*** Choose the right answer from the given options. [1 Marks Each]** **[10]**

1. On simplification, the expression $\frac{5^{n+2}-6\times5^{n+1}}{13\times5^{n}-2\times5^{n+1}}$ equals :

(A) $\frac{5}{3}$ (B) $-\frac{5}{3}$ (C) $\frac{3}{5}$ (D) $-\frac{3}{5}$

Ans. :

b. $-\frac{5}{3}$

Solution :

$\frac{5^{n+2}-6\times5^{n+1}}{13\times5^{n}-2\times5^{n+1}}$
$=\frac{5^{n+1}(5-6)}{5^{n}(13-2\times5)}$
$=\frac{5^{n}\times5\times(-1)}{5^{n}(13-10)}$
$=-\frac{5}{3}$
Hence, the correct option is (b).

2. $\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$ is equal to :

(A) $\sqrt{2}$ (B) 4 (C) 8 (D) 2

Ans. :

4. 2

Solution :

$\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$
$\Rightarrow\frac{\sqrt{16\times2}+\sqrt{16\times3}}{\sqrt{4\times2}+\sqrt{4\times3}}$
$\Rightarrow\frac{4\sqrt{2}+4\sqrt{3}}{2\sqrt{2}+2\sqrt{3}}$
$\Rightarrow\frac{4}{2}(\frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}+\sqrt{3}})$
$\Rightarrow 2$

3. If $x=(7+4\sqrt{3})$ than $\left(x+\frac{1}{x}\right)=?$

(A) 49 (B) 14 (C) 48 (D) $8\sqrt{3}$

Ans. : b. 14

Solution :

$x=(7+4\sqrt{3})$
$\frac{1}{x}=\frac{1}{7+4\sqrt{3}}=(7-4\sqrt{3})$
$x+\frac{1}{x}=(7+4\sqrt{3})+(7-4\sqrt{3})$
$=14$

4. Write the correct answer in the following:

$\sqrt[4]{\sqrt[3]{2^2}}$ equals.

(A) $2^{-\frac{1}{6}}$ (B) 2^{-6} (C) $2^{\frac{1}{6}}$ (D) 2^{6}

Ans. :

c. $2^{\frac{1}{6}}$

Solution:

$\sqrt[4]{\sqrt[3]{2^2}} = \sqrt[4]{(2^2)^{\frac{1}{3}}} = \left(2^{\frac{2}{3}}\right)^{\frac{1}{4}} = 2^{\frac{2}{3}\times\frac{1}{4}} = 2^{\frac{1}{6}}$

Hence, (c) is the correct answer.

5. If $\sqrt{7} = 2.646$ then $\frac{1}{\sqrt{7}} = ?$

(A) None of these. (B) 0.378 (C) 0.441 (D) 0.375

Ans. :

b. 0.378

Solution:

$\frac{1}{\sqrt{7}} = \frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$

$= \frac{\sqrt{7}}{7}$

$= \frac{1}{7} \times \sqrt{7}$

$= \frac{1}{7} \times 2.646$

$= 0.378$

6. If $\mathrm{x} = \sqrt{6} + \sqrt{5}$, then $\mathrm{x}^2 + \frac{1}{\mathrm{x}^2} - 2 =$

(A) $2\sqrt{6}$ (B) $2\sqrt{5}$ (C) 24 (D) 20

Ans. :

d. 20

Solution :

$\mathrm{x}^2 + \frac{1}{\mathrm{x}^2} - 2 = \left(\mathrm{x} - \frac{1}{\mathrm{x}}\right)^2$

$\mathrm{x} = \sqrt{6} + \sqrt{5}$

$\Rightarrow \frac{1}{\mathrm{x}} = \frac{1}{\sqrt{6}+\sqrt{5}} = \frac{1}{\sqrt{6}+\sqrt{5}} \times \frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}-\sqrt{5}}$

$= \frac{\sqrt{6}-\sqrt{5}}{1} = \sqrt{6} - \sqrt{5}$

Now,

$\left(\mathrm{x} - \frac{1}{\mathrm{x}}\right)^2 = [\sqrt{6} + \sqrt{5} - (\sqrt{6} - \sqrt{5}]^2$

$= (2\sqrt{5})^2 = 4 \times 5 = 20$

Hence, correct option is (d).

7. If $(3^3)^2 = 9^x$ than $5^x = ?$

(A) 5 (B) 1 (C) 125 (D) 25

Ans. :

c. 125

Solution :

$(3^3)^2 = 9^x$

$(3^3)^3 = 9^x$

$9^3 = 9^x$

$\Rightarrow x = 3$

$\therefore 5^3 = 125$

8. The value of $\left(\frac{\mathrm{x}^l}{\mathrm{x}^m}\right)^{\frac{1}{lm}} \times \left(\frac{\mathrm{x}^m}{\mathrm{x}^n}\right)^{\frac{1}{mn}} \times \left(\frac{\mathrm{x}^n}{\mathrm{x}^l}\right)^{\frac{1}{nl}}$ is :

(A) 4 (B) 1 (C) 2 (D) 0

Ans. :

b. 1

Solution :

$\left(\frac{\mathrm{x}^l}{\mathrm{x}^m}\right)^{\frac{1}{lm}} \times \left(\frac{\mathrm{x}^m}{\mathrm{x}^n}\right)^{\frac{1}{mn}} \times \left(\frac{\mathrm{x}^n}{\mathrm{x}^l}\right)^{\frac{1}{nl}}$

$\Rightarrow x^{a^2-b^2} \times x^{b^2-c^2} \times x^{c^2-a^2}$
$\Rightarrow x^{a^2-b^2+b^2-c^2+c^2-a^2}$
$\Rightarrow x^0 = 1$

9. The value of $\{5(8^{\frac{1}{4}} + 27^{\frac{1}{3}})^3\}^{\frac{1}{4}}$ is :

(A) 6 (B) 3 (C) 5 (D) 4

Ans. : c. 5

Solution :

$\{5(8^{\frac{1}{4}} + 27^{\frac{1}{3}})^3\}^{\frac{1}{4}}$
$\Rightarrow \{5(2^{3\times\frac{1}{3}} + 3^{3\times\frac{1}{3}})^3\}^{\frac{1}{4}}$
$\Rightarrow \{5(3+2)^3\}^{\frac{1}{4}}$
$\Rightarrow \{5 \times 5^3\}^{\frac{1}{4}}$
$\Rightarrow 5^{4\times\frac{1}{4}}$
$\Rightarrow 5$

10. Which of the following is an irrational number ?

(A) 3.14 (B) 3.141414... (C) 3.14444 (D) 3.141141114...

Ans. :

4. 3.141141114...

Solution :
The decimal expansion of an irrational number is non-terminating recurring non-recurring.
Hence, 3.141141114... is an irrational number.
Hence, the correct opion is (d).

*** Answer the following short questions. [2 Marks Each]** **[6]**

11. Find six rational numbers between 3 and 4.

Ans. : We know that there are infinite rational numbers between any two numbers. A rational number is the one that can be written in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$ We know that the numbers all lie between 3 and 4. We need to rewrite the numbers in $\frac{p}{q}$ form to get the rational numbers between 3 and 4. So, we cover it in$\frac{p}{q}$

$\frac{3}{1} = \frac{3}{1} \times \frac{10}{10} = \frac{30}{10}$
$\frac{4}{1} = \frac{4}{1} \times \frac{10}{10} = \frac{40}{10}$

So any six number between $\frac{30}{10}, \frac{40}{10}$will be the answer example $\frac{31}{10}, \frac{33}{10}, \frac{34}{10}, \frac{35}{10}, \frac{37}{10}, \frac{38}{10}$

12. Show that 0.2353535... = $0.2\overline{35}$, can be expressed in the form $\frac{p}{q}$, where p and q are integers and q $\neq$ 0.

Ans. : Let x = 0.235... ---- (i)
Multiplying both sides by 10
10x = 2.35....-----(ii)
Multiplying both sides by 100
1000x = 235.35....----(iii)
Subtracting (ii) from (iii)
1000x - 10x = 235.35...- 2.35...
990x = 233
x = $\frac{233}{990}$

13. Rationalise the denominator of $\frac{5}{\sqrt{3}-\sqrt{5}}$

Ans. : Let $y = \frac{5}{\sqrt{3}-\sqrt{5}}$ and its denominator = $\sqrt{3} - \sqrt{5}$

Here, the conjugate of denominator $(\sqrt{3} - \sqrt{5})$ is $(\sqrt{3} + \sqrt{5})$.

$y = \frac{5}{\sqrt{3}-\sqrt{5}} \times \frac{\sqrt{3}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$ [by rationalising]

$= \frac{5(\sqrt{3}+\sqrt{5})}{(\sqrt{3})^2-(\sqrt{5})^2}$ [∵ (a-b)(a+b)=a^2 - b^2]

$= \frac{5(\sqrt{3}+\sqrt{5})}{3-5} = -\frac{5}{2}(\sqrt{3}+\sqrt{5})$

*** Answer the following questions. [3 Marks Each]** **[9]**

14. It being given that $\sqrt{2}=1.414, \sqrt{3}=1.732, \sqrt{5}=2.236$ and $\sqrt{10}=3.162$, find the value of three places of decimals, of the following:

$\frac{\sqrt{10}-\sqrt{5}}{\sqrt{2}}$

Ans. : $\frac{\sqrt{10}-\sqrt{5}}{\sqrt{2}}$

$= \frac{\sqrt{5\times2}-\sqrt{5}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{2\sqrt{5}-\sqrt{10}}{\left(\sqrt{2}\right)^2}$

$= \frac{2\sqrt{5}-\sqrt{10}}{2}$

$= \frac{2\times2.236-3.162}{2}$

$= \frac{4.472-3.162}{2}$

$= \frac{1.31}{2}$

$= 0.655$ (three places of decimal)

15. Evaluate:

$\frac{(25)^{\frac{5}{2}}\times(729)^{\frac{1}{3}}}{(125)^{\frac{2}{3}}\times(27)^{\frac{2}{3}}\times8^{\frac{4}{3}}}$

Ans. : $\frac{(25)^{\frac{5}{2}}\times(729)^{\frac{1}{3}}}{(125)^{\frac{2}{3}}\times(27)^{\frac{2}{3}}\times8^{\frac{4}{3}}}$

$= \frac{(5^2)^{\frac{5}{2}}\times(9^3)^{\frac{1}{3}}}{(5^3)^{\frac{2}{3}}\times(3^3)^{\frac{2}{3}}\times(2^3)^{\frac{4}{3}}}$

$= \frac{5^{2\times\frac{5}{2}}\times9^{3\times\frac{1}{3}}}{5^{3\times\frac{2}{3}}\times3^{3\times\frac{2}{3}}\times2^{3\times\frac{4}{3}}}$

$= \frac{5^5\times9}{5^2\times3^2\times2^4}$

$= \frac{5^3}{2^4}$

$= \frac{125}{16}$

16. Prove that:

$\left[8^{-\frac{2}{3}}\times2^{\frac{1}{2}}\times25^{-\frac{5}{4}}\right]\div\left[32^{-\frac{2}{5}}\times125^{-\frac{5}{6}}\right]=\sqrt{2}$

Ans. : $\text{L.H.S.} = \left[8^{-\frac{2}{3}}\times2^{\frac{1}{2}}\times25^{-\frac{5}{4}}\right]\div\left[32^{-\frac{2}{5}}\times125^{-\frac{5}{6}}\right]$

$= \left[2^{3\times\left(-\frac{2}{3}\right)}\times\sqrt{2}\times5^{2\times\left(-\frac{5}{4}\right)}\right]\div\left[2^{5\times\left(-\frac{2}{5}\right)}\times5^{3\times\left(-\frac{5}{6}\right)}\right]$

$= \left[2^{-2}\times\sqrt{2}\times5^{-\frac{5}{2}}\right]\div\left[2^{-2}\times5^{-\frac{5}{2}}\right]$

$= \frac{2^{-2}\times\sqrt{2}\times5^{-\frac{5}{2}}}{2^{-2}\times5^{-\frac{5}{2}}}$

$= \sqrt{2}$

$= \text{R.H.S.}$

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