Total No. of Questions—8] [Total No. of Printed Pages—4+2

Seat No.	

[4757]-1006

S.E. (Civil Engineering) (Second Semester)

EXAMINATION, 2015

CONCRETE TECHNOLOGY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2,** Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6,** Q. No. **7** *or* Q. No. **8.**

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Your answers will be valued as a whole.

(*v*) Use of electronic pocket calculator is allowed.

(*vi*) Assume suitable data, if necessary.

(*vii*) Use of IS code 10262, 456 is not allowed.

1. (*a*) What are the minor compounds in Portland cement ? What is their role. [6]

(*b*) Explain the physical properties of aggregates affecting workability of concrete. [6]

P.T.O.

Or

2. (*a*) What are the functions of types of admixtures ? [6]

(*b*) Define creep of the concrete. What are the factors affecting creep of concrete. [6]

3. (*a*) State the various types of non-destructive tests carried on hardened concrete. Explain "Impact echo test" for determination of concrete properties. [6]

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

Or

4. (*a*) Write short notes on : [6]

(*i*) Cellular light weight concrete

(*ii*) Self-compacting concrete.

(*b*) Define Ferro cement. Explain the basic concepts in forming ferrocement composites used in the construction industry. [6]

5. Using Indian Standard recommended guidelines, design a concrete mix for a reinforced concrete structure to be subjected to the mild exposure conditions for the following requirements : [13]

(A) Stipulations for proportioning :

(*a*) Grade designation : M30

(*b*) Standard deviation, s = 5

(*c*) Type of cement : OPC 43 grade conforming to IS8112

(*d*) Workability : 75 mm (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 Coarse Aggregate per Unit Volume of Total Aggregate :

Sr. No.	Nominal Maximum Size of Aggregate (mm)	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
(1)	(2)	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

Table 3 : 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

6. (*a*) Write major factors affecting mix design. Explain water cement ratio. [4]

(*b*) Write a short note on statistical quality control of concrete. [4]

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

7. (*a*) State and explain factors affecting permeability of concrete. What measures should be taken to reduce permeability of concrete ? [8]

(*b*) Explain in detail corrosion monitoring techniques of reinforcement and its preventive measures. [5]

Or

8. (*a*) Write deatiled notes on : [8]

(*i*) Sulphate attack on concrete

(*ii*) Carbonation of concrete and its determination.

(*b*) What are the symptoms of distress of concrete ? [5]