



Sample Question Paper for Advanced Concrete Technology

Q1. Solve all questions mandatory

02 marks each

- 1a. Durability of concrete is proportional to _____
- Sand content
 - Water cement ratio
 - Aggregate ratio
 - Cement aggregate ratio
- 1b. An ultrasonic pulse velocity test is an _____
- Ex-situ, nondestructive test
 - In-situ, nondestructive test
 - Ex-situ, destructive test
 - In-situ, destructive test
- 1c. Which of the following statements is/are true for the ultrasonic test?
- Equipment used for ultrasonic testing is portable
Complicated shapes can be easily scanned
Waves generated are health hazardous
Waves generated are health hazardous and complicated shapes can be easily scanned
- 1d. Which test can be performed without skilled labour?
- Probe test
UPV test
Carbonation test
Torsion test
- 1e. What is nondestructive test?
- Nondestructive tests are applications for detecting flaws in materials without impairing their usefulness
 - Nondestructive tests are applications for detecting flaws that impair the use of the materials such as pressure testing
 - Nondestructive tests are applications for detecting flaws in materials with impairing their usefulness
 - Nondestructive tests are applications for detecting flaws that do not impair the use of the materials such as pressure testing
- 1f. Which type of aggregates are considered to be most workable in pumpable concrete ?
- Angular aggregates
 - Flaky aggregates
 - Sub angular aggregates
 - Rounded aggregates
- 1g. _____ has designated the concrete mixes into a number of grades as M10, M15.
- IS 456-2000
 - IS 456-2010
 - IS 513-1999
 - IS 465-2000
- 1h. _____ has designated the concrete mixes into a number of grades as M10, M15.
- IS 456-2000
 - IS 456-2010
 - IS 513-1999
 - IS 465-2000
- 1i. According to IS 10262:2019, if the aggregates used are sub angular then weight of the water used will be
- Reduce by 10 kg
 - Increase by 10 kg
 - Increase by 15kg
 - Will be same

1j. If the partial replacement of cementitious material is carried out by using fly ash, the max recommended dosage according to IS 10262- 2019 will be

- a. 30-60
- b. 15-30
- c. 20-25
- d. 5-50

1K .Durability of concrete is proportional to _____

- a. Sand contentAggregate ratio
- b. Water cement ratio
- c. Aggregate ratio
- d. Cement aggregate ratio

1l. In M30 grade concrete, 30 indicates

- a. Compressive strength
- b. characteristic strength
- c. target strength
- d. tensile strength

1m. For ensuring quality of concrete, we should use _____

- a. single sized aggregates
- b. two sized aggregate
- c. graded aggregates
- d. coarse aggregates.

1n. Workability of the concrete can be improved by adding _____

- a. Foaming agent
- b. silica fume
- c. fly ash
- d. GGBFS

1o. The risk of segregation will be more if

- a. concrete is harsh
- b. water content is more
- c. cement content is more
- d. cement content is less

1p. Loss of ignition test is conducted to determine

- a. loss due to moisture
- b. loss due to moisture and carbon di oxide
- c. loss due to organic material
- d. weight of cement

1q. In vacuum concrete, Vacuum is applied to

- a. remove the excess water
- b. remove the air voids
- c. add the water
- d. decrease the strength

1r. The ratio of the particles of cement paste which under go heat hydration to the space available for the hydration such products is called as

- a. maturity index
- b. gel space ratio
- c. w/c ratio
- d. admixture cement ratio

1s. For concrete exposed to a very aggressive environment the w/c should be lower than _____

- a. 1
- b. 0.5
- c. 0.4
- d. 0.8

1t. For M30 grade, target compressive strength will be _____

- a. 30
- b. 38.25
- c. 40
- d. 35

2. Answer any 2 among the following

20 Marks

2a. Design a concrete mix by IS 10262: 2009 for the following data:

- i. Characteristic compressive strength required in the field at 28 days grade designation = M 25
- ii. Standard Deviation = 4.0
- iii. Nominal maximum size of aggregate = 20 mm
- iv. Shape of C.A aggregate = Angular
- v. Degree of workability required at site = 50-75 mm slump
- vi. Type of exposure = mild
- vii. Method of concrete placing = Pumpable concrete
- viii. Specific gravity of cement = 3.15
- ix. Specific gravity of C.A = 2.84
- x. Specific gravity of F.A = 2.64
- xi. Aggregates are assumed to be in saturated surface dry condition.
- xii. F.A belongs to Zone II

Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate
(Clauses 4.2, A-5 and B-5)

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

NOTE — These quantities of mixing water are for use in computing cementitious material contents for trial batches.

¹⁾ Water content corresponding to saturated surface dry aggregate.

Table 3 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate
(Clauses 4.4, A-7 and B-7)

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate ¹⁾ 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	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

¹⁾ Volumes are based on aggregates in saturated surface dry condition.

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size
(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

Sl No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m ³	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m ³	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	—	300	0.55	M 20
iii)	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

NOTES

- 1 Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 5.2. The additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do not exceed the limit of pozzolona and slag specified in IS 1489 (Part 1) and IS 455 respectively.
- 2 Minimum grade for plain concrete under mild exposure condition is not specified.

2b. Define High performance concrete. Give its constituents. What are the various parameters considered in the production of H.P.C ?

2c. What are the special problems encountered in hot weather concreting? How are they rectified?

Q3. Ans any 4 among the following

20 Marks

3a. Explain durability of concrete. Enlist the factors affecting durability of concrete.

3b. State the recommended values for maximum water cement ratio for various environmental conditions as per IS 456:2000.

3c. Explain the behavior of hardened steel fiber reinforced concrete(SFRC)under compression.

3d. Explain the general arrangement of vacuum concrete process with a neat diagram?

3e. Explain the procedure for pull out test.