

**University of Mumbai**  
**Examinations Summer 2022**  
**Program: Civil Engineering**  
**Curriculum Scheme: Rev-2019 'C' Scheme**  
**Examination: SE Semester: IV**  
**Course Code: CEC404**  
**Course Name: Building Materials and Concrete Technology**

Max. Marks: 80

Note: Assume suitable data wherever necessary

Q1 (20 Marks)	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	An ultrasonic pulse velocity test is an _____
Option A:	Ex-situ, nondestructive test
Option B:	In-situ, nondestructive test
Option C:	Ex-situ, destructive test
Option D:	In-situ, destructive test
2.	The commonly used raw material in the manufacture of cement, is
Option A:	slate
Option B:	sand stone
Option C:	lime stone
Option D:	basalt
3.	Knots in timber are
Option A:	Defects caused by crushing fibres
Option B:	Splits radiating from the Centre
Option C:	Speckled strains
Option D:	Signs of branches cut off
4.	One of the main demerits in using the lime mortar is that it
Option A:	is not durable
Option B:	does not set quickly
Option C:	swells
Option D:	is plastic
5.	Due to _____ the dampness finds its way to the floors through the substructure.
Option A:	Action of rain
Option B:	Exposed tops of walls
Option C:	Raising of moisture from ground
Option D:	Condensation
6.	Flaky particles have
Option A:	Small thickness
Option B:	Elongated sides
Option C:	Sharp edges
Option D:	Rounded edges
7.	Initial setting of cement is caused due to

Option A:	Tri-calcium silicate
Option B:	Di-calcium silicate
Option C:	Tri-calcium aluminate
Option D:	Tetra calcium aluminoferrite
8.	Fine aggregates are the aggregates having the size less than:
Option A:	5 mm
Option B:	4.75 mm
Option C:	10 mm
Option D:	2 mm
9.	Bulking of sand is due to
Option A:	water films
Option B:	swelling of sand
Option C:	added mass of water
Option D:	Presence of air
10.	In India, concrete mix design for RCC is carried out using IS _____ code.
Option A:	10262
Option B:	10500
Option C:	800
Option D:	383

Q2(20 Marks)	Solve any Four out of Six	5 marks each
A	Classify the building materials and discuss the role of materials in construction.	
B	Explain different types of mortars.	
C	Discuss the methods of determining compressive strength of accelerated-cured concrete test specimens	
D	Discuss the defects in the timber with neat sketches.	
E	Write short note on Autoclaved Aerated Concrete (AAC) blocks	
F	What are retarders and accelerators? Explain their uses.	

Q3 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Explain the dry process of manufacture of cement.	
B	Design the concrete mix a) Grade designation : M35 b) Type of cement : PPC c) Maximum nominal size of aggregate : 20 mm d) Minimum cement content: 320 kg/m <sup>3</sup> and maximum water-cement ratio 0.45 to be adopted and/or : Severe (for reinforced concrete) e) Workability : 75 mm (slump) f) Method of concrete placing : Non pumpable g) Degree of site control : Good h) Type of aggregate : Crushed angular aggregate j) Maximum cement content not including fly ash : 450 kg/m <sup>3</sup>	

	<p>k) Specific gravity of</p> <ol style="list-style-type: none"> <li>1) Specific gravity of cement : 2.6</li> <li>2) Coarse aggregate [at saturated surface dry : 2.6 (SSD) Condition]</li> <li>3) Fine aggregate [at saturated surface dry : 2.7 (SSD) Condition]</li> <li>4) Chemical admixture (Superplasticizer) : 1.2</li> </ol> <p>l) Water absorption</p> <ol style="list-style-type: none"> <li>1) Coarse aggregate : 0.5 percent</li> <li>2) Fine aggregate : 1.0 percent</li> </ol> <p>m) Moisture content of aggregate</p> <ol style="list-style-type: none"> <li>1) Coarse aggregate : Nil</li> <li>2) Fine aggregate : Nil</li> </ol> <p>n) Fine aggregate : Conforming to grading Zone II of Table 9 of IS 383</p> <p>o) Standard Deviation: 5 N/mm<sup>2</sup></p> <p>Refer tables given at the end of the paper.</p>
C	<p>Explain following nondestructive testing methods : a) Rebound Hammer Test b) Ultrasonic Pulse Velocity Test</p>

<b>Q4 (20 Marks)</b>	
<b>A</b>	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>
i.	Explain defects in painting.
ii.	Define durability and explain factors affects durability.
iii.	Explain demerits of distemper as compared to paints.
<b>B</b>	<b>Solve any One</b> <span style="float: right;"><b>10 marks each</b></span>
i.	What is the RMC? Explain its advantages, components and Layout of RMC with neat sketches.
ii.	Explain Laboratory tests on durability of concrete a) Permeability test, b) Rapid chloride penetration test (RCPT)

**Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate**  
(Clause 5.3)

Sl No.	Nominal Maximum Size of Aggregate mm	Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

<sup>1)</sup>Water content corresponding to saturated surface dry aggregate.

**Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50**  
(Clause 5.5)

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.54	0.52	0.50	0.48
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.73	0.72	0.71	0.69