Total No. of Questions : 8]

SEAT No. :

PD4049

[Total No. of Pages : 4

[6402]-8
S.E. (Civil)
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 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) Explain the compressive strength of concrete. How it is determined in laboratory? **[6]**

b) Explain the relationship between compressive strength and tensile strength of concrete. **[6]**

c) State the various types of non-destructive tests carried, on hardened concrete. Explain ultrasonic pulse velocity test with its limitations. **[6]**

OR

Q2) a) Explain rebound hammer test with its limitations. **[6]**

b) Explain the stress-strain relationship of concrete with neat sketch. **[6]**

c) Define creep of concrete. What are the factors affecting on creep of concrete? **[6]**

Q3) a) What do you mean by concrete mix design? What are the objectives in mix design? **[6]**

b) Explain the factors affecting the concrete mix design. **[5]**

c) Explain DOE method of concrete mix design. **[6]**

OR

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Q4) a) Using IS code method design a concrete for grade M35 for following data: **[13]**

Parameter	:	Details
Grade designation	:	M35
Standard deviation,s	:	5.00
Factor based on the grade of concrete,x	:	6.50
Type of cement	:	OPC 53 grade conforming to IS 8112
Workability	:	75 mm(slump)
Exposure conditions	:	Very 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	:	2.70
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

Water content per m^3 of concrete of 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 material 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	Minumum 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) Describe the cold and hot weather concreting. **[6]**

b) What is light weight concrete? How it can be achieved in practice? **[6]**

c) Describe the types of vibrators used for compaction of concrete. **[6]**

OR

Q6) a) Write a short note on: **[8]**

i) Fiber reinforced concrete
ii) Geo-polymer concrete

b) Enlist special concreting techniques? Explain under water concreting. **[5]**

c) Explain the ferrocement technology with its applications. **[5]**

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Q7) a) Explain the durability of concrete? What effect the 'water- cement ratio makes on durability? **[5]**

b) Write short note on: **[12]**

i) Sulphate attack on concrete

ii) Chloride attack on concrete

iii) Carbonation of concrete

OR

Q8) a) What are the symptoms and diagnosis of distress of concrete? **[5]**

b) Explain in detail corrosion monitoring techniques of reinforcement and preventive measures against corrosion. **[6]**

c) What do you meant by retrofitting of concrete? Discuss the use of fiber reinforced polymer concrete for retrofitting. **[6]**

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