M.E. CIVIL ENGINEERING FIRST YEAR FIRST SEMESTER EXAM 2024

SUBJECT: Concrete Science and Technology **Ref. No. : Ex/PG/CE/T/112A/2024**

Time: 3 hours Full marks: 100

Draw neat sketches wherever necessary.

Answers question no 1 and three from rest.

I.S codes and Handbooks are not allowed in the examination hall

1. a) What is meant by membrane curing?

b) "In a project site, the sulphate content in soil and in water is of Class 3 as per IS 456 and the concrete Technologist suggested to use Portland slag cement in concrete" – explain.

c) Why sea water cannot be used in concreting?

d) What is the difference between bleeding and segregation in concrete?

e) What is high strength concrete as per IS 456-2000? What is the relation between standard cylinder strength and standard cube strength of a concrete mix?

f) How does the rate of loading affect the compressive strength of concrete?

g) What are the differences between strain controlled and stress controlled compression testing machine?

h) How can you reduce the effect of Alkali Aggregate Reaction in concrete?

i) What precautions are to be taken for the concreting in hot weather?

j) What are Nominal Mix Concrete and Design Mix Concrete? Why Design mix concrete is preferred?

k) What is the difference between sample and specimen in concrete technology? How the compressive strength test result of a sample is determined?

l) "In a project site, the sulphate content in soil and in water is of Class 3 as per IS 456 and the concrete Technologist suggested to use Portland slag cement in concrete" – explain. .

2+2+2+2+2+2+2+2+2+2+2+3=25

2. a) The mix proportion of a concrete provided at the site for M30 is cement : sand : coarse aggregate (by weight under SSD condition) = 1: 1.4: 2.5 with water cement ratio of 0.36 and admixture dose of 1% by weight of cement. The following data are noted at the site :

Specific Gravity of Sand = 2.6
Specific Gravity of Coarse Aggregate =2.7
Surface Moisture content of Sand = 2.5%
Surface Moisture content of Coarse Aggregate = 0.5%

What will be the mix proportion at the site for the mix?

b) Describe the core test on reinforced concrete structure? State its acceptability as per IS 456-2000.

c) Define shrinkage of concrete. What are the different types of shrinkage?

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d) Name five typical mineral admixtures used in concrete. Mention their sources. Name the factors to be considered for its suitability in concrete. 5+10+5+5

3 (a) Discuss the ultrasonic pulse velocity test for concrete along with its limitations. How can you determine the location of cracks on the surface of concrete by the above tests?

(b) The measured strength of concrete cube samples of a project is as follows:

34.1, 32.4, 32.1, 30.4, 27.8, 35.1, 31.2, 24.6, 29.4, 32.0, 36.0, 32.0, 31.5, 31.4, 34.1,

Whether the measured strength values are acceptable or not as per IS 456 ? Required grade of concrete is M30 .

c) What are the differences between the TMT bars and CTD bars?

d) What are the other sources of fine aggregates if the natural sand is not available regularly?

7+6+6+6=25

4. Write Short notes:

a) Loss of workability
b) Depth of carbonation test
c) Tremie method of underwater concreting
d) Rebar Locator Test
e) Recycled Concrete Aggregate 5x5=25

5. a) What is the difference between soundness of cement and soundness of aggregate ?

b) What are the differences between OPC, PSC, PPC, and composite cement?

c) Describe the ultrasonic pulse velocity (UPV) test for reinforced concrete? How can you detect the cracks on a deck slab of a bridge using UPV test?

d) Why the fine aggregate of Zone – IV is not suitable for good concrete?

6+8+8+3 =25