

Total No. of Questions : 6]

SEAT No. :

P5437

[Total No. of Pages : 4

B.E./Insem/Oct-6
B.E. (Civil Engineering) (Semester - I)
ADVANCED CONCRETE TECHNOLOGY
(2012 Pattern) (Elective - I)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) *Answer Q.1 or 2, 3 or 4 and 5 or 6.*
- 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) Write a short note on Copper Slag as fine aggregate. **[4]**

b) What are the factors affecting strength of concrete? Describe the influence of gel space ratio on strength of concrete. **[6]**

OR

Q2) a) Write a short note on Green Concrete. **[4]**

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

Q3) a) Explain how high performance concrete differs from high strength concrete. **[4]**

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

- i) Ultra-light weight concrete
- ii) Pervious concrete

OR

P.T.O.

Q4) a) What are the different types of industrial waste materials useful for construction industry? Explain any one waste material based concrete in detail. [4]

b) Write a short notes on : [6]

i) Gap graded concrete

ii) Sulphur infiltrated concrete

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: [10]

a) Stipulations for proportioning

i) Grade designation : M30,

ii) Standard deviation, $s = 5$

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

iv) Maximum water-cement ratio : 0.45

v) Workability : 50 mm(slump)

vi) Degree of supervision: Good

vii) Type of aggregate : Crushed Angular aggregate,

viii) Maximum cement content : 450 kg/m³

ix) Minimum Cement content : 320 kg/m³

x) Method of concrete placing Pumping

xi) Chemical admixture type : Super plasticizer

xii) Assume suitable size of aggregate

b) Test data for materials

i) Specific gravity of cement : 3.15

ii) Specific gravity of admixture : 1.145

iii) Specific gravity of

I) Coarse aggregate – 2.74

II) Fine aggregate – 2.74

- iv) Water absorption
 - I) Coarse aggregates – 0.5%
 - II) Fine aggregates – 1.00%
- v) Free surface moisture
 - I) Coarse aggregates – Nil(absorbed moisture also nil)
 - II) Fine aggregates – Nil
- vi) 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%)	
20	100	100	60	40	100	Confirming of Table 2 of IS 383
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

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

OR

- Q6)** a) Explain the role of infrared thermography in civil engineering structures. **[4]**
- b) Write a short note on non destructive testing methods **[6]**
- i) Ground penetration radar
 - ii) Stress wave propagation method

