption in (F.A)

$$\text{We have } \frac{1}{100} \times 1536 = \boxed{15.36 \text{ Kg}}$$

For 2% free moisture in F.A

$$\text{we have } \frac{2}{100} \times 830.23 = 16.60 \text{ Kg}$$

Net quantity of water,

$$= 180 + 15.36 - 16.60$$

$$= 178.76 \text{ Kg. of water}$$

Net quantity of C.A.

$$= 1536 + 15.36 = 1551.36 \text{ Kg}$$

Net quantity of F.A

$$= 830.23 + 16.60$$

$$= 846.83 \text{ Kg}$$

$$\text{Water} = 178.76 \text{ Kg.}$$

$$\text{C.A} = 1551.36 \text{ Kg.}$$

$$\text{F.A} = 846.83 \text{ Kg.}$$

$$\text{Cement} = 375 \text{ Kg.}$$

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