AN INTRODUCTION TO CONCRETE TECHNOLOGY
(CIVL 4126)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

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

(ii) 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 of concrete
(d) All of the above

(iii) Creep of concrete influenced by:
(a) strength of concrete (b) age of concrete
(c) water-cement ratio (d) All of the above.

(iv) The nominal mix proportion of M20 grade concrete is:
(a) 1:2:4 (b) 1:3:6 (c) 1:1:2 (d) 1:2:6

(v) Which of the following Bogue's compound provides ultimate or later day strength in concrete:
(a) Tricalcium silicate (b) Tetracalcium alumina ferrite
(c) Dicalcium Silicate (d) Tricalcium aluminate

(vi) As per IS 456:2000, the relationship between modulus of rupture (f_{cr}) and the charachteristic strength of concrete (f_{ck}) is:
(a) $0.80\sqrt{f_{ck}}$ (b) $0.12\sqrt{f_{ck}}$
(c) $0.70\sqrt{f_{ck}}$ (d) $0.1\sqrt{f_{ck}}$

(vii) An admixture that slows down the process of hydration of concrete to keep it plastic for a long time is known as:
(a) retarder (b) accelerator
(c) both (a) and (b) (d) none of these

(viii) Addition of fibres in concrete results in
(a) Modest increase in compressive strength
(b) Increased ductility
(c) Enhanced toughness
(d) None of these

(ix) Ready-mix concrete (RMC) is
(a) Produced under factory conditions
(b) Specified in terms of performance parameters
(c) Produced supplied by weight
(d) All of the above

(x) Air-entrained concrete is primarily used to improve
(a) Compressive strength (b) Resistance to freezing and thawing
(c) Workability only (d) Shrinkage resistance

Fill in the blanks with the correct word

(xi) The minimum grade of concrete to be used for RCC as per IS 456:2000 is _____.

(xii) Compacting factor of 0.87 indicates a mix of _____.

(xiii) The datum level (temperature) for computing maturity of concrete is _____.

(xiv) Turbidity in water for concrete should not be more than _____

(xv) _____ are widely used in rural areas for construction of walls.

Group - B

2. (a) Illustrate the relationship between water cement ratio and strength of concrete. *[(CO2)(Remember/LOCQ)]*
(b) Illustrate any of the workability tests in concrete. *[(CO2)(Apply/IOCQ)]*
6 + 6 = 12

3. (a) What do you mean by curing of concrete? *[(CO3)(Remember/LOCQ)]*
(b) What are the methods of curing of concrete? Describe in brief. *[(CO3)(Apply/IOCQ)]*
3 + 9 = 12

Group - C

4. (a) Write the concept of "maturity of concrete"? *[(CIVL4126.1)(Understand/IOCQ)]*
(b) Write the relation between Characteristic compressive strength, flexural strength of concrete and Modulus of Elasticity. *[(CIVL 4126.4)(Evaluate/HOCQ)]*
4 + 8 = 12

5. (a) Write short notes on "alkali-aggregate" reactions. *[(CIVL 4126.3)(Remember/LOCQ)]*
(b) What are the functions of the following oxides in ordinary Portland cement and what are their contents: CaO, SiO_2, Al_2O_3 and Fe_2O_3. *[(CIVL 4126.3)(Remember/HOCQ)]*
4 + 8 = 12

Group - D

6. Design Concrete Mix of M30 to suit the following data as per IS 10262:2009.
Necessary data:
(a) Characteristic cube strength- M30
(b) Type of cement- OPC
(c) Fine aggregate- Natural river sand conforming to grade zone II
(d) Coarse aggregate- Crushed aggregate of 20 mm size
(e) Specific gravity of cement- 3.14
(f) Specific gravity of sand- 2.63
(g) Specific gravity of C.A.- 2.61
(h) Type of exposure- Mild
(i) Degree of quality control- Very good
(j) Degree of Workability- 0.08. *[(CIVL 4126.4)(Analyze/HOCQ)]*

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7. What are chemical admixtures? Classify them with suitable examples and explain their functions. *[(CIVL 4126.3, CIVL 4126.4)(Analyze/HOCQ)]*

(4 + 8) = 12

Group - E

8. (a) Why special concretes are required? Give some names of special concrete. *[(CIVL 4126.5)(Remember/LOCQ)]*

(b) What do you understand by cold weather concreting? What precautions are to be taken during and after concreting? *[(CIVL 4126.5)(Apply/IOCQ)]*

3 + 9 = 12

9. Write short notes on:
(i) High-volume Fly ash Concrete
(ii) Shotcrete. *[(CIVL 4126.5)(Apply/IOCQ)]*

(6 + 6) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	16.66	41.66	41.66