

Date:

8th CLASS

MATHEMATICS

UNIT #3

Ex : No : 3.1

→ Convert the following into decimal system.

(i) $(101)_2$

Solution:

$$\begin{aligned}(101)_2 &= 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 \\ &= 1 \times 4 + 0 \times 2 + 1 \times 1 \\ &= 4 + 0 + 1 \\ &= \boxed{5}\end{aligned}$$

(ii) $(2360)_8$

Solution:

$$\begin{aligned}(2360)_8 &= 2 \times 8^3 + 3 \times 8^2 + 6 \times 8^1 + 0 \times 8^0 \\ &= 2 \times 512 + 3 \times 64 + 6 \times 8 + 0 \times 1 \\ &= 1024 + 192 + 48 + 0 \\ &= \boxed{1264}\end{aligned}$$

(iii) $(3100)_5$

Solution:

$$\begin{aligned}(3100)_5 &= 3 \times 5^3 + 1 \times 5^2 + 0 \times 5^1 + 0 \times 5^0 \\ &= 3 \times 125 + 1 \times 25 + 0 \times 5 + 0 \times 1 \\ &= 375 + 25 + 0 + 0 \\ &= \boxed{400}\end{aligned}$$

→ Convert the following into base system as indicated against each question.

(i) 3025 to binary, octal and base 5.

Solution:

2 3025	2 23-1
2 1512-1	2 11-1
2 756-0	2 5-1
2 378-0	2 2-1
2 189-0	1-0
2 94-1	
2 47-0	
2 23-1	

Binary system = $(101111010001)_2$

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* Octal system:

$$\begin{array}{r|l} 8 & 3025 \\ 8 & 378-1 \\ 8 & 47-2 \\ & 5-7 \end{array}$$

$$3025 = (5721)_8$$

* Base 5:

$$\begin{array}{r|l} 5 & 3025 \\ 5 & 605-0 \\ 5 & 121-0 \\ 5 & 24-1 \\ & 4-4 \end{array}$$

$$3025 = (44100)_5$$

(ii) $(2006)_8$ to binary and base 5

Solution:

$$\begin{aligned} (2006)_8 &= 2 \times 8^3 + 0 \times 8^2 + 0 \times 8^1 + 6 \times 8^0 \\ &= 2 \times 512 + 0 \times 64 + 0 \times 8 + 6 \times 1 \\ &= 1024 + 0 + 0 + 6 \\ &= 1030 \end{aligned}$$

Binary system

$$\begin{array}{r|l} 2 & 1030 \\ 2 & 515-0 \\ 2 & 257-1 \\ 2 & 128-1 \\ 2 & 64-0 \\ 2 & 32-0 \\ & 16-0 \end{array}$$

$$\begin{array}{r|l} 2 & 16-0 \\ 2 & 8-0 \\ 2 & 4-0 \\ 2 & 2-0 \\ & 1-0 \end{array}$$

$$(2006)_8 = (1000000110)_2$$

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* Base 5 system:

5	1030
5	206-0
5	41-1
5	8-1
	1-3

$$(2006)_8 = (13110)_5$$

Ex : No : 3.2

→ Binary addition:

Rules

$$0 + 0 = 0$$

$$0 + 1 = 1$$

$$1 + 0 = 1$$

$$1 + 1 = 0, 1 \text{ in carry.}$$

(i) $(101)_2 + (111)_2$

Solution:

$$\begin{array}{r} (101)_2 \\ + (111)_2 \\ \hline (1100)_2 \end{array}$$

→ Binary subtraction:

Rules

$$0 - 0 = 0$$

$$1 - 0 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = \text{Take carry}$$

(ii) $(11011)_2 - (10000)_2$

$$\begin{array}{r} (11011)_2 \\ - (10000)_2 \\ \hline (1011)_2 \end{array}$$

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→ Binary Multiplication:
Rules

$$0 \times 0 = 0$$

$$0 \times 1 = 0$$

$$1 \times 0 = 0$$

$$1 \times 1 = 1$$

(iii) $(111111)_2 \times (11011)_2$

Solution:

$$\begin{array}{r} 111111 \\ \times 11011 \\ \hline 111111 \\ 111111x \\ 000000xx \\ 111111xxx \\ 111111xxxx \\ \hline (110100010101)_2 \end{array}$$

→ Addition of base 5:

(i) $(2244)_5 + (4433)_5$

Sol:

$$\begin{array}{r} (2244)_5 \\ + (4433)_5 \\ \hline (12232)_5 \end{array}$$

$$4+3=7$$

$$\begin{array}{r} 5 \overline{)7} \\ \underline{5} \\ 2 \end{array}$$

R.W

$$1+4+3=8$$

$$\begin{array}{r} 5 \overline{)8} \\ \underline{5} \\ 3 \end{array}$$

→ Subtraction of base 5:

(ii) $(10001)_5 - (33322)_5$

Sol:

$$\begin{array}{r} (10001)_5 \\ - (33322)_5 \\ \hline (11124)_5 \end{array}$$

Take carry & carry = 5
 coz its base 5.

Date:

R.W

→ Multiplication of base 5:

(iii) $(44143)_5 \times (23023)_5$

Sol:

$$\begin{array}{r}
 (44143)_5 \\
 \times (23023)_5 \\
 \hline
 243034 \\
 143341 \times \\
 00000 \times \times \\
 243034 \times \times \times \\
 143341 \times \times \times \times \\
 \hline
 (2234230444)_5
 \end{array}$$

$$\begin{array}{r}
 5 \overline{) 9} \\
 \underline{1-4} \\
 (14)
 \end{array}$$

$$\begin{array}{r}
 5 \overline{) 13} \\
 \underline{2-3}
 \end{array}$$

$$\begin{array}{r}
 5 \overline{) 5} \\
 \underline{1-0}
 \end{array}$$

*Note: Base 5 has (0-4) digits.

→ Addition of octal system:

(i) $(5631)_8 + (2456)_8$

R.W

Sol:

$$\begin{array}{r}
 (5631)_8 \\
 + (2456)_8 \\
 \hline
 (10307)_8
 \end{array}$$

$$\begin{array}{r}
 8 \overline{) 8} \\
 \underline{1-0}
 \end{array}$$

$$\begin{array}{r}
 8 \overline{) 11} \\
 \underline{1-3}
 \end{array}$$

→ Subtraction of octal system:

(ii) $(7541)_8 - (5675)_8$

Sol:

$$\begin{array}{r}
 (7541)_8 \\
 - (5675)_8 \\
 \hline
 (1644)_8
 \end{array}$$

Take carry & carry = 8