2. EXPONENTS AND POWERS

INTEGRATED + (V_2) ①

Class: VIII . MATHEMATICS

TEACHING TASK (JEE MAINS)

01. $\frac{(9\times10^6)\times(2\times10^3)}{(6\times10^2)} = \frac{18\times10^9}{6\times10^2} = 3\times10^7$ Ans: A

02 $(3\times10^7)\times(2\times10^2) = 6\times10^9$ Ans: A

03 $5.6\times10^{-3} = \frac{5.6}{1000} = \frac{56}{10000} = 0.0056$ Ans: B

04. $2^3\times2^4 = 2^{3+4} = 2^7$ Ans: A

Also $8\times16 = 2^3\times2^4 = 2^7$, but it is not simplified form

05 $-5p^3q$, variable part $= p^3q$ Ans: B

06 $\frac{x^4\times x^7}{x^3} = \frac{x^{11}}{x^3} = x^8$ Ans: B

07 We know, $729 = 3^6$

Given $3^4\times3^2 = 3^6$

$\therefore 3^2$ should be multiplied Ans B

08 $\left(\frac{x^m}{x^n}\right)^p\cdot\left(\frac{x^n}{x^p}\right)^m\cdot\left(\frac{x^p}{x^m}\right)^n$

$= (x^{m-n})^p\cdot(x^{n-p})^m\cdot(x^{p-m})^n$

$= x^{mp-np+nm-pm+pn-mn}$

$= x^0 = 1$ Ans: D

09. $3^{2x-1} = 27 = 3^3$

$\Rightarrow 2x-1 = 3$

$\Rightarrow x = 2$

Ans : C

10. $\left(\frac{p^2 \cdot q^{-3}}{r^2}\right)^{-1} \cdot \left(\frac{r^3}{pq}\right)^2 = r^8 \cdot p^{-4} \cdot q$

$= \frac{r^2}{p^2 \cdot q^{-3}} \times \frac{r^6}{p^2 \cdot q^2}$

Ans. D

JEE ADVANCED

11. $m^n \times m^{-2n} \times m^{4n} = m^p$

$\Rightarrow m^{n-2n+4n} = m^p$

$\Rightarrow m^{3n} = m^p$

$\Rightarrow 3n = p$ (or)

$n = p = 0$

Ans : C, D

12 $45\,00000 = 4.5 \times 10^6$

$= 0.45 \times 10^7$

$= 4.50 \times 10^6$

Ans : A, B, D

13 Statement I: $\left(2^3\right)^2 = 2^6 = 64$

$3^2 \cdot 3^3 = 3^{2+3} = 3^5$ (True)

Statement II: Conceptual (True)

Ans : A

14. Statement I: $2^5 \times 2^3 = 2^{5+3} = 2^8$ (True)

Statement II: Conceptual (True)

Ans : A

15 Assertion : $\frac{3^{-2}}{3^{-5}} = 3^{-2+5} = 3^3$ (True)

Reason: Conceptual (False)

Ans : C

16 **Assertion:** $9^x = 81$

$\Rightarrow 9^x = 9^2 \Rightarrow x = 2$ (True)

Reason: $81 = 9^2$ (True)

Ans: A

17 Given distance between Earth to moon $= 3.84 \times 10^5$

" " Earth to sun $= 1.5 \times 10^8$

No. of times farther in the sun than the moon from Earth $= \frac{1.5 \times 10^8}{3.84 \times 10^5} = 390.625$

$\therefore$ Approximately $= 390$

Ans: B

18 Speed of the spaceship $= 1.92 \times 10^3$ km/min

Distance b/w Earth & moon $= 3.84 \times 10^5$

$\therefore$ We know, $\text{speed} = \frac{\text{Distance}}{\text{time}}$

$\Rightarrow \text{time} = \frac{\text{Distance}}{\text{speed}} = \frac{3.84 \times 10^5}{1.92 \times 10^3}$

$= 200$ min

19. $3^x = 81 = 3^4 \Rightarrow x = 4$

Ans: C

20 $a^m = a^n \Rightarrow m = n$

Ans: D

21. $2^{100} \times 2^{-100} = 2^{100-100} = 2^0 = 1$

Ans: 1

22 $(2x^2y)^3 = 2^3 \cdot x^6 \cdot y^3 = 8x^6y^3 = 8x^a y^b$

$\therefore a = 6, b = 3 \Rightarrow a + b = 9$

Ans: 9

23 a) $(6^4)^3 = 6^{4\times3} = 6^{12}$ (P)

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

c) $x^3 = 7^3 \Rightarrow x = 7$ (S)

d) $2^{1^3} = 2^1 = 2$ (R)

Ans: P, Q, S, R

24 a) $2^3 \times 2^4 = 2^{3+4} = 2^7$ (P)

b) $(3^2)^3 = 2^6$ (Q)

c) $\frac{5^6}{5^2} = 5^{6-2} = 5^4$ (R)

d) $7^0 = 1$ (S)

Ans: P, Q, R, S

LEARNERS TASK (CUQ's)

01. $\frac{-9x^2y^3}{x^2y^3} = -9$ Ans: A

02 $-3^4 \rightarrow -1 \times 3^4$ ∴ base = 3 Ans: B

03 $(4\times5)^2 = 4^2 \times 5^2$ Ans. B

04 $8x^0 = 8 \times 1 = 8$ Ans: C

05 $(a-b)^0 = (1-1)^0 = 0^0$, Not defined Ans. D

06 $x^m = x^n \Rightarrow m = n$ Ans: C

07 $\frac{5^2}{5^6} = 5^{2-6} = \frac{1}{5^{6-2}} = \frac{1}{5^4} = \frac{1}{625} = 5^{-4}$

Ans. D

08 $(2^4 \times 3^2)^2 = (2^4)^2 \times (3^2)^2 = 2^8 \times 3^4$ Ans: A (5)

09 $\left(\frac{1}{2}\right)^{-3} = (2)^3 = 8$ Ans. B

10. $9^{\frac{3}{2}} = (3^2)^{\frac{3}{2}} = 3^3 = 27$ Ans: B

JEE MAINS LEVEL

01. $\frac{3^2 \times 3^{-4}}{3^{-3}} = 3^{2-4+3} = 3$ Ans A

02 $45 \times 10^5 = 4.5 \times 10^6$ Ans: A

03 $\frac{8 \times 10^6}{4 \times 10^3} = 2 \times 10^3$ Ans: A

=

04 3.5×10^7 Ans: B

05 $(9^0 + 8^0) \times 2^3 = (1+1) \times 2^3 = 2 \times 2^3 = 2^4 = 16$ Ans: C

06 $(3^2)^4 = 3^8$ Ans. B

07 $3^x = 81 \Rightarrow 3^x = 3^4 \Rightarrow x = 4$ Ans: C

08 $\frac{5^4 \times 5^{-2}}{5^3} = 5^{4-2-3} = 5^{-1} = \frac{1}{5}$ Ans. A

9) $(2^{-1} + 4^{-1}) - 1 = \left(\frac{1}{2} + \frac{1}{4}\right) - 1 = \frac{3}{4} - 1 = \frac{-1}{4}$

Ans. C

10. $\frac{a}{b} = \frac{2^3 \times 3^2}{2^2 \times 3^3} = \frac{2}{3}$ Ans. A

11 $4^3 + 4^3 + 4^3 + 4^3 = 4 \cdot 4^3 = 4^4 = 4^2 \times 4^2$

$= 256$

Ans: A, B, C

12 $-5x^3y^2 + 7x^2 - 4$

A) Coefficient of x^3y^2 is -5 (True)

B) $7x^2 \rightarrow$ Coefficient 7, Variable x (True)

C) Constant term $= -4$ (True)

D) The expression has three terms (True)

Ans. A, B, C (D)

13 Statement I:

Given $x^y = y^x \Rightarrow y = x^{\frac{y}{x}}$

$LHS = \left(\frac{x}{y}\right)^{\frac{x}{y}} = \left(\frac{x}{x^{\frac{y}{x}}}\right)^{\frac{x}{y}} = \left(x^{1-\frac{y}{x}}\right)^{\frac{x}{y}}$

$= x^{\frac{x}{y} - 1}$ (True)

Statement II:

Giv $2^x = 4^y = 8^z \Rightarrow 2^x = 2^{2y} = 2^{3z} \Rightarrow x = 2y = 3z$

Given $xyz = 288$

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

$\Rightarrow x^3 = 1728$

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

$x = 12, y = 6, z = 4$

$LHS = \frac{1}{2x} + \frac{1}{4y} + \frac{1}{8z}$

$= \frac{1}{24} + \frac{1}{24} + \frac{1}{32}$

$= \frac{11}{36}$ (True)

Ans. A

14. Statement I: $(3x^2y)^3 = 27x^6 \cdot y^3$ (True) (1)

Statement II: Conceptual (False) Ans: C

15 Assertion: $8^{\frac{2}{3}} = (2^3)^{\frac{2}{3}} = 2^2 = 4$ (True)

Reason: Conceptual (False) Ans: C

16. Assertion: $7a^3b^2 \rightarrow$ Degree $3+2=5$ (True)

Reason: Conceptual (False) Ans: C

17 $3^{x+2} = 81 = 3^4$

$\Rightarrow x+2=4$

$\Rightarrow x=2$ Ans. A

18 $5^{2x} = 125 = 5^3$

$\Rightarrow 2x=3$

$\Rightarrow x=1.5$ Ans: C

19. $a^3b^2 = 2^3 \cdot 3^2 = 8 \cdot 9 = 72$ Ans. A

20. $2a^3b^2 = 2 \cdot 2^3 \cdot 3^2 = 2 \cdot 8 \cdot 9 = 144$ Ans. B

21. $(5x^{-1})(5^3) = 125^2$

$\Rightarrow x^{-1} \cdot 5^4 = (5^3)^2 = 5^6$

$\Rightarrow x^{-1} = 5^2 \Rightarrow x = \frac{1}{25} = 0.04$

$\therefore$ Integral value $= 0$ Ans: 0

22 $2^x = 2^7 \Rightarrow x = 7$ Ans: 7

23. a) $3^x = 27 \Rightarrow 3^x = 3^3 \Rightarrow x = 3$ (p)

b) $2^x = 16 \Rightarrow 2^x = 2^4 \Rightarrow x = 4$ (q)

c) $9^x = 81 \Rightarrow 9^x = 9^2 \Rightarrow x = 2$ (r)

d) $5^x = 5 \Rightarrow 5^x = 5^1 \Rightarrow x = 1$ (s)

Ans. p, q, r, s

24 a) Conceptual (p)

b) Conceptual (q)

c) Conceptual (r)

d) Conceptual (s)

$\Rightarrow$ THE END $\in$