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

Seat No.	

[4957]-1008

S.E. (Civil Engineering) (Second Semester) EXAMINATION, 2016

CONCRETE TECHNOLOGY

(2012 PATTERN)

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

N.B. **:—** (*i*) Answer Q. 1 or 2, 3 or 4, 5 or 6 and 7 or 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 is heat of hydration ? How different compounds of cement contribute to heat of hydration ? [6]

(*b*) Explain in detail the importance of compaction of concrete. What are the different methods of compaction ? [6]

Or

2. (*a*) List various types of cement. Explain any *two* in detail. [6]

(*b*) Explain the factors affecting strength of concrete. [6]

3. (*a*) What are the different tests on fresh concrete conducted in laboratory ? Explain any *one* in detail. [6]

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

(*i*) Pumping of concrete

(*ii*) Roller compacted concrete.

P.T.O.

Or

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

(*i*) Fiber reinforced concrete

(*ii*) Self compacting concrete.

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

5. (*a*) 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 :

(*a*) Grade designation : M30

(*b*) Standard deviation, s = 5

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

(*d*) Workability : 100 mm (slump)

(*e*) Degree of supervision : Good

(*f*) Type of aggregate : Angular coarse aggregate,

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

(*h*) Chemical admixture type : Superplasticizer conforming to IS 9103

(B) Test data for materials :

(*a*) Specific gravity of cement : 3.15

(*b*) Specific gravity of :

(*i*) Coarse aggregate — 2.74

(*ii*) Fine agrregate — 2.74

(*c*) Water absorption :

(*i*) Coarse aggregate — 0.5%

(*ii*) Fine agrregate — 1.00%

(*d*) Free surface moisture :

(*i*) Coarse aggregate — Nil (absorbed moisture also nil)

(*ii*) Fine agggregates — 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 :

SI. 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*) What do you mean by concrete mix design ? What are the objectives in mix design ? [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*) What is durability of concrete ? What is significance of durability ? What effect of W/C ratio makes on durability. [7]

(*b*) What are the factors contributing cracks in the conctrete ? What preventive measures to be taken to reduce cracks in the concrete ? [6]

Or

8. (*a*) Write a short note on : [8]

(*i*) Shotcrete

(*ii*) Carbonation of concrete.

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