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G.R. No.

Paper Code - U218-115 CBE-FS

MAY 2019/ENDSEM

S. Y. B. TECH. (CIVIL ENGINEERING) (SEMESTER - I)

COURSE NAME: CONCRETE TECHNOLOGY (Backlog)

COURSE CODE: CVUA21175

(PATTERN 2017)

Time: [2 Hours]

[Max. Marks: 50]

(*) Instructions to candidates:

- 1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) Draw the flow diagrams for wet and dry process of manufacture of cement and explain the same. [6 marks]

OR

b) Explain the advantages of using plasticizers and super plasticizers in making concrete. [6 marks]

Q.2) a) Explain the method of finding the flexural and split tensile strength for concrete. [6 marks]

OR

b) Describe the following tests for concrete: (i) Flow test (ii) slump test [6 marks]

Q.3) a) Differentiate between high performance concrete and geo-polymer concrete. [6 marks]

OR

b) Explain the Sulphur infiltrated concrete in detail [6 marks]

Q.4) a) Explain transportation and placing procedure in concrete [4 marks]

OR

b) Write short note on Shotcrete. [4 marks]

Q.5) a) Using Indian Standard recommended guidelines, design a concrete mix for a structure to be subjected to the mild exposure conditions for the following requirements:

i) Design Stipulations

Characteristic strength at 28 days – 25MPa, Maximum nominal size of aggregate –20mm, aggregate type is Angular (crushed), Degree of workability is Medium (50mm – 75mm slump. Degree of quality control is good, Grading zone of sand is II.

ii) Characteristics of the Materials

Cement: Type of cement is OPC, its specific gravity is 3.15 and its Bulk density is 1450kg/m³.

Aggregate	Fine Aggregate	Coarse Aggregate
Specific Gravity	2.64	2.84
Bulk Density (kg/m ³)	1700	1800
Free Surface Moisture	2.0	1.0
Fine Modulus	2.2	6.0

Calculate Target Mean Strength, Water-cement ratio, Water & Cement Contents. [6marks]

b) From the above Q 5 a, using same data Calculate Quantity of Fine Aggregates & Coarse Aggregates. [4 marks]

c) What is the effect of Water - Cement Ratio on concrete strength & workability? [4 marks]

OR

Q.6) a) Using Indian Standard recommended guidelines, design a concrete mix for a structure to be subjected to the mild exposure conditions for the following requirements:

i) Design Stipulations

Characteristic strength at 28 days – 20MPa, Maximum nominal size of aggregate –20mm, aggregate type is Angular (crushed), Degree of workability is Medium 80 mm slump. Degree of quality control is good, Grading zone of sand is I.

ii) Characteristics of the Materials

Cement: Type of cement is OPC, its specific gravity is 2.95 and its Bulk density is 1450kg/m³.

Aggregate	Fine Aggregate	Coarse Aggregate
Specific Gravity	2.58	2.89
Bulk Density (kg/m ³)	1500	1440
Free Surface Moisture	2.0	1.0
Fine Modulus	2.2	6.0

Calculate Target Mean Strength, Water-cement ratio, Water & Cement Contents. [6marks]

b) From the above Q 6 a, using same data Calculate Quantity of Fine Aggregates & Coarse Aggregates. [4 marks]

c) What is the procedure of Trial Mixes when using a Designed Mix? [4 marks]

- Q.7) a) Define Durability. Explain impact of w/c ratio on durability. [6 marks]
 b) Write a short note on selection on repair cracks. [4 marks]
 c) Explain in detail corrosion of Reinforcement. [4 marks]

OR

- Q.8) a) What is micro cracking? How does they occurs? [6 marks]
 b) Explain any three conventional methods of global retrofitting of RC structures. [4 marks]
 c) What are the factors affecting durability of concrete? [4 marks]

Table 1 Assumed Standard Deviation
(Clauses 3.2.1.2, A-3 and B-3)

Sl No. (1)	Grade of Concrete (2)	Assumed Standard Deviation N/mm ² (3)
i) ii)	M 10 M 15	3.5
iii) iv)	M 20 M 25	
v) vi) vii) viii) ix) x)	M 30 M 35 M 40 M 45 M 50 M 55	5.0

Table No. 1

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

Sl No. (1)	Nominal Maximum Size of Aggregate mm (2)	Maximum Water Content ¹⁾ kg (3)
i)	10	208
ii)	20	186
iii)	40	165

Table No. 2

Step 5

Durability Criteria as per IS 456- 2000

Change in condition	Correction in Water content (%)	Correction in sand %
For Sand of Zone I, III & IV	0	+ 1.50 for Zone I -1.50 for Zone III - 3.0 for Zone IV
Inc or Dec in CF by 0.1 (25 mm slump)	±3	0
Inc or dec in W/C by 0.05	0	±1

Table No. 3

Exposure	Plain Concrete			Reinforced Concrete		
	Min. Cement	Max w/c	Min grade	Min. Cement	Max w/c	Min grade
Mild	220 kg/m ³	0.60	--	300 kg/m ³	0.55	M 20
Moderate	240 kg/m ³	0.60	M 15	300 kg/m ³	0.50	M 25
Severe	250 kg/m ³	0.50	M 20	320 kg/m ³	0.45	M 30
V. Severe	260 kg/m ³	0.45	M 20	340 kg/m ³	0.45	M 35
Extreme	280 kg/m ³	0.40	M 25	360 kg/m ³	0.40	M 40

Table No. 4

Step 3

Estimate the air content for maximum size of aggregate used

Table 3 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate
(Clauses 4.4, A-7 and B-7)

Approximate Entrapped Air Content

Max. size of Aggregate (mm)	Entrapped air as % of concrete
10	3.0
20	2.0
40	1.0

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate ¹⁾ per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

Table No. 5

Table No. 6

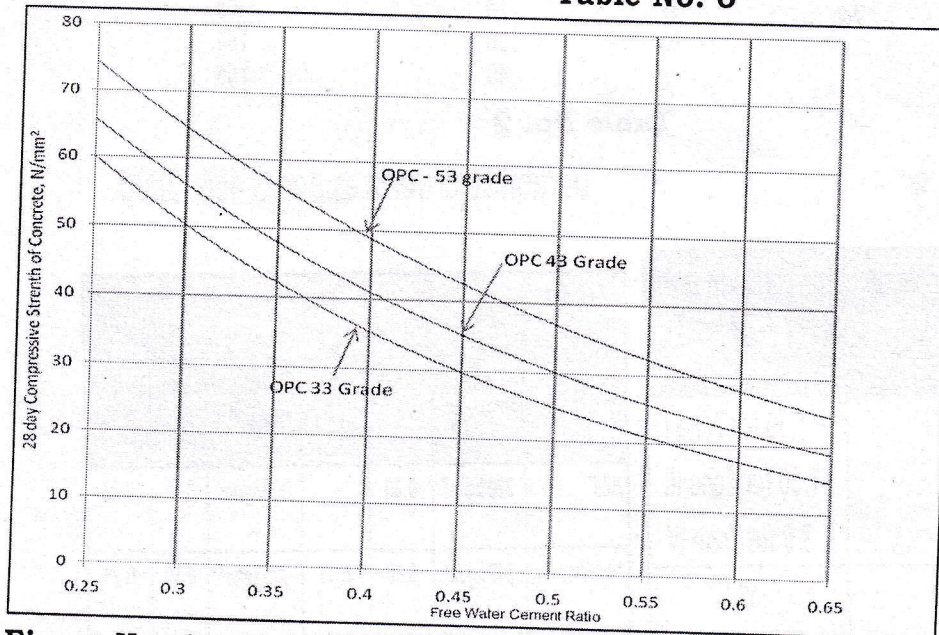


Figure No. 1