(vi) Slump test of concrete is a measure of its
(a) impact value   (b) compressive strength
(c) tensile strength   (d) consistency

(vii) Creep of concrete is influenced by
(a) strength of concrete   (b) age of concrete
(c) water-cement ratio   (d) all of the above

(viii) 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

(ix) "Shotcrete" is used in the application of
(a) soil stabilization   (b) water proofing
(c) stabilization of rock slopes   (d) none of the above

(x) In ultrasonic test for hardened concrete good quality is indicated if the pulse velocity is
(a) below 3km/sec   (b) between 3.0 to 3.5km/sec
(c) above 3.5km/sec   (d) none of the above.

Group - B

2. (a) Define workability.

   (b) Explain various methods for determination of workability of concrete.

   2 + 10 = 12

3. (a) Define curing of concrete.

   (b) Describe briefly the methods of curing of concrete.

   3 + 9 = 12

Group - C

4. (a) Write a short note on Maturity of concrete.

   (b) Write short notes on:
   (i) Shrinkage of concrete (ii) Creep of concrete (iii) Dynamic modulus of Elasticity of hardened concrete.

   3 + (3×3) = 12

5. (a) What are the factors which influence the strength of concrete. Describe any one among them.

   (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]

   4 + 8 = 12

Group - D

6. (a) Write short notes on plasticizers and super plasticizers.

   (b) Explain in brief, the action and application of water reducing admixtures.

   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
   x) 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 : Zone II
       (as per IS: 383-1970)
   iii) Cement   : 53 Grade

   12

Group - E

8. Write a short note on (Any three)
    (i) Waste Material Based Concrete
    (ii) Ferrocement
    (iii) High performance concrete
    (iv) Self compacting concrete

    4 × 3 =12

9. (a)   Explain stress-strain properties of concrete.

    (b)   Explain briefly ultrasonic pulse velocity method for the test of hardened concrete.

    6 + 6 = 12

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 alternatives for the following: **10 × 1 = 10**

    (i)   The property of fresh concrete, in which the water in mix tends to rise to the surface while placing and compacting, is called
    (a) segregation   (b) bleeding
    (c) bulking   (d) creep.

    (ii)   Setting time of concrete is measured by
    (a) Penetrometer   (b) Compression testing machine
    (c) Rebound hammer   (d) Flexural testing machine.

    (iii) The shrinkage in concrete is due to
    (a) hydration of cement
    (b) loss of water by evaporation from the surface
    (c) withdrawal of water stored in unsaturated air voids
    (d) all of these.

    (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)   As per IS 456:2000, the modulus of elasticity of concrete is taken as
    (a) $5700\sqrt{f_{ck}}$ (b) $5000\sqrt{f_{ck}}$ (c) $570\sqrt{f_{ck}}$ (d) $50\sqrt{f_{ck}}$.