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CONCRETE TECHNOLOGY

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

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

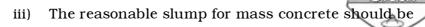
GROUP – A (Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

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- i) Workability of concrete is influenced most by its
 - a) cement concrete
 - b) aggregate-cement ratio
 - c) water-cement ratio
 - d) water content.
- ii) Compacting factor of 0.855 indicates a mix of
 - a) low workability
 - b) high workability
 - c) very low workability
 - d) medium workability.

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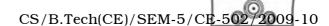


- a) 90-180 m
- b) 10-30 m
- c) 50-75 m
- d) 25-50 m.
- iv) As per IS : 456-2000, the relationship between modulus of rupture ($f_{\it cr}$) and characteristic strength of concrete ($f_{\it ck}$) is
 - a) $0.80 | f_{ck}$
 - b) $0.12 | f_{ck} |$
 - c) $0.70 | f_{ck}$
 - d) $1.0 | f_{ck} |$.
- v) The tensile strength of concrete is approximately of compressive strength of concrete, is
 - a) 50%

b) 20%

c) 10%

- d) 5%.
- vi) The value of pulse velocity of good quality concrete should be
 - a) more than 3.5 km/sec
 - b) less than 3.5 km/sec
 - c) less than 2.0 km/sec
 - d) none of these.



- vii) Gypsum is interground with cement clinker to
 - a) increase strength of cement mortar
 - b) decrease consistency of cement paste
 - c) prevent flash setting of cement concrete
 - d) decrease initial setting time of cement paste.
- viii) The maximum heat of hydration per gram of individual cement compound is due to
 - a) $C_3 S$

b) $C_2 S$

c) C_3A

- d) $C_A AF$.
- ix) For complete hydration of cement and for occupying the space in gel pores, total amount of water by weight of cement required is
 - a) 15%

b) 23%

c) 38%

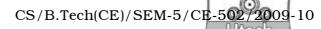
- d) 50%.
- x) An admixture that slows down the process of hydration of concrete to keep it plastic for a long period is called
 - a) retarder
 - b) accelerator
 - c) both (a) and (b)
 - d) none of these.

- xi) In mass concreting, the type of cement which is used is
 - a) ordinary Portland cement
 - b) Portland slag cement
 - c) low heat cement
 - d) Portland Pozzolana cement.
- xii) The best view about concrete is that
 - a) it is a two phase material, *i.e.* paste phase and aggregate phase
 - b) it is aggregate filling the cementing medium
 - c) it is aggregate as mini-masonry joined by mortar
 - d) it is a mixture of cement fine aggregates and coarse aggregates having the consistency of soup.
- xiii) A mixture of cement and water, in place of cement, aggregates and water cannot be considered as a building materials, because
 - a) the so-called volume change will be excessively high
 - b) shrinkage will be too large
 - c) the heat of large amount of hydration may lead to cracking of the structural element

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d) all of these causes.

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GROUP - B

(Short Answer Type Questions)

Answer any three of the following.



- 2. What are all the factors affecting workability of concrete?

 Discuss.
- 3. What is bulking of sand? Discuss its importance in concrete preparation.
- 4. Write the concept of 'maturity of concrete'.
- 5. What are Initial and Final setting time of cement? What is the characteristic compressive strength of concrete?
- 6. Write the relation between the characteristic compressive strength to flexural strength, modules of elasticity.
- 7. What do you mean by alkali aggregate reaction? What are the factors promoting alkali aggregate reaction? Explain.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- 8. What are the various mechanical properties of aggregates?

 Discuss the tests that are conducted on aggregate to determine its properties.
- 9. a) What are the different tests conducted on hardened concrete? Explain.8
 - b) What is shrinkage? What factors promote shrinkage?What precautions will you take to reduce it?

- 10. What do you understand by workability of concrete? What are the factors affecting the workability? Explain. Describe briefly a test for its *in-situ* determination. What should be the values of observation from this test for concrete used for different purposes?
- 11. Write short notes on the following:

 $3 \propto 5$

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- a) Surface hardness test
- b) Mix design of concrete
- c) Setting time of cement.
- 12. a) What is Fiber reinforced concrete? State different types of fibre reinforced concrete and its application in detail.7
 - b) Define admixtures and state its application. What are the different types of admixtures? Explain any one.
- 13. a) Explain how Portland Pozzolana cement and super sulphated cement differ from ordinary Portland cement and the specific circumstances in which these cements would be used.
 - b) Explain in detail about light weight concrete.

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- 14. a) Briefly state the alkali aggregate reaction.
 - b) Elaborate the ultrasonic pulse testing method of determining the strength of the concrete. 6
 - c) What is non-destructive test of concrete?
- 15. a) Distinguish between retarders and accelerators. Under what circumstances are they used?
 - b) Give one example each of accelerator, retarder, plasticiser and superplasticiser.
 - c) What do you mean by flaky and elongated aggregate?

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