Basic operation questions for CDSE, CGL Tier 2, CGLTier 1 and SSC 10+2

Basic operation quiz 3

Direction: Study the following questions carefully and choose the right answer.

1. If $x + \frac{1}{X} = 3$, then the value of $\frac{3x^2 - 4x + 3}{x2 - x + 1}$ is

A. 4/3 B. 3/2

C. 5/2 D. 5/3

2. If x = 2015, y = 2014 and z = 2013, then value of $x^2 + y^2 + z^2 - xy - yz - zx$ is

A. 3 B. 4

C. 6 D. 2

3. If $p^3 + 3p^2 + 3p = 7$, then the value of $p^2 + 2p$ is

A. 4 B. 3

C. 5 D. 6

4. If $x = p + \frac{1}{P}$ and $y = p - \frac{1}{P}$ then the value of $x^4 - 2x^{2y^2} + y^4$ is

A. 24 B. 4

C. 16 D. 8

5. If a + b + c = 0, then the value of $(a + b - c)^2 + (b + c - a)^2 + (c + a - b)^2$ is

A. 0 B. 8 abc

C. 4(a2 + b2 + c2) D. 4(ab + bc + ca)

6. If p – 2q = 4, then the value of $p^3 - 8q^3 - 24pq - 64$ is

A. 2 B. 0

C. 3 D. –1

7. If $x + \frac{1}{X} = 2$ and x is real, then the value of $x17 + \frac{1}{X^{19}}$ is

A. 1 B. 0

C. 2 D. –2

8. If $x = 19$ and $y = 18$, then the value of $\frac{x^2 + y^2 + xy}{x^3 - y^3}$ is

A. 1 B. 37

C. 324 D. 361

9. If $x = -1$, the value of $\frac{1}{x^{99}} + \frac{1}{x^{98}} + \frac{1}{x^{97}} + \frac{1}{x^{96}} + \frac{1}{x^{95}} + \frac{1}{x^{94}} + \frac{1}{x} - 1$ is

A. 1 B. 0

C. –2 D. –1

10. If $x - \frac{1}{X} = 1$, then the value of $\frac{x4 - \frac{1}{X^2}}{3x^2 + 5x - 3}$

A. 1/4 B. 1/2

C. 3/4 D. 0

Correct answers:

1	2	3	4	5	6	7	8	9	10
C	A	B	C	C	B	C	A	C	B

Explanations:

1).

Given, $x + \frac{1}{x} = 3$

So, $\frac{3x^2 - 4x + 3}{x^2 - x + 1}$

$\Rightarrow \frac{3x(x - \frac{4}{3} + \frac{1}{x})}{x(x - 1 + \frac{1}{x})} = \frac{3[(x + \frac{1}{x}) - \frac{4}{3}]}{(x + \frac{1}{x}) - 1}$

$= \frac{3(3 - \frac{4}{3})}{3 - 1} = \frac{3(\frac{5}{3})}{2}$

$= \frac{5}{2}$.

Hence, option C is correct.

2). $x - y = 2015 - 2014 = 1$

$y - z = 2014 - 2013 = 1$

$z - x = 2013 - 2015 = -2$

$\therefore \quad x^2 + y^2 + z^2 - xy - yz - zx$

Numerator & denominator multiplied by 2

$= \frac{1}{2}(2x^2 + 2y^2 + 2z^2 - 2xy - 2yz - 2zx)$

$= \frac{1}{2}(x^2 + y^2 - 2xy + y^2 + z^2 - 2yz + z^2 + x^2 - 2zx)$

$= \frac{1}{2}[(x - y)^2 + (y - z)^2 + (z - x)^2]$

$= \frac{1}{2}[1 + 1 + 4] = \frac{1}{2} \times 6 = 3$

Hence, option A is correct.

3). $p^3 + 3p^2 + 3p = 7$

$\Rightarrow \quad p^3 + 3p^2 + 3p + 1 = 7 + 1 = 8$

$\Rightarrow \quad (p + 1)^3 = (2)^3$

$\Rightarrow \quad p + 1 = 2 \Rightarrow p = 1$

$\therefore \quad p^2 + 2p = 1 + 2 \times 1 = 1 + 2 = 3.$

Hence, option B is correct.

4).

$x = p + \frac{1}{p}$ and $y = p - \frac{1}{p}$

$\therefore \quad x + y = p + \frac{1}{p} + p - \frac{1}{p} = 2p$

$x - y = p + \frac{1}{p} - p + \frac{1}{p} = \frac{2}{p}$

$\therefore x^4 - 2x^2y^2 + y^4 = (x^2 - y^2)^2 = [(x - y)(x + y)]^2$ .....(i)

By putting the value of x and y in equation (i), we get

$= (2p \times \frac{2}{p})^2 = (4)^2 = 16.$

Hence, option C is correct.

5). Given, $a + b + c = 0$

$\therefore \quad a + b = -c, \quad b + c = -a, \quad c + a = -b$

$\therefore \quad (a + b - c)^2 + (b + c - a)^2 + (c + a - b)^2$

$\Rightarrow \quad (-c - c)^2 + (-a - a)^2 + (-b - b)^2$

$\Rightarrow \quad (-2c)^2 + (-2a)^2 + (-2b)^2$

$\Rightarrow \quad 4c^2 + 4a^2 + 4b^2 = 4(a^2 + b^2 + c^2)$

Hence, option C is correct.

6). $p - 2q = 4$

On cubing both sides, we get

$(p - 2q)^3 = (4)^3$

$\Rightarrow p^3 - 8q^3 - 6pq(p - 2q) = 64$

$\Rightarrow p^3 - 8q^3 - 6pq(4) - 64 = 0$

$\Rightarrow p^3 - 8q^3 - 24pq - 64 = 0.$

Hence, option B is correct.

7).

Given, $x + \frac{1}{x} = 2$

$\Rightarrow x^2 + 1 = 2x \Rightarrow x^2 + 1 - 2x = 0$

$\Rightarrow x^2 - 2x + 1 = 0 \Rightarrow (x-1)^2 = 0 \Rightarrow x = 1$

$\therefore \quad x^{17} + \frac{1}{x^{19}} = 1 + 1 = 2.$

Hence, option C is correct.

8).

$$\text{Expression} = \frac{x^2 + y^2 + xy}{x^3 - y^3} = \frac{(x^2 + y^2 + xy)}{(x-y)(x^2 + y^2 + xy)} = \frac{1}{x-y}$$

$$= \frac{1}{19 - 18} = 1.$$

Hence, option A is correct.

9). Putting the value of x,

$$\frac{1}{(-1)^{99}} + \frac{1}{(-1)^{98}} + \frac{1}{(-1)^{97}} + \frac{1}{(-1)^{96}} + \frac{1}{(-1)^{95}} + \frac{1}{(-1)^{94}} + \frac{1}{-1} - 1$$

$\therefore \quad$ Expression $= -1 + 1 - 1 + 1 - 1 + 1 - 1 - 1 = -2$

Sub details:

$$\frac{1}{(-1)^{99}} = -1$$

$\frac{1}{(-1)^{98}} = 1$ and so on,

Hence, option C is correct.

10).

Expression = $\frac{x^4 - \frac{1}{x^2}}{3x^2 + 5x - 3}$

Dividing numerator & denominator by x,

$= \frac{x^3 - \frac{1}{x^3}}{3x + 5 - \frac{3}{x}} = \frac{x^3 - \frac{1}{x^3}}{5 + 3(x - \frac{1}{x})}$

$= \frac{x^3 - \frac{1}{x^3} - 3(x - \frac{1}{x}) + 3(x - \frac{1}{x})}{5 + 3(x - \frac{1}{x})}$

$= \frac{(x - \frac{1}{x})^3 + 3(x - \frac{1}{x})}{5 + 3(x - \frac{1}{x})}$

$= \frac{1 + 3}{5 + 3} = \frac{4}{8} = \frac{1}{2}$

Hence, option B is correct.