

CONCRETE TECHNOLOGY

Time Allowed: 3 Hours

Full Marks: 70

Answer to Question No.1 is compulsory and to be answered first.

This answer is to be made in separate loose script(s) provided for the purpose.

Maximum time allowed is 45 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided.

On early submission of answer scripts of Question No.1, a student will get the remaining script earlier.

Answer any five questions from the rest.

1. Choose the correct answer from the given alternatives: 20x1
- i) For a good cement, lime saturation factor should be – a) 0.5 to 0.85; b) 0.55 to 0.90; c) 0.66 to 1.02; d) 0.7 to 1.15.
 - ii) In manufacture of cement, amount of gypsum added with clinker is – a) 1-2%; b) 3-4%; c) 5-6%; d) 7-10%.
 - iii) The sand which is not suitable for concrete belongs to – a) Zone-I; b) Zone-II; c) Zone-III; d) Zone-IV.
 - iv) In concrete, coarse aggregates are those which are retained on – a) 75 micron IS Sieve; b) 4.75 mm IS Sieve; c) 20mm IS Sieve; d) 40mm IS Sieve.
 - v) The heat liberated during reaction of cement with water is called – a) heat of reaction; b) heat of setting; c) heat of hardening; d) heat of hydration.
 - vi) Low Heat Cement is suitable for the use in construction of a – a) building; b) culvert; c) dam; d) road.
 - vii) Fineness modulus of sand indicates aggregate's – a) density; b) size; c) sp. Gravity; d) shape.
 - viii) If water-cement ratio in concrete is 0.40, the quantity of water required per bag of cement is – a) 20 kg; b) 25 kg; c) 50 kg; d) 0.4 kg.
 - ix) The height of Slump Test cone for concrete is – a) 10cm; b) 20cm; c) 30cm; d) 40cm.
 - x) The characteristic compressive strength of M25 concrete is – a) 25 KN/sq. m.; b) 25 N/sq. m.; c) 25 N/sq. mm; d) 25 N/sq. cm.
 - xi) Vee-Bee Consistometer test is suitable for – a) dry concrete; b) wet concrete; c) too wet concrete; d) any concrete.
 - xii) One of the causes of segregation of concrete is – a) over mixing; b) carrying concrete over long distance; c) over tamping; d) less cement.
 - xiii) Due to bleeding concrete becomes – a) less durable; b) less permeable; c) less economic; d) none of these.
 - xiv) The minimum number of days for curing concrete is – a) 7 days; b) 14 days; c) 21 days; d) 28 days.
 - xv) Due to bulking of sand the volume of sand – a) decreases; b) increases; c) remains same; d) none of above.

- xvi) The final setting time of Portland cement should not be more than – a) 100 mins; b) 300 mins; c) 400 mins; d) 600 mins.
- xvii) One advantage of Design Mix Concrete is that – a) it is economical; b) it requires less cement; c) stipulated strength of concrete is achieved; d) all of these.
- xviii) For concrete Modulus of Elasticity in compression is equal to – a) 3700 $\sqrt{f_{ck}}$; b) 4700 $\sqrt{f_{ck}}$; c) 5700 $\sqrt{f_{ck}}$; d) 6700 $\sqrt{f_{ck}}$.
- xix) Flexural strength of concrete is given by – a) 0.1 $\sqrt{f_{ck}}$; b) 0.5 $\sqrt{f_{ck}}$; c) 0.7 $\sqrt{f_{ck}}$; d) 0.85 $\sqrt{f_{ck}}$.
- xx) The minimum grade of concrete in Prestressed Concrete is – a) M20; b) M30; c) M40; d) M50.

2. a) Write the composition of Portland cement.
b) What is heat of hydration?
c) What is gel-space ratio?
d) Write the names, properties and uses of any two types of cement. 2+2+2+4
3. a) Define (any two) – (i) Angular aggregate; (ii) Graded aggregate; (iii) Flaky aggregate.
b) What are physical properties of coarse aggregate? Briefly describe any two of them.
c) What is bulking of sand? 4+4+2
4. a) What is admixture? https://www.wbscteonline.com
b) Write how the admixtures change the properties of concrete.
c) Write the names and functions of any two types of admixtures.
d) Write the desirable properties of water for use in concrete. 2+3+3+2
5. a) What is workability of concrete? By which means is it measured?
b) On which factors does workability of concrete depend?
c) Describe a test to measure workability of concrete. 2+1+2+5
6. a) How does water-cement ratio affect properties of fresh and hardened concrete?
b) Write Duff Abram's law for water-cement ratio.
c) What is curing of concrete?
d) What are different methods of curing of concrete? 3+2+2+3
7. a) What is segregation of concrete? What are its causes?
b) Why does bleeding occur in concrete? How this can be controlled? (2+3)+(2+3)
8. a) What do you understand by Mix Design of Concrete?
b) What are the advantages of it?
c) Which design data are required for mix design?
d) Name different concrete mix design methods. 2+3+2+3
9. a) What is under-water concreting?
b) Explain briefly different methods of under-water concreting.
c) What are the precautions necessary in cold weather concreting? 2+6+2
10. Write short notes on the followings (any two): 5x2
(a) Compaction of concrete, (b) Batching of concrete, (c) Quality control of concrete, (d) Hot weather or Cold weather concreting
11. Write short notes on the following (any two): 5x2
(a) Ready mix concrete, (b) Light-weight concrete, (c) Prestressed concrete, (d) Polymer concrete