Sl.: 02_IG_CE_E+F_270622

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BUILDING MATERIALS

CIVIL ENGINEERING

Date of Test : 27/06/2022

ANSWER KEY ➤

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

1. (c)

High heat of hydration of C_3A causes evapouration of water.

2. (b)

$CaO \rightarrow 62\text{-}67\%$

$SiO_2 \rightarrow 17\text{-}25\%$

$Al_2O_3 \rightarrow 3\text{-}8\%$

$Fe_2O_3 \rightarrow 3\text{-}4\%$

3. (b)

I. Low heat cement set slower than OPC

II. PSC has less heat of hydration

III. Higher C_2S compensate strength loss.

IV. 1st for HAC is 3.5 hour, not less than 30 mins in any case.

4. (b)

$$\text{Volume of box} = 0.3 \times 0.2 \times 0.1 = 6 \times 10^{-3}\ m^3$$

$$\text{Weight of cement} = 1440 \times 6 \times 10^{-3} = 8.64\ kg$$

$$\text{Standard consistency} = 0.30$$

Water to cement ratio for initial settling test $= 0.85 \times 0.30 = 0.255$

$$\text{Water quantity} = 8.64 \times 0.255 = 2.20\ kg$$

$$\text{Volume} = \frac{2.20}{1000} = 2.2 \times 10^{-3}\ m^{-3} = 2.2\ \text{liter}$$

5. (d)

6. (c)

$$M = \Sigma(\text{time} \times \text{temperature})^{\circ}C\text{-hr}$$

Reference temperature is taken as –11°C, time is taken in hr and value of full maturity = 19800°C-hr

So, $19800 = 24 \times [\{(19 - (-11)\} \times 14) + \{(T - (-11)\} \times 7)]$

$= 48.85^{\circ}C$

7. (c)

$$\text{Split tensile strength} = \frac{2P}{\pi DL} = \frac{2 \times 170 \times 10^3}{\pi \times 150 \times 300} = 2.40\ \text{MPa}$$

8. (d)

Let the amount of cement required for 1 m^3 of concrete is x kg.

So, $x + 2x + 4x + 0.5x = 2400$

$x = 320\ kg$

$\therefore$ Weight of aggregate $= 2(320) + 4(320) = 1920\ kg$ (take $\rho_w = 1000\ kg/m^3$)

9. (b)

$$\text{Compaction factor} = \frac{\text{Weight of partially compacted concrete}}{\text{Weight of fully compacted concrete}}$$

$$= \frac{32.85 - 21.5}{34.80 - 21.5} = 0.85$$

10. (d)

11. (c)

12. (b)

13. (b)

$$\text{Nominal size of brick} = (19 + 2) \times (9 + 2) \times (9 + 2)$$
$$= 21 \times 11 \times 11 \text{ cm}$$

$$\text{Number of bricks required} = \frac{1\times10^6}{21\times11\times11} = 393.55$$

$$\therefore \quad \text{Volume of bricks} = 393.55 \times 19 \times 9 \times 9 \times 10^{-6} = 0.6056 \text{ m}^3$$

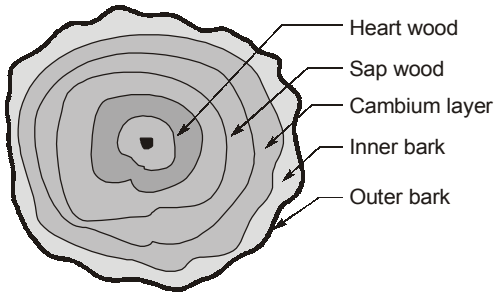
$$\therefore \quad \text{Volume of mortar} = 1 - 0.6056 = 0.3943 \text{ m}^3$$

$$\text{No. of cement bags} = \frac{1}{1+4}\times0.3943\times1.25\times\frac{1}{34.7\times10^{-3}} = 2.840 \text{ bgas}$$

14. (c)
It is more in finer sands.

15. (d)

16. (c)



17. (c)

18. (c)

19. (b)
The pH value of water should not be less than 6 for RCC work (As per IS456 : 2000)
Sand does not impart strength, it read just the strengh.

20. (b)
Excess silica makes the brick brittle.

21. (a)
Metakaolin acts as mineral admixture for high strength concrete.

22. (c)

23. (c)
Rough aggregate surface results in stronger bond.
Vermiculite is an artificial light weight aggregate which produces low strength and high-shrinkage concrete.

24. (d)

25. (c)
Use of sand decreases volume of void, hence prevent shrinkage.

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