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BUILDING MATERIALS

CIVIL ENGINEERING

Date of Test : 17/04/2024

ANSWER KEY ➤

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

DETAILED EXPLANATIONS

1. **(b)**

2. **(c)**

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

3. **(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.

4. **(b)**

$$\text{Number of bricks} = \frac{1 \times 10^6}{(23+1) \times (11.6+1) \times (7.4+1)}$$

$$= 393.67$$

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

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

5. **(c)**

Class C is pure lime which impact vigorous stacking and in Class A impurity of 15.25% makes it hydraulic.

6. **(d)**
- Use of lime makes the paste more plastic in nature hence increases workability and water rententivity.
- Use of two binding material, induces better binding property in mortar and imparts better resistance against frost action.

7. **(b)**

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

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

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

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

8. **(c)**

Sound absorbing mortar are light weight mortar (600 - 1200 kg/m^3) prepared with cement and light weight aggregates like pumice, caustic magnesite, clinder etc.

9. **(d)**

When magnesia content is more than 3%, Autoclave test is conducted to find change in volume.

11. **(a)**

1 - correct

2 - correct

3 - wrong : workability increase when coarse aggregate increase and fine aggregate decrease.

12. **(b)**

If sand quantity is *"x"* in given quantity of mortar therefore if *x* quantity is increased then binding material will be insufficient to bind the given quantities, quantity of sand in mortar, thereby shrinkage will also reduced during setting.

13. **(c)**

$$0.70 \times 19800 = 10 \times 24 \times [T - (-1)]$$
$$T = 46.75°C$$

16. **(d)**

Minimum compressive strength of first class brick is 10 N/mm^2.

18. **(a)**

Refer Table-1 155454

19. **(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.

20. **(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.

22. **(c)**

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

23. **(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%.

24. **(c)**

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

25. **(a)**

$$\text{Silica ratio} = \frac{SiO_2}{Al_2O_3 + Fe_2O_3}$$

If silica ratio is higher, formation of C_2S will be more and formation of C_3A will be lesser.

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