

Ganpat University
B. Tech. Semester: IV Civil Engineering
Regular Examination May - June 2016
2CI406 - Concrete Technology

Time: 3 Hours

Total Marks: 60

Instruction: 1 Answer to the two sections must be written in separate answer books.

2 Assume suitable data if required.

3 Figures to the right indicate full marks.

Section - I

Que.-1 (A) Distinguish between: (1) Plasticizer and Super plasticizers, (2) Entrapped air and Entrained air and (3) Coarse Aggregate and Fine Aggregate (06)

(B) Explain in detail aggregate impact value test. (04)

OR

Que.-1 (A) Enlist the physical properties of cement and explain any one test in detail. (06)

(B) Describe the Bogue's Chemical compounds composition of Portland cement. (04)

Que.-2 (A) Define curing, state different methods of curing and describe any one method. (06)

(B) What are the various factors which affect the workability of concrete? (04)

OR

Que.-2 (A) Explain slump test for the measurement of workability of concrete. (06)

(B) Enlist the causes of segregation. (04)

Que.-3 Design a concrete mix (as per IS: 10262-2009) for a reinforced concrete work which will be exposed to the Server condition. The concrete mix is to be designed as below data. (10)

(a). Stipulations for proportioning : (1) Grade of designation: M 30, (2) Types of cement : OPC 53 grade, (3) Maximum nominal size of aggregate : 10 mm , (4) Workability in terms of Slump: 100 mm, (5) Method of concrete placing: Pumping, (6) Degree of supervision : Good, (7) Type of aggregate: Crushed angular aggregate and (8) Chemical admixture type: Superplasticiser (Use 1% of total cementitious material content) (9) Types of mineral admixture : Rice Husk Ash (Use 15% of total cementitious material content)

(b) Test data of materials (As per IS) : (1) Specific gravity of: Coarse aggregate: 2.70, Fine aggregate: 2.67, Cement: 3.15 and Chemical admixture: 1.145, Rich Huck Ash : 2.50
(2) Water absorption (IS 2386:1963) : (I) Coarse aggregate: 0.5% and (II) Fine aggregate: 1 %.
(3) Free (surface) moisture: (I) Coarse aggregate: Nil (absorbed moisture also nil) (II) Fine aggregate: nil and (4) Sieve analysis (IS 2386 Part 1): (I) Coarse aggregate: (Conforming to Table 2 of IS 383) and (II) Fine aggregate: Conforming to grading Zone II

Section - II

Que.-4 Write down short note on followings: (10)

- (A) Self Compacted Concrete
- (B) Fiber Reinforced Concrete
- (C) High Performance Concrete
- (D) Lightweight Concrete

OR

Que.-4 Write down short note on followings: (10)

- (A) Geopolymer Concrete
- (B) Self Compacted Concrete
- (C) Mass Concrete
- (D) High Strength Concrete

Que.-5 (A) Define durability of concrete and explain factor affecting it. (04)
(B) What do you understand by carbonation of concrete? How is it tested? (03)
(C) Write down short note on deterioration of Concrete by Abrasion, Erosion and Cavitation. (03)

OR

Que.-5 (A) Note down a various types and causes of cracks in concrete. (04)
(B) Write down short note on Impact of W/C Ratio on Durability (03)
(C) Write down short note on Permeability of Concrete (03)

Que.-6 (A) Discuss the purposes of testing hardened concrete (02)
(B) State factors affecting compressive strength of concrete and explain any one. (04)
(C) Explain Non – destructive testing (NDT) and its different methods. (04)

Sr.No.	Grade of Concrete	Assume Standard Derivation N /mm ²
1	M 10	3.5
2	M 15	
3	M 20	4.0
4	M 25	
5	M 30	5.0
6	M 35	
7	M 40	
8	M 45	
9	M 50	
10	M 55	

Note: The above values correspond to site control having proper storage of cement; weigh batching of all materials; controlled addition of water; regular checking of all materials, aggregate grading and moisture content; and periodical checking of workability and strength. Where there is deviation from the above, values given in the above table shall be increased by 1 N/mm²

Sr.No.	Nominal Maximum size of aggregate (mm)	Maximum Water Content # kg
1	10	208
2	20	186
3	40	165

Note: These quantities of mixing water are use in computing cementitious material contents for trial batches.
#Water content corresponding to saturated surface dry aggregate

Sr.No.	Nominal Maximum size of aggregate (mm)	Volume of coarse aggregate # per unit volume of total aggregate for different zones of fine Aggregate (For water-cement ratio = 0.5)			
		Zone IV	Zone III	Zone II	Zone I
1	10	0.50	0.48	0.46	0.44
2	20	0.66	0.64	0.62	0.6
3	40	0.75	0.73	0.71	0.69

#Volumes are based on aggregates in saturated surface dry condition.

Table : 5 Minimum Cement Content, Maximum Water -Cement Ratio and Minimum Grade of Concrete for Different Exposure with Weight Aggregates of 20 mm Nominal Maximum Size (IS 456- 200, Clauses 6.1.2.,8.2.4.1.and 9.1.2.,Page -20)

Sr. No	Exposure	Plain Concrete			Reinforcement Concrete		
		Minimum Cement Content kg /m ³	Maximum Free Water - Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg /m ³	Maximum Free Water - Cement Ratio	Minimum Grade of Concrete
i	Mild	220	0.60	--	300	0.55	M 20
ii	Moderate	240	0.60	M 15	300	0.50	M 25
iii	Severe	250	0.50	M 20	320	0.45	M 30
iv	Very Severe	260	0.45	M 20	340	0.45	M 35
v	Extreme	280	0.40	M 25	360	0.40	M 40

Note :

- 1.Cement content prescribed in the above table is irrespective of the grades of cement and it is inclusive of additions mentioned in 5.2.The additions such as flyash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and w/e ratio if suitability established and as long as the maximum amounts taken into account do not exceed the limit of pozzolana and slag specified in IS 1489(part I) and IS 455 respectively
2. Minimum grade for plain concrete under mild exposure condition is not specified.

END OF PAPER