

Total No. of Questions : 6]

SEAT No. :

P5106

[Total No. of Pages : 4

BE/Insem.-506
B.E. (Civil Engineering)
(c) ADVANCED CONCRETE TECHNOLOGY
(2012 Pattern) (Elective - I) (Semester - 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 manufactured sand as a fine aggregate. [4]
b) What do you mean by quality assurance and quality control? Give the IS recommendations of quality assurance. [6]

OR

- Q2)** a) What is heat of hydration? Explain the factors affecting heat of hydration. [4]
b) Explain workability as a quality measure of green concrete . On which factors workability of concrete depends? [6]

- Q3)** a) What is light weight concrete? How it can be achieved in practice? [4]
b) Write a short notes on : [6]
i) High strength concrete
ii) High performance concrete

OR

- 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]

P.T.O.

- b) Write a short notes on : [6]
- i) Jet cement concrete (Ultra rapid hardening concrete)
 - ii) Vacuum concrete.

Q5) Using Indian Standard recommended guidelines, design a concrete mix for a reinforced concrete structure to be subjected to the very severe exposure conditions for the following requirements : [10]

- A) Stipulations for proportioning
- a) Grade designation : M35,
 - b) Standard deviation, $s = 5$
 - c) Type of cement : OPC 53 grade conforming to IS 8112
 - d) Maximum water-cement ratio : 0.45
 - e) Workability : 75 mm(slump)
 - f) Degree of supervision : Good
 - g) Type of aggregate : Crushed Angular aggregate,
 - h) Maximum cement content : 450 kg/m^3
 - i) Minimum Cement content : 340 kg/m^3
 - j) Method of concrete placing Pumping
 - k) Chemical admixture type : Super plasticizer
- B) Test data for materials
- a) Specific gravity of cement : 3.15
 - b) Specific gravity of admixture : 1.145
 - c) Specific gravity of
 - i) Coarse aggregate - 2.74
 - ii) Fine aggregate - 2.74
 - d) Water absorption
 - i) Coarse aggregates - 0.5%
 - ii) Fine aggregates - 1.00%
 - e) Free surface moisture
 - i) Coarse aggregates - Nil(absorbed moisture also nil)
 - ii) Fine aggregates - Nil

f) Sieve analysis

i) Coarse aggregate :

| IS Sieve sizes (mm) | Analysis of Coarse Aggregate Fraction | | Percentage of different Fractions | | | Remark |
|---------------------|---------------------------------------|------|-----------------------------------|----------|-----------------|---------------------------------|
| | 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

| SI. 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) Write a short note on ground penetration radar technique. [4]
- b) Write a short notes on non destructive testing methods. [6]
- i) Stress wave propagation method
- ii) Nuclear method.

