Total No. of Questions : 8]

SEAT No. : ____

P4829

[Total No. of Pages : 4

[5152]-508
S.E. (Civil Engineering)
CONCRETE TECHNOLOGY
(2015 Pattern)

Time : 2 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q. 1 or 2, 3 or 4, 5 or 6, 7 or 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***
7) ***Use of IS code 10262, 456 is not allowed.***

Q1) a) What are the Bogue's compounds? State the significance of each compound. **[6]**

b) State and explain various operations involved during the concreting from mixing to finishing of concrete surface. **[6]**

OR

Q2) a) Explain alkali aggregate reaction .State factors promoting and control of the reaction. **[6]**

b) Define workability .State and explain factors affecting workability. **[6]**

Q3) a) Define creep of concrete .What are the factors affecting. **[6]**

b) What are the special problems encountered in hot weather concreting? How are they rectified? **[6]**

OR

Q4) a) State the various types of destructive tests carried on hardened concrete. Explain "Flexural Test" **[6]**

b) Define Ferrocement. Explain the basic concepts in forming ferrocement composites used in construction industry? **[6]**

P.T.O.

Q5) Using Indian Standard recommended guidelines, design a concrete mix for a reinforced concrete structure to be subjected to the severe exposure conditions for the following requirements: **[13]**

A) Stipulations for proportioning

i) Grade designation: M35,

ii) Standard deviation, s=5

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

iv) Workability: 100 mm(slump)

v) Degree of supervision: Good

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

vii) Maximum cement content:450 kg/m^3

viii) Chemical admixture type : 2 % Superplasticizer conforming to IS 9103

B) Test data for materials

i) Specific gravity of cement :3.15

ii) Specific gravity of admixture: 1.145

iii) Specific gravity of

a) Coarse aggregate - 2.74

b) Fine aggregate - 2.74

iv) Water absorption

a) Coarse aggregates - 0.5%

b) Fine aggregates — 1.00%

v) Free surface moisture

a) Coarse aggregates — Nil(absorbed moisture also nil)

b) Fine aggregates — Nil

vi) Sieve analysis

a) Coarse aggregate :

IS Sieve sizes (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				

b) Fine aggregate: Conforming to grading zone I

C) Design considerations :

Table 1: From IS 10262 ;Maximum water content per cubic meter of concrete

Sl. No.	Nominal Maximum Size of Aggregate(mm)	Maximum Water Content(kg)
i)	10	208
ii)	20	186
iii)	40	165

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

Sl. No. (1)	Nominal Maximum Size of Aggregate(mm) (2)	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

Table3: From IS 456,Different Exposure conditions for reinforced concrete

Sr No	Exposure	Minimum cement content (kg/cubic m)	Maximum free water cement ratio	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

OR

Q6) a) What do you mean by nominal mix. standard mix and design mix? **[4]**

b) What are the various factors affecting concrete mix design? **[4]**

c) Explain DOE method of mix design in brief. **[5]**

Q7) a) Explain in detail permeability and factors affecting permeability of the concrete. **[5]**

b) Write short note on : **[8]**

i) Symptoms and diagnosis of distress of concrete

ii) Corrosion monitoring techniques and preventive measures

OR

Q8) a) Explain process of preparation of surface for repairs along with its importance. **[5]**

b) Write short note on : **[8]**

i) Attack by sea water

ii) Carbonation of concrete and its determination.