Class –IX | **Topic – INDICES**

Section B (2 marks)

Evaluate the following :

1. $\left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 5^0 + \left(\frac{9}{26}\right)^{-\frac{1}{2}}$ $\left[5\frac{1}{3}\right]$

2. $\sqrt{\frac{1}{4}} + (0.01)^{-\frac{1}{2}} - (27)^{\frac{2}{3}} \times 3^0$ $\left[1\frac{1}{2}\right]$

3. $\left[(64)^{\frac{2}{3}} \times 2^{-2} \div 70\right]^{-\frac{1}{2}}$ $\left[\frac{1}{2}\right]$

4. $\left(\frac{16}{81}\right)^{\frac{-3}{4}} \times \left(\frac{49}{9}\right)^{\frac{3}{2}} \div \left(\frac{343}{216}\right)^{\frac{2}{3}}$ $\left[31\frac{1}{2}\right]$

Section C (3 marks)

1. Simplify: $\left(\frac{a^m}{a^n}\right)^{m+n} . \left(\frac{a^n}{a^l}\right)^{n+l} . \left(\frac{a^l}{a^m}\right)^{l+m}$ [1]

2. Show that : $\left(\frac{a^m}{a^{-n}}\right)^{m-n} \times \left(\frac{a^n}{a^{-l}}\right)^{n-l} \times \left(\frac{a^l}{a^{-m}}\right)^{l-m} = 1$

3. Solve for x: $\sqrt{\left(\frac{3}{5}\right)^{1-2x}} = 4\frac{17}{27}$ $[x = 3.5]$

4. Solve : $2^{2x+3} - 9 \times 2^x + 1 = 0$ $[x = 0]$

5. Evaluate $\sqrt{\frac{a}{b}} = \left(\frac{b}{a}\right)^{1-3x}$ $\left[\frac{1}{2}\right]$

6. Evaluate $\left(\sqrt{\frac{3}{5}}\right)^{x-1} = \left(\frac{27}{125}\right)^{-1}$ $[x = -5]$

Section D (4 marks)

7. Given : $1176 = 2^p . 3^q . 7^r$, find :

   (i) The numerical values of p, q and r $[p = 3, q = 1 \& r = 2]$

(ii) The value of $2^p.3^q.7^{-r}$ as a fraction $\left[\frac{24}{49}\right]$

8. Simplify : $\left(\frac{x^a}{x^{-b}}\right)^{a^2-ab+b^2} \times \left(\frac{x^b}{x^{-c}}\right)^{b^2-bc+c^2} \times \left(\frac{x^c}{x^{-a}}\right)^{c^2-ca+a^2}$ $[x^2(a^3+b^3+c^3)]$

9. Prove that: $\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{b-c}+x^{a-c}} = 1$

10. Evaluate: $(64)^{\frac{2}{3}} - \sqrt[3]{125} - \frac{1}{2^{-5}} + (27)^{-\frac{2}{3}} \times \left(\frac{25}{9}\right)^{-\frac{1}{2}}$ $[-20\ \frac{14}{15}]$

11. Solve for x: $(81)^{\frac{3}{4}} - \left(\frac{1}{32}\right)^{-\frac{2}{5}} + x\left(\frac{1}{2}\right)^{-1}.20 = 27$ [2]

12. Evaluate : $\frac{2^n \times 6^{m+1} \times 10^{m-n} \times 15^{m+n-2}}{4^m \times 3^{2m+n} \times 25^{m-1}}$ $\left[\frac{2}{3}\right]$

13. Solve for x if :

(i) $\left(\sqrt[3]{4}\right)^{2x+\frac{1}{2}} = \left(\sqrt[3]{8}\right)^5$ $[3\frac{1}{2}]$

(ii) $p^{1-2x} \times \sqrt{p} = q^{1-2x} \times \sqrt{q}; p \neq q$ $[x = \frac{3}{4}]$

18. Prove: $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} . \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} . \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$

19. Prove: $\left(\frac{x^a}{x^b}\right)^{a^2-ab+b^2} \times \left(\frac{x^b}{x^c}\right)^{b^2-bc+c^2} \times \left(\frac{x^c}{x^a}\right)^{c^2-ca+a^2} = 1$