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BUILDING MATERIALS

CIVIL ENGINEERING

Date of Test : 19/08/2025

ANSWER KEY ➤

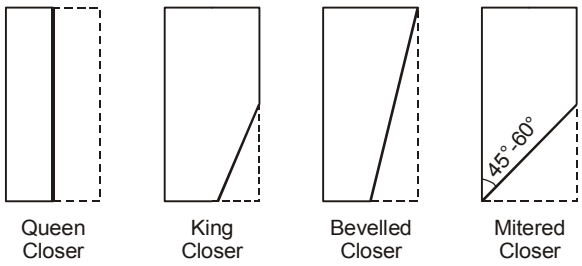
1.	(d)	6.	(a)	11.	(b)	16.	(b)	21.	(d)
2.	(d)	7.	(d)	12.	(b)	17.	(c)	22.	(a)
3.	(c)	8.	(c)	13.	(b)	18.	(b)	23.	(c)
4.	(c)	9.	(b)	14.	(b)	19.	(b)	24.	(a)
5.	(b)	10.	(d)	15.	(b)	20.	(c)	25.	(d)

DETAILED EXPLANATIONS

1. (d)

Silica affects final setting time.

2. (d)



3. (c)

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

4. (c)

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

6. (a)

Consistency	Slump (mm)
Moist earth	0
Very dry	0 - 25
Dry	25 - 50
Plastic	50 - 100
Semi fluid	100 - 175

7. (d)

- Use of lime makes the paste more plastic in nature hence increases workability and water rententivity and reduces shrinkage.
- Use of two binding materials, induces better binding property in mortar and imparts better resistance against frost action.

8. (c)

$$M = t \times 24 \times [T - (-11)]$$
$$0.6 \times 19800 = 15 \times 24 \times [T - (-11)]$$
$$T = 22°C$$

9. (b)

Sheesham is deciduous tree, contains distinct medullary rays.

10. (d)

Excess alumina absorbs water and imparts crack during drying.

11. (b)

- Excess mixing causes bleeding.
- Smaller the size of cube, more the strength but farther from true value.
- Rough angular aggregates impart better strength due to interlocking.

12. (b)

Class B lime is semi hydraulic lime contains clay percentage on lesser side, i.e. 8% - 15%, results in slower rate of slaking and setting.

13. (b)

- LSF↓ C_2S ↑ Rate of gain in strength ↓
- Adsorbed water, gel pores water and interlayer water is responsible for evaporation.

14. (b)

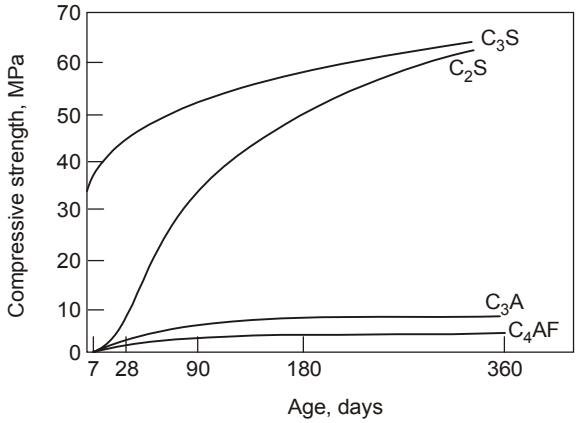
$$\text{Number of bricks} = \frac{1\times10^6}{(23+1)\times(11.6+1)\times(7.4+1)}$$

$$= 393.67$$

$$\text{Volume of bricks} = 393.67 \times 23 \times 11.6 \times 7.4 \times 10^{-6} = 0.7772\ m^3$$

$$\text{Volume of mortar} = 1 - 0.7772 = 0.2227\ m^3$$

15. (b)



16. (b)

- Portland pozzolana cement is combination of cement clinker and granulated blast furnance 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.

17. (c)

- High refractory timber are very difficult to season.
- Application of sodium silicate, known as Sir Able's process, used to make timber fire resistive.

18. (b)

- Ferrocement is prepared by cement mortar retains mesh fo steel wires of diameter 0.5 - 1 mm.
- Alumina works as flux and reduces temperature required to fuse lime and silica together during burning.

19. (b)

$$\text{Weight of 1 m}^3\text{ concrete mix} = 2500 \text{ kg}$$

$$2500 = C + 3C + 5.5C + 0.5C$$

$$C = \frac{2500}{1+3+5.5+0.5} = 250 \text{ kg}$$

$$\text{Number of cement bags} = \frac{250}{50} = 5 \text{ bags}$$

20. (c)

- Setting time for PPC and RHC is same, as both are finer than OPC.
- For QSC it is just 5 minutes.
- LHC has less amount of C_3A, which delays initial set.

22. (a)

X-ray shielding mortar are heavy weight mortar (> 2200 kg/m^3) prepared with cement and heavy weight aggregates like geothite, hematite, limonite, iron shot etc.

23. (c)

Lower water powder ratio imparts strength and replacing cement with fly ash helps in enhancing workability.

24. (a)

- C_3A content is reduced in LHC in order to reduce heat but it also reduces rate of setting
- C_2S content is increased in order to compensate loss of strength, but it reduces rate of gain in strength.

25. (d)

Bacterial concrete is prepared by adding calcium lactate, forms precipitate of calcite, which heals the cracks itself.

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