



GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K₁ to K₆)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: DEC 2015

(Regulation 2014)

Third Semester

CIVIL ENGINEERING

U14CET305: Concrete Technology

(Use of IS 10262 and ACI charts are permitted)

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Consider the following sequence of manufacture of cement by wet process. CO1 [K₃]
 1. Cement silos
 2. Clinker is ground in Ball mill.
 3. Wash mill
 4. Slurry fed to rotary kiln.

The correct sequence of the manufacture is

a) 2-3-4-1	b) 1-3-2-4
c) 3-4-2-1	d) 4-1-3-2
2. Unsoundness in cement is due to CO1 [K₃]

a) Increase in lime content	b) Reduction in lime content
c) Increase in Silica content	d) Reduction in Alkali content
3. Which of the following acts as retarder for concrete? CO2 [K₂]

a) Calcium Chloride	b) Common sugar
c) Magnesia	d) Water

4. Consider the following statements. CO2 [K₂]
1. Plasticizers are used to obtain higher workability without using excess water.
 2. Superplasticizers participate in chemical reactions with cement.
 3. Entrained air and entrapped air in concrete are same.
 4. Addition of mineral admixtures in concrete increases water tightness.

Which of these statements are incorrect?

- a) 1,3 b) 1,4
 c) 1, 2 d) 2,3
5. The mean strength determined from any group of four consecutive test results exceeds the specified characteristic compressive strength by at least CO3 [K₃]
- a) 5 N/mm² b) 0.3 N/mm²
 c) 3 N/mm² d) 2.5 N/mm²

6. Assertion (A): For reinforced concrete construction, the tensile strength is not usually taken into consideration. CO3 [K₃]

Reason (R): Flexural strength of concrete is usually found by testing plain concrete beams.

- a) Both A and R are individually true and R is the correct explanation of A. b) Both A and R are individually true and R is not the correct explanation of A.
 c) A is true but R is false. d) A is false but R is true.

7. The ratio of length to diameter of fibres is called CO4 [K₂]
- a) Diameter ratio b) Length ratio
 c) Fibre – cement ratio d) Aspect ratio

8. Ferrocement is used for casting CO4 [K₂]
- a) Water tanks b) Columns
 c) Beams d) Slabs

9. According to ACI method of concrete mix design, the percentage of air is inversely proportional to the CO4 [K₃]
- a) Minimum size of the aggregates b) Water/cement ratio
 c) Maximum size of the aggregates d) Cement content

10. Match list I with list II and select the correct answer using the codes given below. CO5 [K₃]

List I		List II	
A. Corrosion of reinforcement		1. 5000 N/mm ²	
B. Permeability of gel pores		2. 1.4 to 3.4 J/m ²	
C. Thermal conductivity of concrete		3. Volume increases up to 6%	
D. Modulus of elasticity of concrete		4. 7 x 10 ⁻¹⁶ m/s	

A B C D

- a) 2 1 4 3
 b) 3 4 2 1
 c) 2 4 3 1
 d) 3 1 2 4

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

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| 11. Name the Bougue's components. | CO1 [K ₁] |
| 12. Discuss the factors to be considered while selecting the aggregates for concreting. | CO1 [K ₂] |
| 13. List any four commercially available admixtures. | CO2 [K ₂] |
| 14. Explain the applications of silica fume in concrete. | CO2 [K ₂] |
| 15. List the various methods of curing of concrete. | CO3 [K ₂] |
| 16. Illustrate the factors affecting strength of hardened concrete. | CO3 [K ₃] |
| 17. Explain high performance concrete. | CO4 [K ₂] |
| 18. List the application of shotcrete. | CO4 [K ₂] |
| 19. Differentiate between standard mixes and designed mixes. | CO4 [K ₂] |
| 20. Explain the possibility of sea water used for concreting. | CO5 [K ₃] |

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

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| 21. Explain in detail any four tests for aggregates. | CO1 [K ₃] |
| 22. Explain in detail about the chemical and mineral admixtures in concrete. | CO2 [K ₃] |
| 23. Explain in detail any three tests for hardened concrete. | CO3 [K ₃] |
| 24. Explain the following: | CO4 [K ₂] |
| (i) Bacterial concrete. | (7) |
| (ii) Geopolymer concrete. | (7) |

25. Design a concrete of grade M25 using IS 456-2000 and IS 10262-2009 with the following design data.

CO4 [K₄]

Grade Designation M25

1. Type of Cement OPC 53 grade confirming to IS-12269-1987
2. Maximum Nominal Aggregate Size 20 mm
3. Minimum Cement Content (MORT&H 1700-3 A) 310 kg/m³
4. Maximum Water Cement Ratio (MORT&H 1700-3 A) 0.45
5. Workability (MORT&H 1700-4) 50-75 mm (Slump)
6. Exposure Condition Normal
7. Degree of Supervision Good
8. Type of Aggregate Crushed Angular Aggregate
9. Maximum Cement Content (MORT&H Cl. 1703.2) 540 kg/m³
10. Chemical Admixture Type Superplasticiser Confirming to IS-9103

Test Data for Materials

1. Cement Used Coromandal King OPC 53 grade
2. Sp. Gravity of Cement 3.15
3. Sp. Gravity of Water 1.00
4. Chemical Admixture BASF Chemicals Company
5. Sp. Gravity of 20 mm Aggregate 2.884
6. Sp. Gravity of 10 mm Aggregate 2.878
7. Sp. Gravity of Sand 2.605
8. Water Absorption of 20 mm Aggregate 0.97%
9. Water Absorption of 10 mm Aggregate 0.83%
10. Water Absorption of Sand 1.23%
11. Free (Surface) Moisture of 20 mm Aggregate nil
12. Free (Surface) Moisture of 10 mm Aggregate nil
13. Free (Surface) Moisture of Sand nil
14. Sieve Analysis of Individual Coarse Aggregates Separate Analysis Done
15. Sieve Analysis of Combined Coarse Aggregates Separate Analysis Done
16. Sp. Gravity of Combined Coarse Aggregates 2.882
17. Sieve Analysis of Fine Aggregates Separate Analysis Done.

26. Explain the following:

CO5 [K₃]

- (i) Corrosion of reinforcement. (7)
- (ii) Resistance of concrete to various chemicals. (7)
