



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 :

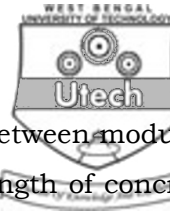
10 × 1 = 10

- 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)  $0.80\sqrt{f_{ck}}$                       b)  $0.12\sqrt{f_{ck}}$   
c)  $0.7\sqrt{f_{ck}}$                       d)  $1.0\sqrt{f_{ck}}$

- 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)  $\text{mm}^3/\text{h}$                       b)  $\text{mm}^2/\text{h}$   
c)  $\text{mm}/\text{h}$                       d)  $\text{mm}$ .

- In Pursuit of Knowledge and Excellence*



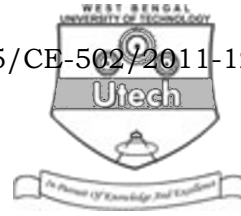
- xiii) In mass concreting, the type of cement which is used is
- a) ordinary Portland cement
  - b) Portland Slag cement
  - c) Low heat cement
  - d) Portland Pozzolana cement.
- xiv) Compressive strength of aggregates can be determined by
- a) Crushing test                      b) Impact test
  - 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.

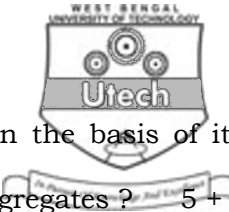
**GROUP – C**

**( 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<sub>2</sub> (15%), Al<sub>2</sub>O<sub>3</sub> (5%), Fe<sub>2</sub>O<sub>3</sub> (3%), SO<sub>3</sub> (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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