Total No of Questions: [8] *SEAT NO. :*

[Total No. of Pages : 3]

S.E. Civil Engineering (2012 Course) Examination, 2014
CONCRETE TECHNOLOGY

(Semester - II)

Time: 2 Hours *Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q. 1 or 2, 3 or 4, 5 or 6 and 7 or 8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***
6) ***Use of IS 10262,IS 456 is not allowed.***

Q1) a) Explain the wet process of manufacturing of Portland cement. [6]

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

Or

Q2) a) Write a short note on classification of aggregate on the basis of [6]
i)Origin
ii)Shape
iii)Unit weight

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

Q3) a) State the various types of non-destructive tests carried on hardened concrete. Explain "Ultrasonic pulse velocity method" for determination of concrete properties. [6]

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

Or

Q4) a) What is light weight concrete? How it can be achieved in practice? [6]

b) Define Ferrocement. What are the properties and specifications of ferrocement materials used in the construction industry? [6]

Q5) a) Using Indian Standard recommended guidelines(IS10262-2009), 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:

a) Grade designation : M40

b)Standard deviation , S=5

c) Type of cement :OPC 43 grade conforming to IS 8112

d) Workability:50mm(slump)

e) Degree of supervision: Good

f)Type of aggregate: Angular coarse aggregate,

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

B)Test data for materials:

a)Specific gravity of cement - 3.15

b) Specific gravity of

i) Coarse aggregate – 2.74

ii) Fine aggregate – 2.74

c) Water absorption

i) Coarse aggregates – 0.5%

ii) Fine aggregates – 1.00%

d) Free surface moisture

i) Coarse aggregates – Nil(absorbed moisture also nil)

ii) Fine aggregates – Nil

e) Sieve analysis

i) 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				

ii) Fine aggregate: Conforming to grading zone I

C)Design considerations :

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

Sr. 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 C.A. per unit volume of Total Aggregate

Sl. No.	Nominal Maximum Size of Aggregate(mm)	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 conditions	Minimum cement content (kg/m^3)	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 [4]
i) Mean strength
ii)Variance
iii)Standard deviation
iv)Coefficient of variation

b) Explain the factors governing the selections of mix proportions. [4]

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

Q7) a) Explain in detail Permeability and factors affecting permeability of concrete. [7]

b) Write a short note on [6]
i)Evaluation of crack
ii)Selection of repair procedure

Or

Q8) a) What is durability of concrete? What is significance of durability? What effect w/c ratio makes on durability? [7]

b) Write a short note on [6]
i)Shotcrete
ii)Repair by stitching