

Unit 14 - Week 12

Course outline

How does an NPTEL online course work?

Prerequisite Assignment

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Service life estimation - 1

Service life estimation - 2

Quiz : Assignment 12

Lecture materials

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Text Transcripts

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-26, 23:59 IST.

1) To avoid premature failure and extend the service life of structures, which of the following strategy is most effective approach? **2 points**

- Strength based design approach
- Durability based design and periodic condition assessment and maintenance
- Strength based design and periodic maintenance
- Durability based design, periodic condition assessment and preventive maintenance

No, the answer is incorrect.

Score: 0

Accepted Answers:

Durability based design, periodic condition assessment and preventive maintenance

2) Which one of the following principles does not typically belong to the durability-based design practices/formulations? **1 point**

- All materials deteriorate with time
- Deterioration rate depends on environmental exposure conditions
- Deterioration rate depends on protective systems of materials
- Deterioration rate depends on service loading conditions

No, the answer is incorrect.

Score: 0

Accepted Answers:

Deterioration rate depends on service loading conditions

3) Which of the following are the typical parameters that affect the service life of structures exposed to carbon dioxide? **2 points**

- Critical pH threshold (say, pH = 9)
- Cover depth
- Carbon dioxide concentration in the environment
- Relative humidity inside the concrete

No, the answer is incorrect.

Score: 0

Accepted Answers:

Critical pH threshold (say, pH = 9)

Cover depth

Carbon dioxide concentration in the environment

Relative humidity inside the concrete

4) Using the nomogram shown in the lecture, determine the target or required chloride diffusion co-efficient of concrete (in m^2/s) for achieving a corrosion **0 points**

-free service life of 45 years. Assume the following input design variables: i) Acceptable probability of corrosion initiation is 30%, (ii) Design cover depth is 40 mm, and (iii) Allowed binder type is OPC. Also, corrosion inhibiting admixtures are allowed to use.

- 1E-12 m^2/s
- 2E-12 m^2/s
- 3E-12 m^2/s
- 4E-12 m^2/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

2E-12 m^2/s

5) The variability of chloride threshold values reported in literature varies because of the use of different way of representations (i.e., free [water-soluble] chloride, total [acid-soluble] chloride, and $[Cl^-]/[OH^-]$). State the comparative variability among these values reported. **2 points**

- Free Cl^- > Total Cl^- > $[Cl^-]/[OH^-]$
- Total Cl^- > Free Cl^- > $[Cl^-]/[OH^-]$
- $[Cl^-]/[OH^-]$ > Total Cl^- > Free Cl^-
- $[Cl^-]/[OH^-]$ Free Cl^- > Total Cl^-

No, the answer is incorrect.

Score: 0

Accepted Answers:

$[Cl^-]/[OH^-]$ > Total Cl^- > Free Cl^-

6) Based on Angst et al. (2009), for developing a chloride threshold test method, which of the following consideration is not reliable? **2 points**

- Adding chloride in the fresh mix
- Chloride ponding on the surface
- Using electrochemical methods
- Using rebars in as-received conditions

No, the answer is incorrect.

Score: 0

Accepted Answers:

Adding chloride in the fresh mix

7) Chloride binding varies for different cementitious systems and admixed chloride levels. **1 point**

- True
- False

No, the answer is incorrect.

Score: 0

Accepted Answers:

True

8) As per the sensitivity plot shown in the lecture, which of the following variable has maximum influence on the time to corrosion initiation, when the other variables are kept constant? **2 points**

- Cover depth
- Critical chloride threshold
- Surface chloride concentration
- Apparent diffusion coefficient

No, the answer is incorrect.

Score: 0

Accepted Answers:

Cover depth

9) Service life of concrete structures is a relatively young research topic. As per the lecture, when was the first official meeting on service life conducted in the USA? **1 point**

- 1978
- 1988
- 1998
- 2008

No, the answer is incorrect.

Score: 0

Accepted Answers:

1998