Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5252]-508

S.E. (Civil Engineering) (Second Semester) EXAMINATION, 2017

CONCRETE TECHNOLOGY

(2015 PATTERN)

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

N.B. **:—** (*i*) Answer Q. Nos. **1** *or* **2**, **3** *or* **4**, **5** *or* **6**, 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*) Enlist the basic ingredients of Portland cement and also state their ill effects if used in excess. [6]

(*b*) Explain difference between segregation and bleeding. State measures to be taken to avoid each. [6]

Or

2. (*a*) Write short note on classification of aggregates on the basis of : [6]

(*i*) Origin

(*ii*) Shape

(*iii*) Unit weight.

(*b*) What are the different methods to measure the workability ? Explain any *one* in detail. [6]

3. (*a*) Explain the relationship between compressive strength and tensile strength of concrete. [6]

P.T.O.

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

Or

4. (*a*) State the various types of non-destructive tests carried on hardened concrete. Explain "Rebound hammer test with its limitations". [6]

(*b*) What is light weight concrete ? How it can be achieved in practice ? [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 : M25,

(*b*) Standard deviation : s = 4

(*c*) Type of cement : OPC 53 grade conforming to IS 8112

(*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

(*h*) Size of aggregate : 20 mm

(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 size (mn)	**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. (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

Table 3 : From IS 456, Different Exposure conditions for reinforced concrete

Sr No.	**Exposure**	**Minimum coment 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*) What do you mean by : [4]

(*i*) Mean strength

(*ii*) Variance

(*iii*) Standard deviation

(*iv*) Coefficient of variation.

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

7. (*a*) Explain the durability of concrete ? What effect of water cement ratio makes on durability ? [5]

(*b*) Write short notes on : [8]

(*i*) Evaluation of cracks and its necessity

(*ii*) Attack by sea water.

Or

8. (*a*) What are the symptoms and diagnosis of distress of concrete ? [5]

(*b*) Write short notes on : [8]

(*i*) Carbonation of concrete and its determination

(*ii*) Shotcrete.