Total No. of Questions : 8]

SEAT No. : ____

PB3598

[Total No. of Pages : 5

[6261]-3

S.E. (Civil)

CONCRETE TECHNOLOGY

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

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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) Write short note on: **[9]**

i) Creep of concrete

ii) Shrinkage of concrete

iii) Modulus of elasticity of concrete

b) Describe any two factors affecting the strength of concrete. **[4]**

c) Explain the relationship between compressive strength and tensile strength of concrete. **[4]**

OR

Q2) a) Enlist non destructive tests for concrete. Explain the principal of rebound hammer with neat sketch. Discuss the limitations of rebound hammer test. **[9]**

b) Calculate the compressive strength of following specimens of concrete **[4]**

Sr. No.	Specimen and size	Crushing load in kN
i	Cube 1 :150mm × 150mm × 150mm	580
ii	Cube 2 :150mm × 150mm × 150mm	567
iii	Cylinder 1 : 150 mm diameter × 300 mm height	452
iv	Cylinder 2 : 150 mm diameter × 300 mm height	462

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c) Calculate the split tensile strength of following specimens of concrete **[4]**

Sr. No.	Specimen and size	Splitting load in kN
i	Cylinder 1: 150 mm diameter × 300 mm height	135
ii	Cylinder 2: 150 mm diameter × 300 mm height	145
iii	Cylinder 3: 150mm diameter × 300mm height	155
iv	Cylinder 4: 150 mm diameter × 300 mm height	175

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

b) Write step by step procedure for concrete mix design by using IS 10262 method. **[10]**

OR

Q4) a) Design a concrete for grade M30 using IS code method for following data: **[14]**

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 8112
Workability	:	75 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	:	3.10
Specific gravity of coarse aggregate and fine aggregate	:	2.75
Water absorption of coarse aggregate	:	0.50 %
Water absorption of fine aggregate	:	1.00 %
Free surface moisture for coarse aggregate	:	Nill
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 for 50mm 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	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 : **[8]**

i) Ready mix concrete (RMC)

ii) Under water concreting

b) Enlist concrete compaction equipments and explain any two of them. **[9]**

OR

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

i) Fiber reinforced concrete

ii) Ferrocement technique

b) What do you meant by light weight concrete and discuss its types. **[9]**

Q7) a) State the durability of concrete. Enlist the factor affecting the durability of concrete and explain any two of them. **[9]**

b) Write short note on: **[9]**

i) Attack by sea water on concrete

ii) Chloride attack on concrete

iii) Carbonation of concrete

OR

Q8) a) Discuss corrosion of reinforcement in concrete. Explain in detail corrosion monitoring techniques of reinforcement and preventive measures against corrosion. **[9]**

b) What do you meant by the retrofitting of concrete structures? Discuss the application of fiber reinforced polymer (FRP) and polymer impregnated concrete for the retrofitting of concrete structures. **[9]**