

GATE 2018

Civil Engineering

General Aptitude
(Question with Solution
Set-1 & 2)



Set-1

1. "The driver applied the _____ as soon as she approached the hotel where she wanted to take a _____."

The words that best fill the blanks in the above sentence are

- A. brake, break B. break, break
C. brake, brake D. break, brake

Ans. A

Sol. • Brake is a device that is used for stopping or moving a vehicle. Therefore the first blank should be filled with "Brake".

• Break refers to a pause in work or during an activity. Therefore the second blank should be filled with "Break".

Hence, option A is the correct answer.

2. "It is no surprise that every society has had codes of behaviour; however, the nature of these codes is often _____."

The word that best fills the blank in the above sentence is

- A. unpredictable B. simple
C. expected D. strict

Ans. A

Sol. Unpredictable – Contrary word required.

Contrary to the general sense of the sentence.

3. Hema's age is 5 years more than twice Hari's age. Suresh's age is 13 years less than 10 times Hari's age. If Suresh is 3 times as old as Hema. How old is Hema?

- A. 14 B. 17
C. 18 D. 19

Ans. D

Sol. Let Hari's age be y years.
Hema = $2y + 5$ (1)

Suresh = $10y - 13$ (2)

Suresh = 3 Hema . . . (3)

Multiply eq (1) by 5,

We get, $5\text{Hema} = 10y + 25$. . . (4)

Substitute (3) in (2)

We get, $3\text{Hema} = 10y - 13$. . . (5)

Now, (4) - (5)

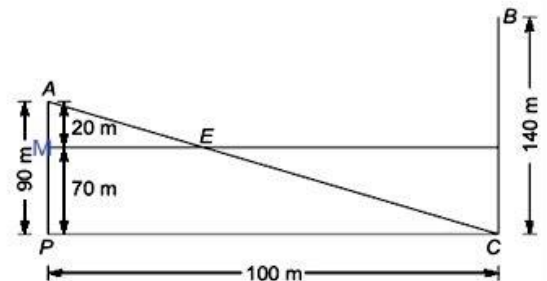
We get, $2\text{Hema} = 0 + 38 = 38$

Hema = $38/2 = 19$ years.

Hence, Hema is 19 years old.

4. Tower A is 90 m tall and tower B is 140 m tall. They are 100 m apart. A horizontal skywalk connects the floors at 70 m in both the towers. If a taut rope connects the top of tower A to the bottom of tower B, at what distance (in meters) from tower A will the rope intersect the skywalk?

Ans.



Sol.

$\triangle AME = \triangle APC$

$\frac{AM}{AP} = \frac{ME}{PC}$

$\Rightarrow \frac{20}{90} = \frac{ME}{100}$

$\Rightarrow ME = 22.22$

5. The temperature T in a room varies as a function of the outside temperature T_0 and the number of persons in the room P , according to the relation $T = K (\theta p + T_0)$,

where θ is K are constants. What would be the value of θ given the following data?

T_0	p	T
25	2	32.4
30	5	42.0

- A. 0.8 B. 1.0
C. 2.0 D. 10.0

Ans. B

Sol. $T_1 = k(\theta p_1 + T_{01}) \dots 1$
 $T_2 = k(\theta p_2 + T_{02}) \dots 2$

Hence,

$$32.4 = k(2\theta + 25) \dots 1$$

$$42 = k(5\theta + 30) \dots 2$$

Dividing equation 2/1

$$\frac{42}{32.4} = \frac{5\theta + 30}{2\theta + 25}$$

$$84\theta + 1050 = 162\theta + 972$$

$$78\theta + 78$$

$$\theta = 1$$

6. A fruit seller sold a basket of fruits at 12.5% loss. Had he sold it for Rs. 108 more, he would have made a 10% gain. What is the loss in Rupees incurred by the fruit seller?

- A. 48 B. 52
C. 60 D. 108

Ans. C

Sol. Let x be the Cost Price of a basket of fruits.

S.P. of a basket of fruits sold at 12.5% loss = $87.5x/100 = 0.875x$

S.P. of a basket of fruits sold at 10 % gain = $110x/100 = 1.1x$

Given that A fruit seller sold a basket of fruits at a 12.5% loss. Had he sold it for Rs. 108 more, he would have made a 10% gain.

$$\text{So, } 1.1x - 0.875x = 108$$

$$0.225x = 108$$

$$x = 480$$

$$\begin{aligned} \text{loss of 12.5\%} &= 12.5 \% \text{ of C.P.} = 0.125x \\ &= 0.125 \times 480 \\ &= 60 \end{aligned}$$

7. The price of a wire made of a superalloy material is proportional to the square of its length. The price of 10 m length of the wire is Rs. 1600. What would be the total price (in Rs.) of two wires of lengths 4 m and 6 m?

- A. 768 B. 832
C. 1440 D. 1600

Ans. B

Sol. $C \propto w^2$

$$C = kW^2$$

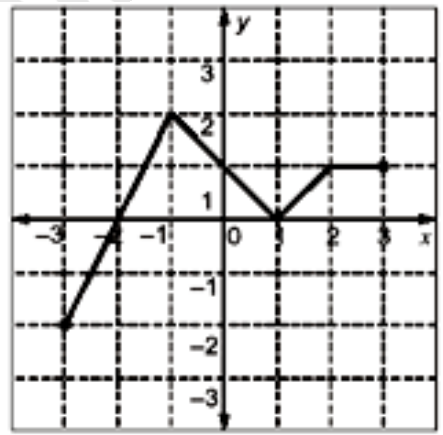
$$\Rightarrow C = k(10)^2 = 100k = 1600 \Rightarrow k = 16$$

$$C_1 = k(4)^2 = 16k$$

$$C_2 = k(6)^2 = 32k$$

$$\text{Now total cost} = 52k = 52 \times 16 = 832$$

8. What of the following function(s) in an accurate description of the graph for the range(s) indicated?



- i. $y = 2x + 4$ for $-3 \leq x \leq -1$
- ii. $y = |x-1|$ for $-1 \leq x \leq 2$
- iii. $y = ||x|-1|$ for $-1 \leq x \leq 2$
- iv. $y = 1$ for $2 \leq x \leq 3$

- A. (i), (ii) and (iii) only
B. (i), (ii) and (iv) only
C. (i) and (iv) only
D. (ii) and (iv) only

Ans. B

Sol. Put value and verify

(i) $y = 2x + 4$ is true in $-3 \leq x \leq -1$

On putting $x=-3, y=2$ and on putting $x= -2 , y=0$ and $x=-1, y=2$

(ii) $y = |x-1|$ is also true ($x = -1, = 2$), ($x = 0, y = 1$) and ($x = 1, y=0$)

(iv) $y = 1$ in ($2 \leq x \leq 3$) always true

(i), (ii) and (iv) are true.

9. Consider a sequence of number $a_1, a_2, a_3, \dots, a_n$ where $a_n = \frac{1}{n} - \frac{1}{n+2}$ for each integer $n > 0$.

What is the sum of the first 50 terms?

- A. $\left(1 + \frac{1}{2}\right) - \frac{1}{50}$
- B. $\left(1 + \frac{1}{2}\right) + \frac{1}{50}$
- C. $\left(1 + \frac{1}{2}\right) - \left(\frac{1}{51} + \frac{1}{52}\right)$
- D. $1 - \left(\frac{1}{51} + \frac{1}{52}\right)$

Ans. C

Sol. The Sum of the series will

$$(1-1/3) + (1/2 - 1/4) + (1/3-1/5) + (1/4-1/6) + (1/5 - 1/7) + \dots + (1/47-1/49) + (1/48 - 1/50) + (1/49 - 1/51) + (1/50 - 1/52)$$

All like terms will cancel out and we will be left with

$$1 + 1/2 - 1/51 - 1/52$$

$$\left(1 + \frac{1}{2}\right) - \left(\frac{1}{51} + \frac{1}{52}\right)$$

10. Each of the letters arranged as below represents a unique from 1 to 9. The letters are positioned in the figure such that $(A \times B \times C)$, $(B \times G \times E)$ and $(D \times E \times F)$ are equal. Which integer among the following choices

cannot be represented by the letters A, B, C, D, E, F or G?

A		D
B	G	E
C		F

- A. 4
- B. 5
- C. 6
- D. 9

Ans. B

Sol. we have been given 7 alphabets as $\{A, B, C, D, E, F, G\}$ and we have to select their unique numbers from set $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ Given that $A \times B \times C = B \times G \times E = D \times E \times F$

Here 2, 3, 5, and 7 are prime numbers, so we have to be careful in choosing these numbers. 2, 4, 6, 8 are multiples of 2, and 3, 6, 9 are multiples of 3. This means we have to not worry about 2 and 3.

5 and 7 have no multiples from the set. Therefore these can not be used in multiplication; otherwise, the equation will never be satisfied.

So, 5 and 7 don't represent any number.

Hence, option B is the correct answer.

now for values of given alphabets...

so required integer values = $\{1, 2, 3, 4, 6, 8, 9\}$

now we have = $A \times B \times C \times D \times E \times F \times G = 1 \times 2 \times 3 \times 4 \times 6 \times 8 \times 9 = 2^7 \times 3^4$

$$(A \times B \times C)^2 \times G = 2^7 \times 3^4 \text{ (as } ABC = DEF)$$

$ABC = DEF$)

Now from these four Alphabets ONE MUST BE 2. And if we choose any one from A, B, C to be 2

than G will be a multiple of 2^5 which will not be in the given domain. therefore, $G = 2$.

now $(A \times B \times C)^2 = (2^6 \times 3^4)$

$$(A \times B \times C) = 2^3 \times 3^2$$

$$(A \times B \times C) = 9 \times 8 \times 1 \text{ or } 3 \times 4 \times 6 \text{ -----(1)}$$

Also, $B \times G \times F = 72$ (AS $G = 2$)

$B \times F = 36$ (9×4) -----(2)

From eq. 1 and 2 we get $B=9$, $F=4$

and from eq. $A \times C \times 8=72$, $A \times C=8 \times 1$

now, $B \times G \times E = 72$ (as $B \times G \times E = A \times B \times C$)

$9 \times 2 \times E = 72$, $E=4$

now, $D \times E \times F = 72$, $D \times 4 \times 4 = 72$, $D \times 4 = 18 = 3 \times 6$

SO, the given solution would look like

1		6
9	2	4
8		3

or, you can interchange the values between 1,8 and 3,6

Set-2

1. "His face _____ with joy when the solution of the puzzle was _____ to him."

The words that best fill the blanks in the above sentence are

- A. shone, shown B. shone, shone
- C. shown, shone D. shown, shown

Ans. A

Sol. Shone – It is past – participle and past form of shine.

Shown – To show means to reveal and point out something.

2. "Although it does contain some pioneering ideas, one would hardly characterize the work as _____."

The word that best fills the blank in the above sentence is

- A. innovative B. simple
- C. dull D. boring

Ans. A

Sol. Innovative is similar to pioneer.

3. $\underbrace{a + a + a + \dots + a}_{n \text{ time}} = na = a^2b$ and

$\underbrace{b + b + b + \dots + b}_{n \text{ time}} = ab^2$ where a, b, n and m

are natural numbers. What is the value of

$\underbrace{m + m + \dots + m}_{n \text{ time}} \times \underbrace{n + n + \dots + n}_{m \text{ time}}$

- A. $2a^2b^2$
- B. a^4b^4
- C. $ab(a+b)$
- D. a^2+b^2

Ans. B

Sol. $\underbrace{a + a + a + \dots + a}_{n \text{ time}} = na = a^2b$

$\Rightarrow n = ab$

$\underbrace{b + b + b + \dots + b}_{m \text{ time}} = mb = b^2a$

$\Rightarrow m = ab$

So, $\underbrace{m + m + \dots + m}_{n \text{ time}} \times \underbrace{n + n + \dots + n}_{m \text{ time}}$

i.e., $mn \times mn = (mn)^2$

from (i) and (ii) $mn = a^2b^2$

So, result, $(mn)^2 = (a^2b^2) = a^4b^4$

4. A three-member committee has to be formed from a group of 9 people. How many such distinct committees can be formed?

- A. 27 B. 72
- C. 81 D. 84

Ans. D

Sol. ${}^9C_3 = \frac{9!}{6! \times 3!} = \frac{9 \times 8 \times 7}{6} = 84$

5. For non-negative integers a, b & c what would be the value of $a+b+c$ if $\log a + \log b + \log c = 0$.

- A. 3 B. 1
- C. 0 D. -1

Ans. A

Sol. As a,b,c are non-negative integers and given

$$\log a + \log b + \log c = 0$$

$$\log (a \times b \times c) = \log 1$$

$$\Rightarrow a = b = c = 1$$

Which can be possible for simple values.

$$a = b = c = 1$$

$$\text{Hence } a + b + c = 1 + 1 + 1 = 3$$

Alternate Method:

$$\text{Given, } a = b = c = 1$$

$$\log a + \log b + \log c = 0$$

As we know $\log 1 = 0$, so each one of them

can be zero if $a = b = c = 1$

$$\log 1 + \log 1 + \log 1 = 0$$

By putting $a = b = 1$ equation satisfies

$$a + b + c = 1 + 1 + 1 = 3$$

6. In manufacturing industries, loss is usually taken to be proportional to the square of the deviation from a target. If the loss is Rs. 4900 for a deviation of 7 units, what would be the loss in Rupees for a deviation of 4 units from the target?

- A. 400 B. 1200
C. 1600 D. 2800

Ans. C

Sol. let "d" be the deviation from the target

$$\text{Loss} = kd^2$$

$$\text{for deviation of 7 units, } 4900 = k(7)^2$$

$$\Rightarrow k = 100$$

$$\text{for deviation of 4 units, loss} = 100(4)^2 = 1600$$

Hence option C is the correct answer.

7. A faulty wall clock is known to gain 15 minutes every 24 hours. It is synchronized to the correct time at 9 AM on 11th July. What will be the correct time to the nearest minute when the clock show 2 PM on 15th July of the same year?

A. 12:45 PM

B. 12:58 PM

C. 1:00 PM

D. 2:00 PM

Ans. B

Sol. 9 AM of 11 July of 2 PM on 15th July = 101 hours

$$\left(24 + \frac{15}{60}\right) \text{ hours of incorrect clock} = 24 \text{ hours}$$

of correct clock

$$\left(24 + \frac{15}{60}\right) \text{ hours of IC} = 24 \text{ hours of correct}$$

clock

$$1 \text{ hour of IC} = \frac{96}{97} \text{ hours of correct clock}$$

$$101 \text{ hour of IC} = \frac{96}{97} \times 101 \text{ hours of correct}$$

clock

$$= 99.958 \text{ hours of correct clock}$$

$$= 99 \text{ hours} + 0.95876 \times 60 \text{ minutes of correct clock}$$

$$= 99 \text{ hours} + 57.525 \text{ minutes}$$

$$= 99 \text{ hours and approx. 58 minutes}$$

So, correct time will be

$$2 \text{ PM, } 11^{\text{th}} \text{ July} + (99 \text{ hours and } 58 \text{ minutes})$$

$$= 12 : 58 \text{ PM on } 15^{\text{th}} \text{ July}$$

Alternate solution:

Given that In 24 hours, wall clock gain = 15 minutes

$$\text{So, in 101 hours, wall clock gain} = \frac{15}{24} \times 101 = 63.125 \text{ minutes}$$

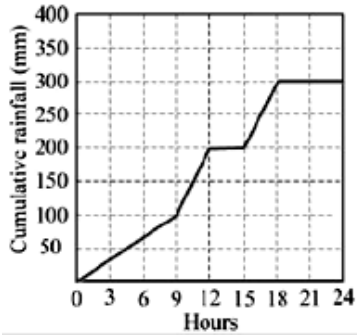
$$= 1 \text{ hour, } 3 \text{ minutes, } 7.5 \text{ seconds}$$

$$= \text{approx } 1 \text{ hour, } 3 \text{ minutes}$$

So at 2 pm the wall clock is gain 1 hour, 3 minutes. It means the right = 2 pm - (1 hour, 3 minute = 12: 57 pm

From the given option time 12:58 pm is closest to it. So the correct answer is option B.

8. The annual average rainfall in a tropical city is 1000 mm. On a particular rainy day (24-hour period), the cumulative rainfall experienced by the city is shown in the graph. Over the 24-hour period, 50% of the rainfall falling on a rooftop, which had an obstruction-free area of 50m², was harvested into a tank. What is the total volume of water collected in the tank in liters?



- A. 25,000 B. 18,750
C. 7,500 D. 3,125

Ans. C

Sol. Cumulative rainfall = Total rainfall for the given time of 24 hrs. = 300 mm (from graph)
so rainfall accumulated on rooftop = 50% of total rainfall = $\frac{1}{2} \times 300 = 150\text{mm} = 0.15\text{ m}$
now, volume collected in rooftop = $50\text{m}^2 \times 0.15\text{ m}$
 $= 7.5\text{ m}^3$
 $= 7.5 \times 1000\text{ L}$ (since 1cu.m = 1000L)
 $= 7500\text{L}$ of water collected in the tank.

9. Given that $\frac{\log P}{y-z} = \frac{\log Q}{z-x} = \frac{\log R}{x-y} = 10$ for $x \neq y \neq z$, what is the value of the product PQR?
A. 0 B. 1 C. XYZ D. 10^{XYZ}

Ans. B

Sol. $\frac{\log P}{y-z} = \frac{\log Q}{z-x} = \frac{\log R}{x-y} = 10$
So, $\log P = 10(y-z)$
 $\log Q = 10(z-x)$

$\log R = 10(x-y)$

on adding these three we get

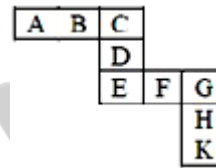
$\log P + \log Q + \log R = 0$

$\log (PQR) = 0$

$\log (PQR) = \log(1)$

$PQR = 1$

10. Each of the letters in the figure below represents a unique integer from 1 to 9. The letters are positioned in the figure such that each of (A+B+C), (C+D+E), (E+F+G) and (G+H+K) is equal to 13 each. Which integer does E represent?



- A. 1 B. 4 C. 6 D. 7

Ans. B

Sol. $A+B+C = C + D + E = E + F + G = G + H + K = 13$

If we add all, we will get = $4 \times 13 = 52$

But sum of all natural number 1 to 9

$= 45 = \frac{9 \times 10}{2}$

$A+B+C+C+D+E+E+F+G+G+H+K=52$

$A + B + C + D + E + F + G + H + K = 45$

Substraction eq. (ii) from (i)

Hence, $C + E + G = 7$

Also, $C + D + E = 13$

Substraction eq. (iii) from (iv)

$D - G = 6$

$E = 4$

Alternative Method

By checking other equations

(ABC)	(CDE)	(EFG)	(GHK)
(1,3,9)	(1,8,4)	(2,4,7)	(2,5,6)
□	□	□	□
13	13	13	13
