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Part - A : (1) 255.375

$255 \div 2 = 2(127) + 1$ $\quad$ $0.375 \times 2 = 0.75 \; (0)$

$127 \div 2 = 2(63) + 1$ $\quad$ $0.75 \times 2 = 1.5 \; (1)$

$0.5 \times 2 = 1 \; (1)$

$(110)_2$

$63 \div 2 = 2(31) + 1$

$31 \div 2 = 2(15) + 1$

$15 \div 2 = 2(7) + 1$

$7 \div 2 = 2(3) + 1$

$3 \div 2 = 2(1) + 1$

$1 \div 2 = 0 + 1$

$(11111111)_2$

Ans : $(11111111)_2 . (011)_2 = (377)_8 . (3)_8$

$= (15\,15)_{16} . (6)_{16}$

$\hookrightarrow$ FF. $(6)_{16}$

1111
$8+4+2+1$

(2) we go from top to down when writing fractional part

0.101 $\Rightarrow$ we got $x \times 2 = 1$ at last digit.

thus : $x = 0.5$

$2 \times 0.625 = 1.25$ $\quad$ $\therefore$ Fractional part $= \underline{0.625}$

$2 \times 0.25 = 0.5$

$2 \times 0.5 = 1$ $\quad$ Integral $= \underline{\underline{53}}$

(3) $(100111)_2 \longrightarrow 3 + 2^2(1+8) \Rightarrow$ Divisible by 3

$1 + 2^1 + 2^2 + 2^3 = 3^0 + (?)3^2 + \ldots$

$32 \rightarrow (2^4 + 2^4) \% 10$

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(3) $(100111)_2 = 2^0 + 2^1 + 2^2 + 2^5 = 3n$

$2^n \Rightarrow n = \text{even} \quad 2^n \% 3 = 1$

$n = \text{odd} \quad 2^n \% 3 = 2$

$\therefore$ Adding up remainders $\Rightarrow 1+2+1+2 = 6 \Rightarrow 6$ Thus this no is divisible by 3

(4) $F = (A+B)(A'+C)(B+C')$

$(A.A' + A.C + A'B + BC)(B+C')$

$A.A' = 0$ (If $A=0$ then $A'=1$, both never 1 at same time)

$(A.C + A'B + BC)(B+C')$

$ABC + \underset{0}{A.C.C'} + A'B.B + A'BC' + (B.B)C + 0$

$B.B = B$ (~~gate~~ From truth table)

$ABC + A'B + A'BC' + B.C$

$B[A' + A.C] + B[C + A'C']$

$B[(A'+A).(A'+C)] + B[(C+C').(A'+C)]$

A or $\bar{A} = 1$ (one of the always true)

$C + \bar{C} = 1$

$B(A'+C) + B(A'+C) \Rightarrow \boxed{B(A'+C)}$

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(6)

	A	B	C
m_0	0	0	0
m_1	0	0	1
m_2	0	1	0
m_3	0	1	1
m_4	1	0	0
m_5	1	0	1
m_6	1	1	0
m_7	1	1	1

$F(A,B,C) = \sum m(1,3,5,7)$

$= \bar{A}\bar{B}C + \bar{A}BC + A\bar{B}C + ABC$

$\Rightarrow \bar{A}C\underbrace{[B+\bar{B}]}_{1} + AC\underbrace{[B+\bar{B}]}_{1}$

$= C[A+\bar{A}] = \boxed{C}$

(4) $23 \Rightarrow (10111)_2$

~~Since~~ For 1's complement: Invert 1 and 0 $\cancel{(1000)_2}$ $\cancel{1000}$ $(11101000)_2$

Add +1 $\Rightarrow (11101001)_2$

↳ Ans

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