CAT 2022 QA Slot 1 Question Paper

General Instructions

(i) This question paper contains 22 questions. All questions are compulsory.

(ii) It comprises 13 single-correct multiple-choice questions and 9 numerical / type-in-the-answer questions.

(iii) Attempt every question; detailed solutions are provided in the companion solutions booklet.

(iv) For numerical questions, report the answer rounded exactly as asked.

1. Pinky is standing in a queue at a ticket counter. Suppose the ratio of the number of persons standing ahead of Pinky to the number of persons standing behind her in the queue is 3:5. If the total number of persons in the queue is less than 300, then the maximum possible number of persons standing ahead of Pinky is

2. The largest real value of a for which the equation $|x + a| + |x - 1| = 2$ has an infinite number of solutions for x is

(A) -1

(B) 0

(C) 1

(D) 2

3. The average of three integers is 13. When a natural number n is included, the average of these four integers remains an odd integer. The minimum possible value of n is

(A) 3

(B) 4

(C) 5

(D) 1

4. Let A be the largest positive integer that divides all the numbers of form $3^k + 4^k + 5^k$, and B be the largest positive integer that divides all the numbers of the form $4^k + 3(4^k) + 4^{k+2}$, where k is any positive integer. Then $(A + B)$ equals

5. In a village, the ratio of number of males to females is 5:4. The ratio of number of literate males to literate females is 2:3. The ratio of the number of illiterate males to illiterate females is 4:3. If 3600 males in the village are literate, then the total number of females in the village is

6. Let ABCD be a parallelogram such that the coordinates of its three vertices A, B, C are (1, 1), (3, 4), and (−2, 8), respectively. Then, the coordinates of the vertex D are

(A) (−4, 5)

(B) (4, 5)

(C) (−3, 4)

(D) (0, 11)

7. Alex invested his savings in two parts. The simple interest earned on the first part at 15% per annum for 4 years is the same as the simple interest earned on the second part at 12% per annum for 3 years. Then, the percentage of his savings invested in the first part is

(A) 62.50%

(B) 37.50%

(C) 60%

(D) 40%

8. The average weight of students in a class increases by 600 gm when some new students join the class. If the average weight of the new students is 3 kg more than the average weight of the original students, then the ratio of the number of original students to the number of new students is

(A) 1:2

(B) 3:1

(C) 1:4

(D) 4:1

9. A mixture contains lemon juice and sugar syrup in equal proportion. If a new mixture is created by adding this mixture and sugar syrup in the ratio 1 : 3, then the ratio of lemon juice and sugar syrup in the new mixture is

(A) 1:6

(B) 1:4

(C) 1:5

(D) 1:7

10. Amal buys 110kg of syrup and 120kg of juice, syrup being 20% less costly than juice, per kg. He sells 10kg of syrup at 10% profit and 20kg of juice at 20% profit. Mixing the remaining juice and syrup, Amal sells the mixture at ₹ 308.32 per kg and makes an overall profit of 64%. Then, Amal's cost price for syrup, in rupees per kg, is

11. A trapezium ABCD has side AD parallel to BC, ∠BAD=90°, BC=3 cm, and AD=8 cm. If the perimeter of this trapezium is 36 cm, then its area, in sq. cm, is

12. All the vertices of a rectangle lie on a circle of radius R. If the perimeter of the rectangle is P, then the area of the rectangle is

(A) $\frac{P^2}{2} - 2PR$

(B) $\frac{P^2}{8} - 2R^2$

(C) $\frac{P^2}{16} - R^2$

(D) $\frac{P^2}{8} - \frac{R^2}{2}$

13. Let a,b,c be non-zero real numbers such that $b^2 < 4ac$, and $f(x) = ax^2 + bx + c$. If the set S consists of all integers m such that $f(m) < 0$, then the set S must necessarily be

(A) the set of all integers

(B) either the empty set or the set of all integers

(C) the empty set the set of all positive integers

(D) the set of all positive integers

14. Let a and b be natural numbers. If $a^2 + ab + a = 14$ and $b^2 + ab + b = 28$, then (2a+b) equals

(A) 7

(B) 10

(C) 9

(D) 8

15. In a class of 100 students, 73 like coffee, 80 like tea, and 52 like lemonade. It may be possible that some students do not like any of these three drinks. Then the difference between the maximum and minimum possible number of students who like all the three drinks is

(A) 48

(B) 53

(C) 47

(D) 52

16. Trains A and B start traveling at the same time towards each other with constant speeds from stations X and Y, respectively. Train A reaches station Y in 10 minutes while train B takes 9 minutes to reach station X after meeting train A. Then the total time taken, in minutes, by train B to travel from station Y to station X is

(A) 15

(B) 12

(C) 6

(D) 10

17. Ankita buys 4kg cashews, 14kg peanuts, and 6kg almonds when the cost of 7kg cashews is the same as that of 30kg peanuts or 9kg almonds. She mixes all three nuts and marks a price for the mixture in order to make a profit of ₹1752. She sells 4kg of the mixture at this marked price and the remaining at a 20% discount on the marked price, thus making a total profit of ₹744. Then the amount, in rupees, that she had spent buying almonds is

(A) 1440

(B) 1176

(C) 1680

(D) 2520

18. For natural numbers x,y, and z, if xy+yz=19 and yz+xz=51, then the minimum possible value of xyz is

19. Let $0 \leq a \leq x \leq 100$ and f(x)=$|x-a|+|x-100|+|x-a-50|$.Then the maximum value of f(x) becomes 100 when a is equal to

20. For any real number x, let [x] be the largest integer less than or equal to x. If $\sum_{n=1}^{N}\left[\frac{1}{5}+\frac{n}{25}\right]=25$ then N is

21. For any natural number n,suppose the sum of the first n terms of an arithmetic progression is $(n+2n^2)$. If the n^{th} term of the progression is divisible by 9,then the smallest possible value of n is

(A) 4

(B) 8

(C) 7

(D) 9

22. The number of ways of distributing 20 identical balloons among 4 children such that each child gets some balloons but no child gets an odd number of balloons, is