CLASS TEST

S.No. : 04 IG_CE_I_26062023

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GENERAL APTITUDE

CIVIL ENGINEERING

Date of Test : 26/06/2023

ANSWER KEY ➤

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

DETAILED EXPLANATIONS

1. (a)

S1 is 'particular affirmative' type of statement whereas S2 is Universal affirmative. S1 & S2 combined lead to 'particular affirmative' i.e. 'some guitars are doors' which can also be interpreted as 'some doors are guitars' i.e. C1. Now S3 is also 'particular affirmative' and 'some doors are guitars' do not lead to any conclusion which means no conclusion can be made regarding tablets and guitars i.e. C3 is not possible. C2 is also NOT possible since no conclusion is possible regarding books and posters; hence only C1 follows leading to option (a).

2. (b)

Let us form equations based on the given information. If 'a', 'b', 'c' are the number of marbles in the 3 boxes respectively, we can write

$$a + b + c = 249 \quad \ldots(1)$$

$$5 \times (a - 36) = b + 36 \text{ or } b = 5a - 216 \quad \ldots(2)$$

and $$b - 21 = 1.5 \times (c + 21) \quad \ldots(3)$$

Solving the 3 equations, we get

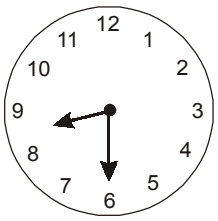
$$a = 69,\ b = 129 \text{ and } c = 51.$$

To get equal number of marbles in 'A' and 'B', we have to transfer from box 'B' and the number of marbles to be transferred $= \dfrac{129 - 69}{2} = 30$.

3. (b)

Because Sohan eats more than Mohan and Raghav eats more than Sohan. Hence, Rathav eats more than Mohan.

4. (c)



Angle between hour and minute hands = Angle between 6 and 7 + angle between 7 and 8 + angle between 8 and 8: 30

$$= 30° + 30° + 15° = 75°$$

5. (b)

The number of polygons = ${}^{n}C_2 - n$, where n is number of sides

$${}^{n}C_2 - n = 170$$

$$\frac{(n)(n-1)}{1.2} - n = 170$$

$$n^2 - n - 2n = 340$$

$$n^2 - 3n - 340 = 0$$

$$n = 20,\ -17$$

n can't be negative, so $n = 20$

6. (a)

$$\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}} \quad ..... \quad \frac{1}{\sqrt{15}+\sqrt{16}}$$

Rationalising each term

$$= \frac{1-\sqrt{2}}{1-2}+\frac{\sqrt{2}-\sqrt{3}}{2-3}+\frac{\sqrt{3}-\sqrt{4}}{3-4} \quad ..... \quad \frac{\sqrt{15}-\sqrt{16}}{15-16}$$

$$= -1\left[1-\sqrt{2}+\sqrt{2}-\sqrt{3} \quad ..... \quad +\sqrt{15}-\sqrt{16}\right] = -1[1-4] = 3$$

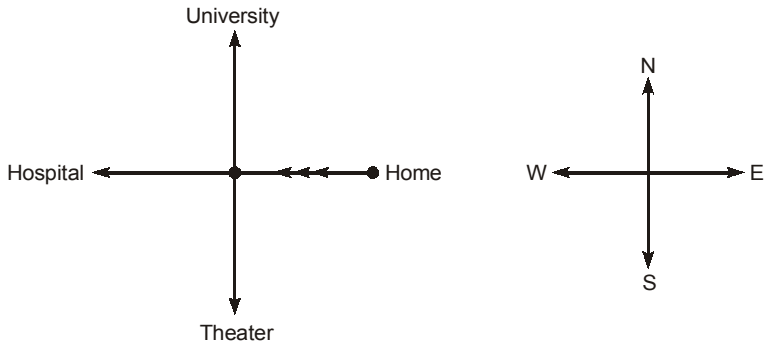
7. (a)

Because 4 + 7 + 7 + 7 means Monday so after Monday is Tuesday.

8. (d)

In given code, first half of the word and second half of the word are reversed. NAGENDGA will be written as EGANAGDN.

9. (d)



Answer is North.

10. (a)

4! onwards every factorial will be a multiple of 24. As 4! = 24

$$5! = 4! \times 5$$
$$6! = 4! \times 5 \times 6 \text{ and so on}$$

So, remainder will be 1! + 3! = 7

11. (c)

Let bus started with x number of passengers.

After 1st stop, no. of passengers = $x-\frac{x}{5}+40=\frac{4x+200}{5}$

After 2nd stop, no. of passengers = $\frac{4x+200}{5}-\frac{4x+200}{5\times 2}+30$

$$\frac{4x+200}{5\times 2}+30 = 70$$
$$\frac{4x+200}{10} = 40$$
$$4x = 400-200$$
$$x = 50$$

12. (c)

First term, $a = 16$

Sum of 16 terms $= \frac{n}{2}[a + l]$ [Here l is last term, $n = 16$ no. of terms]

$$l^2 = \frac{16}{2}[16 + l] = 8[16 + l] = 128 + 8l$$

$$l^2 - 8l - 128 = 0$$
$$(l - 16)(l + 8) = 0$$
$$l = 16, -8$$

$a + 15d = 16$ $\qquad$ $a + 15d = -8$

$16 + 15d = 16$ $\qquad$ $15d = -24$

$d = 0$ $\qquad$ $d = -\frac{8}{5}$

So, $d = -\frac{8}{5}$

13. (b)

$$y = \sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + \ldots\infty}}}$$
$$y = \sqrt{8 + 2y}$$

Squaring both sides

$$y^2 = 8 + 2y$$
$$y^2 - 2y - 8 = 0$$
$$(y + 2)(y - 4) = 0$$
$$y = 4, -2$$

y can't be negative, so $y = 4$

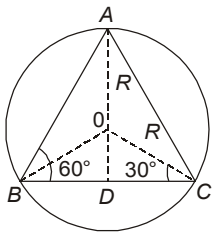
14. (a)

We know that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ which means $\frac{5}{6} = \left(1 - \frac{1}{2}\right) + P(B) - \frac{1}{3}$ leading to

$P(B) = \frac{5}{6} + \frac{1}{3} - \frac{1}{2} = \frac{2}{3}$

$P(A) \cdot P(B) = \frac{1}{2} \times \frac{2}{3} = \frac{1}{3} = P(A \cap B)$ which means events A and B are independent and are NOT mutually exclusive.

15. (c)



$$BD = CD = R\cos 30° = R\times\frac{\sqrt{3}}{2}$$

$$BC = AB = CA = 2\times CD$$

$$= 2R\times\frac{\sqrt{3}}{2} = R\sqrt{3}$$

$$\text{Area of triangle} = \frac{\sqrt{3}}{4}\times a^2 = \frac{\sqrt{3}}{4}\times(R\sqrt{3})^2$$

$$= \frac{3\sqrt{3}}{4}\times R^2$$

$$\text{Area of circle} = \pi R^2$$

$$\text{Ratio} = \frac{3\sqrt{3}}{4}\times R^2 : \pi R^2 = 3\sqrt{3} : 4\pi$$

16. (a)

From the given conditions, for the four positions available:
5 cannot come at the first place. So 6, 7 and 8 can appear there.
8 cannot come at the last place. So 5, 6 and 7 can appear there.
6 and 7 cannot immediately follow each other. So 67 and 76 is not allowed.
5 cannot be immediately followed by 7. So 57 is not allowed.
Let us list the possible numbers now 6875 possible, does not violate any condition
6587 possible, does not violate any condition
7586 possible, does not violate any condition
7856 possible, does not violate any condition
7865 possible, does not violate any condition
8756 possible, does not violate any condition
Hence, answer is (a). Total 6 numbers are possible.

17. (c)

$$x^{x\sqrt{x}} = (x\sqrt{x})^x$$

Taking Log both sides

$$x\sqrt{x}\,\text{Log}x = x\,\text{Log}(x\sqrt{x})$$

$$x\sqrt{x}\,\text{Log}x = x\,\text{Log}x^{3/2}$$

$$x^{3/2}\,\text{Log}x = \frac{3x}{2}\,\text{Log}x$$

$$\frac{2}{3}\frac{x^{3/2}}{x} = 1$$

$$\Rightarrow \quad x^{1/2} = \frac{3}{2}$$

$$x = \frac{9}{4} = 2.25$$

18. (d)

Let original workers be x

actual number of workers $x - 7$

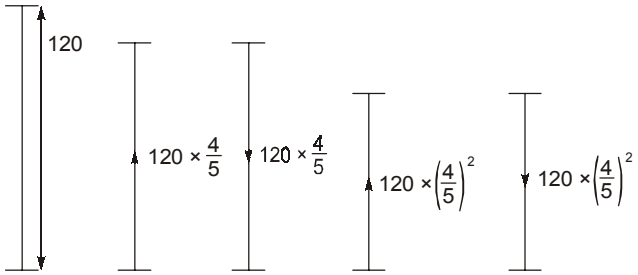
Man days required in both cases

$$x(24) = (x-7)30$$

$$\Rightarrow \quad x = 35$$

$$\text{Actual number of workers} = 35 - 7 = 28$$

19. (b)



$$\text{Total distance} = 120 + 2\times120\times\frac{4}{5} + 2\times120\times\left(\frac{4}{5}\right)^2 + \ldots\ldots + \infty$$

$$= 2\times120 + 2\times120\times\left(\frac{4}{5}\right) + 2\times120\times\left(\frac{4}{5}\right)^2 \ldots\ldots - 120$$

$$= 2\times120\left(1 + \frac{4}{5}\times\left(\frac{4}{5}\right)^2 + \ldots. + \infty\right) - 120$$

$$= 2\times120\times\frac{1}{1-\frac{4}{5}} - 120$$

$$= 1200 - 120 = 1080 \text{ m}$$

20. (d)

RT, RO, RL, OL.

21. (b)

Volume of water flowing through the pipe in 1 sec

$$= 5 \times 30 \times 100 = 15000 \text{ cm}^3/\text{sec}$$

$$1000 \text{ cm}^3 = 1 \text{ L}$$

Volume of water flowing through pipe in 60 sec = 1 min = $15 \times 60 = 900$ L

22. (b)

$$\text{Initial volume } V = \frac{1}{3}\pi r^2 h$$

$$\text{Final volume} = \frac{1}{3}\pi\left(r - \frac{50}{100}r\right)^2\left(h + \frac{200}{100}h\right) = \frac{1}{3}\pi\left(\frac{r}{2}\right)^2 \cdot 3h$$

$$= \frac{1}{3}\pi^2 h \cdot \frac{3}{4} = \frac{3}{4}\text{V}$$

$$\%\text{ decrease in volume} = \frac{V - \frac{3}{4}\text{V}}{V}\times100\% = 25\%$$

23. (a)

	American	Chinese	Mediterranean	Continental
A	y	y		
B	y		y	
C		y	y	y
D	y	y		y

B and *C* feel sick and both of them ate Mediterranean. So, it must be Mediterranean which made them sick.

24. (b)

Since *M* and *N* are mid points of sides *AB* and *AC* of ΔABC, *MN, BC* and $MN = \frac{1}{2}BC$ (mid point theorem).

Area of $\Delta AMN = \frac{1}{4}\Delta ABC$ and area of $\Delta AMP = \frac{1}{8}\Delta ABC$

Area of $MNBC = \frac{3}{4}\Delta ABC$ and area of $PNXC = \frac{1}{2}MNBC = \frac{3}{8}\Delta ABC$

Hence ratio of area of ΔAMP and area of quadrilateral $PNCX = 1 : 3$.

25. (d)

Simple LCM problem. Take the LCM of 12, 16, 24 and 30 which comes out to be 240 minutes i.e. 4 hours. Add to 6'o clock. The time is 10 : 00 hours.

26. (a)

$$x^3 - \frac{1}{x^3} = 14$$

$$\left(x - \frac{1}{x}\right)^3 + 3x \times \frac{1}{x}\left(x - \frac{1}{x}\right) = 14$$

$$\text{Put } x - \frac{1}{x} = z$$

$$z^3 + 3z - 14 = 0$$

Now, $z = 2$, satisfies the equation, hence $(z - 2)$ is a factor. i.e.,

$$z = 2$$

$$x - \frac{1}{x} = 2$$

27. (b)

The easiest way to solve this problem is to make an assumption that length of each side of the triangular course be 60 km (60 is LCM of 10, 15 and 20 – the 3 speeds at which Radhika covers the 3 sides).

Time taken by her to cover the 3 sides of the course = $\frac{60}{10}, \frac{60}{15}, \frac{60}{20}$ hours respectively or 6 hours, 4 hours and 3 hours respectively. Total time taken to cover the distance of $3 \times 60 = 180$ km is $6 + 4 + 3 = 13$ hours.

Average speed of Radhika for the entire journey = $\frac{180}{13} = 13.84$ km/hour leading to option (b).

28. (c)

If S is niece of T, i.e., T is brother of father of S, which is shown in option (c).

$T + M \times S - K$:

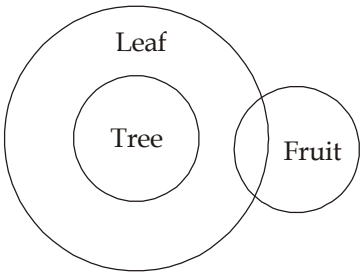
$S - K$ means S is sister of K.

$M \times S$ means M is father of S.

$T + M$ means T is brother of M, T is brother of father of S, hence S is niece of T.

So, option (c) is correct.

29. (b)



30. (b)

$$\text{Difference} = \text{CI} - \text{SI} = \frac{Pr^2}{100^2}$$

$$72 = 5000 \times \frac{r^2}{100 \times 100}$$

$$\therefore \quad r = 12\% \text{ per annum}$$

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