

GATE 2017

Civil Engineering

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



Set-1

1. The bacteria in milk are destroyed when it _____ heated to 80 degree Celsius.
A. would be B. will be
C. is D. was

Ans. C

Sol. The bacteria in milk are destroyed when it is heated to 80 degree Celsius

2. _____ with someone else's email account is now very serious offence.
A. Involving B. Assisting
C. Tampering D. Incubating

Ans. C

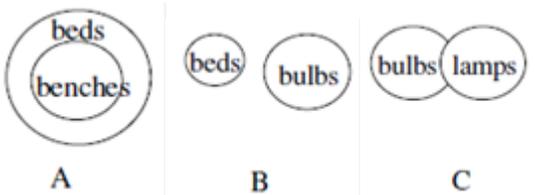
Sol. Tamper - interfere with (something) in order to cause damage or make unauthorized alterations.

Tampering with someone else's email account is now very serious offence.

3. Consider the following sentences:
All benches are beds. No bed is a bulb. Some bulbs are lamps.
Which of the following can be inferred?
i. Some beds are lamps.
ii. Some lamps are beds.
A. Only i B. Only ii
C. Both i and ii D. Neither i nor ii

Ans. D

Sol. Since there is no direct relation given between lamps and beds. So, neither I nor II will be correct.



Thus option D is the correct answer.

4. If the radius of a right circular cone is increased by 50%, its volume increases by
A. 75% B. 100%
C. 125% D. 237.5%

Ans. C

Sol. Given, radius of a right circular cone is increased by 50%.

Let, height of the circular cone=(h)

A volume of the right circular cone(V)

$$= \frac{1}{3} \pi R^2 h \dots(1)$$

$$\text{If } R \rightarrow R+R/2 = 3R/2$$

$$\text{then, } V_1 = (1/3) \pi (1.5R)^2 h = 2.25V$$

So, Percentage increase in volume = 100

$$(V_1-V)/V = 100 \times (2.25V-V)/V = 125\%$$

5. The following sequence of numbers is arranged in increasing order:

1, x, x, x, y, y, 9, 16, 18. Given that the mean and median are equal, and are also equal to twice the mode, the value of y is

- A. 5 B. 6
C. 7 D. 8

Ans. D

Sol. 1, x, x, x, y, y, 9, 16, 18

So mode = x

(Note: The *mode* of a set of data values is the value that appears most often.)

Given, Mean=Median=2Mode

$$\text{Mean}=\text{Median}= 2x$$

$$\therefore \text{Mean of data}=(3x+2y+44)/9$$

$$2x = (3x+2y+44)/9$$

$$18x = 3x+2y+44$$

$$15x - 2y = 44 \dots\dots\dots(1)$$

Note: In order to calculate the **median**, the data must first be ranked (sorted in ascending order). The **median** is the number in the

middle. **Median** = the middle value of a set of ordered data.

Given that 1, x, x, x, y, y, 9, 16, 18 is in increasing order. there is 9 values in this, so the median is the 5th value from the start as 'y'

$$\text{Median} = y$$

$$2x = y \text{ -----(2)}$$

Putting the value of y in eq. 1,

$$15x - 4x = 44$$

$$x = 4$$

$$\text{and } y = 2x = 8$$

Hence option D is the correct answer.

6. The old concert hall was demolished because of fears that the foundation would be affected by the construction of the new metro line in the area. Modern technology for underground metro construction tried to mitigate the impact of pressurized air pockets created by the excavation of large amounts of soil. But even with these safeguards, it was feared that the soil below the concert hall would not be stable. From this, one can infer that
- A. The foundations of old buildings create pressurized air pockets underground, which are difficult to handle during metro construction.
 - B. Metro construction has to be done carefully considering its impact on the foundations of existing buildings.
 - C. Old buildings in an area form an impossible hurdle to metro construction in that area.
 - D. Pressurized air can be used to excavate large amounts of soil from underground areas.

Ans. B

Sol. Metro construction has to be done carefully considering its impact on the foundations of existing buildings.

7. Students applying for hostel rooms are allotted rooms in order of seniority. Students already staying in a room will move if they get a room in their preferred list. Preferences of lower ranked applicants are ignored during allocation. Given the data below, which room will Ajit stay in?

Names	Student Seniority	Current Room	Room Preference List
Amar	1	P	R, S, Q
Akbar	2	None	R, S
Anthony	3	Q	P
Ajit	4	S	Q, P, R

- A. P
- B. Q
- C. R
- D. S

Ans. B

Sol. From the given table, Amar is at a higher priority number as 1. His preference will be considered first. His first preference is R, S, Q. Hence, Now he will leave room P and would go to room R

Coming to Akbar, his first preference is R, S but R is already allocated to Amar so, his second preference will be considered which is S and room S is available now so he will be allocated room S.

Coming to Anthony, his only preference is P and P is available now, so he will be allocated room P.

Coming to Ajit, he will be allocated the remaining room which is Q.

Thus, option B is the correct answer.

8. The last digit of $(2171)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$ is
- A. 2
 - B. 4
 - C. 6
 - D. 8

Ans. B

Sol. We have, $(2171)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$ is
 $1^{\text{anyvalue}}=1$ so the unit digit of $(2171)^1 = 1$
 $2^1=2, 2^2=4, 2^3=8, 2^4=16$ (cyclicity of 2 is =4)
 when 9 is divided by 4(cyclicity) it leaves the remainder as 1, so the unit digit of $(2172)^9 = 2^1 = 2$
 $3^1=3, 3^2=9, 3^3=27, 3^4=81$ (cyclicity of 3 is =4)
 when 11 is divided by 4(cyclicity) it leaves the remainder as 3, so the unit digit of $(2173)^{11} = 3^3 = 7$
 $4^{\text{odd}}=4, 4^{\text{even}}=16$
 13 is odd, so the unit digit of $(2174)^{13} = 4$
 Thus, the last digit of the sum $(2171)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$ is $= 1+2+7+4 = 14$
 so, the answer is 4 (option B).

9. Two machines M1 and M2 are able to execute any of four jobs P, Q, R and S. The machines can perform one job on one object at a time. Jobs P, Q, R and S take 30 minutes, 20 minutes, 60minutes and 15 minutes each respectively. There are 10 objects each requiring exactly 1 job. Job P is to be performed on 2 objects. Job Q on 3 objects. Job R on 1 object and Job S on 4 objects. What is the minimum time needed to complete all the jobs?

- A. 2 hours B. 2.5 hours
 C. 3 hours D. 3.5 hours

Ans. A

Sol. Time needed to perform job P on 2 objects = $30\text{min} \times 2 = 60$ min
 Time needed to perform job Q on 3 objects = $20\text{min} \times 3 = 60$ min
 Time needed to perform job R on 1 object = $60\text{min} \times 1 = 60$ min

Time needed to perform job S on 4 objects = $15\text{min} \times 4 = 60$ min

Total time needed to perform jobs on all 10 objects = 240 min

The minimum time will be taken when both the machines work together for the same period of time (as $240/2 = 120$ minutes each).

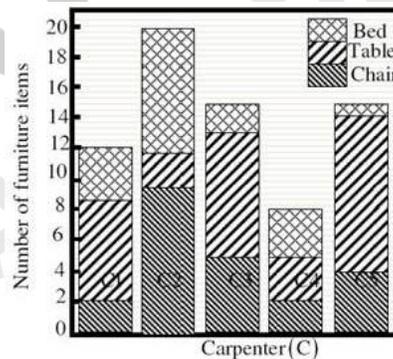
M_1 P Q = 2 hrs

M_2 P S = 2 hrs

So minimum time needed to complete all the jobs = 2 hours (when working together).

Thus, option A is the correct answer.

10. The bar graph below shows the output of five carpenters over one month, each of whom made different items of furniture: Chairs, tables, and beds.



Consider the following statements.

- The number of beds made by carpenter C2 is exactly the same as the same as the number of tables made by carpenter C3.
- The total number of chairs made by all carpenters is less than the total number of tables. Which one of the following is true?

- A. Only I B. Only ii
 C. Both i and ii D. Neither i nor ii

Ans. C

Sol. I. The number of beds made by carpenter C₂ is exactly the same as the number of table made by carpenter C₃

i.e., beds made by carpenter $C_2 = 20 - 12 = 8$
tables made by carpenter $C_3 = 13 - 5 = 8$
[From the bargraph]

So,

(i) is correct

II. The total number of chairs made by all carpenters is less than the total number of tables.

Total Number of chairs made by all carpenters = $2 + 10 + 5 + 2 + 4 = 23$.

Total Number of tables made by all carpenters = $7 + 2 + 8 + 3 + 10 = 30$.

$23 < 30$

\therefore (ii) is correct

Set-2

1. The event would have been successful if you _____ able to come.

- A. are B. had been
C. have been D. would have been

Ans. B

Sol. With perfect conditional we have to use "past perfect" in it.

This is Type 3 conditional statement.

If + past perfect, perfect conditional or perfect continuous conditional

If this thing had happened, that thing would have happened.

2. There was no doubt that their work was thorough.

Which of the words below is closest in meaning to the underlined word above?

- A. Pretty B. Complete
C. Sloppy D. Haphazard

Ans. B

Sol. **Thorough:** complete with regard to every detail; not superficial or partial.

3. Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red, and blue.

Proposition: If a card has an even value on one side, then its opposite face is red.

The cards which **MUST** be turned over to verify the above proposition are

- A. 2, Red B. 2, 3, red
C. 2, blue D. 2, red, blue

Ans. C

Sol. The proposition said that even value has a red face but it is not necessary that red face has even value so we cannot use red now we cannot use 3 because it may have the red face or blue face.

We use 2 to check the opposite side for red colour and we use blue to check for odd numbers. So the answer is (C) 2, blue.

Detailed Method

The proposition said that even value has a red face, but the red face doesn't need to have even value; it may contain an odd value. So, we don't need to check the card with red colour.

If a card value contains an odd number, checking the opposite side colour is unnecessary. (because no proposition is given about the card with odd value).

Now we don't have to check 3 because it may have a red face or blue face.

An even number card must be turned to check whether the opposite face is red or not.

If the card's face is blue, its opposite face can contain any value (either odd or even), so this needs to be checked.

So, a card containing the number 2 on one side and the colour Blue on the opposite needs to be turned in to verify the proposition.

Hence, Option "C" is the correct choice.

4. What is the value of x when

$$81 \times \left(\frac{16}{25}\right)^{x+2} \div \left(\frac{3}{5}\right)^{2x+4} = 144?$$

- A. 1
- B. -1
- C. -2
- D. cannot be determined

Ans. B

Sol. $3^4 \times \left(\frac{2^4}{5^2}\right)^{x+2} \times \left(\frac{5}{3}\right)^{2x+4} = 2^4 \times 3^2$

$$(3^4) \times (2^{4x+8}) \times (5^{-2x-4}) \times (5^{2x+4}) \times (3^{-2x-4}) = 2^4 \times 3^2$$

$$2^{4x+8} \times 3^{-2x} = 2^4 \times 3^2$$

So, $4x + 8 = 4 \Rightarrow x = -1$
 $-2x = 2 \Rightarrow x = -1$

5. Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

- A. 1/9
- B. 2/9
- C. 1/3
- D. 4/9

Ans. B

Sol. (Possible outcomes - (1 1), (2 2), (3 3), (4 4), (5 5), (6 6), (4 1), (1 4), hence favorable outcomes = 8

Total outcomes = 36

Required probability = $8/36 = 2/9$

6. Bhaichung was observing the pattern of people entering and leaving a car service centre. There was a single window where customers were being served. He saw that people inevitably came out of the centre in the order that they went in. However, the time they spent inside seemed to vary a lot:

some people came out in a matter of minutes while for others it took much longer.

From this, what can one conclude?

- A. The centre operates on a first-come-first-served basis but with variable service times, depending on specific customer needs.
- B. Customers were served in an arbitrary order since they took varying amounts of time for service completion in the centre.
- C. Since some people came out within a few minutes of entering the centre. The system is likely to operate on a last-come-first-served basis.
- D. Entering the centre early ensured that one would have shorter service times and most people attempted to do this.

Ans. A

Sol. People coming out in the same order in which they enter indicates that the centre operates on a first come first serve basis.

7. A map shows the elevations of Darjeeling, Gangtok, Kalimpong, Pelling, and Siliguri. Kalimpong is at a lower elevation than Gangtok. Pelling is at a lower elevation than Gangtok. Pelling is at a higher elevation than Siliguri. Darjeeling is at a higher elevation than Gangtok.

Which of the following statements can be inferred from the paragraph above?

- i. Pelling is at a higher elevation than Kalimpong
- ii. Kalimpong is at a lower elevation than Darjeeling
- iii. Kalimpong is at a higher elevation than Siliguri
- iv. Siliguri is at a lower elevation than Gangtok

- A. Only ii
- B. Only ii and iii
- C. Only ii, iii and iv
- D. Only iii and iv

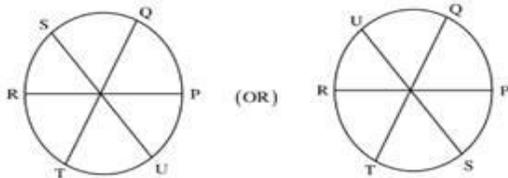
Ans. C

Sol. "Kalimpong is at a lower elevation than Darjeeling" & "Siliguri is at a lower elevation than Gangtok" can be easily inferred from the given paragraphs.

8. P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats. Which of the following must necessarily be true?

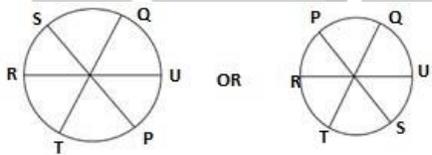
- A. P is immediately to the right of R
- B. T is immediately to the left of P
- C. T is immediately to the left of P or P is immediately to the right of Q
- D. U is immediately to the right of R or P is immediately to the left of T

Ans. C



Sol.

P <---> U Now, P & U switch seats; then there are 2 possibilities



So from this diagram, we can predict that option 3 is always true.

9. Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

- A. 1
- B. 4
- C. 5
- D. 6

Ans. D

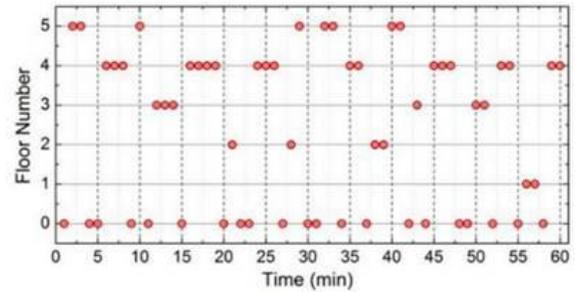
Sol. Let cycling speed=C; and walking speed=W

$$C\left(\frac{1}{2}\right) + W\left(\frac{3}{2}\right) = 19$$

$$C + W = 26 \dots\dots(2)$$

On solving (1) & (2), we get W=6 km/hr

10. The points in the graph below represent the halts of a lift for duration of 1 minute, over a period of 1 hour.



Which of the following statements are correct?

- i. The elevator never moves directly from any non-ground floor to another non-ground floor over the one hour period
 - ii. The elevator stays on the fourth floor for the longest duration over the one hour period
- A. Only I
 - B. Only ii
 - C. Both i and ii
 - D. Neither i nor ii

Ans. D

Sol. Option I is incorrect as it moves directly from one non-ground floor to another non-ground floor. (Because at time 26 to 29 seconds lift goes from floor 2 to 5.)

Option II is incorrect as it stayed for the maximum duration on the ground floor. (Because halt time on 4th-floor time =19points =19 minute and for ground floor time =21points =21minute).
