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BUILDING MATERIALS

CIVIL ENGINEERING

Date of Test : 30/07/2024

ANSWER KEY ➤

1.	(a)	7.	(c)	13.	(d)	19.	(c)	25.	(c)
2.	(a)	8.	(d)	14.	(d)	20.	(d)	26.	(a)
3.	(c)	9.	(c)	15.	(c)	21.	(a)	27.	(d)
4.	(d)	10.	(a)	16.	(c)	22.	(c)	28.	(c)
5.	(c)	11.	(b)	17.	(d)	23.	(b)	29.	(c)
6.	(c)	12.	(b)	18.	(a)	24.	(a)	30.	(d)

DETAILED EXPLANATIONS

1. (a)

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

3. (c)

1 m^3 freshly mixed concrete corresponds to 1.54 m^3 dry volume of concrete.

Summation of proportions = 1 + 2 + 4 = 7

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

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

4. (d)

Rebound hammer test is a non-destructive test used to determine the strength of hardened concrete by noting the rebound deflection when the concrete is hit with plunger, strength of hardened concrete is assessed.

5. (c)

Hydrophobic cement resist pre-hydration RHC dos not suits for mass concreting, as it contains high C_3S which makes finished surface porous.

Air entraining additive increases frost resistance.

Low heat cement has better durability, as it has higher C_2S.

6. (c)

In industrial areas, the acidic rain water reacts with the constituents of stones leading to its deterioration.

7. (c)

If dry bricks are used then it will absorb water from mortar and mortar will become dry and cannot attain desired strength. Bricks are soaked in water so that when used in masonry work they donot absorb water from cement.

9. (c)

The operations involved in the manufacture of clay bricks:

Preparation of brick earth

Unsoiling → Digging → Cleaning → Weathering → Blending → Tempering

↓

Moulding

↓

Drying

↓

Burning

↓

Brick

10. (a)

If amount of alkali oxides exceeds 1%, it leads to the failure of concrete made from that cement. Similarly if the content of magnesium oxide exceeds 5%, it causes cracks after mortar or concrete hardens.

11. (b)

1 m^3 of wet cement mortar = 1.25 m^3 of dry mortar

Sum of proportions = 1 + 6 = 7

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

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

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

15. (c)

$$CaO + H_2O \rightarrow Ca(OH)_2$$

56 g 18g

1g $\frac{18}{56} g$

10kg $\frac{18}{56} \times 10\text{kg} = 3.2\text{kg}$

16. (c)

$$M = t \times 24 \times [T - (-11)]$$

$$0.6 \times 19800 = 15 \times 24 \times [T - (-11)]$$

$$T = 22°C$$

17. (d)

- In dry process, raw ingredients are pre-heated by exhaust gases at 800°C which reduces the cost of fuel used in kiln to attain the required temperature.
- In wet process, cost of excavating and grinding of raw materials is low while the fuel consumptions cost is high as there is no preheating done in wet process.

18. (a)

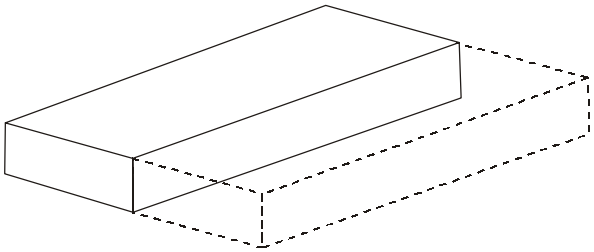
Cubical mould of area = 5000 mm^2 is used to find compressive strength of cement.

$$\text{Side of mould} = \sqrt{5000} \simeq 70.7 \text{ mm}$$

$$\text{Volume} = 353500 \text{ mm}^3$$

$$= 353.5 \text{ cm}^3$$

19. (c)



Queen closer

22. (c)

For flexural tensile strength test or two-point load test, sample is prepared by using mould of size as following:

(i) 15 cm × 15 cm × 70 cm = If nominal size of aggregate is more than 20 mm

(ii) 10 cm × 10 cm × 50 cm = If nominal size of aggregate is less than 20 mm

23. (b)

$$\text{water} = \left(\frac{P}{5} + 2.5\right)\% \text{ where } P = \text{Std. consistency}$$

$$= \left(\frac{30}{5} + 2.5\right)\% = 8.5\%$$

25. (c)

We know that cross-section area of briquette at its least section is 6.45 cm^2.

So ultimate tensile strength $= \frac{\text{Failure load}}{6.45} = \frac{161.25}{6.45} = 25 \text{ kg/cm}^2$

26. (a)

Bettles is defect due to insects.

Wane is defect due to conversion.

■■■■