26.6.2020

Questions And Answers of Chapter test

(1) which of the following rational number have terminating decimal expansion:- (1)

(a) $\frac{11}{11} = \frac{1}{(11 \times 1)}$

∴ As 11 has factors 11 and 1 other than 2 and 5 so, $\frac{1}{11}$ is non-terminating repeating decimal.

(b) $\frac{36}{100} = \frac{36}{2 \times 5 \times 2 \times 5} = \frac{36}{2^2 \times 5^2}$

∴ As 100 have factors only 2 and 5.
∴ $\frac{36}{100}$ is terminating decimal

(c) $\frac{3}{13} = \frac{3}{(13 \times 1)}$

As 13 has factors 13 and 1, other than 2 and 5
so $\frac{3}{13}$ is non-terminating repeating decimal.

(2) The value of $\frac{2^0 + 7^0}{5^0} = ?$ (1)

$\frac{2^0 + 7^0}{5^0} = \frac{1+1}{1} = \frac{2}{1} = 2$

(3) Simplify $(\sqrt{5} + \sqrt{2})^2$ (1)

$(\sqrt{5} + \sqrt{2})^2 = (\sqrt{5})^2 + 2(\sqrt{5})(\sqrt{2}) + (\sqrt{2})^2$

$= 5 + 2\sqrt{10} + 2$

$= 7 + 2\sqrt{10}$

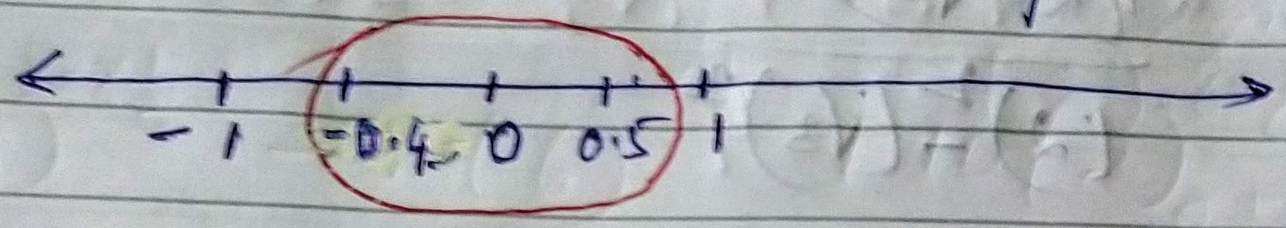
(4) The Two rational numbers between $\frac{1}{2}$ and $\frac{-3}{7}$ are (2)

(a) 0 and -1 (b) $\frac{-3}{10}$ and $\frac{7}{10}$

(c) $\frac{-2}{10}$ and 0 (d) $-\frac{1}{2}$ and $-\frac{3}{10}$

Solution

$\frac{1}{2} = 0.5$ and $\frac{-3}{7} = -0.428571143$



(a) 0 & -1 ✗

(b) $\frac{-3}{10} = -0.3$ ✓

$\frac{7}{10} = 0.7$ ✗

(c) $\frac{-2}{10} = -0.2$ ✓

$0 = 0$ ✓

(d) $-\frac{1}{2} = -0.5$ ✗

$\frac{-3}{10} = -0.3$ ✓

(5) If $a=2, b=3$, then value of $(a^b + b^a)^{-1}$ is :- (2)

$(a^b + b^a)^{-1} = (2^3 + 3^2)^{-1}$

$= (8+9)^{-1}$

$= (17)^{-1}$

$= \left(\frac{1}{17}\right)^1$

$= \frac{1}{17}$

(6) If $x = 2+\sqrt{3}$ find $x^2 + \frac{1}{x^2} = ?$ (3)

Ans $x = 2+\sqrt{3}$

$\therefore \frac{1}{x} = \frac{1}{2+\sqrt{3}}$

$= \frac{1}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$

$= \frac{(2-\sqrt{3})}{(2)^2-(\sqrt{3})^2}$

$= \frac{(2-\sqrt{3})}{(4-3)}$

$= \frac{2-\sqrt{3}}{1}$

$= 2-\sqrt{3}$

Now, $x + \frac{1}{x} = (2+\sqrt{3}) + (2-\sqrt{3})$

$= 2+\sqrt{3}+2-\sqrt{3}$

$= 2+2$

$= 4$

$\therefore \left(x+\frac{1}{x}\right)^2 = (4)^2$

$\Rightarrow (x)^2 + 2 \cdot x \cdot \frac{1}{x} + \left(\frac{1}{x}\right)^2 = 16$

$\Rightarrow x^2 + \frac{2x}{x} + \frac{1}{x^2} = 16$

$\Rightarrow x^2 + \frac{1}{x^2} = 16-2$

$\Rightarrow x^2 + \frac{1}{x^2} = 14$

(7) $\left(\frac{2^a}{2^b}\right)^{a+b} \times \left(\frac{2^b}{2^c}\right)^{b+c} \times \left(\frac{2^c}{2^a}\right)^{c+a}$ (3)

$= \left(2^{a-b}\right)^{a+b} \times \left(2^{b-c}\right)^{b+c} \times \left(2^{c-a}\right)^{c+a}$

$= 2^{a^2-b^2} \times 2^{b^2-c^2} \times 2^{c^2-a^2}$

$= 2^{a^2-b^2+b^2-c^2+c^2-a^2}$

$= 2^0$

$= 1$ (3)

(8) $\frac{2^{30}+2^{29}+2^{28}}{2^{31}+2^{30}-2^{29}} = \frac{2^2 2^{28}+2^1 2^{28}+1\cdot 2^{28}}{2^2 2^{29}+2^1 2^{29}-1\cdot 2^{29}}$

$= \frac{2^{28}\left(2^2+2^1+1\right)}{2^{29}\left(2^2+2^1-1\right)}$

$= \frac{2^{28}\,(4+2+1)}{2^1 \times 2^{28}\,(4+2-1)}$

$= \frac{1\,(7)}{2\,(5)}$

$= \frac{7}{10}$

(9) find a & b :- (4)

$\frac{7+3\sqrt{7}}{3+\sqrt{5}} - \frac{7-3\sqrt{7}}{3-\sqrt{5}} = a\sqrt{5}+b\sqrt{7}$

Now, $\frac{7+3\sqrt{7}}{3+\sqrt{5}} = \frac{(7+3\sqrt{7})}{(3+\sqrt{5})} \times \frac{(3-\sqrt{5})}{(3-\sqrt{5})}$

$$\frac{7+3\sqrt{7}}{3+\sqrt{5}} = \frac{7(3-\sqrt{5})+3\sqrt{7}(3-\sqrt{5})}{(3)^2-(\sqrt{5})^2}$$

$$= \frac{21-7\sqrt{5}+9\sqrt{7}-3\sqrt{35}}{(9-5)}$$

$$= \frac{21-7\sqrt{5}+9\sqrt{7}-3\sqrt{35}}{4}$$

Similarly

$$\frac{7-3\sqrt{7}}{3-\sqrt{5}} = \frac{(7-3\sqrt{7})}{(3-\sqrt{5})} \times \frac{(3+\sqrt{5})}{(3+\sqrt{5})}$$

$$= \frac{7(3+\sqrt{5})-3\sqrt{7}(3+\sqrt{5})}{(3)^2-(\sqrt{5})^2}$$

$$= \frac{21+7\sqrt{5}-9\sqrt{7}-3\sqrt{35}}{9-5}$$

$$= \frac{21+7\sqrt{5}-9\sqrt{7}-3\sqrt{35}}{4}$$

Now, $\frac{7+3\sqrt{7}}{3+\sqrt{5}} - \frac{7-3\sqrt{7}}{3-\sqrt{5}}$

$$= \frac{(21-7\sqrt{5}+9\sqrt{7}-3\sqrt{35})}{4} - \frac{(21+7\sqrt{5}-9\sqrt{7}-3\sqrt{35})}{4}$$

$$= \frac{(21-7\sqrt{5}+9\sqrt{7}-3\sqrt{35})-(21+7\sqrt{5}-9\sqrt{7}-3\sqrt{35})}{4}$$

$$= \frac{21-7\sqrt{5}+9\sqrt{7}-3\sqrt{35}-21-7\sqrt{5}+9\sqrt{7}+3\sqrt{35}}{4}$$

$$= \frac{(-7\sqrt{5} + 9\sqrt{5} - 4\sqrt{5} + 9\sqrt{7})}{4}$$

$$= \frac{(-7\sqrt{5} - 7\sqrt{5} + 9\sqrt{5} + 9\sqrt{7})}{4}$$

$$= \frac{(-14\sqrt{5} + 18\sqrt{5})}{4}$$

$$= \frac{(-14\sqrt{5})}{4} + \frac{(18\sqrt{5})}{4}$$

$$= \frac{-\cancel{14}^{7}\sqrt{5}}{\cancel{2}\,\cancel{4}} + \frac{\cancel{18}^{9}\sqrt{5}}{\cancel{2}\,\cancel{4}}$$

$$= \frac{-7}{2}\sqrt{5} + \frac{9}{2}\sqrt{7}$$

comparing with $a\sqrt{5} + b\sqrt{7}$ we get

$$a = \frac{-7}{2}, \quad b = \frac{9}{2}$$