Total No. of Questions : 8]

SEAT No. :

PE-4232

[Total No. of Pages : 4

[6582]-3
S.E. (Civil Engineering)
CONCRETE TECHNOLOGY
(2019 Pattern) (Semester - IV) (201010)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable calculator is allowed.***
5) ***If necessary, assume suitable data and indicate clearly.***

Q1) a) Explain importance of abrasion testing also explain abrasion testing. **[6]**

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

c) Explain the relationship between compressive strength and tensilestrength of concrete. **[6]**

OR

Q2) a) State the various types of non-destructive tests carried on hardened concrete. Explain ultrasonic pulse velocity test with its limitations. **[6]**

b) Explain the compressive strength of concrete. How it is determined in laboratory **[6]**

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

Q3) a) Define concrete mix design. Enlist objectives in mix design. **[6]**

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

c) What do you mean by : **[6]**

i) Mean strength

ii) Variance

iii) Standard deviation

iv) Coefficient of variation

P.T.O.

OR

Q4) a) Using Indian Standard recommended guidelines, design a concrete mixfor a reinforced concrete structure to be subjected to the mild exposure conditions for the following requirements: **[13]**

A) Stipulations for proportioning

i) Grade designation: M30

ii) Standard deviation, s = 5

iii) Type of cement: OPC 53 grade conforming to IS 8112

iv) Workability : 75 mm (slump)

v) Degree of supervision: Good

vi) Exposure condition: Moderate

vii) Type of aggregate: Angular coarse 20 mm aggregate,

viii) Minimum and maximum cement content 300 kg/m3and 450 kg/m^3 respectively

B) Test data for materials

i) Specific gravity of cement: 3.15

ii) Specific gravity of:

(I) Coarse aggregate - 2.74

(II) Fine aggregates - 2.74

iii) Water absorption:

(I) Coarse aggregates - 0.5 %

(II) Fine aggregates - 1.00 %

iv) Free surface moisture :

(I) Coarse aggregates - Nil (absorbed moisturealso nil)

(II) Fine aggregates - Nil

v) Sieve analysis

(I) Coarse aggregate :

IS Sieve sizes in mm	Analysis of coarse aggregate fraction		Percentage of different fractions			Remarks
	I	II	I (60%)	II (40%)	Combined (100%)	Confirming of table 2 of IS 383
20	100	100	60	40	100	
10	0	71.2	0	28.5	28.5	
4.75		9.40		3.7	3.7	
2.36		0				

(II) Fine aggreatate : Conforming to grading zone I

(III) Design considerations :

Table 1: From IS 10262: Maximum water content per cubic meter ofconcrete :

Sr. No.	Nominal Maximum Size of aggregate in mm	Maximum water content in kg
1	10	208
2	20	186
3	30	165

Table 2: From IS 10262; Volume of Coarse Aggregate per UnitVolume of Total Aggregate:

Sr.No	Nominal Maximum size of aggregate in mm	Volume of coarse aggregate per unit volume of total aggregate for differentzone of fine aggregate			
		Zone I	Zone II	Zone III	Zone IV
1	10	0.50	0.48	0.46	0.44
2	20	0.66	0.64	0.62	0.60
3	30	0.75	0.73	0.71	0.69

Table 3: From IS 456, Different Exposure conditions for reinforcedconcrete

Exposure	Minimum cement content (kg/m^3)	Maximum water cement ratio	Minimum grade of concrete
Mild	300	0.55	M20
Moderate	300	0.50	M25
Severe	320	0.45	M30
Very Severe	340	0.45	M35
Extreme	340	0.40	M40

b) Enlist the factors influencing concrete mix design and explain in detail. **[5]**

Q5) a) Describe the cold and hot weather concreting. **[6]**

b) Discuss the self-compacting concrete (SCC) with its advantages. **[6]**

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

OR

Q6) a) Write short note on : **[12]**

i) Roller compacted concrete

ii) Under water concreting

iii) Ready mix concrete

b) Explain the ferrocement technology with its applications. **[6]**

Q7) a) Define durability of concrete. Explain its significance and discuss thefactors affecting the durability of concrete. **[6]**

b) What do you mean by retrofitting of concrete and explain use of fiber reinforced polymer concrete for retrofitting. **[5]**

c) Write short note on Carbonation of concrete. **[5]**

OR

Q8) a) Write short note on : **[6]**

i) Sulphate attack on concrete

ii) Chloride attack on concrete

b) Explain in detail corrosion monitoring techniques of reinforcement andpreventive measures against corrosion. **[5]**

c) Define the term permeability of concrete. What measures should be taken to reduce permeability of concrete? **[5]**