

Theory of Indices

3

1m	2m	3m	4m	5m	6m	Total
1(K)	1(U)	1(S)	–	–	–	06

(Knowledge)

1 MARK QUESTIONS

- Simplify: $(7^3)^0 + (5^2)^0$.
- Simplify: $(3^2)^0 + (5^3)^{(2^0)}$.
- Simplify: $(a^0)^2 + (b^2)^0$.
- Simplify: $\left(\frac{9}{4}\right)^{-\frac{3}{2}}$.
- Simplify: $\left(\frac{16}{8}\right)^{\frac{1}{2}}$.
- Simplify: $\left(\frac{5x^3}{y}\right)^2$.
- Simplify: $\left(\frac{27x^2}{y^2}\right)^{\frac{1}{3}}$.
- Simplify: $\left[\left\{\sqrt[4]{x^2}\right\}^4\right]^{\frac{1}{2}}$.
- Simplify: $\left[(3x^2)^{\frac{1}{2}}\right]^3$.
- Simplify: $\left(\frac{3}{2}\right)^2 \cdot \left(\frac{2}{3}\right)^{\frac{1}{2}}$.

2 MARKS QUESTIONS

(Understanding)

- Simplify: $\frac{2^{n+1} + 2^{n-1}}{2^n + 2^{n+2}}$.
- Simplify: $\frac{3^{n-1} + 3^{n+2}}{3^n + 3^{n+2}}$.
- Simplify: $\frac{a^{2m-n} \cdot a^{4m+2n}}{a^{5m+3n}}$.
- Simplify: $\frac{2^{7b-2a} \cdot 8^{2a-b}}{16^{a+b}}$.
- Simplify: $\frac{(7)^{(3^0)} + (5^0)^4}{(3^2)^0 + (2^2)^1}$.
- Simplify: $\frac{x^{4m-n} \cdot x^{3m-n}}{x^{8m+9n}}$.
- Prove that: $(x^{b-c})^a \cdot (x^{c-a})^b \cdot (x^{a-b})^c = 1$.
- Simplify: $\left(\frac{x^a}{x^b}\right)^{a+b} \left(\frac{x^b}{x^c}\right)^{b+c} \left(\frac{x^c}{x^a}\right)^{c+a}$.

BASIC MATHEMATICS

9. Simplify: $2(3^{-2}) + \left(\frac{1}{4}\right)^{-2} + 3^0$.

10. Simplify: $\frac{2^b(2^{b+2})^2}{2^{b+3} \cdot 4^b}$.

3 MARKS QUESTIONS

(Skill based)

1. Prove that $\left(\frac{x^{a+b}}{x^{b-c}}\right)^{a-c} \left(\frac{x^{b+c}}{x^{c-a}}\right)^{b-a} \left(\frac{x^{c+a}}{x^{a-b}}\right)^{c-b} = 1$.

2. Simplify: $\left(\frac{x^b}{x^c}\right)^{\frac{1}{bc}} \cdot \left(\frac{x^c}{x^a}\right)^{\frac{1}{ca}} \cdot \left(\frac{x^a}{x^b}\right)^{\frac{1}{ab}}$.

3. If $a^x = b^y = c^z$ and $b^2 = ac$ show that $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$.

4. If $a^x = b$, $b^y = c$, $c^z = a$ show that $xyz = 1$.

5. Simplify: $\frac{x^{-1}}{y^{-1} + x^{-1}} + \frac{x^{-1}}{y^{-1} - x^{-1}}$.

6. Simplify: $\frac{y^{-1}}{x^{-1} + y^{-1}} + \frac{y^{-1}}{x^{-1} - y^{-1}}$.

7. If $l^x = m^y = n^z = p^w$ and $lm = np$ show that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z} + \frac{1}{w}$.

8. If $9^x = 5^y = 45^z$ show that $z(x + y) = xy$.

9. If $2^{\frac{1}{a}} = 17^{\frac{1}{b}} = (68)^{\frac{1}{c}}$ show that $2a + b = c$.

10. If $a = 5^x$, $b = 5^y$, $c = 5^z$ and $ab = c^2$ prove that $x + y = 2z$.

11. If $a^x = bc$, $b^y = ca$ and $c^z = ab$ show that $xyz = x + y + z + 2$.

(Skill)

12. If $abc = 1$, then prove that $\frac{1}{1+a+b^{-1}} + \frac{1}{1+b+c^{-1}} + \frac{1}{1+c+a^{-1}} = 1$.

13. Show that $\sum \frac{1}{1+x^{a-b}+x^{a-c}} = 1$.

14. If $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$, then show that $(x + y + z)^3 = 27xyz$.

15. If $a^{\frac{1}{3}} + b^{\frac{2}{3}} + c = 0$ then show that $(a + b^2 + c^3)^3 = 27ab^2c^3$.

16. If $x = 4^{\frac{1}{3}} + 4^{-\frac{1}{3}}$ prove that $x^3 - 12x - 17 = 0$.

17. Solve for x : $2^{2x} - 6 \cdot 2^x + 8 = 0$.

18. Solve for y : $5 \cdot 5^{2y} - 26 \cdot 5^y + 5 = 0$.
