Total No. of Questions—12] [Total No. of Printed Pages—7

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S.E. (Civil) EXAMINATION, 2008

CONCRETE TECHNOLOGY

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** from Section I and Q. No. **7** *or* Q. No. **8**, Q. No. **9** *or* Q. No. **10**, Q. No. **11** *or* Q. No. **12** from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of electronic pocket calculator is allowed.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) What is heat of hydration ? How different compounds of cement contributes to heat of hydration ? [6]

(*b*) What is fineness modulus of aggregates ? Explain procedure of finding fineness modulus in laboratory. [5]

(*c*) What is the function of aggregate in concrete ? [5]

Or

2. (*a*) Enlist various types of cement along with their suitability in various situations. [8]

P.T.O.

(*b*) Explain phenomenon of bulking of fine aggregate. What will be the effect of bulking on batching ? [4]

(*c*) Explain classification of aggregate on various basis. [4]

3. (*a*) What are different methods to measure workability of concrete ? State suitability of each method. [6]

(*b*) Write a note on relation between tensile and compressive strength of concrete. [5]

(*c*) What precautions should be taken while placing concrete in deep formwork ? [5]

Or

4. (*a*) Explain Flexural Test on concrete in detail. [6]

(*b*) Define creep of concrete. Discuss beneficial and harmful effects of creep. [5]

(*c*) Explain in detail the importance of compaction of concrete. What are different methods of compaction ? [5]

5. (*a*) Design a concrete mix for grade M30 and mild exposure condition. Also calculate quantities required for 1 bag of cement. Use IS method of mix design. [14]

(1) Maximum size of aggregate = 20 mm

(2) Degree of workability – medium (0.9 compacting factor)

(3) Degree of quality control – Good

(4) Cement – OPC 53 Grade (Specific gravity 3.15)

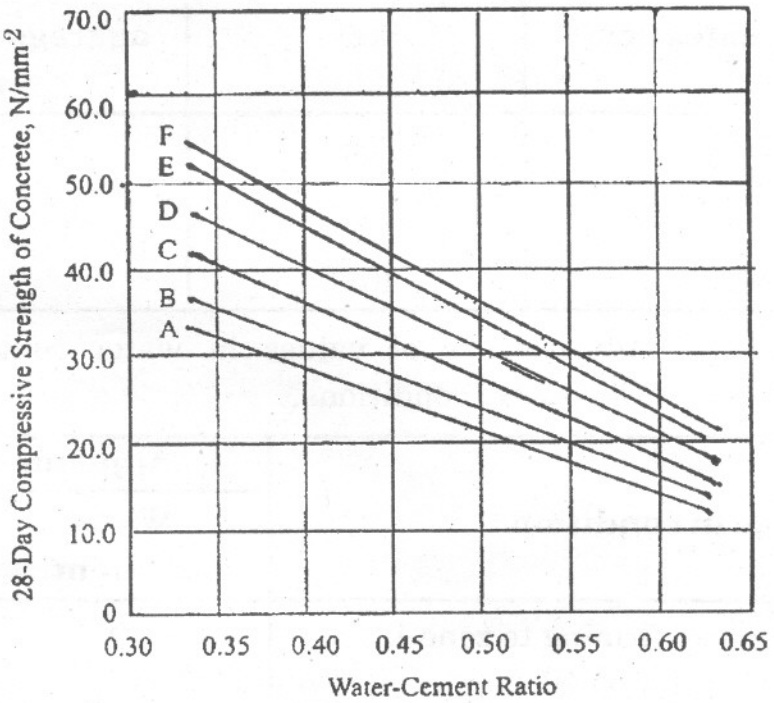
(5) Aggregates—

(*a*) Coarse aggregates—Crushed Stone (Specific gravity = 2.7)

(*b*) Fine aggregates—Natural sand confirming to zone III (Specific gravity = 2.6)

(6) Assume standard deviation = 4.0

(7) Refer to figure No. 1 and tables 1, 2 and 3.



28-Day strength of cement, tested According to IS : 4031—1968

A = 31.9–36.8 N/mm²
B = 36.8–41.7 N/mm²
C = 41.7–46.6 N/mm²
D = 46.6–51.5 N/mm²
E = 51.5–56.4 N/mm²
F = 56.4–61.3 N/mm²

Relation between free Water-Cement Ratio and Concrete Strength for different cement strengths.

Fig. 1

Table : 1 Minimum Cement content and maximum W/C ratio for different exposures.

Exposure	**Minimum Cement Content** kg/m^3	**Maximum** W/C ratio
Mild	300	0.55
Moderate	300	0.5
Severe	320	0.45

Table 2 : Approximate sand and water content per cubic metre of concrete W/C = 0.6, workability = 0.8 C.F.

Maximum Size of Aggregates (mm)	**Water Content** (kg)	**Sand as % of total aggregates by absolute volume**
10	200	40
20	186	35
40	165	30

Table 3 : Adjustments of values in water content and sand % for other conditions.

Change in condition	**Adjustment required in**	
	Water content	**% Sand in total aggregates**
For sand confirming to zone-I, zone-III and zone-IV	0	+ 1.5 for zone-I – 1.5 for zone-III – 3.0 for zone-IV
Increase or decrease in value of Compacting factor by 0.1	± 3.0 %	0
Each 0.05 increase or decrease in W/C ratio	0	± 1.0%

(*b*) Define :

(*i*) Mean strength

(*ii*) Variance

(*iii*) Standard deviation

(*iv*) Coefficient of variation. [4]

Or

6. (*a*) Explain factors influencing choise of mix proportions. [8]

(*b*) Explain DOE method of mix design. [5]

(*c*) What is the effect of water-cement ratio on plastic and hardened concrete properties ? [5]

SECTION II

7. (*a*) Explain various methods to access workability of 'self compacting concrete'. Give typical range of permissible values for different methods. [8]

(*b*) Write a note on roller compacted concrete. [4]

(*c*) Write a note on pumping of concrete. [4]

Or

8. (*a*) Explain method of under water concreting. [6]

(*b*) What is Ready Mix Concrete ? State advantages of the same. [5]

(c) What are different fibres available for fibre reinforced concrete ? Explain their effect on properties of concrete. [5]

9. (a) Explain compatibility of superplasticizer and cement. Explain 'Marsh Cone Test' in detail. [6]

(b) Explain Rebound Hammer Test. Also state limitations of test. [5]

(c) What are Test Cores ? What are advantages and disadvantages of Test Cores ? [5]

Or

10. (a) Explain effect of Micro Silica on fresh and hardened concrete properties. [6]

(b) What are different admixtures available ? Explain their use in concrete. [6]

(c) Explain Impact Echo test. [4]

11. (a) What is durability of concrete ? What is significance of durability ? What effect W/C ratio makes on durability ? [8]

(b) What are the factors contributing cracks in concrete ? [6]

(c) Write a note on attack of sea water on concrete. [4]

Or

12. (a) What is effect of permeability on concrete ? What measures should be taken to reduce permeability of concrete ? [6]

(*b*) Explain process of preparation of surface for repairs along with its importance. [6]

(*c*) Write short notes on : [6]

(*i*) Chloride attack on concrete

(*ii*) Carbonation of concrete.