Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(CE)/SEM-5/CE-502/2011-12

2011

CONCRETE TECHNOLOGY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) The bulking of sand is caused by

a) absorbed moisture b) voids

c) angularity d) moisture content.

ii) The approximate ratio between the strengths of cement concrete at 7 days and 28 days is

a) $\frac{3}{4}$ b) $\frac{2}{3}$

c) $\frac{1}{2}$ d) $\frac{1}{3}$.

iii) As per IS : 456-2000, the relationship between modulus of rupture (f_{cr}) and characteristic strength of concrete (f_{ck}) is

a) $0 \cdot 80\sqrt{f_{ck}}$ b) $0 \cdot 12\sqrt{f_{ck}}$

c) $0 \cdot 7\sqrt{f_{ck}}$ d) $1 \cdot 0\sqrt{f_{ck}}$.

iv) 'Tremie' is a

a) bucket b) water-tight pipe

c) bag d) prepack concrete.

v) Vicat's apparatus is used to determine which of the following properties of cement ?

I. Normal consistency II. Initial setting time

III. Final setting time IV. Fineness.

The correct answer is

a) (I) and (III) b) (II) and (IV)

c) (I) and (IV) d) (I), (II) and (III).

vi) In terms of oxide composition, the minimum percentage of ingredient in the cement is that of

a) lime b) magnesium oxide

c) iron oxide d) alumina.

vii) The workability of concrete by slump test is expressed as

a) mm^3/h b) mm^2/h

c) mm/h d) mm.

viii) Minimum water-cement ratio required for a workable concrete is

a) 0·30 b) 0·40

c) 0·50 d) 0·60.

ix) Creep of the concrete is influenced by

a) strength of concrete b) age of concrete

c) water-cement ratio d) all of these.

x) The pH value of water suitable for concrete construction is

a) 3-4 b) 5-6

c) 8-9 d) 6-8.

xi) The fundamental requirement of fibre reinforced concrete is

a) uniform distribution of fibres throughout the mix

b) mix should have sufficient paste to coat the fibres and aggregate

c) mix should have optimum content of fibres for workability

d) all of these.

xii) In ultrasonic test for hardened concrete good quality of concrete is indicated if the pulse velocity is

a) below 3·0 km/sec

b) between 3·0 to 3·5 km/sec

c) above 3·5 km/sec

d) none of these.

xiii) In mass concreting, the type of cement which is used is

a) ordinary Portland cement

b) Portland Slag cement

c) Low heat cement

d) Portland Pozzolana cement.

xiv) Compressive strength of aggregates can be determined by

a) Crushing test b) Impact test

c) Elongation test d) 10% Fineness test.

xv) The effect of sea water on hardened concrete is to

a) increase the strength b) reduce strength

c) retard setting time d) increase durability.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. What is hydration of cement ? Discuss the reactions that take place between cement compounds and water.

3. Give the physical characteristics of 53 grade OPC.

4. Write short notes on any *one* of the following :

a) Fibre reinforced concrete

b) Polymer concrete.

5. Briefly describe the following tests :

   a) Slump test

   b) Compacting Factor test.

6. Write short notes on the following :

   a) Crushing test

   b) Impact test.

7. State the effect of shape and size of aggregate on strength of concrete.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. Design concrete mixes of M30 to suit the following data per IS:10262-1982 :

   Characteristic cube strength = M-30, type of cement - ordinary Portland, fine aggregate natural river sand conforming to grading zone II of table-4 of IS:383-1970 coarse aggregate-crushed (angular) coarse aggregate of 20 mm maximum size conforming to IS:383 code requirements, specific gravities of cement, sand and coarse aggregate are 3·14, 2·63 and 2·61 respectively. Type of exposure - mild, Degree of quality control - very good. Degree of workability = 0·08. use IS:10262-1982.

9. a) How can you classify an aggregate on the basis of its size ? What are flaky and elongated aggregates ? 5 + 3

b) How can the shape of aggregate influence strength of concrete ? 2

c) Following is the result of a sieve analysis of 500 gm aggregate :

IS sieve size	10 mm	4·75 mm	2·36 mm	1·18 mm	600 micron	300 micron	150 micron	lower than 150 micron
Weight retained in gm	0	10	50	50	95	175	85	35

Find out the 'Fineness Modulus' of the sample. 5

10. a) The Oxide composition of O.P.C. is as follows :

CaO (50%), SiO_2 (15%), Al_2O_3 (5%), Fe_2O_3 (3%), SO_3 (2%)

Find the percentage of C3S and C3A. 5

b) What are the initial and final setting times of cement ? How are they experimentally determined ? 10

11. a) Describe about the Rebound Hammer test method for determining the strength of concrete. 7

b) Describe about the ultrasonic pulse testing method for determining strength of concrete. 8

12. a) Briefly define shrinkage. What are the factors promoting shrinkage ? How can it be reduced ? 8

b) How do water-cement ratio and workability affect the strength of concrete ? 7

13. a) Write notes on Mixing and Mixer machines of concrete. 5

b) Explain Kelly Ball to measure the workability of concrete. Mention the limitation of the test. 5

c) Differentiate between creep and shrinkage of concrete. 5

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