1. Five sharpners and Six erasers cost ₹ 28. Six sharpners and five erasers cost ₹ 27. Find the cost (in ₹) of each sharpner and each eraser respectively.

(a) 3, 2 (b) 2, 3 (c) 1, 1 (d) 1, 1

2. How many pairs of x and y satisfy the equations $4x + 6y = 16$ and $6x + 9y = 24$?

(a) 0 (b) 1 (c) ∞ (d) 2

3. Three chocolates; four biscuits and five cakes cost ₹ 34. Six chocolates and eight biscuits cost ₹ 38. Find the cost of each cake (in ₹).

(a) 6 (b) 5 (c) 1 (d) 3

4. A fraction becomes $\frac{1}{2}$, if its numerator is increased by 1 and denominator by 3. It becomes $\frac{2}{5}$ if the numerator is increased by 2 and the denominator by 7. Find the fraction.

(a) $\frac{1}{2}$ (b) $\frac{4}{7}$ (c) $\frac{1}{5}$ (d) $\frac{2}{3}$

5. A two-digit number is such that the sum of its digits is thrice the difference of its digits. If the number exceeds the number formed by reversing the digits by 36; find the number.

(a) 51 (b) 62 (c) 73 (d) 84

6. Rajesh takes 5 hours more than Rakesh to cover the distance of 500 km. If instead Rajesh doubles his speed he would reach the destination $7\frac{1}{2}$ hours before Rakesh. Find Rajesh's speed.

(a) 20 km/hr (b) 25 km/hr (c) 35 km/hr (d) 30 km/hr

7. Find the value of K if the equation $4x + 5y = 32$ and $12x + 15y = 2K$ are consistent.

(a) 18 (b) 24 (c) 36 (d) 48

8. Find the greater of the two numbers such that their sum is 200 and the difference of their squares is 8000.

(a) 80 (b) 100 (c) 120 (d) 140

9. A two digit number is formed by either subtracting 16 from eight times the sum of the digits or by adding 20 to 22 times the difference of the digits. Find the number.

(a) [redacted]24 (b) [redacted]48 (c) [redacted]64 (d) [redacted]82

10. Divide 80 into two parts such that the sum of their reciprocals is $\frac{4}{75}$.

(a) 20, 60 (b) 30, 50 (c) 35, 45 (d) 75, 5

11. There is some money with Ajay and some with Vijay. If Ajay gives ₹ 30 to Vijay, then the amounts with them would be interchanged. Instead, if Vijay gives ₹ 20 to Ajay, then Ajay would have ₹ 70 more than that of Vijay. Find the amount that Ajay has.

(a) ₹ 40 (b) ₹ 50 (c) ₹ 70 (d) Cannot be determined

12. Anand has only 10 paise and 25 paise coins with him. If he has 70 coins in all worth ₹ 10 with him; how many 25 paise coins does he have?

(a) 20 (b) 25 (c) 40 (d) 50

13. The expenses of a hostel are partly constant and partly varying with the number of occupants. If there are 20 occupants, then each of the occupants has to bear ₹ 650 per month and if there are 5 more occupants comes down by ₹ 50 per month. How many occupants would be there if the share of each occupants is ₹ 500?

(a) 35 (b) 40 (c) 45 (d) 50

14. The difference between a three-digit number and the number formed by reversing the digits is 297. The sum of the units and tens digit is the same as the difference of the hundreds and the units digits. Also, the hundreds digit is twice the units digit. Find the number.

(a) 242 (b) 342 (c) 603 (d) 884

15. The cost of three pens; four rulers and five refills is ₹ 75 while that of ten refills; six pens and seven rulers is ₹ 138. Find the cost of three pens; one ruler and five refills.

(a) ₹ 39 (b) ₹ 42 (c) ₹ 41 (d) ₹ 52

16. Rohan went to the market to buy 10kg of each of Oranges; mangoes; bananas and grapes. The cost of 5kg of Oranges, [redacted], and 2kg of mangoes together was ₹ 310. The cost of 3kg of mangoes and 3.5kg of bananas together was ₹ 230. The cost of 1.5kg of bananas and 5kg of grapes together was ₹ 160. Find the [redacted] total amount spent by Rohan.

(a) ₹ 1400 (b) ₹ 1050 (c) ₹ 1750 (d) ₹ 2100

17. A student was asked to find $\frac{3}{7}$th of a number and he instead multiplied it by $\frac{7}{3}$. As a result, he got an answer, which was more than the correct answer by 1680. What was the number?

(a) 882 (b) 273 (c) 840 (d) 1684

18 The number of pencils with P is $\frac{5}{3}$ times the number of pencils with Q. If P has 18 pencils more than Q, then the total number of pencils with them.

(a) 48 (b) 72 (c) 96 (d) 88

19. Find k if the given system of equations was infinite number of solutions.

$2x + ky = 1 + 2y$ and $kx + 12y = 3$

(a) -4 (b) 6 (c) 1 (d) -2

20. The sum of the ages of two friends A and B 18 years ago was half of the sum of the their ages today. Presently, A is twice as old as B. What is the present age of A?

(a) 30 years (b) 48 years (c) 24 years (d) 6 years

21. Two boys and two girls went to a movie. They found that there are only two tickets available in the counter and they bought them. For the remaining two tickets; they spent ₹ 50 more for each ticket than the actual price. At the end they found that each person had spent ₹ 60 for the ticket as their share. Find the actual price of each ticket.

(a) ₹ 30 (b) ₹ 35 (c) ₹ 40 (d) ₹ 45

22. If $\frac{bz-ay}{b} = \frac{cy-bz}{c} = \frac{az-cx}{a}$ and given that $bx \neq ay$; $cy \neq bz$ and $az \neq cx$; Which of the following is true?

(a) $a+b=c$ (b) $a+b+c=0$ (c) $ab+bc+ca=0$

(d) $ab+bc-ca=0$

23. A rope of 77 meters is cut into two pieces such that one piece is $\frac{4}{7}$ of the other piece. What is the length of $\frac{3}{14}$ of the longer piece? (in m).

(a) 22.5 (b) 24.5 (c) 17.5 (d) 10.5

[9] NUMBER SYSTEM (A) ⟨7⟩

21. A two-digit number is obtained by either subtracting 12 from 4 times the sum of its digits or by adding 6 to twice the difference of its digits.

(a) 16 (b) 28 (c) 39 (d) 48

25. Tank X is the shape of a cuboid. Tank Y is in the shape of a cube. X contains 400 litres of water more than Y. If 200 litres of water is filled in each, X would contain twice the quantity of water that Y would contain. Find the quantity of water X contains (in litres).

(a) 500 (b) 600 (c) 700 (d) 800

[8] ALGEBRA (B)

1. If $x = \sqrt{\frac{5+2\sqrt{6}}{5-2\sqrt{6}}}$; then the value of $x^2 - (x+10)^2$ is

(a) 0 (b) 1 (c) −1 (d) 2

2. If $x = \left[\frac{(1\cdot331)^{-1} + (1\cdot331)^{-2} + (1\cdot331)^{-3} + \cdots + (1\cdot331)^{-6}}{(1\cdot331)^{-2} + (1\cdot331)^{-3} + (1\cdot331)^{-4} + \cdots + (1\cdot331)^{-7}}\right]^{\frac{1}{3}+1}$

Find the value of x ?

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) 2 (d) 1

3. If $a = \frac{2+\sqrt{3}}{2-\sqrt{3}}$ and $b = \frac{2-\sqrt{3}}{2+\sqrt{3}}$; then the value of $(a^2 + b^2 + ab)$ is :

(a) 185 (b) 195 (c) 200 (d) 175

4. If $\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$; then the value of a is

(a) $\frac{11}{3}$ (b) $-\frac{4}{3}$ (c) $\frac{4}{3}$ (d) $-\frac{4\sqrt{7}}{3}$

5. If polynomials $2x^3 + ax^2 + 3x - 5$ and $x^3 + x^2 - 2x + a$ are divided by $(x-2)$; the same remainders are respectively 5 and 19. The values of a and b are:

(a) $a = -3$; [redacted] (b) $a = 3$; [redacted]

(c) $a = 8$; [redacted] (d) $a = -6$; [redacted]

6. If the polynomial $f(x) = x^4 - 2x^3 + 3x^2 - ax + b$ is divided by $(x-1)$, [redacted] and $(x+1)$; the remainders are respectively 5 and 19. The values of a and b are :

(a) $a = 8$; $b = 7$ (b) $a = 5$; $b = 8$ (c) $a = 8$; $b = 5$ (d) $a = 6$; $b = 8$

[9] ALGEBRA (3) ⟨1⟩

7. If $x+y+z=0$; then

$$\frac{1}{x^2+y^2-z^2}+\frac{1}{y^2+z^2-x^2}+\frac{1}{z^2+x^2-y^2}=?$$

(a) 1 (b) −1 (c) 0 (d) 2

8. If $a+b+c=2s$; then find the value of

$$(s-a)^3+(s-b)^3+3(s-a)(s-b)c$$

(a) c (b) c^2 (c) c^3 (d) $2c^2$

9. If $x^2+4y^2+z^2+3=2x+4y+2z$; then the value of $(x+y+z)$ is:

(a) $2\frac{1}{3}$ (b) 2 (c) $2\frac{1}{2}$ (d) $3\frac{1}{2}$

10. If $(x+y+z)=0$; then the value of

$$x^2(y+z)+y^2(z+x)+z^2(x+y)+3xyz \text{ is:}$$

(a) 0 (b) −1 (c) 1 (d) 2

11. If $a^2=b+c$; $b^2=a+c$; $c^2=a+b$; then the value of $3\left(\frac{1}{a+1}+\frac{1}{b+1}+\frac{1}{c+1}\right)$:

(a) 1 (b) $\frac{1}{3}$ (c) 3 (d) 9

12. If $x+\frac{1}{x}=5$; then the value of $\frac{x^9+\frac{1}{x^5}}{x^2-3x+1}$

(a) 70 (b) 50 (c) 110 (d) 55

13. If $\frac{3-5x}{x} + \frac{3-5y}{y} + \frac{3-5z}{z} = 0$; then the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ is

(a) −5 (b) 5 (c) 2 (d) 3

14. If $x + \frac{1}{x} = 3$; then the value of $x^5 + \frac{1}{x^5}$ is

(a) 122 (b) 118 (c) 123 (d) 120

15. If $(a-b) = 3$; $(b-c) = 5$ and $(c-a) = 1$; then the value of $\frac{a^3+b^3+c^3-3abc}{a+b+c}$ is

(a) 17.5 (b) 20.5 (c) 10.5 (d) 15.5

16. If $ax + by = 6$; $bx - ay = 2$ and $x^2 + y^2 = 4$; then the value of (a^2+b^2) would be:

(a) 10 (b) 2 (c) 4 (d) 5

17. If $a + \frac{1}{a} = 1$; then the value of a^3 is:

(a) −2 (b) 2 (c) −1 (d) 1

18. If $a + \frac{1}{a+2} = 0$; then the value of $(a+2)^3 + \frac{1}{(a+2)^3}$ is:

(a) 2 (b) 6 (c) 4 (d) 3

19. If $a = \sqrt{2}+1$; $b = \sqrt{2}-1$; then the value of $\frac{1}{a+1} + \frac{1}{b+1}$ is

(a) 9 (b) 3 (c) 1 (d) 2

20. If $a^4 + a^2b^2 + b^4 = 8$ and $a^2 + ab + b^2 = 4$; then the value of ab is

(a) −1 (b) 0 (c) 2 (d) 1

[OKE] ALGEBRA (11)

21. $x = 3 + 2\sqrt{2}$; then the value of $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$ is:

(a) 1 (b) 2 (c) $2\sqrt{2}$ (d) $3\sqrt{3}$

22. $x = b + c - 2a$; $y = c + a - 2b$, $z = a + b - 2c$; then the value of $x^2 + y^2 - z^2 + 2xy$ is

(a) 0 (b) $a + b + c$ (c) $a - b + c$ (d) $a + b - c$

23. $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} = 4$; then the value of $x^2 + y^2$ is

(a) 2 (b) 4 (c) 8 (d) 16

24. $x - y = \frac{x+y}{7} = \frac{xy}{4}$; the numerical value of xy is

(a) $\frac{4}{3}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

25. If $ax^2 + bx + c = a(x - p)^2$; then the relation among a, b, c would be

(a) $abc = 1$ (b) $b^2 = ac$ (c) $b^2 = 4ac$ (d) $2b = a + c$