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SF - 7665

B. E. IV (Sem. VIII) (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. 4 (SEM. 8) (CIVIL)

Name of the Subject :
☛ CONCRETE TECHNOLOGY

☛ Subject Code No. : 7 6 6 5 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Assume suitable data if necessary.
(3) Figures to the right indicate full marks.
(4) No codes of practice are permitted.
(5) Programmable calculator is not permitted.

1 Attempt the following questions : (any **three**) **18**

(1) Explain the importance of sieve analysis for aggregate to calculate the fineness modulus.
(2) What are the factors that govern the aggregate grading ? Discuss workability of mix in terms of aggregate grading.
(3) Explain how to determine aggregate crushing value by laboratory test ?
(4) Discuss the effect of deleterious substances in aggregate strength.

2 Attempt any three questions : **18**

(1) Define workability and explain compacting factor test in detail.
(2) Write short note on segregation and bleeding of concrete.
(3) Write short note on ready mix concrete and pumped concrete.
(4) What is the aim of mixing of concrete ? Classify different types of mixers depend upon the discharge of concrete.

3 Attempt the following questions : (any **two**) **14**

(1) State factors affecting strength of the concrete according to Feret, Abram and power.

(2) Which are the different methods of curing ? Explain the effect of temperature on curing ?

(3) Explain high pressure curing with advantages and disadvantages.

4 Attempt any **three** :

(a) State Bogue's compound and its properties. **6**

(b) Distinguish between Rapid Hardening and quick setting cement. **6**

(c) Explain initial and final setting time test of cement. **6**

(d) What is heat of hydration ? Explain its effect on quality of concrete. **6**

5 Attempt any **three** :

(a) State the various destructive and non destructive tests for hardened concrete and explain any one in detail. **6**

(b) What is creep ? State factors affecting creep. **6**

(c) Enlist the factors which affect the strength of concrete. Discuss any one in detail. **6**

(d) What is sulphate attack ? State the methods to control sulphate attack. **6**

6 Design the concrete mix by I. S. method. **14**

The requirement of concrete mix is as 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 = mild

(v) Maximum size of aggregate = 20mm (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 = 2.75

(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/mm²*
*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 Law 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/MM2	*W/C*
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

		Plain concrete			Reinforced concrete		
S.N.	Exposure	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 wateer, 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 II -3.0 % for Zone IV
Increase or decrease in the value of compacting factor by 0.1	(+/-)3%	0
Each 0.5 increase or decrease in water - cement ratio	0	(+/-)1%
For rounded aggregate	(-)15 kg	(-)7%