



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Fifth Semester

CIVIL ENGINEERING

U18CET5005: Concrete Technology

(Use of IS 10262-2019 and IS 456-2000 are permitted)

COURSE OUTCOMES

- CO1:** Understand the properties of various ingredients of concrete.
CO2: Select suitable admixture for concrete with special properties.
CO3: Design the concrete mix for the required strength as per BIS guidelines.
CO4: Understand tests for fresh and hardened properties of concrete.
CO5: Understand special type of concrete for the given requirement.

Time: Three Hours

Maximum Marks: 100

**Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)**

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|---|-----|-------------------|
| 1. Define heat of hydration. | CO1 | [K ₂] |
| 2. List the Bouge's compounds of ordinary Portland cement (OPC). | CO1 | [K ₂] |
| 3. What is the purpose of adding plasticizers in concrete? | CO2 | [K ₂] |
| 4. How does metakaolin mitigate alkali silica reaction? | CO2 | [K ₂] |
| 5. If a concrete mixture has 95% of the samples above 20 MPa compressive strength, what is the grade of concrete and what kind of compressive strength is that? | CO3 | [K ₂] |
| 6. What is the role of mix design in concrete? | CO3 | [K ₂] |
| 7. Define secant modulus of elasticity. | CO4 | [K ₂] |
| 8. What are the applications of sulphur-infiltrated concrete? | CO4 | [K ₂] |
| 9. What is guniting? | CO5 | [K ₂] |
| 10. What are the applications of high-strength concrete? | CO5 | [K ₂] |

**Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)**

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|---|----|-----|-------------------|
| 11. a) Explain about grading of aggregate in detail. | 8 | CO1 | [K ₂] |
| b) Discuss the quality of water to be used for the preparation of concrete. | 8 | CO1 | [K ₂] |
| 12. What is mineral admixture? Explain the uses of mineral admixtures bringing out their effects on the properties of concrete. | 16 | CO2 | [K ₂] |

13. Design a M30 grade concrete mix for the following details and as per IS 10262:2019. 16 CO3 [K₃]
 Cement - OPC, specific gravity of cement - 3.15
 Fine aggregate - Grading zone - II
 Coarse aggregate - 20 mm angular
 Exposure condition- Moderate
 Water absorption of coarse aggregate - 0.6 % and fine aggregate -1% and
 Workability - 50 mm (slump).
 Test data for materials. (Assume missing data if any suitably).
 a) Cement used : OPC 53 Grade conforming IS 12269
 b) Specific gravity of cement : 3.15
 c) Chemical admixture : Super Plasticizer conforming to IS 9103 (ECMAS HP 890)
 d) Specific gravity:
 1) Coarse aggregate 20 mm: 2.67
 2) Fine aggregate: 2.65
 3) GGBS: 2.84
 e) Water absorption:
 1) Coarse aggregate : 0.6 %
 2) Fine aggregate (M.sand) : 1 %
 f) Free (surface) moisture:
 1) Coarse aggregate : Nil (Absorbed Moisture also Nil)
 2) Fine aggregate : Nil
 g) Sieve analysis:
 1) Coarse aggregate: Conforming to all in aggregates of Table 2 of IS 383.
 2) Fine aggregate : Conforming to Grading Zone II of Table 4 of IS 383.
14. a) Distinguish between segregation and bleeding of concrete. 8 CO4 [K₂]
 b) Describe the various properties of fresh and hardened concrete. 8 CO4 [K₂]
15. a) What are the advantages of using ready mix concrete? 8 CO5 [K₂]
 b) Write short notes on 3D printing of concrete. 8 CO5 [K₂]
- 16 Write short notes on the following:
- i) Los Angeles test. 4 CO1 [K₂]
 ii) Air entraining agent. 4 CO2 [K₂]
 iii) Slump test. 4 CO4 [K₂]
 iv) Ferrocement. 4 CO5 [K₂]
