

**CONCRETE TECHNOLOGY
(CIVL 2203)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

***Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.***

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

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) As per IS 456:2000, the relationship between Modulus of rupture (f_{cr}) and Characteristic strength of concrete (f_{ck}) is:
(a) $f_{cr} = 0.80 \sqrt{f_{ck}}$ (b) $f_{cr} = 0.12 \sqrt{f_{ck}}$
(c) $f_{cr} = 0.7 \sqrt{f_{ck}}$ (d) $f_{cr} = 1.0 \sqrt{f_{ck}}$
 - (ii) Calcium Chloride is used in concrete as:
(a) retarder (b) set accelerator
(c) water reducing agent (d) polymer modifier.
 - (iii) If p is the standard consistency of cement, the amount of water used in conducting the setting time test is
(a) 0.65p (b) 0.85p (c) 0.6p (d) 0.78p.
 - (iv) Which of the following aggregates gives maximum strength in concrete?
(a) rounded aggregates (b) elongated aggregates
(c) flaky aggregates (d) angular aggregates.
 - (v) The pH value of water suitable for concrete construction:
(a) 3.0 (b) 4.0 (c) 5.0 (d) 6.0.
 - (vi) The workability of concrete by slump test is expressed as:
(a) mm/hr (b) mm³/hr (c) mm (d) m.
 - (vii) Se Separation of coarse aggregates form mortar during transportation is:
(a) Bleeding (b) creeping
(c) shrinkage (d) segregation.
 - (viii) Air permeability method is used to determine:
(a) Specific surface of cement (b) Soundness of cement
(c) Workability of concrete (d) Flexural strength of concrete.

- (ix) 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 aggregates
(c) Mix should have optimum content of fibres for workability
(d) All of these.
- (x) High range water reducers results in water reduction in concrete of about:
(a) 5%- 10% (b) 1% - 2%
(c) 20%- 30% (d) 10 %- 12%.

Group – B

2. (a) What do you mean by “Normal Consistency” of cement? What is the significance of this experiment? How the test is determined.
(b) Write short notes on:
(i) Rapid hardening cement
(ii) Sulphate resisting cement.
(c) Describe “Heat of hydration” and “hydration of cement” process.
3. (a) Explain the wet process and dry process of cement manufacture with proper diagrams and flowchart.
(b) Write short notes: (Also provide diagrams)
(i) Fineness test of hydraulic cement
(ii) Soundness test of hydraulic cement.
(c) Mention the various bogue’s compounds present in cement along with their respective properties.

5 + (2 + 2) + 3 = 12

5 + (2 + 2) + 3 = 12

Group – C

4. (a) Explain the slump test conducted for concrete with neat diagrams. Also explain the different patterns of slump formations.
(b) List down the factors which influence the workability of concrete. Also mention any four factors which affect the strength of concrete.
5. (a) Mention any two stages of production of concrete. Also enumerate any two properties of hardened concrete.
(b) Among the following types of admixtures, write short notes on any two admixtures mentioned below:
(i) Air-entraining admixtures
(ii) Superplasticizers
(iii) Water-reducing admixtures
(iv) Retarding admixtures.

(4 + 3) + (3 + 2) = 12

- (c) State Abraham's law of water-cement ratio. Also, with the help of a graph, explain the relation between strength and w/c ratio.

(1 + 2) + 4 + 5 = 12

Group – D

6. (a) Explain the role of water reducing admixtures in cement concrete in context with surface-active agents.
- (b) Mention various admixtures used as:
- (i) Superplasticizers
 - (ii) Set Retarders
 - (iii) Set Accelerators.

6 + 6 = 12

7. Design Concrete Mix of M30 to suit the following data as per IS 10262:2009.

Necessary data:

- (i) Characteristic cube strength- M30
- (ii) Type of cement- OPC
- (iii) Fine aggregate- Natural river sand conforming to grade zone II
- (iv) Coarse aggregate- Crushed aggregate of 20 mm size
- (v) Specific gravity of cement- 3.14
- (vi) Specific gravity of sand- 2.63
- (vii) Specific gravity of C.A.- 2.61
- (viii) Type of exposure- Mild
- (ix) Degree of quality control- Very good
- (x) Degree of Workability- 0.08.

12

Group – E

8. (a) Write short notes on the following:
- (i) Fibre reinforced concrete
 - (ii) Polymer Impregnated concrete
 - (iii) Geopolymer concrete.
- (b) Describe Rebound Hammer test method to determine the strength of concrete.
9. (a) What is non-destructive test of concrete?
- (b) Elaborately discuss regarding U.P.V. (Ultra sonic Pulse velocity) test conducted on hardened concrete.

(3 × 3) + 3 = 12

2 + 10 = 12

Google classroom joining code	gpzwdhb
Submission Link	https://classroom.google.com/u/1/c/Mzc10TcxMzMxOTcx/a/Mzc10TcxMzMxMDA3/submissions/by-status/and-sort-first-name/all