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BUILDING MATERIALS

CIVIL ENGINEERING

Date of Test : 20/08/2026

ANSWER KEY ➤

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

DETAILED EXPLANATIONS

1. (c)

2. (a)

The raw materials used for manufacturing of high alumina cement are limestone and bauxite.

3. (b)

4. (a)

5. (c)

1 m³ freshly mixed concrete corresponds to 1.54 m³ dry volume of concrete.

Summation of proportions = 1 + 2 + 4 = 7

$$\therefore \text{Volume of cement} = \frac{1.54}{7} = 0.22 \text{ m}^3$$

$$\text{Volume of sand} = \frac{2}{7} \times 1.54 = 0.44 \text{ m}^3$$

6. (d)

IS 456 : 2000 stipulates a minimum of 7 day moist curing while **IS : 7861 (Part I) 1975** stipulates a minimum of 10 days curing under hot weather condition. On an average, the one-year strength of continuously moist cured concrete is 40% higher than that of 28 days moist cured concrete, while non moist curing can lower the strength to about 40%. Moist curing for the first 7 to 14 days may result in a compressive strength of 70% - 85% of that of 28 days moist curing.

7. (c)

Most hardwoods contain a type of cell called "VESSEL CELL" or "VESSEL ELEMENT" that appear as small pipes running throughout the tree in longitudinal direction. These vessels in the cross-section of hard-wood appear as holes.

8. (b)

1 m³ of wet cement mortar = 1.25 m³ of dry mortar

Sum of proportions = 1 + 6 = 7

$$\therefore \text{Volume of cement} = \frac{1.25}{7} = 0.17857 \text{ m}^3$$

$$\therefore 0.17857 \text{ m}^3 \text{ of cement} = \frac{50}{0.0347} \times 0.17857 = 257.3 \text{ kg cement}$$

$$\text{Volume of sand} = \frac{6 \times 1.25}{7} = 1.07 \text{ m}^3$$

9. (c)

10. (b)

Assuming 1 ml of cement on hydration produces 2.06 ml of gel.

$$\text{Volume of gel} = C \times 0.319 \times 2.06 = 0.657 C$$

$$\text{Space available} = C \times 0.319 + W_o$$

$$\text{Gel space ratio} = \frac{0.657C}{0.319C + W_o}$$

11. (b)

- **Rapid hardening cement:** It is suitable for repairs of roads and bridges and when load is required to be applied in a short period of time.
- **Quick setting portland cement:** It is used when concrete is to be laid under water or in running water.
- **High alumina cement:** It is resistant to the action of fire, sea water, acidic water and sulphates and is used as refractory concrete in industries and is widely used for precasting.
- **Low heat portland cement:** It is most suitable for large mass concrete works such as dams, large raft foundations, etc.

12. (d)

Neutral bricks are used for neutral lining. They offer resistance to the corrosive action of slags and acid fumes. As compared to the basic bricks, the neutral bricks are more inert to the slags following are the type of neutral bricks:

- Chromite bricks
- High alumina bricks

13. (d)

Hydraulic lime: It is also known as the water lime as it sets under water. It contains clay and some amount of ferrous oxide.

Following facts should be noted:

- The increase in percentage of clay makes the slaking difficult and increases the hydraulic property.
- With about 30% of clay, the hydraulic lime resembles natural cement.
- The hydraulic lime can set under water and in thick walls where there is no free circulation of air.
- The colour of hydraulic lime is not perfectly white. It therefore appears less sanitary than the fat lime.

14. (c)

15. (a)

The durability of concrete can be defined and interpreted to mean its resistance to deteriorating influences which may reside inside the concrete itself, or to the aggressive environments.

16. (c)

- High aggregate cement ratio will result lean mix.
- Excess compaction leads to segregation.

17. (c)

- White patches over steam signifies druxiness.
- Abnormal growth or projection signifies burls
- Crushed fiber in transverse direction are upsets.
- Yellow-red tinge surrounding heartwood signifies Foxiness.

18. (b)
- Excess mixing causes bleeding.
 - Smaller the size of cube, more than strength but far from true value.
 - Rough angular aggregate impart better strength due to interlocking.
19. (d)
- Excess alumina absorb water and impart crack during drying.
20. (b)
- Sheesham is deciduous tree, contains distinct medullary rays.
21. (b)
- Portland pozzolana cement is combination of cement clinker and granulated blast furnace slag as pozzolonic material, so known as binary cement.
 - RHC is finer OPC with higher C_3S .
 - Sulphate resisting is finer OPC with less C_3A .
22. (a)
- X-ray shielding mortar are heavy weight mortar ($> 2200 \text{ kg/m}^3$) prepared with cement and heavy weight aggregates like geothite, hematite, limonite, iron shot etc.
23. (a)
- Concrete requires sufficient water for hydration, but too much water reduces strength. Excess water increases porosity, leaving voids after evaporation, which weakens the hardened concrete. Hence, optimum water-cement ratio is crucial.
24. (c)
- Plywood is preferred because it is stronger, dimensionally stable, and resistant to warping compared to thin planks. However, the main reason is **strength and dimensional stability** and not primarily cost savings or environmental considerations.
25. (c)
- Lower water powder ratio imparts strength and replacing cement with fly ash helps in enhancing workability.

