CDC 08 2022 QA

Q 1. What is the value of A such that the sum of the squares of the roots of the quadratic equation $x^2 + (4 - A)x + 3 - A = 0$ has the least value?

1) 10

2) 3

3) 2

4) 16/3

Q 2. A vessel had 320 ml of a mixture of milk and water. The mixture has 40% milk. First X ml of milk was added to the mixture. Then Y ml of water was added to the mixture. Each time an addition is done, the ratio of milk and water in the vessel is reversed. Find the difference between the quantities X and Y (in ml).

Q 3. Let numbers 'a' and 'b' be selected from sets S1 = {11, 13, 15, 17, 19} and S2 = {1999, 2000, …, 2018} respectively. A new set S is created which contains the elements of the form a^b and have unit digit as 1. How many elements does S contain?

1) 40

2) 36

3) 32

4) 39

Q 4. Three friends A, B and C start simultaneously from city P to city Q. A rides the bike. The speed of the bike is 32 km/h and the walking speed of both B and C is 8 km/h. The distance between P and Q was 140 km. First A and B go together on the bike, A drops B on the way, goes back to pick up C who was walking towards Q and reach Q on the bike. After getting dropped, B walked towards Q and reached Q at the same time as A,C. Find the total distance (in km) covered by the bike.

1) 140

2) 160

3) 260

4) 320

Q 5. A farmer wants to fence his rectangular field to protect his crops from animals. The cost of fencing the field is Rs. 300 per meter on one side, and Rs. 150 per meter along three other sides. If the area of the rectangular field is 1350 sq. m, then what is the lowest possible cost (in Rs.) of fencing the field?

1) 13500

2) 24000

3) 29000

4) 27000

Q 6. Every week Binu pays for a movie ticket and a book out of her allowance. Last week, Binu's allowance was Rs. A. The cost of her movie ticket was 20% of the difference between A and the cost of the book, while the cost of her book was 5% of the difference between A and the cost of her movie ticket. To the nearest whole percent, what percentage of A did Binu pay for her movie ticket and book?

1) 23%

2) 27%

3) 19%

4) 22%

Q 7. Sundarpur and Pritampur are 2 stations. A single track runs between them. Train A leaves everyday from Sundarpur at 8:00 AM and reaches Pritampur. Another train B starts from Pritampur as soon as A reaches there. B reaches Sundarpur at 10:00 AM. The speed of B is four times that of A. One day, A started from Sundarpur 20 minutes late as per the schedule. In order to maintain B's right arrival time at Sundarpur, both trains travel at an increased speed. If B doubles its speed, find the ratio of the new speeds of A and B.

1) 3 : 22

2) 22 : 3

3) 38 : 3

4) 44 : 9

Q 8. The cost of bars of a precious metal varies directly as the square of the weight of the bar. Metal bars of weights in the ratio 3 : 5 : 7 were bought from three different places and melted together to form a big bar. The cost of the big bar was Rs.69,580 more than the total cost of the metal bars. What was the difference (in Rs.) between the initial cost of the heaviest bar and the lightest bar?

1) 13,750

2) 19,600

3) 14,400

4) 24,010

Q 9. A set of 6 integers has to be formed from the numbers among 1, 2, 3, 4, …, 12 with the property that no number is a multiple of another in this set. Then what is the difference of the least and the highest possible value of the numbers from all possible 6 integer sets?

Q 10. An ice cream vendor sells ice creams for Rs. 5 and Rs. 7. The vendor sold 'a' Rs. 5 ice creams and 'b' Rs. 7 Ice creams costing Rs. 420 on a Sunday evening. If 'a' and 'b' are natural numbers, then how many pairs of (a, b) are possible?

1) 10

2) 11

3) 9

4) 13

Q 11. Anu takes 5 days to complete a job. Binu takes twice the time as Anu to complete the job. Chinu takes twice the time as Binu to complete the job. Dinu takes twice the time as Chinu to complete the job. Two of the four when working together take 25% of the time to complete the job that the other two would take working together. Find the faster pair.

1) Anu, Dinu

2) Anu, Chinu

3) Anu, Binu

4) Chinu, Dinu

Q 12.

For a positive integer n, $\left(\sqrt{2}\right)^{\frac{4}{5}}\left(\sqrt{2}\right)^{\frac{8}{5}}\ldots\left(\sqrt{2}\right)^{\frac{2^{n+1}}{5}} > 63$, then what is the least possible value of 'n'?

Q 13. Two identical circles C1 and C2 of radius 2 cm touch externally. A third circle, C3, touches the circles C1 and C2 externally. If C1, C2 and C3 have a common tangent, then what is the ratio of the area of C3 to that of C2?

1) 1 : 4

2) 1 : 8

3) 1 : 16

4) 1 : 32

Q 14. A tank has N inlet pipes numbered from 1 to N fitted to it and all are opened simultaneously. The rate at which the rth pipe ($1 \le r \le N$) fills the tank is r liters/minute. Together, all the N taps take a certain time to fill the tank. If the rate of rth pipe had been r^2 liters/minute the total time taken to fill the tank would have been one-third of the normal time. Find the value of N.

Q 15.

If $\frac{a_1 + a_2 + \cdots + a_{11}}{a_{n-10} + \cdots + a_{n-2} + a_{n-1} + a_n} = \frac{1}{8}$ and $\frac{a_{10} + a_{11} + \cdots + a_n}{a_1 + a_2 + \cdots + a_{n-9}} = 2$, where $a_1, a_2, a_3, \ldots, a_n$ are in geometric progression, then what is the value of 'n'?

Q 16. Karun borrowed Rs.1.2 lakh at 10% rate of interest compounded annually. He repaid a certain amount at the end of the first year. Then, he paid Rs.90,200 at the end of the second year to completely repay the loan. What amount (in Rs.) did he repay at the end of first year?

1) 55,000

2) 50,000

3) 45,000

4) 54,000

Q 17.

Let $f(x)=\frac{2}{4^x+2}$ for real numbers x.

Then, find the value of $f\left(\frac{1}{2023}\right)+f\left(\frac{2}{2023}\right)+f\left(\frac{3}{2023}\right)+\ldots+f\left(\frac{2022}{2023}\right)$.

Q 18. The height of a tree varies as the square root of its age. When the tree is 16 months old, its height is 24 cm. What will be its height (in cm) when it is 25 months old?

Q 19. If $y = \log_{7-a}(2x^2 + 2x + a + 3)$ for all real values of x, then which of the following is NOT a possible integral value of 'a'?

1) 4

2) 5

3) −2

4) −3

Q 20. Hiten and Ketan run a business and during 2021 the basic salary of Hiten turns out to be equal to 20% of the balance of the profit left after his salary was paid. If Hiten finally received a total of Rs.8,40,000 after splitting the remaining profit equally between the two, then find how much (in Rs. lakh) Ketan received from the profit in 2021.

1) 7

2) 5.4

3) 6

4) 9

Q 21. For an Inter-Gully Cricket tournament, a team of 6 players needs to be formed. A team contains 2 batsmen, 3 bowlers and 1 wicketkeeper. There are 23 batsmen, 26 bowlers, and 9 wicketkeepers. If the maximum number of teams is formed, then find out the number of players that will not be the part of any team.

Q 22. A vertical cell tower LT stands at the center L of a square ABCD of side 32 m. If $\angle ATB = 60°$, then the height (in meter) of the cell tower LT is

1) 32

2) $20\sqrt{2}$

3) $16\sqrt{2}$

4) $32\sqrt{2}$
