* K C - 8 0 5 1 *

KC-8051

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

November / December – 2012

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) The characteristic strength of concrete is defined as the strength below which not more than _____ percent of the test results are expected to fall.

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

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

(iv) Tremie is used for _____ concreting.

(v) Shotcrete is used to repair the _____ surfaces.

(vi) When the mixing of concrete is done at mixing plant and partially en route the concrete is known as _____.

(vii) Bulk volume of dry rodded coarse aggregate is used in _____ method of mix design.

(viii) Fibers in concrete mainly improve the _____ strength.

(ix) There are _____ categories of exposure condition as per I.S. 456-2000.

(x) Pneumatically projecting mortar with high velocity on a surface is known as _____.

2 (a) Describe Light Weight concrete. **7**

(b) Write short notes on repairing materials. **7**

(c) Describe cold weather concreting. **6**

OR

2 (a) Write short notes on Fiber reinforced concrete **7**

(b) Explain shotcrete and describe dry mix process for it. **7**

(c) List out the factors affecting the result of rebound hammer test. **6**

3 (a) State various methods of mix design. **4**

(b) Design the concrete mix by I.S. Method. The requirement of concrete mix is as under. **16**

(i) Grade of concrete = M 20

(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 = 20 mm

(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 = 2.80

(iv) Specific gravity of F.A. = 2.6

(v) Grading Zone of F.A. = Zone III

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 Kg/m^2	Max free water cement Ratio	Min grade of concrete	Min cement content Kg/m^2	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 above 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%

4 (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**

5 (a) Write short note on : (attempt any **three**) **12**

(i) Bulking of sand

(ii) Sulphur resisting cement

(iii) Fibre reinforced concrete

(iv) Durability of concrete

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

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

6 (a) What are the advantages of Portland pozzolana cement ? **4**

OR

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

(b) What is curing? Explain membrane curing. **4**

(c) Write difference between setting of cement and hardening of cement. **4**