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GENERAL APTITUDE

CIVIL ENGINEERING

Date of Test : 25/12/2023

ANSWER KEY >

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

DETAILED EXPLANATIONS

1. (a)

If we multiply the given expression by 3, we get, $\left(3x + \frac{1}{3x}\right) = 3$

$$\begin{aligned} \left(27x^3 + \frac{1}{27x^3}\right) &= (3x)^3 + \frac{1}{(3x)^3} = \left(3x + \frac{1}{3x}\right)^3 - 3(3x)\left(\frac{1}{3x}\right)\left(3x + \frac{1}{3x}\right) \\ &= (3)^3 - 3(3) = 18 \end{aligned}$$

2. (d)

From the given data of Table-1 and Table-2,

$$\therefore 12.5\% \text{ of } 15\% \text{ of total} = 4800$$

$$\frac{12.5}{100} \times \frac{15}{100} \times \text{Total} = 4800$$

$$\text{Total} = 4800 \times \frac{100}{12.5} \times \frac{100}{15} = 256000$$

Now, from table-1,

$$\text{Admissions in kerala} = 11\% \text{ of Total}$$

$$= \frac{11}{100} \times 256000 = 28160$$

3. (b)

Initial content of milk = 100 litres

When 20% of milk is removed and replaced by water, the existing milk content is 80% of initial content. When this replacement process is done 2 more times, the milk always becomes 80% of previous milk content.

$$\text{Remaining milk content} = 100 \times \frac{80}{100} \times \frac{80}{100} \times \frac{80}{100} = 51.2 \text{ litres}$$

4. (c)

$N = 15! - 13! = 13! (15 \times 14 - 1) = 13! \times (210 - 1) = 13! \times 209 = 13! \times 11 \times 19$ giving 19 as the highest prime divisor of N .

5. (c)

Since there is no profit no loss

$$\Rightarrow 5k + 3k = 1600$$

$$k = 200$$

$$\Rightarrow \text{cost price of table} = 5 \times 200 = ₹ 1000$$

$$\Rightarrow \text{cost price of chair} = 3 \times 200 = ₹ 600$$

Now,

$$1000 \times \left(\frac{100-x}{100}\right) + 600 \left(\frac{100+y}{100}\right) = 1600$$

$$1000 - 10x + 600 + 6y = 1600$$

$$10x = 6y$$

$$\frac{x}{y} = \frac{6}{10} = \frac{3}{5}$$

Only the values given in option (c) satisfy this ratio.

6. (b)

A careful look will tell you that each subsequent term is made by multiplying the digits of the number i.e. 77 is followed by $7 \times 7 = 49$ which is followed by $4 \times 9 = 36$ and that leads us to the next number being $3 \times 6 = 18$.

7. (c)

Let the cost price of article is CP

When 20% discount is given, SP becomes 80% of CP which is ₹24.

$$80\% \text{ of CP} = 24$$

$$\frac{80}{100} \text{CP} = 24$$

$$\frac{4}{5} \text{CP} = 24$$

$$\text{CP} = 24 \times \frac{5}{4} = ₹30$$

Now if 30% discount is given SP becomes 70% of CP

$$\text{New selling price} = \frac{70}{100} \times 30 = ₹21$$

8. (d)

Using conventional approach, we can say that if all 3 pipes are opened simultaneously, in one hour they

will fill up $\frac{1}{10} + \frac{1}{15} + \frac{1}{18} = \frac{9+6+5}{90} = \frac{20}{90} = \frac{2}{9}^{\text{th}}$ of the vessel. This leads to the entire vessel getting

filled up in $\frac{9}{2}$ hours or 270 minutes. Time required to fill up 60% of the vessel will be $270 \times 60\% = 162$ minutes.

9. (d)

In this coding language, the letters are written such that one letter from right end followed by one letter from left end.

DISTANCE = EDCINSAT

ACQUIRE = AERICQU

10. (d)

$$95 + 20.5 = 115.5$$

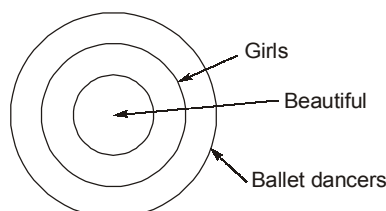
$$115.5 + 22.5 = 138$$

$$138 + 24.5 = 162.5$$

$$162.5 + 26.5 = 189$$

11. (d)

We can represent the given statements as shown:

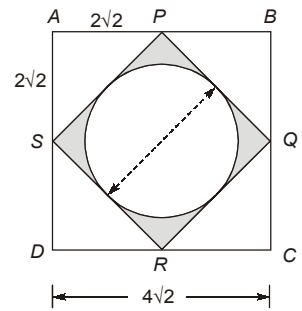


A look at the diagram drawn leads us to conclude that "All ballet dancers are beautiful." which is C1. Likewise, we can also conclude that though all ballet dancers are girls but NOT ALL girls are ballet dancers implying C2 is also a valid conclusion; leading us to option 'd'

12. (b)

Since we are joining midpoints of sides of the square $ABCD$,
 $AP = AS = 2\sqrt{2}$ giving the side of the square $PQRS$ formed by
 joining mid points of the sides of the square $ABCD = 4$.

Diameter of the circle which is drawn inside the square $PQRS$ touching
 all the sides = 4 cm i.e. its radius = 2 cm and therefore, the area of this
 circle = $4\pi \text{ cm}^2$.



13. (d)

Number of odd days in one ordinary year = 1

Number of odd days in one leap year = 2

Counting the number of odd days from the year 2007 onwards as follows:

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Odd day	1	2	1	1	1	2	1	1	1	2	1	1

By taking the total odd days accumulated from 2007 to 2017, we get,

$1 + 2 + 1 + 1 + 1 + 2 + 1 + 1 + 1 + 2 + 1 = 14 = 2 \times 7 \Rightarrow$ equivalent to "0" odd days.

As 2018 is ordinary year like 2007, both will have same calendar.

14. (b)

Let P , Q and R represent their respective monthly income. Then, we have:

$$P + Q = (5050 \times 2) = 10100 \quad \dots(i)$$

$$Q + R = (6250 \times 2) = 12500 \quad \dots(ii)$$

$$P + R = (5200 \times 2) = 10400 \quad \dots(iii)$$

Adding (i), (ii) and (iii),

we get: $2(P + Q + R) = 33000$

$$\Rightarrow P + Q + R = 16500 \quad \dots(iv)$$

Subtracting (ii) from (iv), we get,

$$P = 4000$$

$\therefore P$'s monthly income = ₹ 4000

15. (d)

Total distance = 100 m

Ravi beats Salil by 6 seconds

Salil beats Toni by 3 seconds

It means, Ravi beats Toni by 9 seconds ... (i)

and also given that Ravi beats Toni by 25 m.

It means that, Toni has taken 9 seconds to travel that 25 m.

$$\text{Speed of Toni } (T_{sp}) = \frac{25}{9} \text{ m/s} \quad \dots(ii)$$

From (i) and (ii)

$$\frac{100}{T_{\text{speed}}} - \frac{100}{R_{\text{speed}}} = 9$$

$$\frac{100}{25/9} - \frac{100}{R_{\text{speed}}} = 9$$

$$100 \times \frac{9}{25} - \frac{100}{R_{\text{speed}}} = 9$$

$$36 - \frac{100}{R_{\text{speed}}} = 9$$

$$\frac{100}{R_{\text{speed}}} = 36 - 9 = 27 \text{ seconds}$$

Time taken by Ravi to complete the race = 27 seconds.

16. (c)

Option (c) is the converse of S1. Since ONLY students can participate in the race, it implies that ALL participants in the race are students.

S3 negates option (a) as well as (b) since ONLY girls are invited for coaching.

17. (a)

Based on the given information, we can write

$$a + d + f + g = 180 \quad \dots\dots\dots (1) \quad \text{(volley ball)}$$

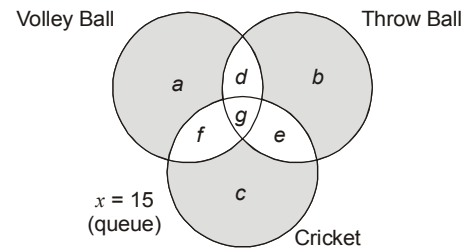
$$b + d + e + g = 150 \quad \dots\dots\dots (2) \quad \text{(throw ball)}$$

$$c + e + f + g = 120 \quad \dots\dots\dots (3) \quad \text{(cricket)}$$

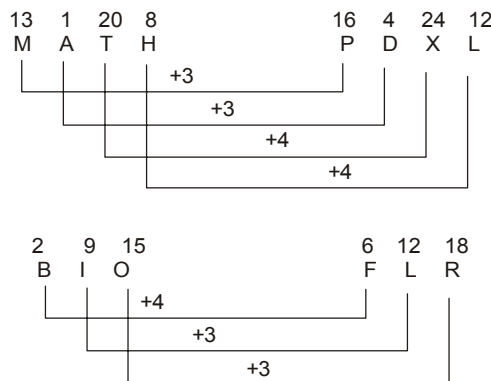
$$a + b + c = 150 \quad \dots\dots\dots (4) \quad \text{(exactly one)}$$

adding (1), (2), (3) and subtracting (4), we get
 $2d + 2e + 2f + 3g = 180 + 150 + 120 - 150 = 300$

Since $g = 30$ (given), we get $d + e + f = 105$ i.e. the number of persons playing exactly 2 games is 105.

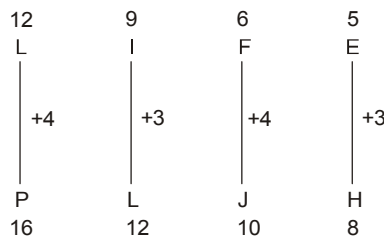


18. (d)



+3 for odd and +4 for even.

Similarly,



19. (b)

$$P = \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \times \dots \times \frac{99}{98} \times \frac{100}{99}$$

$$= \frac{100}{2} = 50$$

$$Q = \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \times \frac{98}{99} \times \frac{99}{100} = \frac{1}{100}$$

$$\frac{P}{Q} = 5000$$

20. (d)

Let the principal = ₹ x

$$\text{Simple interest} = \frac{x \times 12 \times 2}{100} = \frac{24}{100}x$$

$$\text{Compound interest} = x \left(1 + \frac{12}{100}\right)^2 - x = x \left(\frac{112}{100}\right)^2 - x$$

$$\text{CI} - \text{SI} = 72$$

$$x \left[\left(\frac{112}{100}\right)^2 - 1 - \frac{24}{100} \right] = 72$$

From here, $x = 5000$

21. (c)

Given that all senior schools are colleges and some primary schools are senior schools which leads to the conclusions that "all those primary schools which are senior schools are colleges" i.e. some of the colleges are primary schools i.e. option 'c'.

22. (b)

Given $A^2 = 2002 + B$

$$B^2 = 2002 + A$$

We can write, $A^2 - B^2 = B - A$

$$(A + B)(A - B) = B - A$$

$$A + B = -1$$

since

$$A \neq B$$

$$A^2 + B^2 = 4004 + A + B = 4003$$

$$(A + B)^2 = A^2 + B^2 + 2AB$$

Which leads to, $2AB = 1 - 4003 = -4002$ or $AB = -2001$

23. (c)

The trains starts at 6:00 AM, 7:00 AM, 8:00 AM.... from both the stations



The trains reach at 10:30 AM, 11:30 AM, 12:30 PM

The train which starts at 12 PM from Mumbai will reach the pune by 4 : 30 PM. This train first meets a train moving towards Mumbai to reach the destination by 12:30 PM, which started in Pune at 8:00 AM.

The train crosses the trains which starts from Pune between 8:00 AM and 4:30 PM.

⇒ Total number of trains is 9.

24. (c)

Let a and b be the work done by a man and a woman in one day respectively

$$6a + 8b = 1/10 \tag{i}$$

Also, $26a + 48b = 1/2 \tag{ii}$

From (i) and (ii) we have, $a = 1/100$ and $b = 1/200$

So, work done by 15 men and 20 women in one day = $(15/100) + (20/200) = 1/4$

∴ Required time = 4 days.

25. (c)

	volley ball	basket ball	baseball
Let the number of students in group A	$6x$	$8x$	$10x$
The number of students in group B	$9x$	$12x$	$15x$
$15x - 10x = 40$			
$x = 8$			
Total number of students = $(6 + 8 + 10 + 9 + 12 + 15) \times 8 = 480$			

26. (d)

Option (d) i.e. 'stalking' here refers to a silent approach of the lioness towards the 3 month old kid. She straight away walked up to the kind once the kid started crying (bleating) giving up all caution.

27. (b)

C1 – P5 – SUN

C2 – P3 – TUE

The sequence of programs based on channels is C7-C3-C4-C6

Since neither C7 nor C3 telecasts on MON, the only channel left is C5 which telecasts a program on MON.

P1 is followed by P6 and C4 telecasts neither P1 nor P6 implies that C4 telecasts P4 and the days for C7-C3-C4-C6 are Wed/THU/FRI/SAT.

28. (c)

Let's assume $|x - 2| = m$ Now $m^2 + m - 2 = 0$ $\Rightarrow (m - 1)(m + 2) = 0$ only admissible value is $m = 1$ $(\because m = -2 \text{ as } m \geq 0)$ $\Rightarrow |x - 2| = 1$ Now $x = 3, 1$ Now sum of real roots = $3 + 1 = 4$

29. (b)

Given, $3^a = 4$, means $4^b = (3^a)^b = 3^{ab}$; likewise keep replacing successive values.We will end up getting $3^{abcdef} = 9 = 3^2$ or $abcdef = 2$.

30. (b)

The angle traversed by hour hand

$$= 6 \times 30^\circ + 15^\circ = 195^\circ$$

The angle traversed by minute hand

$$= 6 \times 360^\circ + 180^\circ = 2340^\circ$$

$$\text{Ratio} = \frac{2340}{195} = 12$$

