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 is codes 10262,456 is not allowed.***

Q1) a) Enlist factor affecting the strenght 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 strenght 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 Table7 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

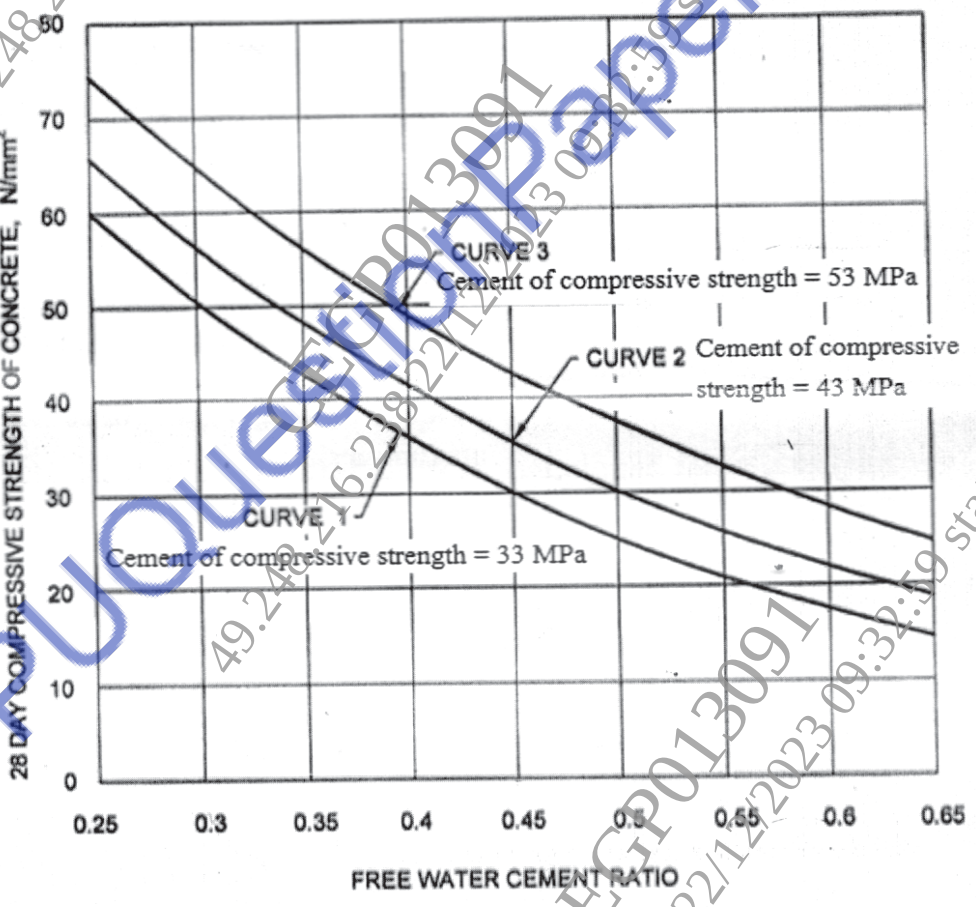

Figure: Relationship between free water cement ratio and 28 days compressive strengths of concrete

Water content per m^3 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]**

i) Ready mix concrete

ii) Roller compacted concrete

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

i) Extremely cold weather and

ii) Extremely hot weather.

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

OR

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

i) Fiber reinforced concrete

ii) 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]**

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