

Q1 $16_{10} = 16 = 1 \times b^2 + 0 \times b^1 + 0 \times b^0 = b^2$
 $\Rightarrow b = 4$

Q2 (a) Let the base be b . So

$$2b + 3 + 4b + 4 + b + 4 + 3b + 2 = 2b^2 + 2b + 3$$

$$\Rightarrow b^2 - 4b - 5 = 0$$

$$\Rightarrow b = 5 \text{ \& -1 (It can't be a base as maximum digit present in eqn is 4)}$$

(b) $\frac{4b+1}{3} = b+3$

$$\Rightarrow 4b+1 = 3b+9$$

$$\Rightarrow b = 8$$

(c) $\sqrt{4b+1} = 5$

squaring $4b+1 = 25$

$$b = 6$$

Q3

(a)
$$\begin{array}{r} (777)_8 \\ - (135)_8 \\ \hline (642)_8 \end{array}$$

Diminished radix complement of $(135)_8$ is $(642)_8$.

$$\begin{array}{r} (FFF)_{16} \\ - (135)_{16} \\ \hline (ECA)_{16} \end{array}$$

Diminished radix complement of $(135)_8$ is $(ECA)_{16}$

(b)

$$\begin{array}{r} (777)_8 \\ - (671)_8 \\ \hline (106)_8 \end{array}$$

Diminished radix complement
of $(671)_8$ is $(106)_8$.

$$\begin{array}{r} (FFF)_{16} \\ - (ACD)_{16} \\ \hline \end{array}$$

$$(532)_{16}$$

Diminished radix complement
of $(ACD)_{16}$ is $(532)_{16}$.

Q4

(a) $(643)_8$ is the radix complement of $(135)_8$

$(E(B)_{16}$ is the radix complement of $(135)_{16}$

(b) $(107)_8$ is the radix complement of $(671)_8$.

$(533)_{16}$ is the radix complement of $(ACD)_{16}$.

NOTE

Diminished radix ^{complement} of N (n -digit) in radix r
is $(r^n - 1) - N$

Radix complement of N (n -digit) in radix r

is $[(r^n - 1) - N] + 1$

Q5

	<u>sign magnitude</u>	<u>1's Comp</u>	<u>2's Comp</u>
11011	-11	-4	-5
0101	+5	+5	+5
1111111	-63	0	-1
1111	-7	0	-1

Q6

$$M = 72532$$

$$N = 3250$$

$$M = 72532$$

$$10's \text{ Comp. of } N = 96750$$

$$\text{Sum} = 169282$$

$$\begin{array}{r} 99999 \\ - 03250 \\ \hline 96,749 \\ + 1 \\ \hline 96,750 \end{array}$$

(discard end carry) ← 69282 (result)

Q7

(a) $(1,00,000)_{18} = 1 \times 18^5 = (1,889,568)_{10}$

Half this money = $1,889,568 / 2 = \text{Rs. } 9,44,784$

Each son will get $9,44,784 / 2 = \text{Rs. } 4,72,392$

Each daughter will get $9,44,784 / 3 = \text{Rs. } 3,14,928$

(4)

(b) Amount of money available in Indian currency Rs. $(1,00,000)_{10}$

The amount spent on food, clothing and travelling is in the ratio of $1:2:7$. So, the amount spent on food = Rs. $10,000 = 1\text{CFA}_{18}$.

the amount spent on clothing = Rs. $20,000 = 3702_{18}$

the amount spent on travelling = Rs. $70,000 = 6006_{18}$

Q8

$$+73.75 = N = 01001001.1100$$

Positive expression of the given number 01001001.1100

1's complement of it

$$10110110.0011$$

Add 1

+1

Thus, the 2's complement of -73.75 is 10110110.0100

Q9 (a)

$$\begin{array}{r} 999.99 \\ - 782.54 \\ \hline 217.45 \end{array}$$

(9's comp. of 782.54)

$$\begin{array}{r} 9999.999 \\ - 4526.075 \\ \hline 5473.924 \end{array}$$

(9's comp. of 5473.924)

$$\begin{array}{r} (b) \quad FFF.FF \\ - ACD.35 \\ \hline \end{array}$$

532.CA

(15's comp. of $ACD.35$)

$$\begin{array}{r} 777.77 \\ - 670.13 \\ \hline \end{array}$$

107.64

(7's comp. of 670.13)