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RN-8051

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

May / June – 2010

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,.....) : **1&2**

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.

(3) Assume suitable data, if necessary.

(4) No. I.S. codes are permitted.

SECTION - I

1 Complete the following with appropriate words/sentences : **10**

(i) The minimum number of specimens required for compressive strength is _____.

(ii) Duff Abram's relation for strength of concrete to water cement ratio is given by _____ where A and B are constant and x is water cement ratio.

(iii) For columns and beams _____ vibrator is used for compaction.

(iv) A concrete which can be pushed through a pipe line is called as _____.

(v) Tremine is used for _____ concreting.

(vi) The relation between Modulus of Elasticity and its characteristic compressive strength is given by _____.

(vii) _____ and _____ are known as alkalies.

(viii) As per IS 456-2000 concrete grades M10 to M20 are in _____ concrete group.

(ix) For durable concrete water cement ratio should be _____ as far as possible.

(x) American Concrete Institute method is based on _____ test of workability.

2 (a) Enumerate the destructive and non-destructive tests for hardened concrete and describe any **one** non-destructive test. **10**

(b) Describe the following : **10**

(i) Underwater concreting

(ii) Ready mixed concrete.

OR

2 (a) What is creep? State factors affecting creep. **5**

(b) State and explain factors affecting strength of concrete. **5**

(c) Explain alkali aggregate reaction. **5**

(d) What is sulphate attack ? State the methods to control sulphate attack. **5**

3 Design the concrete mix using I.S. method. The requirement of concrete mix is as umder. **20**

(i) Grade of concrete = M30 (RCC)

(ii) Standard Deviation as per I.S. 456-2000

(iii) Maximum size of aggregate = 20 mm (Angular)

(iv) Degree of workability = 0.90 C.F.

(v) Type of Exposure = severe

The test data of material is as under :

(i) Specific gravity of cement = 3.15

(ii) Grade of cement = 43 grade O.P.C.

(iii) Specific gravity of C.A. = 2.85

(iv) Specific gravity of F.A. = 2.60

(v) Grading zone of F.A. = Zone I

Use the data given in table 1 to 7 wherever required.

Also determine the quantity of ingradients required for sag of cement in field if C.A. absorbs 0.5% water and F.A. contains 2% free moisture.

SECTION - II

4 Fill in the blanks: **10**

(i) Active group of concrete consists of _____ and _____.

(ii) An argillaceous material contains _____ and _____.

(iii) For fineness test residue should not exceed _____ percentage when the cement is sieved through I.S. Sieve No. _____ Micron.

(iv) _____ set is the abnormal premature hardening within few minutes of mixing cement with water.

(v) Limiting value of chlorides in water used for concreting is _____ ppm.

(vi) Resistance of aggregate to fail by impact is known as _____.

(vii) Fine residue resulting from the combustion of powdered coal and collected by electrostatic precipitator is known as _____.

5 (a) Why admixtures are used in concrete? Explain accelerator admixtures. **6**

OR

(a) Explain how the impurities in water affect the quality of concrete. **6**

(b) Describe with figure consistency test for cement. **5**

(c) Explain the sieve analysis test for aggregate. **5**

6 (a) Write short notes on : (any **two**) **6**
(i) Bulking of sand (ii) Sulphur resisting cement
(iii) Fibre reinforced concrete.

(b) Discuss effect of water cement ratio on strength of the concrete. **5**

(c) What are the factors affecting permeability of concrete? **5**

7 (a) What are the advantages of Portland Pozzolana cement? **4**

OR

(a) With flow diagram explain the manufacture of cement. **4**

(b) Which are the important points to be considered in rehabilitation of building? **4**

Note : Use data from Table 1-7 for Q. 3

Table 1: Suggested values of Standard Deviation

Grade of Concrete	Assumed Standard Deviation N/mm^2
M 10 / M 15	3.5
M 20/ M 25	4.0
M 30/ M 35 / M 40/ M45/ M 50	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	1.50
1 in 20	1.65
1 in 40	1.86
1 in 100	2.33

Table 3: Values of W/C ratio and Compressive strength at 28 days

Compressive Strength in	Water Cement Ratio
20	0.600
25	0.525
30	0.480
35	0.420
40	0.375
45	0.335

Table 4: Minimum Cement Content and Maximum Water Cement Ratio for Different Exposures

S.N.	Exposure	Plain Concrete			Reinforced Concrete		
		Min Cement Content kg/m^3	Max Free Water Cement ratio	Min Grade of Concrete	Min Cement Content kg/m^3	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	M 15	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	Entrapped Air as % of Volume of Concrete
10	3.0
20	2.0
40	1.0

Table 6 : Approximate Sand and water Content per cubic meter of concrete (W/C=0.60, Workability = 0.08C.F.) forgrade upto M35

Nominal maximum Size of Aggregate	Water content per cubic meter of concrete	Sand as percentage of total aggregate by absolute volume
10	208	40
20	186	35
40	165	30

Table 7 : Adjustment of values in water content and sand percentage for other condition

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 of Tab 4 of 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 compacting factor by 0.1	(+)3% / (-) 3%	0
Each 0.05 increase or decrease in water cement ratio	0	(+)/(-)1%
For rounded aggregate	(-)15kg	(-)7%