Exercise - 2.2

Complete Solution by Mubashar Siddique

Question 1: Express each of the following in logarithmic form

(i) $10^3 = 1000$

$$\log_{10}(1000) = 3$$

Answer: $\log_{10}(1000) = 3$

(ii) $2^8 = 256$

$$\log_2(256) = 8$$

Answer: $\log_2(256) = 8$

(iii) $3^{-3} = \frac{1}{27}$

$$\log_3\left(\frac{1}{27}\right) = -3$$

Answer: $\log_3(1/27) = -3$

(iv) $20^2 = 400$

$$\log_{20}(400) = 2$$

Answer: $\log_{20}(400) = 2$

(v) $2^4 = 16$

$$\log_2(16) = 4$$

Answer: $\log_2(16) = 4$

(vi) $11^2 = 121$

$$\log_{11}(121) = 2$$

Answer: $\log_{11}(121) = 2$

(vii) $p^1 = p$

$$\log_p(p) = 1$$

Answer: $\log_p(p) = 1$

(viii) $3^2 = 9$

$$\log_3(9) = 2$$

Answer: $\log_3(9) = 2$

Question 2: Express each of the following in exponential form

(i) $\log_5(125) = 3$

$$5^3 = 125$$

Answer: $5^3 = 125$

(ii) $\log_2(16) = 4$

$$2^4 = 16$$

Answer: $2^4 = 16$

(iii) $\log_{23}(1) = 0$

$$23^0 = 1$$

Answer: $23^0 = 1$

(iv) $\log_5(5) = 1$

$$5^1 = 5$$

Answer: $5^1 = 5$

(v) $\log_2\left(\frac{1}{8}\right) = -3$

$$2^{-3} = \frac{1}{8}$$

Answer: $2^{-3} = 1/8$

(vi) $\frac{1}{2} = \log_9(3)$

$$9^{1/2} = 3$$

Answer: $9^{1/2} = 3$

(vii) $5 = \log_{10}(100000)$

$$10^5 = 100000$$

Answer: $10^5 = 100000$

(viii) $\log_4\left(\frac{1}{16}\right) = -2$

$$4^{-2} = \frac{1}{16}$$

Answer: $4^{-2} = 1/16$

Question 3: Find the value of x

(i) $\log_x(64) = 3$

$$x^3 = 64 \quad \Rightarrow \quad x = \sqrt[3]{64} = 4$$

Answer: $x = 4$

(ii) $\log_5(1) = x$

$$5^x = 1 \quad \Rightarrow \quad x = 0$$

Answer: $x = 0$

(iii) $\log_x(8) = 1$

$$x^1 = 8 \quad \Rightarrow \quad x = 8$$

Answer: $x = 8$

(iv) $\log_{10}(x) = -3$

$$10^{-3} = x \quad \Rightarrow \quad x = \frac{1}{1000}$$

Answer: $x = \frac{1}{1000}$

(v) $\log_4(x) = \frac{3}{2}$

$$4^{3/2} = x \quad \Rightarrow \quad x = \sqrt{4^3} = \sqrt{64} = 8$$

Answer: $x = 8$

(vi) $\log_2(1024) = x$

$$2^x = 1024 \quad \Rightarrow \quad 2^{10} = 1024 \quad \Rightarrow \quad x = 10$$

Answer: $x = 10$