

Solution “Machine Structure 1” “Final Exam” 1/3 23/24

EXO1 (6pts)

1)

11a) First method with successive division

$$\begin{array}{r}
 1457 \overline{)16} \\
 \underline{1 91} \\
 11 \overline{)16} \\
 \underline{5 16} \\
 5 \overline{)0}
 \end{array}
 \qquad
 \begin{array}{r}
 0.11 \\
 \times 16 \\
 \hline
 (1).76 \\
 \times 16 \\
 \hline
 (12).16
 \end{array}$$

(5 11 1 . 1 12) corresponds in hexadecimal to 5B1.1C
 $(1457)_{10} = (5B1.1C)_{16}$ (2pts)

11b) Second method we convert to binary the integer part

2048	1024	512	256	128	64	32	16	8	4	2	1
0	1	0	1	1	0	1	1	0	0	0	1

$(1457)_{10} = (0101\ 1011\ 0001)_2 = (5B1)_H$ (1pt)

Now we convert the fractional part by multiplying by 16 we get:

$0.11 \times 16 = 1.76$ we take 1

$0.76 \times 16 = 12.16$ we take 12 which corresponds to C in hexadecimal base

Therefore **$(1457.11)_{10} = (5B1.1C)_H$ (1pt)**

b) To convert from base 16 to base 4 . The base 4 is includes in base 16 then We divide this number 5B1.1C by 4 it gives (11 23 01.01 03)₄

$(5B1.1C)_H = (112301.0103)_4$ (2pts)

2) negative sign $s = 1$ $(10100111.1001)_2$ we normalize 1.01001111001×2^7 $e = 7$

$E = 7 + 127 = (134)_{10}$ in binary we get $(10000110)_2$

Single precision: **1 10000110 0100111100100000000000 (2pts)**

Solution “Machine Structure 1” “Final Exam” 2/3 23/24

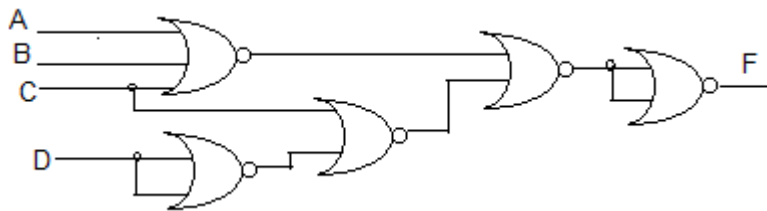
EXO2 (4pts)

$BC'D' + ABC' + AC'D + AB'D + A'BD'$ By using Consensus theorem : $XY + X'Z + YZ = XY + X'Z$ we take the terms ABC' and $AB'D$ to eliminate $AC'D$ in one hand , in the other hand we take the terms ABC' and $A'BD'$ to eliminate $BC'D'$ in using the consensus theorem (2pts)

$$BC'D' + ABC' + AC'D + AB'D + A'BD' = \mathbf{ABC' + AB'D + A'BD'} \quad (2pts)$$

EXO3 (4pts)

$$F = \overline{\overline{\overline{ABC}} + \overline{\overline{CD}}} = \overline{\overline{\overline{ABC}} + \overline{\overline{CD}}} = \overline{\overline{\overline{ABC}} \cdot \overline{\overline{CD}}} = \overline{(A + B + C) \cdot (C + \overline{D})} = \overline{(A + B + C) \cdot (C + \overline{D})} = \overline{(A + B + C)} + \overline{(C + \overline{D})} \quad (2 \text{ pts})$$



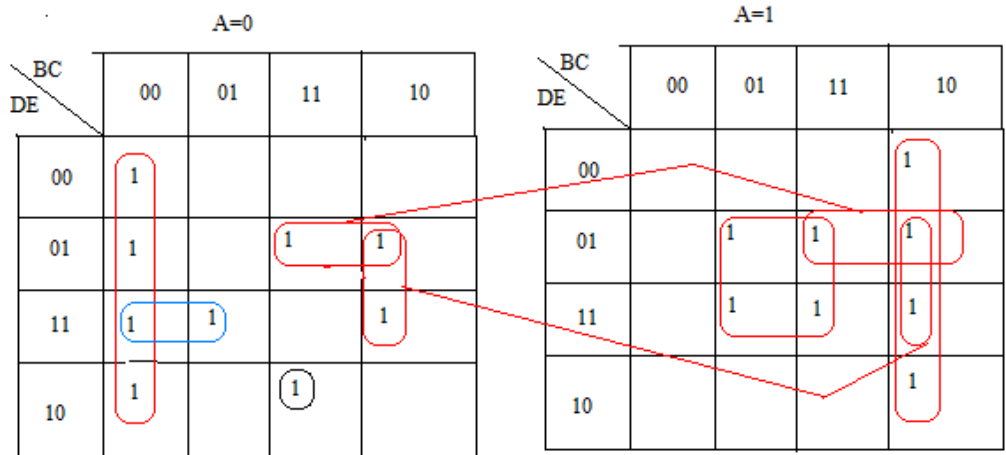
(2 pts)

EXO4 (6pts)

- (a) Prime Implicants (8) : $A'B'C', BD'E, ACE, ABC', A'B'DE, A'BCDE', BC'E, A'C'E$ (1pt)
- (b) Essential PI (6) : $A'B'C', BD'E, ACE, ABC', A'B'DE, A'BCDE'$ (1pt)
- (c) Minimizing

Solution "Machine Structure 1" "Final Exam" 3/3 23/24

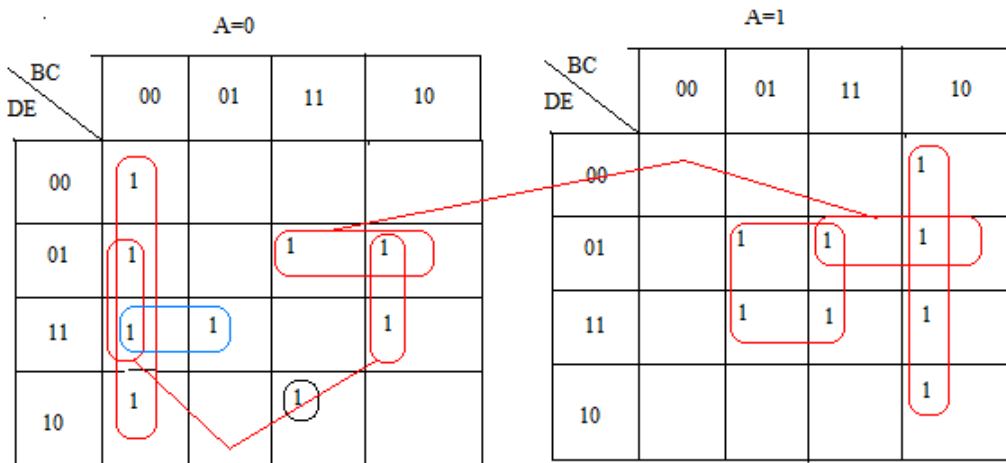
First solution



(2pts)

$$F(A, B, C, D, E) = A'B'C' + BD'E + ACE + ABC' + A'B'DE + A'BCDE' + BC'E \quad (2pts)$$

Second solution



(2pts)

$$F(A, B, C, D, E) = A'B'C' + BD'E + ACE + ABC' + A'B'DE + A'BCDE' + A'C'E \quad (2pts)$$