



# MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : CE(PC)404 Concrete Technology

UPID : 004448

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

## Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [ 1 x 10 = 10 ]
- (I) The phenomenon in which water or water-cement mixture separates from the freshly mixed concrete is known as \_\_\_\_
  - (II) Modulus of elasticity of concrete may be defined as ratio of \_\_\_\_ to \_\_\_\_ within elastic limit.
  - (III) Maturity of concrete is a function of summation of product of \_\_\_\_
  - (IV) A good plasticizer is the one which does not cause air-entrainment in concrete greater than \_\_\_\_
  - (V) The ratio of various ingredients (cement, sand, aggregates) in concrete of grade M 20 is \_\_\_\_
  - (VI) What does higher velocities indicate regarding material quality in ultrasonic pulse velocity test?
  - (VII) A cement paste is of standard consistency if the Vicat's plunger penetrates by \_\_\_\_ mm from the top of the mould.
  - (VIII) An aggregate is said to be flaky if its least dimension is less than \_\_\_\_
  - (IX) Segregation can be prevented if the free fall of concrete is avoided from a height of more than \_\_\_\_ m.
  - (X) For normal concrete the value of poisson's ratio lies in the range of \_\_\_\_
  - (XI) In which respect angular aggregates are superior to rounded aggregates?
  - (XII) What is the Vee-Bee time for very low degree of workability?

## Group-B (Short Answer Type Question)

Answer any three of the following : [ 5 x 3 = 15 ]

2. What are Bogue's compounds? Specify their role in heat of hydration and strength development of cement. [ 5 ]
3. What do you understand by bulking of sand? How does it affect quantity of sand by volume batching? [ 5 ]
4. What is Ready Mixed Concrete? List few advantages of Ready Mixed Concrete. [ 5 ]
5. Explain the phenomenon of 'Segregation' and 'Bleeding' with reference to the properties of fresh concrete. Are they useful or harmful for the concrete? [ 5 ]
6. What is creep of concrete? What are the effects of creep on RCC structures? [ 5 ]

## Group-C (Long Answer Type Question)

Answer any three of the following : [ 15 x 3 = 45 ]

7. (a) Explain in detail about the rebound hammer test that is conducted on existing structure to assess its strength with a neat diagram. What are its limitations? [ 8 ]
- (b) Explain ultrasonic pulse velocity method and the techniques measuring the pulse velocity through concrete with a neat diagram. [ 7 ]
8. (a) What is the role of water-cement ratio with respect to workability and strength gain of concrete. [ 4 ]
- (b) What is high pressure steam curing? What are its advantages? [ 5 ]
- (c) Write short notes on: [ 6 ]
  - (i) Water-cement ratio
  - (ii) Gel-space ratio.
9. (a) Explain what are the mechanisms involved in the action of plasticizers. [ 7 ]
- (b) What are plasticizer? What are its purpose? What materials and at what dosage are plasticizer used? [ 8 ]
10. (a) What is 'Shrinkage' of concrete? Classify and explain each type of them. [ 6 ]
- (b) Write short notes on (i) Permeability and (ii) Microcracks in concrete. [ 4 ]
- (c) Briefly describe about the 'splitting tensile test' of concrete. [ 5 ]

11. Design a concrete mix of grade M35 grade concrete using the following data as per IS 10262:2019 :

[ 15 ]

- (a) Maximum nominal size of aggregate: 20mm
- (b) Workability : 75 mm (slump)
- (c) Method of concrete placing : Chute (Non pumpable)
- (d) Degree of site control : Good
- (e) Type of aggregate : Crushed angular aggregate
- (f) Maximum cement content not including fly ash : 450 kg/m<sup>3</sup>
- (g) Chemical admixture type : Superplasticizer - normal
- (h) Specific gravity of cement: 3.1
- (i) Specific gravity of fine aggregate: 2.62
- (j) Specific gravity of coarse aggregate: 2.77
- (k) Specific gravity of Chemical admixture : 1.145
- (l) Water absorption:
  - (i) coarse aggregate: 1 percent
  - (ii) fine aggregate: 2 percent
- (m) Moisture content of aggregate: Nil
- (n) Fine aggregate confirming to grading zone III as per IS.383.

\*\*\* END OF PAPER \*\*\*