

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) Separation of coarse aggregates from mortar during transportation, is known
 - (a) bleeding
 - (b) creep
 - (c) segregation
 - (d) shrinkage.
 - (ii) Compacting factor of 0.87 indicates a mix of
 - (a) medium workability
 - (b) very low workability
 - (c) low workability
 - (d) high workability.
 - (iii) Strength of concrete increases with
 - (a) increases with water-cement ratio
 - (b) increases in fineness of cement
 - (c) reducing the curing time
 - (d) decrease in size of aggregate.
 - (iv) From workability point of view, the shape of aggregate is suitable to use
 - (a) Angular
 - (b) Irregular
 - (c) Flaky
 - (d) None of these.
 - (v) Slump test of concrete is a measure of its
 - (a) impact value
 - (b) compressive strength
 - (c) tensile strength
 - (d) consistency.
 - (vi) $\sum(\text{curing period} \times \text{temperature})$ is known as
 - (a) curing
 - (b) maturity
 - (c) shrinkage
 - (d) none of these.
 - (vii) Concrete shrinkage is more pronounced in
 - (a) rich mix
 - (b) lean mix
 - (c) very lean mix
 - (d) normal mix.
 - (viii) The effect of sea water in hardened concrete is to
 - (a) increases the strength
 - (b) reduces the strength
 - (c) retard setting time
 - (d) increase its durability.

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- (ix) Use of accelerators in concrete
(a) shortens the setting time (b) reduces the early strength of concrete
(c) increases period of curing (d) all of the above.
- (x) In ultrasonic test for hardened concrete good quality is indicated if the pulse velocity is
(a) below 3 km/sec (b) between 3.0 to 3.5 km/sec
(c) above 3.5 km/sec (d) none of the above.

Group- B

2. (a) Define workability. [(CO3)(Remember/LOCQ)]
(b) Explain various methods for determination of workability of concrete. [(CO3)(Understand/LOCQ)]
2 + 10 = 12
3. (a) Define curing of concrete. [(CO2)(Remember/LOCQ)]
(b) Describe briefly the methods of curing of concrete. [(CO2)(Understand/LOCQ)]
3 + 9 = 12

Group - C

4. (a) What are the factors influence the strength of concrete. Describe any one among them. [(CO3)(Understand/LOCQ)]
(b) The strength of a sample of fully matured concrete is found to be 40.0 MPa. Find the strength of identical concrete at the age of 7 days when cured at an average temperature during day time at 20°C and night time at 10°C.
Given equation: The percentage strength of identical concrete at known maturity is: $A + B \log_{10} (\text{Maturity}/10^3)$. [A= 32, B=54]. [(CO3)(Understand/LOCQ)]
4 + 8 = 12
5. (a) Write a short note on Maturity of concrete. [(CO2)(Remember/LOCQ)]
(b) Write short notes on
(i) Shrinkage of concrete (ii) Creep of concrete (iii) Dynamic modulus of Elasticity of hardened concrete. [(CO1)(Remember/LOCQ)]
3 + 9 = 12

Group - D

6. (a) Write short notes on plasticizers and super plasticizers. [(CO5)(Remember/LOCQ)]
(b) Explain in brief, the action and application of water reducing admixtures. [(CO5)(Understand/LOCQ)]
6 + 6 = 12

7. Design M-35 grade of Cement Concrete Mix as per IS: 10262-2009, based on the following Data and Test Results:

A. Stipulations:

- (i) Grade of Concrete : M-35
- (ii) Maximum Nominal size of Aggregate : 20 mm.
- (iii) Method of Placing : Pumping
- (iv) Workability : Slump – 125 mm.
- (v) Exposure : Severe
- (vi) Aggregate type : Crushed Angular
- (vii) Admixture : Super plasticizer

B. Test Data

(i) Specific Gravity:

- (a) Cement : 3.15
- (b) Coarse Aggregate : 2.70
- (c) Fine Aggregate : 2.68
- (d) Super plasticizer : 1.45

(ii) Sieve Analysis of Fine Aggregates (as per IS: 383-1970) : Zone II

(iii) Cement : 53 Grade

[[CO3](Create/HOCQ)]

12

Group - E

8. Write a short notes on (Any three)

(4 × 3) = 12

- (i) Light-weight concrete
- (ii) Fibre reinforced concrete
- (iii) Shotcrete
- (iv) Polymer concrete.

[[CO5](Remember/LOCQ)]

9. (a) Briefly describe the types of deterioration of concrete.

[[CO2](Understand/LOCQ)]

(b) Discuss briefly about in corrosion of reinforcement embedded in concrete.

[[CO1](Understand/LOCQ)]

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	87.5	0	12.5

Course Outcome (CO):

After the completion of the course students will be able to

1. Understand the properties of ingredients of concrete
2. Study the behavior of concrete at its fresh and hardened state
3. Study about the concrete design mix
4. Know about the procedures in concreting

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5. Understand special concrete and their use
6. Understand the various Non-Destructive tests.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question;
HOCQ: Higher Order Cognitive Question