Student Exam No._____

Ganpat University
B. Tech. Semester: IV Civil Engineering
Regular Examination April - June 2017
2CI406 - Concrete Technology

Total Marks: 60

Time: 3 Hours

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) List out the advantages and disadvantages of concrete. (0

(B) Explain the procedure for find out standard consistency and initial setting time of cement. (0

Que.-2 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. (1

(a). Stipulations for proportioning :(1) Grade of designation: M 35, (2) Types of cement : OPC 53 grade, (3) Maximum nominal size of aggregate : 10 mm , (4) Workability in terms of Slump: 125 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 0.5% of total cementitious material content) (9) Types of mineral admixture : Fly Ash (Use 30% 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, Fly 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

OR

Que.-2 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.

(a). Stipulations for proportioning :(1) Grade of designation: M 35, (2) Types of cement : OPC 43 grade, (3) Maximum nominal size of aggregate : 20 mm , (4) Workability in terms of Slump: 125 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 10% 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, Rice Husk Ash : 2.4 (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

Que.-3 (A) Distinguish between: (1) Entrapped air and Entrained air and (2) Coarse Aggregate and Fine Aggregate (03)

(B) Explain Alkali – Aggregate reaction. What are the factors promoting it and how it can be controlled? (04)

(C) List at-least five different types of cement and its use in different construction condition. (03)

OR

Que.-3 (A) What is admixture? Enlist at least four admixtures with their use. (05)

(B) Write a short note on : Sulphate Attack (05)

Section - II

Que.-4 (A) Explain methods of transportation of concrete. (06)

(B) What is importance of compaction of concrete? (04)

OR

Que.-4 (A) List method of measurement of workability & explain one of them. (05)

(B) What is curing? Enlist methods of curing and explain any one method in brief. (05)

Que.-5 (A) Write a short note on Flexural Strength Test of Concrete (05)

(B) State factors affecting compressive strength of concrete and explain any one. (05)

OR

Que.-5 (A) Explain Non – Destructive testing (NDT) and describe any one test. (07)

(B) Discuss the statement: "Small cubes of concrete show more strength". (03)

Que.-6 (A) Define durability of concrete and list out factors affecting it. (04)

(B) What are the factors affecting permeability? (04)

(C) What is Carbonation? (02)

Table 1 Assume Standard Derivation (IS 10262 :2009, Clauses 3.2.1.2, A-3 and B-3,Page-2)

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/mm^2

Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate (IS 10262 :2009, Clauses 4.2,A-5 and B-5, Page-3)

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

Table 3. Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate (IS 10262 :2009, Clauses 4.4,A-7 and B-7, Page-3)

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/c 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(partI) and IS 455 respectively

2. Minimum grade for plain concrete under mild exposure condition is not specified.

END OF PAPER