Number System

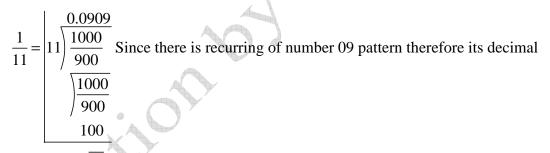
Solution of Exercise 1.3:

Question 1:

(i)

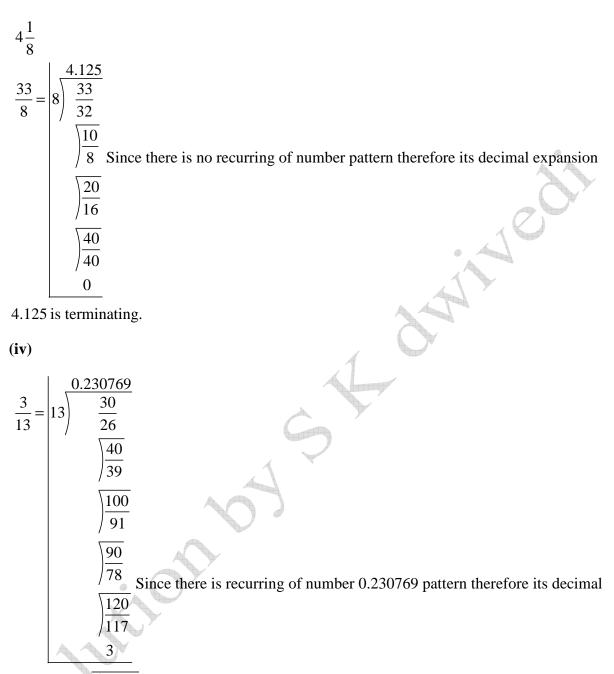
expansion is 0.36 terminating (because of remainder is zero).

(ii)



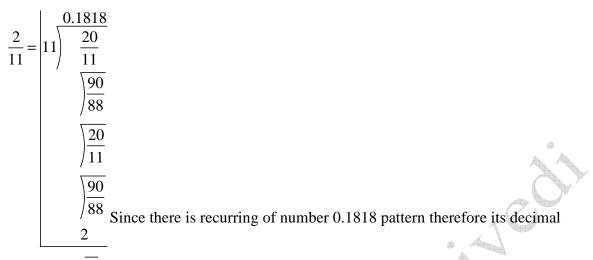
expansion $0.\overline{09}$ is no terminating repeating.

(iii)



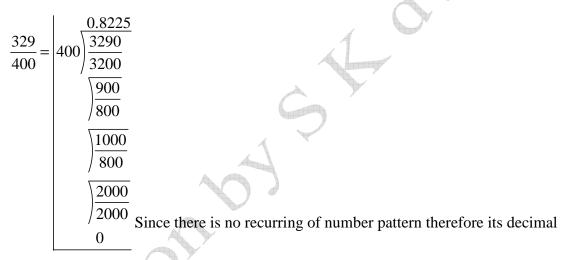
expansion $0.\overline{230769}$ is no terminating repeating.

(v)



expansion $0.\overline{18}$ is no terminating repeating

(vi)



expansion 0.8225 is terminating.

Question 2: Given
$$\frac{1}{7} = 0.\overline{142857}$$

Similarly $\frac{2}{7}$ can be written as $2 \times \frac{1}{7} = 0.\overline{285714}$
 $\frac{3}{7}$ can be written as $3 \times \frac{1}{7} = 0.\overline{428571}$

$$\frac{4}{7} \text{ can be written as } 4 \times \frac{1}{7} = 0.\overline{571428}$$
$$\frac{5}{7} \text{ can be written as } 5 \times \frac{1}{7} = 0.\overline{714285}$$
$$\frac{6}{7} \text{ can be written as } 6 \times \frac{1}{7} = 0.\overline{857142}$$

Question 3:

(i)

Let $x = 0.\overline{6}$ note that only 6 is repeating. Since only one digit is repeating, we multiply x by 10 to get

(ii)

Let $x = 0.4\overline{7}$ note that only 7 is repeating. Since only one digit is repeating, we multiply x by 10 to get

Let x = 0.001 note that only 001 is repeating block of 3 digits. Since block of three digit is repeating, we multiply x by 1000 to get

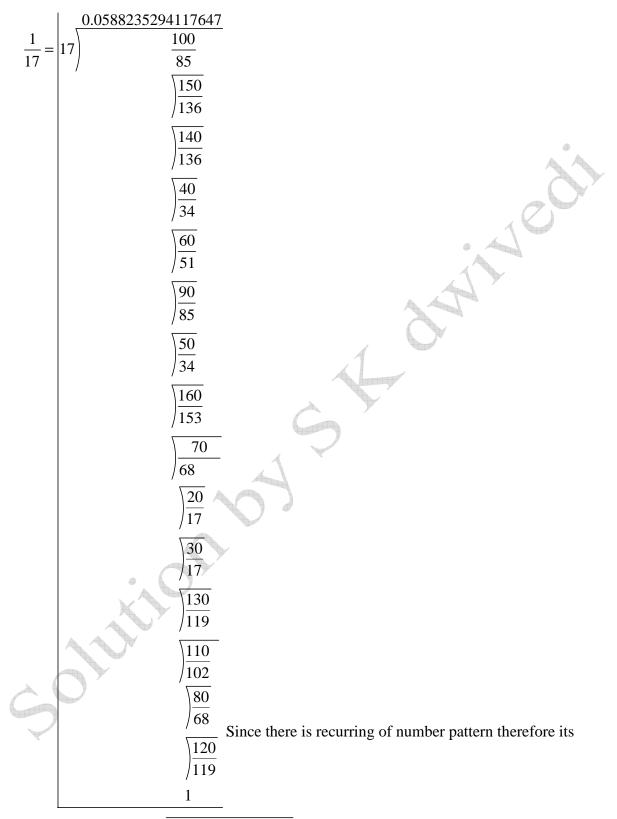
$$1000x = 1.001001001001001$$
$$1000x = 1 + 0.001$$
$$1000x = 1 + x$$
$$x = \frac{1}{999}$$

Question 4:

Let $x = 0.\overline{9}$ note that only 9 is repeating. Since only one digit is repeating, we multiply x by 10 to get

10x = 9.9999999 $10x = 9 + 0.\overline{9}$ 10x = 9 + xx = 1

Question 5:



decimal expansion is 0.0588235294117647 recurring, non-terminating.

Question 6 & 7 : do your self

Question 8:

Let the given rational numbers are
$$\frac{5}{7} = 0.\overline{714285}$$
 and $\frac{9}{11} = 0.\overline{81}$.

As we know there are infinite irrational numbers between the two rational number so choose any three value randomly between a given value.

0.72787672458732424782....., 0.735842266981....., 0.743666852369844569855.....

Question 9:

(i) $\sqrt{23} = 4.7958315233.....$ (Irrational).

(ii)
$$\sqrt{225} = 15$$
 (Rational)

- (iii) $0.3796 = \frac{3796}{10000}$ (Rational).
- (iv) 7.478478.....(Irrational).
- (v) 1.1010010001......(Irrational).