
SURDS & INDICES

- KOUSTAV

CONCEPT

$$(1024)^{-\frac{1}{10}} = 2^{-1} = \frac{1}{2}$$

1. Laws of Indices:

i. $a^m \times a^n = a^{m+n}$

ii. $\frac{a^m}{a^n} = a^{m-n}$

iii. $(a^m)^n = a^{mn}$

iv. $(ab)^n = a^n b^n$

v. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

vi. $a^0 = 1$

$$a^{-1} = \frac{1}{a}$$

2. Surds:

Let a be rational number and n be a positive integer such that $a^{(1/n)} = \sqrt[n]{a}$

Then, $\sqrt[n]{a}$ is called a surd of order n .

3. Laws of Surds:

i. $\sqrt[n]{a} = a^{(1/n)}$

ii. $\sqrt[n]{ab} = \sqrt[n]{a} \times \sqrt[n]{b}$

iii. $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

iv. $(\sqrt[n]{a})^n = a$

v. $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

vi. $(\sqrt[n]{a})^m = \sqrt[n]{a^m}$

1. $(17)^{3.5} \times (17)^? = 17^8$

A. 2.29

B. 2.75

C. 4.25

☒ D. 4.5

$$17^{3.5 + x} = 17^8$$

$$x = 8 - 3.5 = 4.5$$

2. If $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$, then the value of x is:

A. $\frac{1}{2}$

B. 1

☒ C. 2

D. $\frac{7}{2}$

$$\left(\frac{a}{b}\right)^{x-1} = \left(\frac{a}{b}\right)^{-x+3}$$

$$x-1 = -x+3$$

$$2x = 4$$

$$x = 2$$

3. Given that $10^{0.48} = x$, $10^{0.70} = y$ and $x^z = y^2$, then the value of z is close to:

A. 1.45

B. 1.88

✓ C. 2.9

D. 3.7

$$10^{0.48z} = 10^{0.70 \times 2}$$

$$z = \frac{0.7 \times 2}{0.48} = \frac{1.4}{0.48} = \frac{140}{48}$$

4. If $5^a = 3125$, then the value of $5^{(a-3)}$ is:

✓ A. 25

B. 125

C. 625

D. 1625

$$5^a = 5^5$$

$$5^{5-3} = \underline{\underline{25}}$$

5. If $3^{(x-y)} = 27$ and $3^{(x+y)} = 243$, then x is equal to:

A. 0

B. 2

✓ C. 4

D. 6

$$x - y = 3$$

$$x + y = 5$$

⊕

$$2x = 8$$

$$x = \underline{\underline{4}}$$

6. $(256)^{0.16} \times (256)^{0.09} = ?$

✓ A. 4

B. 16

C. 64

D. 256.25

$$\begin{aligned} 256^{0.16+0.09} &= 256^{0.25} \\ &= 256^{\frac{1}{4}} \\ &= \underline{\underline{4}} \end{aligned}$$

7. The value of $[(10)^{150} \div (10)^{146}]$

A. 1000

☒ B. 10000

C. 100000

D. 10^6

$$10^4 = \underline{\underline{10000}}$$

8. $\frac{1}{1 + x^{(b-a)} + x^{(c-a)}} + \frac{1}{1 + x^{(a-b)} + x^{(c-b)}} + \frac{1}{1 + x^{(b-c)} + x^{(a-c)}} = ?$

A. 0

☒ B. 1

C. x^{a-b-c}

D. None of these

$$\frac{1}{1 + \frac{x^b}{x^a} + \frac{x^c}{x^a}} + \frac{1}{1 + \frac{x^a}{x^b} + \frac{x^c}{x^b}} + \frac{1}{1 + \frac{x^b}{x^c} + \frac{x^a}{x^c}} = \frac{x^a + x^b + x^c}{x^a + x^b + x^c} = 1$$

9. $(25)^{7.5} \times (5)^{2.5} \div (125)^{1.5} = 5^?$

- A. 8.5
- B. 13
- C. 16
- D. 17.5
- E. None of these

10. $(0.04)^{-1.5} = ?$

- A. 25
- B. 125
- C. 250
- D. 625

11. $\frac{(243)^{n/5} \times 3^{2n+1}}{9^n \times 3^{n-1}} = ?$

A. 1

B. 2

C. 9

D. 3^n

12. $\frac{1}{1 + a^{(n-m)}} + \frac{1}{1 + a^{(m-n)}} = ?$

A. 0

B. $\frac{1}{2}$

C. 1

D. a^{m+n}

13. If m and n are whole numbers such that $m^n = 121$, the value of $(m - 1)^{n + 1}$ is:

- A. 1
- B. 10
- C. 121
- D. 1000

14. $\left(\frac{x^b}{x^c}\right)^{(b+c-a)} \cdot \left(\frac{x^c}{x^a}\right)^{(c+a-b)} \cdot \left(\frac{x^a}{x^b}\right)^{(a+b-c)} = ?$

- A. x^{abc}
- B. 1
- C. $x^{ab+bc+ca}$
- D. x^{a+b+c}

ANSWER KEY

QUESTION	ANSWER	QUESTION	ANSWER
1	D	8	B
2	C	9	B
3	C	10	B
4	A	11	C
5	C	12	C
6	A	13	D
7	B	14	B

