* U F - 8 0 5 1 *

UF-8051

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

May/June – 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. - II (Sem. - III) (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.

(5) Attempt all questions.

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

(i) Tremie is used for _____ concreting.

(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) Drop bottom bucket is a method used for _____ concreting.

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

(v) When the mixing of concrete is done at mixing plant and partially enroute the concrete is known as _____.

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

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

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

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

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

2 (a) Write short notes on Ready Mixed concrete. **7**

(b) Write short notes on damage assessment of structural elements. **7**

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

OR

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

(b) List out the factors affecting the result of rebound hammer test. **7**

(c) Describe the under water concreting. **6**

3 (a) Distinguish between the nominal mix and design mix. **4**

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

(i) Grade of concrete = M 25

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

(iii) Degree of workability = 0.85

(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 = 2.8

(iv) Specific gravity of F.A. = 2.7

(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.

4 (a) Attempt any **two** : **6**

(i) Explain Bulking of sand.

(ii) Discuss heat of hydration.

(iii) What are chemical and compound compositions of Portland cement ?

(b) Explain compressive strength test of cement. **4**

(c) Which are the factors affecting the workability of concrete ? **6**

(d) Explain relation between workability and strength of concrete. **5**

5 (a) Determine the test for aggregate crushing value. **4**

(b) Determine the factors affecting durability of concrete. **4**

(c) Write short notes on : (any **two**) **6**

(i) Sulphate resisting cement.

(ii) Blast furnace slag.

(iii) Physical properties of Portland cement.

6 (a) Differentiate between Light weight concrete and Heavy concrete. **5**

(b) Explain how the impurities in water affect the quality of concrete. **5**

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

OR

(c) What are the functions of bonding agent and pozzolana admixtures ? **5**

Table : 1 Standard Deviation for different grades of concrete

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/*M*45/*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	*1.5*
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*			*Rein forced Concrete*		
		Min. cement Content 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	*M*20
II	*Moderate*	240	0.60	*M*15	300	0.50	*M*25
III	*Severe*	250	0.50	*M*20	320	0.45	*M*30
IV	*Very severe*	260	0.45	*M*20	340	0.45	*M*35
V	*Extreme*	280	0.40	*M*25	360	0.40	*M*40

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%