

M.E Civil Engineering First year First Semester Exam 2018

SUBJECT: Concrete Science and Technology

Ref. No. : Ex/PG/CE/T/112A/2018

Time : 3 hours

Full marks : 100

Draw neat sketches wherever necessary.

Answer question no 1 and three from rest.

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

1. a) Name two important properties to be tested for a chemical admixture and why ?
- 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) What is the difference between sample and specimen in concrete technology? How the compressive strength test result of a sample is determined?
- d) Why concrete should be transported in closed container during hot or cold weather ?
- 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 is the difference between bleeding and segregation in concrete?
- j) What are Nominal Mix Concrete and Design Mix Concrete? Why Design mix concrete is preferred?
- k) Why the fine aggregate of Zone – IV is not suitable for good concrete?
- l) Name the factors influencing the durability of concrete as per IS 456 .

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: 2.6 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 = 2.65

Surface Moisture content of Sand = 3%

Surface Moisture content of Coarse Aggregate = 0.5%

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

- b) Describe the problems of shuttering for vertical reinforced concrete wall of large depth that needs continuous casting of wall ?

c) Define shrinkage of concrete. What are the different types of shrinkage? Discuss the effect of such shrinkages with reference to rigid pavement construction and their remedial measures? Discuss the test method in brief for the determination of drying shrinkage.

5+5+15=25

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:

34.0, 32.5, 32.0, 30.4, 26.8, 35.2, 30.2, 24.6, 29.4, 32.5, 36.0, 32.0, 31.5, 31.4, 34.0,

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

c) Name five typical mineral admixtures used in concrete. Mention their sources. Name the factors to be considered for suitability in concrete.

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) Light weight concrete

d) Rebar Locator Test

e) Tremie method of underwater concreting

5x5=25

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

b) What are the uses of fiber reinforced concrete? What are the different types of fiber used in fiber reinforced concrete? What are problems of having higher amount of fiber volume content?

c) What are the differences between OPC, PSC and PPC?

d) Describe the flat jack test in masonry structures?

6+6+8+5 =25