DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. **Branch : Civil Engineering** **Semester :6th Sem**

Subject Code & Name: BTCVC603 Concrete technology

Max Marks: 60 **Date:20/08/2022** **Duration: 3.45 Hr.**

Instructions to the Students:

1. *Solve any 5 out of Q.1 to Q.6.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/ CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	Explain Dry and wet Process of Cement manufacturing with flow chart.	**CO1**	**6**
B)	Illustrate bulking of sand and explain in detail the laboratory method used to find out the bulking of sand.	**CO1**	**6**
C)	Enlist types of cement with its application.	**CO1**	**6**
Q.2	**Solve Any Two of the following.**		
A)	Draw & explain with neat sketch of slump cone test used for measuring workability of concrete.	**CO1**	**6**
B)	Write a short note on curing of concrete.		**6**
C)	Define the following terms. a) Segregation. b) Bleeding. c) Setting time of concrete.	**CO1**	**6**
Q. 3	**Solve Any Two of the following.**		
A)	Define Admixtures and State purpose of adding the admixtures into the concrete. (any four)	**CO2**	**6**
B)	Write a short note on Plasticizers and Super-plasticizers.	**CO2**	**6**
C)	Differentiate between the Retarder and Accelerator. (Min 4 points)	**CO2**	**6**
Q.4	**Solve Any Two of the following.**		
A)	Write a short note on effect of W/C Ratio on Strength of concrete.	**CO1**	**6**

B)	Explain the laboratory method of determining the compressive strength of concrete.	**CO1**	**6**
C)	Enlist the properties of fresh concrete and explain it in detail. (any four)	**CO1**	**6**

Q. 5 Solve Any Two of the following.

A)	Illustrate the terms creep and shrinkage of concrete and state its effect on structure.	**CO1**	**6**
B)	What is mean by alkali aggregate reaction (AAR) and explain the effects of alkali aggregate reaction.	**CO1**	**6**
C)	State Factors Contributing to Cracks in Concrete.	**CO1**	**6**

Q. 6 Solve Any Two of the following.

A)	Explain the mix design procedure of concrete as per IS code Method.	**CO3**	**6**
B)	Design a M35 concrete mix using IS method of Mix Design for the following data:	**CO3**	**6**

Maximum size of aggregate - 20mm (Angular)
Degree of workability - 0.90 compaction factor.
Quality control – good
Cement- OPC 53 grade conforming
Type of exposure - severe
Specific Gravity A)Cement - 3.14 B)Sand - 2.63 C) Coarse aggregate - 2.68
Water absorption: A. Coarse aggregate - 0.5%
B. Fine aggregate - 1.0%
Free surface moisture: A. Coarse aggregate – Nil
B. Fine aggregate - 2.2%
Sand confirms to **Zone I** grading.
Assume any other data required suitably.
Note: Refer the following tables for design calculations.

C)	Write short note on non-destructive testing of concrete.	**CO1**	**6**

Table 1 Value of X
(*Clause* 4.2)

Sl No.	Grade of Concrete	Value of X
(1)	(2)	(3)
i)	*M*10, *M*15	5.0
ii)	*M*20, *M*25	5.5
iii)	*M*30, *M*35, *M*40, *M*45, *M*50, *M*55, *M*60	6.5
iv)	M65 and above	8.0

Table 2 Assumed Standard Deviation
(*Clause* 4.2.1.3)

Sl No.	Grade of Concrete	Assumed Standard Deviation N/mm²
(1)	(2)	(3)
i)	*M*10, *M*15	3.5
ii)	*M*20, *M*25	4.0
iii)	M30, M35, M40, M45, M50, M55, M60	5.0
iv)	*M*65, *M*70, *M*75, *M*80	6.0

Table 3 Approximate Air Content

(*Clause* 5.2)

Sl No.	Nominal Maximum Size of Aggregate mm	Entrapped Air, as Percentage of Volume of Concrete
(1)	(2)	(3)
i)	10	1.5
ii)	20	1.0
iii)	40	0.8

Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate

(*Clause* 5.3)

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

[1)]Water content corresponding to saturated surface dry aggregate.

NOTES

1 These quantities of mixing water are for use in computing cement/cementitious materials content for trial batches.

2 On account of long distances over which concrete needs to be carried from batching plant/RMC plant, the concrete mix is generally designed for a higher slump initially than the slump required at the time of placing. The initial slump value shall depend on the distance of transport and loss of slump with time.

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50

(*Clause* 5.5)

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate 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	0.54	0.52	0.50	0.48
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.73	0.72	0.71	0.69

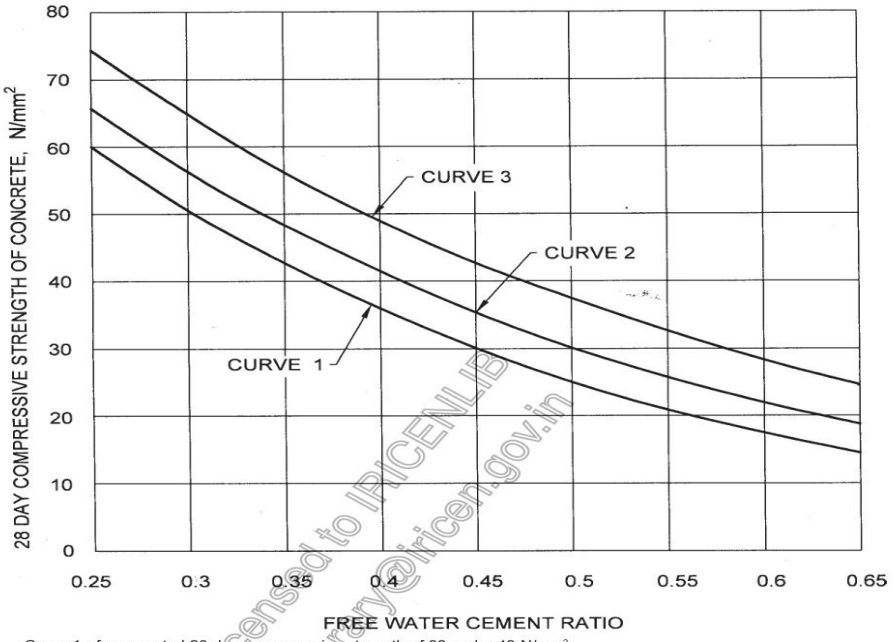
NOTES

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

2 These volumes are for crushed (angular) aggregate and suitable adjustments may be made for other shape of aggregate.

3 Suitable adjustments may also be made for fine aggregate from other than natural sources, normally, crushed sand or mixed sand may need lesser fine aggregate content. In that case, the coarse aggregate volume shall be suitably increased.

4 It is recommended that fine aggregate conforming to Grading Zone IV, as per IS 383 shall not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mix proportions.



Curve 1 : for expected 28 days compressive strength of 33 and < 43 N/mm².
Curve 2 : for expected 28 days compressive strength of 43 and < 53 N/mm².
Curve 3 : for expected 28 days compressive strength of 53 N/mm² and above.

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