

EXPONENTS AND POWERS.

①

Class: VIII, Mathematics

(F)

SOLUTIONS

TEACHING TASK

$$\begin{aligned} 01. \quad \frac{a^{15} \cdot b^4}{a^6 \cdot b^2} &= a^{15-6} \cdot b^{4-2} \\ &= a^9 \cdot b^2 \end{aligned}$$

Ans: B

$$\begin{aligned} 02. \quad x + y &= 5 \\ \Rightarrow x^2 + y^2 + 2xy &= 25 \\ \Rightarrow 10 + 2xy &= 25 \\ \Rightarrow xy &= \frac{15}{2} = 7\frac{1}{2} \end{aligned}$$

Ans: A

$$\begin{aligned} 03. \quad (a^{4n} \cdot b^{3n} \cdot a^{2n})^2 \\ = (a^{4n+3n+2n})^2 \\ = (a^{9n})^2 = a^{18n} \end{aligned}$$

Ans: C

$$\begin{aligned} 04. \quad \left[5 \left(8^{\frac{1}{3}} + 27^{\frac{1}{3}} \right)^3 \right]^{\frac{1}{4}} \\ = \left[5 (2 + 3)^3 \right]^{\frac{1}{4}} \\ = \left[5 \times 125 \right]^{\frac{1}{4}} = \left[625 \right]^{\frac{1}{4}} = 5 \end{aligned}$$

Ans: B



05

(2)

$$\left\{ \left\{ \left(\frac{1}{3}\right)^{-3} - \left(\frac{1}{2}\right)^{-3} \right\} \div \left(\frac{1}{4}\right)^{-3} \right\}$$

$$= (27 - 8) \div 64$$

$$= \frac{19}{64}$$

Ans: A

06

$$\left(\sqrt[3]{4}\right)^{2x+1} = \frac{1}{32} \quad \Rightarrow \quad 2^{\frac{4x+1}{3}} = 2^{-5}$$

$$= 4^{\frac{4x+1}{6}} = 2^{-5} \quad \Rightarrow \quad 4x+1 = -15$$

$$\Rightarrow x = -4$$

Ans: A

07

$$3 \cdot a^8 \cdot b^2 \cdot c^2$$

Ans: D

09

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

$$= \left[\frac{1}{16} - \frac{1}{64} \right] \times 64$$

$$= \left[\frac{4-1}{64} \right] \times 64 = 3$$

Ans: C

10

$$\left(\frac{a^a}{a^b}\right)^{a^2+ab+b^2} \cdot \left(\frac{a^b}{a^c}\right)^{b^2+br+c^2} \cdot \left(\frac{a^c}{a^a}\right)^{c^2+Ca+a^2}$$

$$= \frac{(a-b)(a^2+ab+b^2)}{a} \cdot \frac{(b-c)(b^2+br+c^2)}{a} \cdot \frac{(c-a)(c^2+Ca+a^2)}{a}$$

$$= a^3 - b^3 + b^3 - c^3 + c^3 - a^3$$

$$= a^0$$

$$= 1$$

Ans: A



11.

$$\frac{8m-2}{2}$$

 (3)
Ans: A

12.

$$a^2 = 16 \Rightarrow a = 4.$$

$$\therefore a^{-1} = \frac{1}{a} = \frac{1}{4}$$

Ans: A

13.

$$x^{-2} = 5^{-2} \Rightarrow x = 5$$

Ans: A

14.

$$x^3 \cdot y^3 = z^5$$

$$\Rightarrow x^3 \cdot y^3 = z^5$$

$$\Rightarrow (xy)^3 = z^5$$

$$\Rightarrow xy = z^{\frac{5}{3}}$$

Ans: D

15.

$$a^{8-2} = a^p \Rightarrow p = 6$$

Ans: B

16.

$$m^{n-2n} = m^{-3}$$

$$\Rightarrow n = 3$$

Ans:

17.

$$\left(\frac{m^3}{n^2}\right)^{-2} \times \left(\frac{n^5}{m}\right)^{-1}$$

$$= \frac{m^{-6}}{n^{-4}} \times \frac{n^{-5}}{m^{-1}}$$

$$= m^{-6+1} \times n^{-5+4}$$

$$= m^{-5} \times n^{-1}$$

$$= \frac{1}{m^5 n}$$

Ans: -

$$\begin{aligned}
 19. \quad & (a^3 \cdot b^2)^2 \div a^{-4} \cdot b^3 \\
 &= a^6 \cdot b^4 \div a^{-4} \cdot b^3 \\
 &= a^{6+4} \cdot b^{-4-3} \\
 &= \frac{a^{10}}{b^7}
 \end{aligned}$$

Ans: —

$$\begin{aligned}
 20 \quad & a^9 \cdot b^3 \cdot a^2 \cdot b^{-4} = a^m \cdot b^n \\
 \Rightarrow & a^{11} \cdot b^{-1} = a^m \cdot b^n \\
 \Rightarrow & m+n = 11-1 = 10
 \end{aligned}$$

Ans.

ADVANCED LEVEL

01. Conceptual

Ans: A, B, C, D

$$\begin{array}{r}
 2n \quad 5 \quad 9 \\
 3 \cdot 3 \cdot 3 = 3^3 \\
 \hline
 3 \cdot 3^{16}
 \end{array}$$

$$\begin{aligned}
 2n+5+9-1-16 &= 3 \\
 \therefore 3 &= 3
 \end{aligned}$$

$$\Rightarrow 2n-3 = 3$$

$$\Rightarrow n = 3 \text{ or } \sqrt[4]{81}$$

Ans: B, D

03

$$\sqrt{1+3+9+27+81} = \sqrt{121} = 11 \text{ or } \sqrt{11^2}$$

Ans: B, C

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Ans: B

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Ans: A

$$\begin{aligned} 03. \quad (a^{4n} \cdot b^{3n} \cdot a^{2n})^2 \\ &= (a^{4n+3n+2n})^2 \\ &= (a^{9n})^2 = a^{18n} \end{aligned}$$

Ans: C

$$\begin{aligned} 04. \quad &\left[5 \left(8^{\frac{1}{3}} + 27^{\frac{1}{3}} \right)^3 \right]^{\frac{1}{4}} \\ &= \left[5 (2 + 3)^3 \right]^{\frac{1}{4}} \\ &= \left[5 \times 125 \right]^{\frac{1}{4}} = \left[625 \right]^{\frac{1}{4}} = 5 \end{aligned}$$

Ans: B

$$\left\{ \left\{ \left(\frac{1}{3} \right)^{-3} - \left(\frac{1}{2} \right)^{-3} \right\} \div \left(\frac{1}{4} \right)^{-3} \right\}$$

$$= (27-8) \div 64$$

$$= \frac{19}{64}$$

Ans: A

$$(\sqrt[3]{4})^{2x+\frac{1}{2}} = \frac{1}{32}$$

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

$$\frac{4x+1}{6} = \frac{-5}{2}$$

$$\Rightarrow 4x+1 = -15$$

$$\Rightarrow x = -4$$

Ans: A

$$3 \cdot a^8 \cdot b^2 \cdot c^2$$

Ans: D

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

$$= \left[\frac{1}{16} - \frac{1}{64} \right] \times 64$$

$$= \left[\frac{4-1}{64} \right] \times 64 = 3$$

Ans: C

$$\left(\frac{a^9}{x^b} \right)^{a^2+ab+b^2} \cdot \left(\frac{x^b}{nc} \right)^{b^2+bc+c^2} \cdot \left(\frac{xc}{na} \right)^{c^2+ca+a^2}$$

$$= (a-b)(a^2+ab+b^2) \cdot (b-c)(b^2+bc+c^2) \cdot (c-a)(c^2+ca+a^2)$$

$$= a^3-b^3+b^3-c^3+c^3-a^3$$

$$= x$$

$$= x^0$$

$$= 1$$

Ans: A

(3)
Ans: A

11. $8n-2$
2

12. $a^2=16 \Rightarrow a=4.$

Ans: A

$\therefore a^{-1} = \frac{1}{a} = \frac{1}{4}$

13. $x^{-2} = \frac{-2}{5} \Rightarrow x=5$

Ans: A

14. $x^3 \cdot y^3 = z^5$

$\Rightarrow x^3 \cdot y^3 = z^5$

$\Rightarrow (xy)^3 = z^5$

Ans: D

$\Rightarrow xy = z^{\frac{5}{3}}$

15. $a^{8-2} = a^p \Rightarrow p=6$

Ans: B

16. $m^{n-2n} = m^{-3}$

$\Rightarrow n=3$

Ans:

17. $\left(\frac{m^3}{n^2}\right)^{-2} \times \left(\frac{n^5}{m}\right)^{-1}$

$= \left(\frac{m^{-6}}{n^{-4}}\right) \times \frac{n^{-5}}{m^{-1}}$

$= m^{-6+1} \times n^{-5+4}$

$= m^{-5} \times n^{-1}$

Ans:

$= \frac{1}{m^5 n}$

5

18

$$\begin{aligned}
 19. \quad & (a^3 \cdot b^2)^2 \div a^{-4} \cdot b^3 \\
 &= a^6 \cdot b^{-4} \div a^{-4} \cdot b^3 \\
 &= a^{6+4} \cdot b^{-4-3} \\
 &= a^{10} \cdot b^{-7} \\
 &= \frac{a^{10}}{b^7}
 \end{aligned}$$

Ans: —

$$\begin{aligned}
 20 \quad & a^3 \cdot b^3 \cdot a^2 \cdot b^{-4} = a^m \cdot b^n \\
 \Rightarrow & a^{11} \cdot b^{-1} = a^m \cdot b^n \\
 \Rightarrow & m+n = 11-1 = 10
 \end{aligned}$$

Ans.

ADVANCED LEVEL

01. Conceptual

Ans: A, B, C, D

$$\begin{aligned}
 02. \quad & \frac{2n \cdot 5 \cdot 3^9}{3 \cdot 3 \cdot 3} = 3^3 \\
 & \frac{2n \cdot 5 \cdot 3^9}{3 \cdot 3 \cdot 3} = 3^3 \\
 & 2n + 5 + 9 - 1 - 16 = 3 \\
 & 2n - 3 = 3
 \end{aligned}$$

$$\begin{aligned}
 \Rightarrow & 2n - 3 = 3 \\
 \Rightarrow & n = 3 \text{ or } \sqrt[4]{81}
 \end{aligned}$$

Ans: B, D

$$\begin{aligned}
 03. \quad & \sqrt[3]{1+3+9+27+81} = \sqrt{1+1} = 11 \text{ or } \sqrt{11^2} \\
 & \text{Ans: B, C}
 \end{aligned}$$

$$\begin{aligned}
 04. \quad & a^{3/2} = \sqrt{a^3} = a \sqrt{a} = a \cdot a^{1/2} \\
 & \text{Ans: A, C, D}
 \end{aligned}$$



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05	$\begin{aligned} &3^{-5} \cdot m \cdot n^2 = p \\ \Rightarrow &m \cdot 3^{-5} \cdot n^2 = p \\ \Rightarrow &m \cdot n^2 = p \end{aligned}$	Ans: C
06.	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
07.	<u>Assertion:</u> Conceptual (False) <u>Reason:</u> Conceptual (False)	
08	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
09	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
10.	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
11.	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
12.	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
13	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
14.	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A
15.	<u>Assertion:</u> Conceptual (True) <u>Reason:</u> Conceptual (True)	Ans: A

16. Statement I:

$$x^{2017} \times \frac{1}{x^{2016}}$$

①

$$= x^{2017-2016}$$

$$= x$$

$$= x^1 \text{ (True)}$$

Statement II: Conceptual (True)

17. Statement I: $a^m = a^n \Rightarrow m = n$ (True)

$$x^{x+2} = 4x-3$$

$$8 = 2 = 2 \quad 4x-3$$

$$\Rightarrow \left(\frac{3}{2}\right)^{x+2} = 2 \quad 4x-3$$

$$\Rightarrow \frac{3x+6}{2} = 2 \quad 4x-3$$

$$\Rightarrow 3x+6 = 4x-3$$

$$\Rightarrow 4x-3x = 6+3$$

$$\Rightarrow x = 9 \text{ (True)}$$

Ans: A

18

$$\frac{\frac{x+2}{3} \cdot \frac{2x-1}{3}}{\frac{4x-3}{3}} = \frac{x+2+2x-1}{3} = \frac{3x+1}{3} = \frac{4x-3}{3}$$

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

Ans:

19.

$$= \frac{\frac{a+3}{2} \cdot \frac{3a-1}{3}}{6^{a-2}}$$

$$= \frac{\frac{a+3}{2} \cdot \frac{3a-1}{3}}{(2 \cdot 3)^{a-2}}$$

$$= \frac{\frac{a+3}{2} \cdot \frac{3a-1}{3}}{2^{a-2} \cdot 3^{a-2}} = \frac{(a+3)-(a-2)}{2} \cdot \frac{(3a-1)-(a-2)}{3} = \frac{2}{2} \cdot \frac{2a+1}{3}$$

Ans: —

20.

$$\begin{aligned}
 \frac{3x-1}{2} \cdot 4^{x+2} &= 8^{2x} \\
 \Rightarrow \frac{3x-1}{2} \cdot \left(\frac{2^2}{2}\right)^{x+2} &= \left(\frac{2^3}{2}\right)^{2x} \\
 \Rightarrow \frac{3x-1}{2} \cdot 2^{2x+4} &= 2^{6x} \\
 \Rightarrow \frac{5x+3}{2} &= 2 \\
 \Rightarrow 5x+3 &= 6x \\
 \Rightarrow x &= 3
 \end{aligned}$$

Ans: —

21

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

Ans: C

22

$$\begin{aligned}
 \left(\frac{5}{2}\right)^{-5} \cdot \left(\frac{2}{3}\right)^{-5} \\
 = \left(\frac{5}{2} \times \frac{2}{3}\right)^{-5} \\
 = \left(\frac{5}{3}\right)^{-5} = \left(\frac{3}{5}\right)^5 =
 \end{aligned}$$

Ans: —

23

$$\begin{aligned}
 \frac{2x-1}{5} &= 25^{x+2} \\
 \Rightarrow \frac{2x-1}{5} &= 5^{2x+4} \\
 \Rightarrow 2x-1 &= 2x+4
 \end{aligned}$$

Ans: —

24

$$\begin{aligned}
 \frac{x-2}{4} &= 8^{2x+1} \\
 = \frac{2^{x-4}}{2} &= 2^{6x+3} \\
 \Rightarrow 2x-4 &= 6x+3 \\
 \Rightarrow 4x &= -4-3 \\
 \Rightarrow x &= -\frac{7}{4}
 \end{aligned}$$

Ans: —

25.

$$\frac{3x}{2} = 16 \cdot 2^x$$

$$\Rightarrow \frac{3x}{2} = 4 + x$$

$$\Rightarrow 3x = 4 + x$$

$$\Rightarrow 2x = 4$$

$$\Rightarrow x = 2$$

Ans: 2

26

$$3^{x+2} = 18$$

$$\Rightarrow 3^x \cdot 3^2 = 18$$

$$\Rightarrow 3^x \cdot 9 = 18$$

$$\Rightarrow 3^x = 2$$

Ans: 2

27

$$8^{x-1} = 2^{x+3}$$

$$\Rightarrow \frac{3x-3}{2} = \frac{x+3}{2}$$

$$\Rightarrow 3x-3 = x+3$$

$$\Rightarrow 2x = 6$$

$$\Rightarrow x = 3$$

Ans: 3

28

$$29. a) 5^{-5} = \frac{1}{5^5}$$

$$b) {}_6^{-6} \times {}_6^6 = {}_6^{-6+6} = {}_6^0 = 1$$

$$c) \text{ If } x = \frac{3}{7} \Rightarrow x = 7$$

$$d) {}_2^1 \cdot {}_2^1 = 2^1 = 2$$

Ans: b, c, d, e

29

$$a) \frac{2^{10}}{2^{-10}} = 2^{10+10} = 2^{20}$$

(10)

$$b) 6^{18} = (2 \times 3)^{18} = 2^{18} \times 3^{18}$$

$$c) 2^x = 16 \Rightarrow x = 4$$

$$d) 5^0 - 6^0 = 1 - 1 = 0$$

Ans: 5, 6, 7

LEARNER'S TASK

CUR'S

$$01. \left(-\frac{2}{5}\right)^{-3} = \left(-\frac{5}{2}\right)^3 = -\frac{125}{8}$$

Ans: B

$$02. (-n^2)^2 \times (-n^2)^3$$

$$= n^4 \times -n^6 = -n^{10}$$

Ans: A

$$03. x = a^m, y = a^n, \therefore x^m = a^{nm} \therefore x = y$$

Ans: A

$$04. (x^{m-n})^p \cdot (x^{n-p})^m \cdot (x^{p-m})^n = x^{mp-np+nm-pm+pn-mn} = x^0 = 1$$

Ans: B

$$05. x^0 = 1$$

Ans: C

$$06. 20 \cdot (x-y)^4$$

Ans: A

$$07. (2010)^{2010}$$

Ans: B

$$08. (-1 - \frac{1}{2}) \times 6^0 = (-1-1) \times 6^0 = 0$$

Ans: D

$$09. (-1)^{2014} = 1, \text{ since } 2014 \text{ is Even.}$$

Ans: A

$$10. \quad 3^5 - 6^5 = 5^3 - 3^5 \\ = 125 - 243 \\ = -118$$

Ans: D

$$11. \quad \frac{a^{10}}{a^{12}} = a^{10-12} = a^{-2}$$

Ans: C

$$12. \quad \frac{3^2}{4} - 4^8 \\ = 4^9 - 4^8 = 4^8(4-1) = 3 \times 4^8 \\ = 3 \times 2^{16}$$

Ans: B

$$13. \quad 8^x \times 2^2 = 2^6 \\ \Rightarrow 2^{3x+2} = 2^6 \Rightarrow x = \frac{4}{3}$$

Ans: B

$$14. \quad 96326000000 \\ = 96326 \times 10^6 \\ = 9.6326 \times 10^{10}$$

Ans: B

JEE MAINS LEVEL

$$01. \quad \frac{1}{2} \times (3^x - 3^{x-1}) = 81$$

$$3^x - \frac{3^x}{3} = 162 \Rightarrow x = 5 \text{ (option verification)}$$

Ans: D

$$02. \quad 0.000019^{-6} \\ = \frac{19}{1000000} = 19 \times 10^{-6} \\ = 1.9 \times 10^{-5}$$

Ans: A

$$03. \quad (x^{-1} + y^{-1})^{-1} = \left(\frac{1}{x} + \frac{1}{y} \right)^{-1} = \left(\frac{x+y}{xy} \right)^{-1} = \frac{xy}{x+y}$$

Ans: C

$$\left[x^{2-3n+4+3n-3} \right]^3$$

12

$$= \left(x^3 \right)^3 = x^9$$

Ans: D

$$3^{x-1} = 3^2 \quad \left| \quad \frac{y+2}{4} = 4^3 \right| \quad \therefore \frac{x}{y} = 3$$

Ans: B

$$\Rightarrow y = 1$$

$$\left\{ \left(\frac{3}{2} \right)^{-1} \div \left(-\frac{2}{5} \right)^{-1} \right\}$$

$$= \left\{ \frac{2}{3} \div \left(-\frac{5}{2} \right) \right\} = \frac{2}{3} \times -\frac{2}{5} = -\frac{4}{15}$$

Ans: D

$$\frac{5x-3}{19x+2} = \frac{3}{5}$$

$$\Rightarrow 25x - 15 = 57x + 6$$

$$\Rightarrow 32x = -21$$

$$\Rightarrow x = -\frac{21}{32}$$

Ans: A

19.

$$x+y=5$$

$$\Rightarrow x^2+y^2+2xy=25$$

$$\Rightarrow 10+2xy=25$$

$$\Rightarrow xy = \frac{15}{2} = 7\frac{1}{2}$$

Ans: A

$$\begin{aligned} 10. & (50 \cdot 5)^2 - (49 \cdot 5)^2 \\ &= (50 \cdot 5 + 49 \cdot 5)(50 \cdot 5 - 49 \cdot 5) \\ &= 100 \times 1 \\ &= 100 \end{aligned}$$

Ans: B

04. $\left[x^{2-3n+4+3n-3} \right]^3$

(12)

$= \left(x^3 \right)^3 = x^9$

Ans: D

05. $\left. \begin{array}{l} 3^{x-1} = 3^2 \\ \Rightarrow x = 3 \end{array} \right| \begin{array}{l} y+2 = 4^3 \\ \Rightarrow y = 14 \end{array} \right| \therefore \frac{x}{y} = \frac{3}{14}$

Ans: B

06. $\left\{ \left(\frac{3}{2} \right)^{-1} \div \left(-\frac{2}{5} \right)^{-1} \right\}$
 $= \left\{ \frac{2}{3} \div \left(-\frac{5}{2} \right) \right\} = -\frac{2}{3} \times \frac{-2}{5} = -\frac{4}{15}$

Ans: D

08. $\frac{5x-3}{19x+2} = \frac{3}{5}$
 $\Rightarrow 25x - 15 = 57x + 6$
 $\Rightarrow 32x = -21$
 $\Rightarrow x = -\frac{21}{32}$

Ans: A

09. $x+y = 5$
 $\Rightarrow x^2 + y^2 + 2xy = 25$
 $\Rightarrow 10 + 2xy = 25$
 $\Rightarrow xy = \frac{15}{2} = 7\frac{1}{2}$

Ans: A

10. $(50.5)^2 - (49.5)^2$
 $= (50.5 + 49.5)(50.5 - 49.5)$
 $= 100 \times 1$
 $= 100$

Ans: B

12. $2^{0.64} + 0.36 = 2^1 = 2$

Ans: B

13. $a^3 \times b^2 = a^5 \times b$

$\Rightarrow b = a^2$

Ans: A

The value of b is a^2

14. $\frac{1}{2^2} + \frac{1}{3^3} = \frac{1}{4} + \frac{1}{27}$

$= \frac{31}{108}$

Ans: B

15. $\frac{a^4(x-x^4)}{x^3(x-x^4)} = x^{-2^4}$

Otherwise, $\frac{x^4 \times x^7}{x^3} = x^8$

Ans: B

16. $3^4 \times x = 729 = 3^6$

$\therefore x = 3^2 = 9$

Ans: —

17. $x^0 = 1$

Ans: D

18. $3^{2x-1} = 3^3$

$\Rightarrow x = 2$

Ans: C

19. $8x^6 \cdot 9x^2 = 72x^8$

Ans: —

20. $a^{3+4} \cdot b^{-2-4} = \frac{a^7}{b^6}$

Ans: —

21. $\frac{x^2}{p^2 \cdot q^{-3}} \times \frac{x^6}{p^2 \cdot q^2} = \frac{x^8}{p^4 \cdot q^{-1}} = p^{-4} \cdot q \cdot x^8$

Ans:

14

$$\begin{aligned}
 22. \quad (ab)^2 &= \frac{c}{d^3} \\
 \Rightarrow ab &= \frac{c^{1/2}}{d^{3/2}} \\
 (ab)^3 &= (ab)^2 \cdot (ab) \\
 &= \frac{c}{d^3} \times \frac{c^{1/2}}{d^{3/2}} \\
 &= \frac{c^{3/2}}{d^{9/2}}
 \end{aligned}$$

ADVANCED LEVEL QUESTIONS

$$\begin{aligned}
 01. \quad n-2n+4n &= m^p \\
 \Rightarrow 3n &= m^p \\
 \Rightarrow 3n &= p \\
 \text{Ans: } C
 \end{aligned}$$

$$\begin{aligned}
 02. \quad \frac{x^{-6}}{y^{-4}} \times \frac{y^{15}}{x^{-3}} &= \frac{y^{19}}{x^6} = x^{-6} y^{19} \\
 \text{Ans: } C
 \end{aligned}$$

$$\begin{aligned}
 03. \quad 8^{\frac{2}{3}} &= \left(\frac{2}{3}\right)^{\frac{2}{3}} = 2^2 = 4 \quad (64)^{\frac{3}{64}} (x)^2 \\
 \text{Ans: } A, B, C
 \end{aligned}$$

$$\begin{aligned}
 04. \quad \frac{9+14}{2} &= \frac{23}{2} \text{ or } \frac{14+9}{2} \text{ or } \frac{9+24}{2} \\
 \text{Ans: } A, C, D
 \end{aligned}$$

$$\begin{aligned}
 05. \quad \frac{2n \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3}{3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3} &= \frac{1}{27}
 \end{aligned}$$

$$\begin{aligned}
 &\left| \begin{array}{l} \frac{3n+2}{3} = \frac{-8}{27} = -\frac{8}{27} \\ \frac{3n}{3} \cdot \frac{8}{3} \end{array} \right| \Rightarrow n-m = -1 \\
 &\Rightarrow n-m = 1 \\
 &\Rightarrow \frac{3n(9-1)}{3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3} = \frac{1}{27} \\
 &\Rightarrow \frac{3n-3m}{3} = \frac{-3}{3} \\
 \text{Ans: } A
 \end{aligned}$$

Statement I:

$$2^x = 4^y = 8^z$$

$$\Rightarrow 2^x = 2^{2y} = 2^{3z}$$

$$\Rightarrow x = 2y = 3z$$

Given $xyz = 288$

$$\Rightarrow x\left(\frac{x}{2}\right)\left(\frac{x}{3}\right) = 288$$

$$\Rightarrow x^3 = 2^6 \times 3^3$$

$$\Rightarrow x = 2^2 \times 3 = 12$$

$$\therefore x = 12, y = 16, z = 8$$

$$\therefore \frac{1}{2x} + \frac{1}{4y} + \frac{1}{8z} = \frac{1}{24} + \frac{1}{64} + \frac{1}{96}$$

$$= \frac{11}{96} \quad (\text{True})$$

Ans: A

12. $x^0 = 1$

13. $\frac{-5+2x+1}{2} = 2$

$$\Rightarrow 2x - 4 = 6$$

$$\Rightarrow x = 5$$

14. 0.000939478

$$= \frac{939478}{10^9} = 939478 \times 10^{-9}$$

$$= 9.39478 \times 10^5 \times 10^{-9}$$

$$= 9.39478 \times 10^{-4}$$

Ans: A

15. $3^{x+5} = 81^{x-1}$
 $\Rightarrow 3^{x+5} = 3^{4x-4}$
 $\Rightarrow x+5 = 4x-4$
 $\Rightarrow 3x = 9$
 $\Rightarrow x = 3$

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Ans: 3

16. $100 - 100 = 2^0 = 1$

Ans: 1

17. $\frac{3x-3}{2} = \frac{x+3}{2}$
 $\Rightarrow 3x-3 = x+3$
 $\Rightarrow 2x = 6$
 $\Rightarrow x = 3$

Ans: 3

18. a) $2^{100} = 100^2$
b) $(12^0 - 11^0)(3^1 - 1^3) = (1-1)(3-1) = 0$
c) $(128)^{\frac{5}{7}} = (2^7)^{\frac{5}{7}} = 2^5 = 32$
d) $5^x = 25^y = 625$
 $\Rightarrow 5^x = 5^{2y} = 5^4$
 $\Rightarrow x = 4, y = 2$
Now, $x^2 - y^2 = 4^2 - 2^2 = 16 - 4 = 12$

Ans: 12, 18, 9

- 19
- a) $\frac{0-10}{2} = -5$
 - b) $\frac{18-12}{2} = 3$
 - c) $\frac{18-12}{2} = 3$
 - d) $\frac{18-12}{2} = 3$

THE END

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19. a) $2^{10-(-10)} = 2^{20}$

b) $6^{18} = (2 \times 3)^{18} = 2^{18} \times 3^{18}$

c) $2^x = 16 \Rightarrow x = 4$

d) $5^6 - 6^6 = 1 - 1 = 0$

$\Rightarrow$ THE END $\in$

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Ans: s, u, t, q