Paper / Subject Code: 40405 / Building Materials & Construction Technology

SE/CIVIL/SEM IV/BMCT/CBCS

29 MAY 2019

(03 HOURS)

TOTAL MARKS: 80

Instructions : (1). Question No .1 is compulsory
(2) Answer any **three questions** from the remaining questions.
(3) Each full question carries 20 marks.
(4) Assume suitable data, if needed and state it clearly.

Q.1 Attempt any four

a Enlist in detail classifications of engineering materials. (05M)

b What is the effect of 'Bulking of sand & Water absorption of CA on the concrete mix proportioning. (05M)

c State the elastic properties of hardened concrete and explain any one of them in brief. (05M)

d Explain defects in timber due to seasoning with neat sketch. (05M)

e Draw Queen closer & King closer sketches with dimensions in case of standard brick. (05M)

f Which field tests are conduct in the field on cement? (05M)

Q.2 a) Which IS code is required to perform compressive strength test on burnt clay brick? Explain step by step procedure to determine compressive strength of brick in the lab as per IS code. (10M)

b) Which IS code is required to perform compaction factor test? Calculate how much quantities of ingredients of concrete in 'Kg.' are required to perform this test in the lab? If the nominal mix proportions for M20 grade of concrete by ratio are 0.6 : 1 : 1.67 : 3.33, Take internal dimensions of the upper hopper as , top diameter = 254 mm, bottom diameter = 127 mm & height = 279 mm and also take density of concrete = 2350 Kg/m^3. (10M)

Q.3 a) State the physical properties of OPC as per IS code? Explain in brief Standard Consistency of cement and give applications of it. (06M)

b) What are the various applications of cement mortar? (04M)

c) Explain in-detail, how will you decide dosage of chemical WRA's to enhance the properties of concrete by reducing W/C ratio of the mix. Plot graph of it. (10M)

Q.4 a) Describe English bond in case of single brick wall in brief with labeled sketches. (10M)

b) Enlist the various types of pointing of masonry work and explain any one of them with sketch. (06M)

c) Define cladding. Explain 'Attached system' of installation method of cladding. (04M)

Q.5 a) Design M25 grade of concrete for flexure in accordance with IS 10262, for the following data: (12M)

Design Parameters :
f_{ck} = 25 MPa
MSA = 20 mm
Shape of CA : Angular
Degree of Workability : 0.78 of CF.
Degree of Quality Control : Very good
Degree of Exposure : Moderate.

Data On Material :
Cement used : OPC.
Specific Gravity of Cement : 3.15
Specific Gravity of FA : 2.65
Specific Gravity of CA : 2.71
CA :20 mm & 10 mm size in 60:40 ratio.
FA (Sand) : Confirming to zone-I (08M)

b) Explain the Wedging method of quarrying of stone with neat labeled sketch. (10M)

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Q.6 a) Explain with neat labeled sketch "Couple roof". (05M)
b) Explain "Marble Flooring". (05M)
c) Draw a neat labeled sketch of D.P.C. treatment for ground flooring.

Data For Q. 5 a)

Data for Concrete Mix Design from Indian Standard Codes

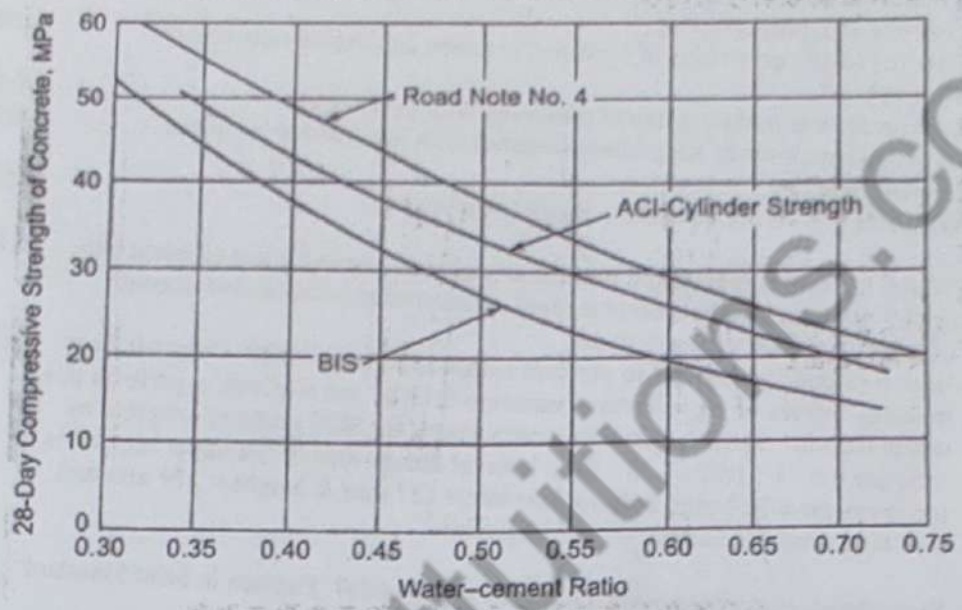

Table 1: Values of 'k' OR 't'

Percentage of results below the characteristics strength	Values of 'k' OR 't'
50	0
16	1.00
10	1.28
5	1.65
2.5	1.96
1	2.33
0.5	2.58
0.0	Infinity

Table 2 : Suggested Values of Standard Deviation

Grade of Concrete	Standard deviation for different degree of control in N/mm²		
	Very good	Good	Fair
M10	2.0	2.3	3.3
M15	2.5	3.5	4.5
M20	3.6	4.6	5.6
M25	4.3	5.3	6.3
M30	5.0	6.0	7.0
M35	5.3	6.3	7.3
M40	5.6	6.6	7.6
M45	6.0	7.0	8.0
M50	6.4	7.4	8.4
M55	6.7	7.7	8.7
M60	6.8	7.8	8.8

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Table 3 : Approximate Air Content

Maximum size of aggregate (mm)	Percentage of Entrapped air (%)
10	3.0
20	2.0
40	1.0

Table 4: Minimum cement content, maximum water-cement ratio & minimum concrete grade (20 mm nominal max. size of aggregates)

Exposure	Reinforced Concrete		
	Min. cement content (kg/m^3)	Max. free water-cement ratio	Min. concrete grade
Mild	300	0.55	M20
Moderate	300	0.50	M25
Severe	320	0.45	M30
Very Severe	340	0.45	M35
Extreme	360	0.40	M40

Table 5: Approximate sand & water content per m^3 of concrete*

Grade	Nominal size of	Water content	Sand as % of	Remarks
Up to M35	10	208	40	Sand zone II, water-cement ratio = 0.6, Compaction Factor = 0.8
	20	186	35	
	40	163	30	
Beyond M35	10	200	28	
	20	180	25	

* These values apply to the conditions given in the remarks column. For other conditions, corrections are to be applied as per Table 6.

Table 6: Corrections to the values given in Table 5, to be applied for conditions other than those given in the remarks column of Table 5.

Change in conditions other than those given in Table 5	Correction for water content	Correction for sand content in total aggregates
Sand conforming to zone I, III or IV	0	+1.5 for zone I, - 1.5 for zone III, - 3.0 for zone IV
Increase or decrease in compacting factor value by 0.1 (for workability)	±3%	0
Each 0.05 increase or decrease in water-cement ratio	0	±1%
For rounded aggregates (gravel)	- 15 kg/m^3	- 7%

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