Reg. No. : | | | | | | | | | | | | |

**Question Paper Code : 20512**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fourth Semester

Civil Engineering

CE 3403 – CONCRETE TECHNOLOGY

(Regulations 2021)

Time : Three hours Maximum : 100 marks

(Use of IS: 10262:2019 is permitted) (Without Any Annexures)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the chemical composition and its percentage in cement?
2. List the BIS grading requirements for aggregates?
3. What is the effect of fly ash on concrete?
4. Mention the different types of mineral admixtures used in concrete.
5. Define the principles of mix proportioning.
6. What is air entering agent?
7. What are the factors affecting workability of concrete?
8. Outline the significance of segregation and bleeding in concrete?
9. Recall the uses of polymer concrete.
10. What are the functions of shotcrete?

PART B — (5 × 13 = 65 marks)

11. (a) Describe the tests conducted on cement to determine its quality and explain the IS specifications for cement.

Or

(b) Explain the quality requirements for water used in concrete and discuss the effect of impurities on concrete.

12. (a) Describe the different types of chemical admixtures and their uses in concrete.

Or

(b) (i) Discuss the importance of waterproofers in concrete and their effect on the properties of concrete. (8)

(ii) Summarize the purpose of accelerators and retarders in concrete. (5)

13. (a) Explain the role of mix proportioning in producing quality concrete.

Or

(b) Compare the properties of nominal mix and design mix for M20 grade concrete.

14. (a) Discuss the different properties of hardened concrete and explain the tests used to determine them.

Or

(b) Explain the significance of the stress-strain curve for concrete and the factors affecting it.

15. (a) Discuss the types of fibers used in FRC and their effect on the properties of concrete.

Or

(b) Narrate the different types of special concretes and their uses in construction.

PART C — (1 × 15 = 15 marks)

16. (a) Calculate the target mean strength: 40 N/mm$^2$ at 28 days. Consider the data as follow:

Maximum size of aggregate: 20mm

Degree of workability: 50-75 mm slump

Specific gravity of cement: 3.15

Specific gravity of fine aggregate: 2.6

Specific gravity of coarse aggregate: 2.7

Water absorption of fine aggregate: 1%

Water absorption of coarse aggregate: 2%

Maximum water-cement ratio as per IS 10262 :2009: 0.35

Or

(b) Suggest and Discuss a concrete that can replace cement in future to reduce carbon foot print to address sustainable development goals.

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