BUILDING MATERIALS

CIVIL ENGINEERING

Date of Test : 21/09/2025

ANSWER KEY ➤

1.	(a)	6.	(b)	11.	(b)	16.	(c)	21.	(c)
2.	(d)	7.	(d)	12.	(a)	17.	(d)	22.	(a)
3.	(a)	8.	(d)	13.	(a)	18.	(b)	23.	(d)
4.	(a)	9.	(b)	14.	(d)	19.	(d)	24.	(c)
5.	(b)	10.	(c)	15.	(d)	20.	(a)	25.	(d)

DETAILED EXPLANATIONS

1. (a)

2. (d)

3. (a)

4. (a)

5. (b)

6. (b)

7. (d)

8. (d)

Fibre saturation point is the moisture content in percentage of the timber when the cell walls are saturated with water and the cells cavity contains no water.

Any drying below the fiber saturation point results in shrinkage. Sudden and fast drying of timber results in the removal of water from cells and the consequent shrinkage causes cracking.

9. (b)

Strain determination is obtained from secant modulus. So, option (b) is correct.

10. (c)

Low heat cement sets slower than OPC. Setting time has no relation with strength of cement. So, option (c) is correct.

11. (b)

The increase in the volume of a given mass of fine aggregate caused by the presence of water is known as bulking. If sand is measured by volume and no allowance is made for bulking, the mix will be richer than that specified because for a given mass, moist sand occupies a considerably larger volume than the same mass of dry mass. This results in a mix deficient in sand.

12. (a)

The proportion of fine aggregate to combined aggregate,

$$R = \frac{p_2 - p}{p_2 - p_1} \times 100$$

$$\therefore \quad R = \frac{7.6 - 6.4}{7.6 - 2.8} \times 100 = 25\%$$

13. (a)

14. (d)

15. (d)

16. (c)

The need to prepare sulphate resisting cement is the proneness of OPC towards sulphur.

The main constituents of OPC that are valuable to sulphur are C_3A and C_4AF. The ideal way to prepare sulphate resisting cement will be by reducing the concentration of Al_2O_3 in raw material which will eventually produce less C_3A and C_4AF but concentration of Al_2O_3 cannot be reduced feasibly.

So, excess Fe_2O_3 is added in raw material which results in the formation C_4AF at the expense of C_3A and C_4AF is less vulnerable to sulphate attack as compared to C_3A.

17. (d)

18. (b)

19. (d)

Statement 1 is incorrect because unit of slump test is not in the range of 50–100 cm but in 50–100 mm. Statement 2 is incorrect because compaction factor test is not done for highly workable concrete mix sample.

20. (a)

21. (c)

The rebound hammer test measures the elastic rebound of concrete. The rebound number is correlated with compressive strength of concrete. The variation of strength of a properly calibrated hammer may lie between ± 15% and ± 20%.

22. (a)

23. (d)

Fine cement shows less setting time as compared to coarse cement.

Because hydration of C_3S produces more $Ca(OH)_2$ which is soluble in water and leaches out making the concrete porous. In hydraulic structures, a cement with small percentage of C_3S and more C_2S is recommended for use in hydraulic structures. For testing compressive strength of cement, test specimens are in the form of cubes of size 70.6 mm.

24. (c)

Metakaolin acts as mineral admixture for high strength concrete.

25. (d)

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