

Code No: R100506

ADVANCED CONCRETE TECHNOLOGY

Time: 3 hours

Max.Marks:100

Answer any FIVE questions
All questions carry equal marks

Note: No code book or data sheet is allowed.

- 1.a) During the chemical analysis on a given cement, the oxide composition was found to be as follows:
CaO=59%; SiO₂=19%; Al₂O₃=8%; Fe₂O₃=7%; MgO=3% and SO₃=4%. Calculate Bogue's compounds.
b) Explain how Alakali aggregate reaction can be controlled. [10+10]
- 2.a) What type of admixtures are required for concreting in hot weather and cold weather?
b) Discuss the mechanism by which mineral admixtures improve the durability of concrete. [10+10]
- 3.a) What is workability of concrete? Discuss about the effect of 'Time' and 'Temperature' on workability of concrete.
b) Explain the procedure for finding setting times of fresh concrete. [10+10]
- 4.a) Discuss the relation between 'tensile' and 'compressive' strength of concrete.
b) What is the effect of water-cement ratio on the strength of concrete? Explain Abram's law.
c) What is meant by drying shrinkage and creep of concrete? [7+7+6]
- 5.a) Explain the stress-strain relationship of concrete. Discuss about static and dynamic moduli of elasticity of concrete and their relation.
b) What is meant by 'Autogenous healing'?
c) Briefly explain 'Ultrasonic Pulse Velocity method' of non-destructive testing of hardened concrete. [7+6+7]
- 6.a) Can the 'High Strength Concrete' always be 'High Performance Concrete'? Explain.
b) What are the various techniques to be adopted for production of 'High Performance Concrete'? [10+10]
- 7.a) What is meant by 'no-fines' concrete?
b) What are the different types of fibres used in fibre reinforced concrete (FRC)? Discuss how the fibre orientation and size effect the strength of FRC.
c) Briefly discuss the tests to be conducted to satisfy the requirements for 'self-compacting concrete' in the fresh state. [6+7+7]

8. Design a M 30 grade concrete mix for an RC structure, as per Bureau of Indian Standards, to be subjected to moderate exposure condition for the following requirements:

Maximum nominal size of aggregate = 20 mm

Minimum Cement content = 320 kg/m³

Maximum water-cement ratio = 0.45

Type of Aggregate = Crushed angular aggregate.

Degree of Workability = 0.96 Compaction Factor

Degree of quality control = Weigh batching, Occasional supervision.

Standard Deviation = 5 MPa.

Fine Aggregate = Natural River Sand confirming to Zone II

Type of cement = OPC 53 grade

Specific gravity of cement = 3.05

Bulk density of cement = 1450 kg/m³.

[20]

Property	Fine Aggregate	Coarse Aggregate
Specific gravity	2.66	2.67
Bulk Density (kg/m ³)	1750	1820
Free Surface Moisture (%)	2	1
Fineness Modulus	2.5	6.3

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