

## College of Engineering, Pune

**Class: S Y B. Tech (Civil)**

**Sub.: CE-211 Concrete Technology**

**Date:**

**Timing: 3 Hours**

**Academic Year: 2011-12**

**Max. Marks: 50**

**Instructions:**

1. All questions are compulsory
2. Only one option out of the two options provided for Q. No. 1, 3 and 5 may be answered.

Q.1	A	Name the major oxides in Portland cements.	2																																																					
	B	Which are the different grades of ordinary Portland cement specified by Bureau of Indian Standards? State the minimum 3-day compressive strength specified in these codes.	2																																																					
	C	What is the purpose of addition of gypsum in the cement?	2																																																					
	D	From the compositions of the chemical compounds given below identify the four different types of cement  <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">C<sub>3</sub>S</td> <td style="text-align: center;">55</td> <td style="text-align: center;">55</td> <td style="text-align: center;">60</td> <td style="text-align: center;">52</td> </tr> <tr> <td style="text-align: center;">C<sub>2</sub>S</td> <td style="text-align: center;">25</td> <td style="text-align: center;">25</td> <td style="text-align: center;">25</td> <td style="text-align: center;">29</td> </tr> <tr> <td style="text-align: center;">C<sub>3</sub>A</td> <td style="text-align: center;">8</td> <td style="text-align: center;">8</td> <td style="text-align: center;">1</td> <td style="text-align: center;">13</td> </tr> <tr> <td style="text-align: center;">C<sub>4</sub>AF</td> <td style="text-align: center;">7</td> <td style="text-align: center;">7</td> <td style="text-align: center;">9</td> <td style="text-align: center;">1</td> </tr> </tbody> </table>	C <sub>3</sub> S	55	55	60	52	C <sub>2</sub> S	25	25	25	29	C <sub>3</sub> A	8	8	1	13	C <sub>4</sub> AF	7	7	9	1	4																																	
C <sub>3</sub> S	55	55	60	52																																																				
C <sub>2</sub> S	25	25	25	29																																																				
C <sub>3</sub> A	8	8	1	13																																																				
C <sub>4</sub> AF	7	7	9	1																																																				
<b>OR</b>																																																								
Q.1	A	With the help of a flow diagram explain the process of manufacture of Portland cement. (Dry process).	6																																																					
	B	What are initial and final setting times of cement? What are the minimum and maximum values specified in Indian Standards?	4																																																					
Q.2	A	State four major impurities in aggregates and explain how these affect the properties of concrete?	4																																																					
	B	In a typical concrete mix, the proportion of the 20mm, 10mm and sand are respectively 43%, 22% and 35%. The sieve analysis results are given below. From this, find out the combined aggregate grading to be used in the mix.  <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Sieve size (mm)</th> <th colspan="4" style="text-align: center;">% Passing</th> </tr> <tr> <th style="text-align: center;">20mm</th> <th style="text-align: center;">10mm</th> <th style="text-align: center;">Sand</th> <th style="text-align: center;">Combined</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">100</td> <td style="text-align: center;">100</td> <td style="text-align: center;">100</td> <td></td> </tr> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">97</td> <td style="text-align: center;">100</td> <td style="text-align: center;">100</td> <td></td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">5</td> <td style="text-align: center;">92</td> <td style="text-align: center;">100</td> <td></td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">1</td> <td style="text-align: center;">12</td> <td style="text-align: center;">100</td> <td></td> </tr> <tr> <td style="text-align: center;">2.36</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">94</td> <td></td> </tr> <tr> <td style="text-align: center;">1.18</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">76</td> <td></td> </tr> <tr> <td style="text-align: center;">0.6</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">62</td> <td></td> </tr> <tr> <td style="text-align: center;">0.3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">26</td> <td></td> </tr> <tr> <td style="text-align: center;">0.15</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">2</td> <td></td> </tr> </tbody> </table>	Sieve size (mm)	% Passing				20mm	10mm	Sand	Combined	40	100	100	100		20	97	100	100		10	5	92	100		5	1	12	100		2.36	0	1	94		1.18	0	0	76		0.6	0	0	62		0.3	0	0	26		0.15	0	0	2	
Sieve size (mm)	% Passing																																																							
	20mm	10mm	Sand	Combined																																																				
40	100	100	100																																																					
20	97	100	100																																																					
10	5	92	100																																																					
5	1	12	100																																																					
2.36	0	1	94																																																					
1.18	0	0	76																																																					
0.6	0	0	62																																																					
0.3	0	0	26																																																					
0.15	0	0	2																																																					
C	State the any two principal characteristics of aggregates and explain how they influence the strength of concrete?		2																																																					

Q.3	A	Define the term workability, bleeding, and segregation of concrete	3
	B	You are in-charge of carrying out concreting work of a building during summer months in Pune. State four important precautions you will take to mitigate the effects of hot weather and explain the logic behind the same?	4
	C	Explain the procedure of carrying out the Marsh cone test.	3
OR			
Q.3	A	Describe briefly the four benefits of using of using fly ash in concrete.	4
	B	You are in-charge of a large road project where concrete is produced from a modern batching-mixing plant. Specifications allows the use of fly ash in different grades of concrete. List the steps you will take to control the quality of fly ash received from supplier.	4
	C	IS 456: 2000 allows the use of fly ash and ground granulated blast-furnace slag (GGBS) as replacement of ordinary Portland cement (OPC) in concrete. State the minimum and maximum limits specified such replacement in Indian standards?	2
Q.4	A	What is meant by a superplasticizer? Explain its action during the fresh and hardening states in concrete. State commonly used compounds used in producing superplasticizers?	4
	B	List four tests specified in IS 9103 used for controlling the batch-to-batch variation in chemical admixtures.	2
	C	Explain the step-by-step procedure of carrying out mix design of concrete in accordance with the IS method.	4
Q.5	A	A stadium using reinforced concrete is being constructed in the close vicinity of sea. Explain the principle phenomenon governing concrete deterioration and the steps you will take to ensure the long-term durability of the structure.	4
	B	Explain the deterioration process causing alkali-aggregate reaction. What steps are essential to mitigate the harmful effects of this reaction?	3
	C	Describe the advantages of using fiber-reinforced concrete. Which type of fibers are used in such concrete? Highlight two applications where this type of concrete can be used advantageously.	3
OR			
Q.5	A	What are the advantages of ready mixed concrete?	4
	B	Which are the main features of RMC that distinguishes it from site-mixed concrete?	4
	C	How ready-mixed concrete is specified?	2