

Total No. of Questions : 8]

SEAT No. :

P-1481

[Total No. of Pages : 5

[6002]-108

S.E. (Civil)

CONCRETE TECHNOLOGY

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8
- 2) Bold figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever, 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 IS codes 10262,456 is not allowed.

Q1) 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 × 150 mm × 150mm	600
ii)	Cube 2 : 150 mm × 150 mm × 150mm	630
iii)	Cube 3 : 150 mm × 150 mm × 150mm	625

b) Calculate the split tensile strength of following specimen of concrete. [6]

Sr. No.	Specimen and size	Crushing load in kN
i	Cylinder 1 : 150mm diameter × 300 mm height	130
ii	Cylinder 2 : 150mm diameter × 300 mm height	140
iii	Cylinder 3 : 150mm diameter × 300 mm height	150

c) Write short note on :

[6]

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

OR

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- Q2)** a) Enlist non destructive tests for concrete. Explain core test along with its advantages and limitations. [6]
 b) Explain the principal of rebound hammer with neat sketch. Enlist the limitations of rebound hammer test. [6]
 c) Explain the stress-strain relationship of concrete with neat sketch. [6]
- Q3)** a) Define concrete mix design and state objectives in mix design? [4]
 b) Enlist the factors influencing concrete mix design and explain any one of them. [5]
 c) Enlist various methods available for concrete mix design and explain the step by step procedure for concrete mix design IS 10262 method. [8]

OR

- Q4)** a) Design a concrete for grade M30 using IS code method for following data. [13]

Parameter	:	Details
Grade designation	:	M30
Standard deviations	:	5.00
Factor based on the grade of concrete, X	:	6.50
Type of cement	:	OPC 53 grade conforming to IS 12269
Workability	:	75 mm (slump)
Exposure conditions	:	Moderate (for plain concrete)
Degree of supervision	:	Good
Maximum cement content	:	450 kg/m ³
Type of aggregate	:	Angular coarse aggregate
Specific gravity of cement	:	3.00
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

Course 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

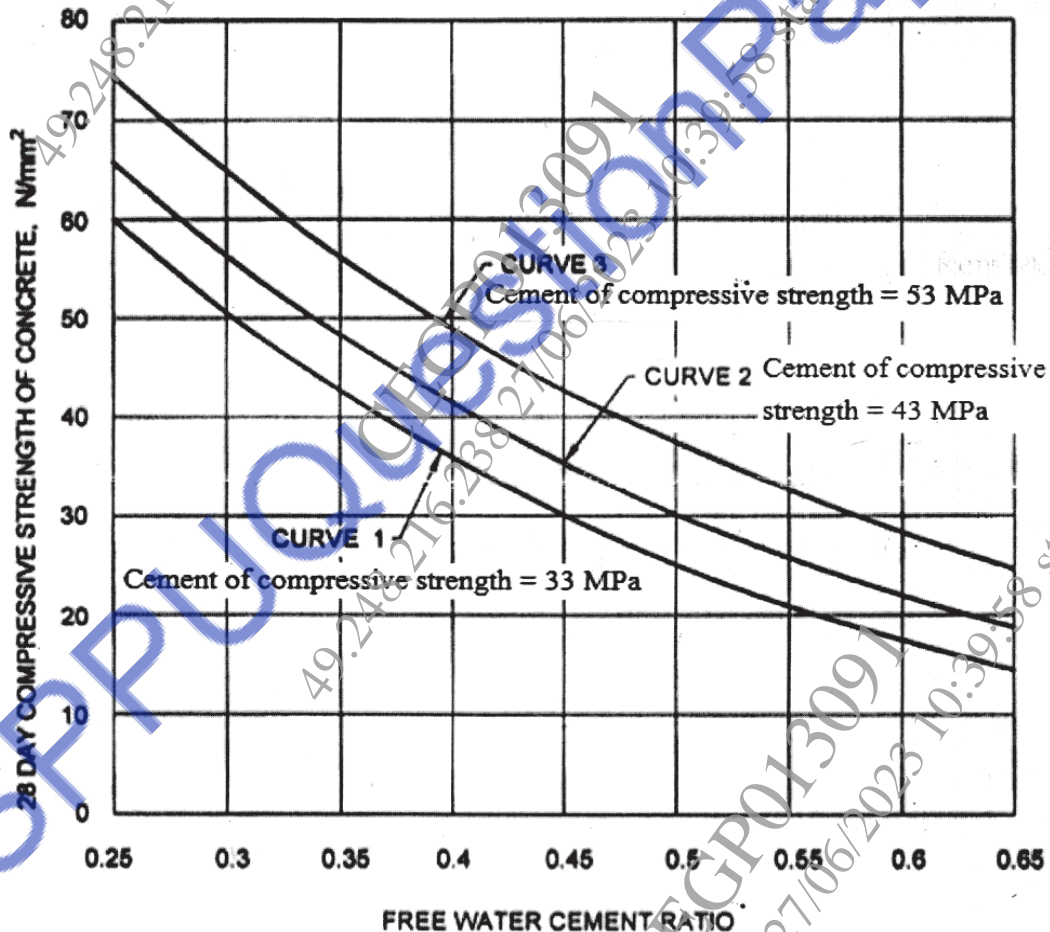


Figure: Relationship between free water cement ratio and 28 days compressive strengths of concrete

Water content per m³ of concrete for 50mm slump :

Sr.	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 material ratio of 0.30 :

Sr.	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.	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 20mm nominal maximum size :

Sr.	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)	What do you mean by :			[4]

- i) Mean strength
- ii) Variance
- iii) Standard deviation
- iv) Coefficient of variation

- Q5) a)** Write short note on [6]
- i) Ready mix concrete (RMC)
 - ii) Under water concreting
- b) What do you mean by roller compacted concrete. Give real life examples/application of roller compacted concrete. [6]
- c) Discuss concrete vibrators and compaction equipments. [6]

OR

- Q6) a)** Define lightweight concrete? Classify the various types of lightweight concrete by their method of production. [6]
- b) Discuss the self compacting concrete (SCC) with its advantages, material and examples of SCC mixes. [6]
- c) Write short note on: [6]
- i) Fiber reinforced concrete
 - ii) Geo-polymer concrete

- Q7) a)** Discuss factors affecting the durability of concrete. [6]
- b) Discuss ingredients/factors influencing the permeability of concrete. [5]
- c) Write short note on : [6]
- i) Attack by sea water on concrete
 - ii) Carbonation of concrete

OR

- Q8) a)** What are the symptoms and diagnosis of distress of concrete? [5]
- b) Explain in detail corrosion monitoring technique for reinforcement and preventive measures against corrosion. [6]
- c) What do you mean by retrofitting of concrete? Discuss the use of fiber reinforced polymer concrete for retrofitting. [6]

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