

3(i) let  $x = 0.\overline{6} \dots$  (i)

multiplying both sides by 10 ( $\because$  1 digit repeats)

$$10x = 6.\overline{6} \dots$$
 (ii)

$$(ii) - (i)$$

$$10x - x = 6.\overline{6} - 0.\overline{6}$$

$$\Rightarrow 9x = 6$$

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

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

$$\therefore 0.\overline{6} = \frac{2}{3}$$

3(ii) let  $x = 0.4\overline{7}$

Multiplying both sides by 10 [ $\because$  1 digit (4) without  $\overline{\quad}$ ]

$$10x = 4.\overline{7} \dots$$
 (i)

again Mul. both sides by 10 [ $\because$  1 digit (7) with  $\overline{\quad}$ ]

$$100x = 47.\overline{7} \dots$$
 (ii)

$$(ii) - (i)$$

$$100x - 10x = 47.\overline{7} - 4.\overline{7}$$

$$\Rightarrow 90x = 43$$

$$\Rightarrow x = \frac{43}{90}$$

$$\therefore 0.4\overline{7} = \frac{43}{90}$$

3(iii) let  $x = 0.\overline{001} \dots$  (i)

mul. both sides by 1000

$$1000x = 1.\overline{001} \dots$$
 (ii)

$$(ii) - (i)$$

$$1000x - x = 1.\overline{001} - 0.\overline{001}$$

$$\Rightarrow 999x = 1$$

$$\Rightarrow x = \frac{1}{999}$$

$$\therefore 0.\overline{001} = \frac{1}{999}$$