Q 1: Convert the following Exponential form into Logarithmic form

1) $3^5 = 243$ 2) $10^{-3} = 0.001$ 3) $4^{\frac{3}{2}} = 32$ 4) $4^{-4} = \frac{1}{256}$ 5) $a^b = c$

Q 2: Convert the following Logarithmic form into Exponential form

1) $\log_b a = c$ 2) $\log_{10}(0.0001) = -4$ 3) $\log_4 1024 = 5$

4) $\log_{10} 10000 = 4$ 5) $\log_{7\sqrt{3}} 343 = \sqrt{3}$

Q 3: Find the value of

1) $\log_5 3125$ 2) $\log_{\sqrt{3}} 81$ 3) $\log_{2\sqrt{3}} 144$ 4) $\dfrac{1}{\log_\alpha\left(\frac{1}{\alpha}\right)}$

Q 4: Find the value of the following

1) $\log_3(\log_3 27)$ 2) $\log_5(\log_{32} 2)$ 3) $\dfrac{1}{\log_2 6} + \dfrac{1}{\log_3 6}$

4) $(\log_4 3)(\log_3 16)$ 5) $\log_3(\log_2 512)$

Q 5: Prove that

1) $23 \ \log\left(\dfrac{10}{9}\right) - 6\log\left(\dfrac{25}{24}\right) + 10 \log\left(\dfrac{81}{80}\right) = \log 10$

2) $\dfrac{1}{\log_6 24} + \dfrac{1}{\log_{12} 24} + \dfrac{1}{\log_8 24} = 2$

3) $2 \ \log\left(\dfrac{6}{7}\right) + \dfrac{1}{2}\log\left(\dfrac{81}{16}\right) - \log\left(\dfrac{27}{196}\right) = \log 12$

4) $\dfrac{1}{\log_{\sqrt{2}} 30} + \dfrac{1}{\log_{\sqrt{3}} 30} + \dfrac{1}{\log_{\sqrt{5}} 30} = \dfrac{1}{2}$

5) $\dfrac{1}{\log_x(xyz)} + \dfrac{1}{\log_y(xyz)} + \dfrac{1}{\log_z(xyz)} = 1$

Q 6: Solve the following

1) $\log_2\big(\log_2(\log_2 x)\big) = 1$

2) $\log(x+3) + \log(x-3) = \log 27$

3) $\log_2(x + 5) + \log_2(x - 2) = 3$

4) $\dfrac{(\log 3)(\log x)}{\log 9} = \log 27$

5) $\log(\log x^2) - \log(\log x) = \log 2$

6) $\log_a x^3 - \log_a 25 = \log_a x$

Q 7: Prove that

1) If $\log\left(\dfrac{a+b}{2}\right) = \dfrac{1}{2}(\log a + \log b)$ then prove that $a = b$

2) If $\log\left(\dfrac{a+b}{3}\right) = \dfrac{1}{2}(\log a + \log b)$ then prove that $a^2 + b^2 = 7ab$

3) Solve: $\log_x 4 + \log_x 64 + \log_x 16 = 12$

Q: Express the following as a sum of partial fractions.

1) $\dfrac{x}{(x + 2)(3x - 2)}$

2) $\dfrac{3x + 5}{(x - 3)(2x + 1)}$

3) $\dfrac{3x}{(x - 1)(x + 2)}$

4) $\dfrac{x}{(x - 3)^2(2x + 1)}$

5) $\dfrac{x^2 + 1}{(x - 1)^2(x + 1)}$