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SE-8051

B. E. - II (Sem. III) (Civil) Examination

May / June – 2011

Concrete Technology

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 2 (Sem. 3) (Civil)**

Name of the Subject :

☛ **Concrete Technology**

☛ Subject Code No. : **8 0 5 1** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Programmable calculator is not permitted.
(3) Figures to the right indicate full marks.
(4) Assume suitable data wherever required and mention it clearly.

1.	Complete the following with the appropriate words/sentences	10
(i)	There are _____ groups of concrete grades as per I.S. 456- 2000	
(ii)	The characteristic strength of concrete is defined as the strength below which not more than _____ percent of the test results are expected to fall.	
(iii)	American Concrete Institute method is based on _____ test of workability.	
(iv)	The relation between modulus of elasticity and its characteristic compressive strength is given by _____.	
(v)	Drop bottom bucket is a method used for _____ concreting.	
(vi)	The tensile strength of concrete can be determined by _____ test and _____ test.	
(vii)	When the nixing of concrete is done at at mixing plant and partially enroute the concrete is known as _____	
(viii)	Bulk volume of dry rodded coarse aggregate is used in _____ method of mix design.	
(ix)	Shotcrete is used to repair the _____ surfaces.	

(x) The minimum number of specimens required for compressive strength is ———————

2 (a)	What is sulphate attack? State the methods to control sulphate attack.	7
(b)	What is special concrete? Describe any one.	7
(c)	Describe hot weather concreting.	6
	OR	
2 (a)	Explain shrinkage and factors affecting it.	7
(b)	Describe High density concrete	7
(c)	Explain freezing and thawing.	6
3 (a)	Explain acceptance criteria as per IS 456-2000 for compressive strength.	4
3(b)	Design the concrete mix by I.S. Method . The requirement of concrete mix is as	16

under.

(i) Grade of concrete = M 25
(ii) Standard deviation as per I.S. 456-2000
(iii) Degree of workability = 0.9
(iv) Type of exposure = severe
(v) Max size of aggregate = 20mm
(vi) Shape of Coarse aggregate = Angular

The test data of material is as under

(i) Specific gravity of cement = 3.15
(ii) Grade of cement =53 grade OPC
(iii) Specific gravity of CA= 2.85
(iv) Specific gravity of F.A. = 2.65
(v) Grading Zone of F.A.=Zone I

Use data given in table 1 to 8 wherever required. Also determine the quantity of ingredients required per bag of cement in field if C.A. absorbs 0.5% water and F.A. contains 2.0% free moisture.

Table :1 **Standard Deviation for different grades of concrete**

Grade of Concrete	Assumed Standard deviation N/mm^2
M10/M15	3.5
M20/M25	4.0
M30/M35/M40/M45/M50	5.0

Table: 2 **Values of Tolerance Factor "t"**

Accepted Proportion of Low Results	Value of " t "
1 in 5	0.84
1 in 10	1.28
1 in 15	1.5
1 in 20	1.65
1 in 40	1.86
1 in 100	2.33

Table: 3 **Values of W/C and compressive strength**

Compressive Strength in N/mm^2	W/C Ratio
20	0.6
25	0.525
30	0.48
35	0.42
40	0.375
45	0.335

Table: 4 Minimum cement content and maximum water cement ratio for different Exposure

S.N.	Exposure	Plain Concrete			Reinforced Concrete		
		Min cement Content Kg/m²	Max Free Water Cement Ratio	Min Grade of Concrete	Min cement Content Kg/m2	Max Free Water Cement Ratio	Min Grade of Concrete
1	2	3	4	5	6	7	8
I	Mild	220	0.60	-	300	0.55	M20
II	Moderate	240	0.60	M15	300	0.50	M25
III	Severe	250	0.50	M20	320	0.45	M30
IV	Very severe	260	0.45	M20	340	0.45	M35
V	Extreme	280	0.40	M25	360	0.40	M40

Table:5 Approximate Entrapped Air Content

Maximum Size of Aggregate (mm)	Entrapped Air as % of Volume of Aggregate
10	3.0
20	2.0
30	1.0

Table:6 Approximate sand and Water Content Per Cubic Metre of Concrete W/C = 0.60, Workability = 0.80 C.F.

For Concrete grade upto M35

Maximum Size of Aggregate (mm)	Water Content including surface water,per Cubic Metre of Concrete(kg)	Sand as percent of Total Aggregate by Absolute Volume
10	200	40
20	186	35
30	165	30

Table:7 Approximate sand and Water Content Per Cubic Metre of Concrete W/C = 0.35, Workability = 0.80 C.F.

For Concrete grade upto M35

Maximum Size of Aggregate (mm)	Water Content including surface water,per Cubic Metre of Concrete(kg)	Sand as percent of Total Aggregate by Absolute Volume
10	200	28
20	180	25

Table:8 **Adjustment of Values In Water Content and Sand Percentage for Other Conditions**

Change in Conditions Stipulated for Tables	Adjustment Required in	
	Water Content	% Sand in Total Aggregate
For sand conforming to Grading zone I,zone III or zone IV,IS:383-1979	0	+1.5 % for Zone I -1.5% for Zone III -3.0% for Zone IV
Increase or decrease in the value of comacting factor by 0.1	(+/-) 3%	0
Each 0.5 increase or decrease in water- cement ratio	0	(+/-) 1%
For rounded aggregate	(-) 15 Kg	(-)7 %

Q-4 Fill in the blanks. [10]

1. Maturity of concrete is defined by _____and _____.
2. If _____ and _____ shapes particles mixed together will reduce the voids in concrete.
3. The ratio of surface of the particle to their volume is called _____.
4. The Abram's relation for compressive strength of concrete is given by _____.
5. The fineness of cement is a measure of the _____ of particles of cement.
6. The water used for mixing and curing of concrete has pH value_____.
7. The aggregates passing through _____ I. S sieve are called fine aggregates.
8. Resistance of aggregate to fail by impact is known as _____.

Q-5 Attempt any four questions [16]

a) Short note on Sulphate resisting cement.
b) Advantages of fly ash admixtures
c) Functions of admixtures
d) Discuss bulking of sand.
e) Describe in detail the segregation and bleeding

Q-6 (A) Enlist the different types of cement. Describe the test for determining initial and final setting time of cement with dimensional sketch. [10]

(B) Differentiate between Light weight concrete and Heavy concrete. [5]

OR

(B) Explain how the impurities in water affect the quality of concrete. [5]

(C) Which are the important points to be considered in rehabilitation of building? [5]

(D) Determine the factors affecting durability of concrete. [4]