

Total No. of Questions : 8]

SEAT No. :

P9078

[Total No. of Pages : 6

[6179]-203

S.E. (Civil Engineering)

CONCRETE TECHNOLOGY

(2019 Pattern) (Semester - IV) (201010)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn whenever necessary.
- 4) Use of non programmable calculator is allowed in the examination.
- 5) Your answers will be valued as a whole.
- 6) If necessary assume suitable data and indicate clearly.
- 7) Use of codes 10262,456 is not allowed.

Q1) a) Enlist factor affecting the strength of concrete and explain role of water cement (W/C) ratio in strength of concrete.. [6]

b) Explain the relation between tensile and compression strength concrete.[6]

c) Write short note on: [6]

- i) Shrinkage of Concrete
- ii) Creep of Concrete

OR

Q2) a) Calculate the compressive strength of following specimen of concrete.[6]

Sr. No.	Specimen and size	Crushing load in kN
i)	Cube 1 : 150 mm X 150 mm X 150 mm	750
ii)	Cube 2 : 150 mm X 150 mm X 150 mm	760
iii)	Cylinder 1 : 150 mm diameter X 300 mm height	525
iv)	Cylinder 2 : 150 mm diameter X 300 mm height	540

b) Explain experimental test to evaluate flexural strength of concrete. [6]

c) Explain the factors affecting the measurement of pulse velocity. [6]

P.T.O.

Q3) a) What do you mean by concrete mix design? What are the objectives in mix design? [8]

b) Enlist various methods available for concrete mix design and explain the step by step procedure for concrete mix design by using IS 10262 method. [9]

OR

Q4) a) Design a concrete for grade M30 using IS code method for following data: [12]

Parameter	: Details
Grade designation	: M30
Standard deviation,s	: 5.00
Factor based on the grade of concrete, X	: 6.50
Type of cement	: OPC 53 grade conforming to IS 12269
Workability	: 50 mm (slump)
Exposure conditions	: Severe (for RCC)
Degree of supervision	: Good
Maximum cement content	: 450 kg/m ³
Type of aggregate	: Angular coarse aggregate
Specific gravity of cement	: 3.15
Specific gravity of coarse aggregate and fine aggregate	: 2.65
Water absorption of coarse aggregate	: 0.50%
Water absorption of fine aggregate	: 1.00%
Free surface moisture for coarse aggregate	: Nil
Free surface moisture for fine aggregate	: Nil
Sieve Analysis	:

Coarse aggregate

IS Sieve (mm)	Analysis of coarse aggregate fraction		Percentage of different fractions			Remarks
	I	II	I (50%)	II (50%)	Combined (100%)	
20	100	100	50	50	100	Conforming to Table 7 of IS 383
10	2.80	78.30	1.4	39.15	40.55	
4.75	0	8.70	0	4.35	4.35	

Fine aggregate : Conforming to grading Zone II of Table 9 of IS 383

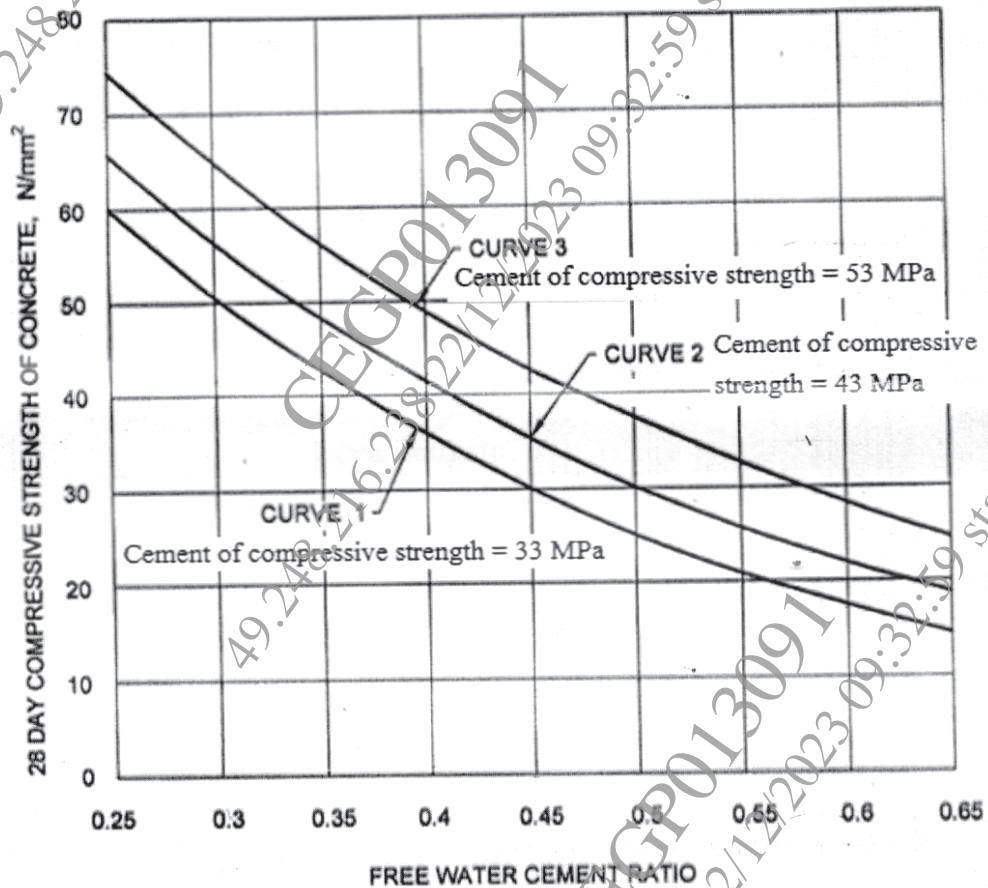


Figure: Relationship between free water cement ratio and 28 days compressive strengths of concrete

Water content per m³ of concrete for 50 mm slump:

Sr. No.	Nominal maximum size of aggregate (mm)	Maximum water content (kg/m ³)
i)	10	208
ii)	20	186
iii)	40	165

Volume of coarse aggregate per unit volume of total aggregate for
water-cement/water-cementitious materials ratio of 0.30:

Sr. No.	Nominal maximum size of aggregate (mm)	Volume of coarse aggregate per unit volume of total aggregate for different zones of fine aggregate		
		Zone III	Zone II	Zone I
i)	10	0.56	0.54	0.52
ii)	12.5	0.58	0.56	0.54
iii)	20	0.68	0.66	0.64

Approximate air content:

Sr. No.	Nominal maximum size of aggregate (mm)	Entrapped air, as % of volume of concrete
i)	10	1.0
ii)	12.5	0.8
iii)	20	0.5

Minimum cement content, maximum W/C and minimum grade of concrete for different exposures with normal weight aggregates of 20 mm nominal maximum size:

Sr. No.	Exposure	Minimum cement content (kg/m ³)	Maximum W/C	Minimum grade of concrete
i)	Mild	300	0.55	M20
ii)	Moderate	300	0.50	M25
iii)	Severe	320	0.45	M30
iv)	Very severe	340	0.45	M35
v)	Extreme	360	0.40	M40

- b) Enlist the factors influencing concrete mix design and explain any one of them. [5]

Q5) a) Write short note on. [6]

- Ready mix concrete
- Roller compacted concrete

b) What particular precautions one should take while concreting in: [6]

- Extremely cold weather and
- Extremely hot weather.

c) Explain underwater concreting by tremie method. [6]

OR

Q6) a) Write short note on: [6]

- Fiber reinforced concrete
- Ferrocement technique

- b) Discuss the self compacting concrete (SCC) with its advantages, material and examples of SCC mixes. [6]
- c) Define lightweight concrete? Classify the various types of lightweight concrete by their method of production. [6]
- Q7)** a) Explain the permeability of concrete. [5]
- b) Enlist the factors affecting durability of concrete. Explain any two in detail. [6]
- c) Write short note on: [6]
- i) Attack by sea water on concrete
- ii) Chloride attack on concrete

OR

- Q8)** a) Discuss shotcrete and grouting technique to repair the defects/ cracks of concrete. [5]
- b) Explain in detail corrosion monitoring techniques for reinforcement and preventive measures against corrosion. [6]
- c) Discuss the application of fiber reinforced polymer (FRP) and polymer impregnated concrete for the retrofitting of concrete structures. [6]

