CT & SEM IV CIVIL & CBSGS

08/06/2015

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QP Code :3462

80 MARKS (CBSGS)

INSTRUCTIONS: 1. Question number 1 is **COMPULSORY.** 2. Attempt any **THREE** from the remaining. 3. Each full question carries **EQUAL** marks. 4) **ASSUME** any suitable data, if needed

1. a) Carry out the Concrete Mix Design for M30 grade of concrete as per Indian Standard method. The target strength to be achieved is 38.25 MPa. The water-cement ratio for the required target strength is 0.49 (from the graph). Refer the various tables given at the end. The details are as below. (10 M)

Design Parameters		Material Properties	
Max. size of coarse aggregates	20 mm.	Cement	53 grade (IS: 12269- 1987)
Shape of coarse aggregates	Angular	Sp. gravity of cement	3.15
Degree of workability (compacting factor)	0.85	Coarse Aggregates	20 mm & 12.5 mm in the (60:40) ratio
Degree of quality control	Fair	Sand	Conforming to Zone II
Degree of exposure	Severe	Sp. gravity of CA	2.67
		Sp. gravity of sand	2.60

b) Enlist the types of cement. Discuss Rapid Hardening Cement. (05 M)

c) Write a note on permeability of concrete. (05 M)

2. a) Explain the hydration of cement. (05 M)

b) Write a note on Rebound Hammer Test on concrete. (05 M)

c) Explain routing & sealing method of crack repair techniques, with neat sketch. (05 M)

d) What are the properties of High Strength Concrete? (05 M)

3. Write notes on the following. (20 M)

a) Ready Mixed Concrete

b) Curing of Concrete

c) Segregation

d) Slump test

4. a) Why bleeding takes place in concrete? What are the factors affecting bleeding? If the rate of bleeding is less than that of surface evaporation, what happens to the concrete? (05 M)

b) Discuss the factors affecting creep & shrinkage of concrete. (05 M)

c) For major concreting works, you would recommend weigh batching or volume batching? Discuss with substantial reasoning. (05 M)

JP-Con. 12396-15.

d) What is the effect of maximum size of aggregate on concrete strength? (05 M)

5. a) Choose & write the correct option: (4 X 1= 04 M)

i) The most commonly used admixture which prolongs the setting & hardening time is
a) Gypsum b) Calcium chloride c) Sodium silicate d) All of the above

ii) If 380 ml (or grams) of water is required to have a cement paste of 1880 grams of normal consistency, the percentage of water is:

a) 26.67% b) 20.21% c) 25.33% d) None of these

iii) Wp and Wf are the weights of a cylinder containing partially compacted and fully compacted concrete. If the compaction factor (Wp/Wf) is 0.95, the workability of concrete is:

a) Extremely low b) Very low c) Low d) High

iv) The target mean strength (MPa) for M25 grade concrete with risk factor = 1.65 & standard deviation = 4, is:

a) 18.4 b) 45.25 c) 31.6 d) none of these

b) Write a detailed note on High Performance Concrete. (08 M)

c) Write a detailed note on Light Weight Concrete. (08 M)

6. Write notes on the following. (20 M)

a) Retarders in concrete

b) Self Compacting Concrete

c) Creep of concrete

d) Shrinkage of concrete

Data for Concrete Mix Design from Indian Standard Code [Q. 1 (a)]

Table 1: Minimum cement content, maximum water-cement ratio & minimum concrete grade (20 mm nominal max. size of aggregates)

Exposure	Reinforced Concrete		
	Min. cement content (kg/m^3)	Max. free water-cement ratio	Min. concrete grade
Mild	300	0.55	M20
Moderate	300	0.50	M25
Severe	320	0.45	M30
Very Severe	340	0.45	M35
Extreme	360	0.40	M40

Maximum cement content: restricted to 450 kg/m^3.

Table 2: Approximate sand & water content per m^3 of concrete*

Grade	Nominal size of aggregate (mm)	Water content in m3 of concrete (kg)	Sand as % of aggregate by absolute volume	Remarks
Up to M35	10	208	40	Sand zone II, water-cement ratio = 0.6, Compaction Factor = 0.8
	20	186	35	
	40	163	30	
Beyond M35	10	200	28	
	20	180	25	

* These values apply to the conditions given in the remarks column. For other conditions, corrections are to be applied as per **Table 3.**

Table 3: Corrections to the values given in Table 2, to be applied for conditions other than those given in the remarks column of Table 2.

Change in conditions other than those given in Table 2	Correction for water content	Correction for sand content in total aggregates (%)
Sand conforming to zone I, III or IV	0	+1.5 for zone I, – 1.5 for zone III, – 3.0 for zone IV
Increase or decrease in compacting factor value by 0.1 (for workability)	±3%	0
Each 0.05 increase or decrease in water-cement ratio	0	±1%
For rounded aggregates (gravel)	– 15 kg/m^3	– 7%

Table 4: Approximate Air Content

Maximum size of aggregate (mm)	Entrapped air
10	3%
20	2%
40	1%