Short Answer Type Questions – I

[2 marks]

Que 1. Is every rational number a whole number? Justify your answer.

Sol. No, for example $\frac{1}{5}$ is a rational number but not a whole number.

Que 2. Classify the following numbers as rational or irrational and give justification of your answer.

(i) 0.05918 (ii) 1.010010001…… (iii) $\sqrt{\frac{9}{27}}$ **(iv)** $\sqrt{\frac{12}{75}}$

Sol. (i) 0.05918 is a rational number as decimal expansion is terminating.

(ii) 1.010010001…. is an irrational number as decimal expansion is non-terminating non-recurring (non-repeating).

(iii) $\sqrt{\frac{9}{27}} = \sqrt{\frac{1}{3}} = \frac{1}{\sqrt{3}}$, Which is a quotient of rational and irrational number therefore it is in irrational number.

(iv) $\sqrt{\frac{12}{75}} = \sqrt{\frac{4}{25}} = \frac{2}{5}$, Which is a rational number.

Que 3. Simplify: $\left(\frac{3125}{243}\right)^{\frac{-4}{5}}$.

Sol.

$$\left(\frac{3125}{243}\right)^{\frac{-4}{5}} = \left(\frac{243}{3125}\right)^{\frac{4}{5}} = \left(\frac{3^5}{5^5}\right)^{\frac{4}{5}} = \left[\left(\frac{3}{5}\right)^5\right]^{\frac{4}{5}} = \left(\frac{3}{5}\right)^4 = \frac{81}{625}$$

Que 4. Rationalise: $\frac{1}{7+5\sqrt{2}}$

$$\textbf{\textit{Sol.}} \frac{1}{7+5\sqrt{2}} = \frac{1}{7+5\sqrt{2}} = \times \frac{7-5\sqrt{2}}{7-5\sqrt{2}} = \frac{7-5\sqrt{2}}{7^2-\left(5\sqrt{2}\right)^2}$$

$$= \frac{7-5\sqrt{2}}{49-50} = \frac{7-5\sqrt{2}}{-1} = -7+5\sqrt{2}$$

Que 5.Which is grater $\sqrt[3]{3}$ *or* $\sqrt[4]{4}$?

Sol. LCM of 3 and 4 = 12

$$\sqrt[3]{3} = \sqrt[12]{3^4} = \sqrt[12]{81} \; and \; \sqrt[4]{4} = \sqrt[12]{4^3} = \sqrt[12]{64}$$

$$Clearly, \sqrt[12]{81} > \sqrt[12]{64} . \sqrt[3]{3} > \sqrt[4]{4}$$

Que 6. Find two rational numbers between -2 and 5.

Sol. A rational number between -2 and 5 is $\frac{1}{2}[-2+5] = \frac{3}{2}$

Further, a rational number between $\frac{3}{2} and \; 5 \; is \; \frac{1}{2}\left[\frac{3}{2}+5\right] = \frac{1}{2}\left[\frac{3+10}{2}\right] = \frac{13}{4}$

Hence, two rational numbers between -2 and 5 are 3/2 and 13/4.

Que 7. Express $0.\overline{6}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

Sol. Let $x = 0.\overline{6}$

Then, $x = 0.666\ldots$ …(i)

$$\Rightarrow \quad 10x = 6.666\ldots\ldots \quad \ldots(ii)$$

Subtracting (i) from (ii), we get

$$9x = 6 \Rightarrow x = \frac{6}{9} \Rightarrow x = \frac{2}{3}$$

Que 8. Multiply: $5\sqrt[3]{4}$ *by* $\sqrt{3}$.

Sol. LCM of 3 and 2 = 6

$$5\sqrt[3]{4} = 5\sqrt[6]{4^2} = 5\sqrt[6]{16}$$

$$\sqrt{3} = \sqrt[6]{3^3} = \sqrt[6]{27}$$

$$5\sqrt[3]{4} \times \sqrt{3} = 5\sqrt[6]{16} \times \sqrt[6]{27}$$

$$= 5\sqrt[6]{16 \times 27} = 5\sqrt[6]{432}$$