

## CpRE 281- HOMEWORK 1

- P1.
- A. ASIC: Application specific integrated circuit (ASIC) is an integrated chip customised for particular use rather than general purpose.
- B. ASCII: Alphabetic information like letters & numbers typed on keyboard are represented as 0 and 1. Most common code for this information is ASCII.
- C. FPGA: Most common type of Programmable Logic Device (PLD) is FPGA with billions of transistors & supports implementation of complex digital systems.
- D. VHDL: Verilog Hardware Description Language is a ~~low~~ hardware description often used by designers of digital ASIC's.

P2. ~~Prototype~~ Prototype implementation is most expensive as a large number of errors discovered in the testing stage late in developmental process are introduced at beginning of process as requirement errors. Moreover, fixing these errors in testing is 10 times more expensive if they had been found earlier.

- B. They can be avoided but with certain penalties:
- Exhaustive testing may not be performed.
  - Proper Integration Test can't be performed if all parts are working.
  - Bugs produced later may go untested.

P3. A.  $1010110_2 = 1 \times 2^6 + 0 + 1 \times 2^4 + 0 + 1 \times 2^2 + 1 \times 2^1 + 0$   
 $= 64 + 16 + 4 + 2$   
 $= 86_{10}$

B.  $1011_2 = 1 \times 2^3 + 0 + 1 \times 2^1 + 1 \times 2^0$   
 $= 8 + 2 + 1$   
 $= 11_{10}$

C.  $175_8 = 1 \times 8^2 + 7 \times 8^1 + 5 \times 8^0$   
 $= 64 + 56 + 5$   
 $= 125_{10}$

D.  $149_{16} = 1 \times 16^2 + 4 \times 16^1 + 9 \times 16^0$   
 $= 256 + 64 + 9$   
 $= 329_{10}$

E.  $ACDC_{16} = 10 \times 16^3 + 12 \times 16^2 + 13 \times 16^1 + 12 \times 16^0$   
 $= 40960 + 3072 + 208 + 12$   
 $= 44252_{10}$



P4. A.  $47_{10} =$

$$47/2 = 23 \rightarrow 1$$

$$23/2 = 11 \rightarrow 1$$

$$11/2 = 5 \rightarrow 1$$

$$5/2 = 2 \rightarrow 1$$

$$2/2 = 1 \rightarrow 0$$

$$1/2 = 0 \rightarrow 1$$

$$= 101111_2$$

B.  $241_{10} =$

$$241/2 = 120 \rightarrow 1$$

$$120/2 = 60 \rightarrow 0$$

$$60/2 = 30 \rightarrow 0$$

$$30/2 = 15 \rightarrow 0$$

$$15/2 = 7 \rightarrow 1$$

$$7/2 = 3 \rightarrow 1$$

$$3/2 = 1 \rightarrow 1$$

$$1/2 = 0 \rightarrow 1$$

$$= 11110001_2$$

$$C. 118_{10} =$$

$$118/2 = 59 \rightarrow 0$$

$$59/2 = 29 \rightarrow 1$$

$$29/2 = 14 \rightarrow 1$$

$$14/2 = 7 \rightarrow 0$$

$$7/2 = 3 \rightarrow 1$$

$$3/2 = 1 \rightarrow 1$$

$$1/2 = 0 \rightarrow 1$$

$$= 1110110_2$$

8 4 2 1

A → 10

B → 11

C → 12

D → 13

$$D. 157_8 = 1101111_2$$

$$E. 8AAD_{16} = \text{0101010110101101}_2$$

$$= 1011101010101101_2$$

8 4 2 1  
0 1 0 1

Q5. A.  $[53_{16} 74_{16} 61_{16} 72_{16} 57_{16} 61_{16} 72_{16} 73_{16}]$

$$\Rightarrow [01010011, 01110100, 01100001, 01110010, 01010111, 01100001, 01110010, 01110011]$$

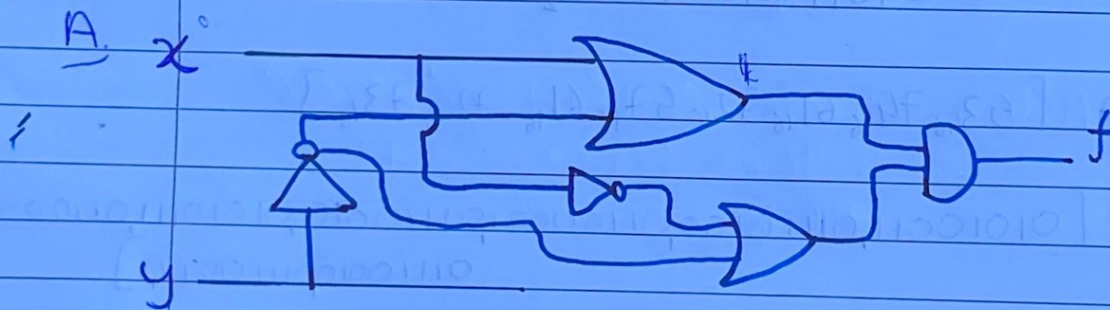
$\Rightarrow$  Star Wars



P6.  $(A.\bar{S}) + (S.B) = F$

B.	A	S	B	F
	0	0	0	0
	1	0	0	1
	1	1	0	0
	1	0	1	1
	1	1	1	1
	0	1	0	0
	0	0	1	0
	0	1	1	1

P7.  $f(x,y) = (x + \bar{y}) \cdot (\bar{x} + \bar{y})$

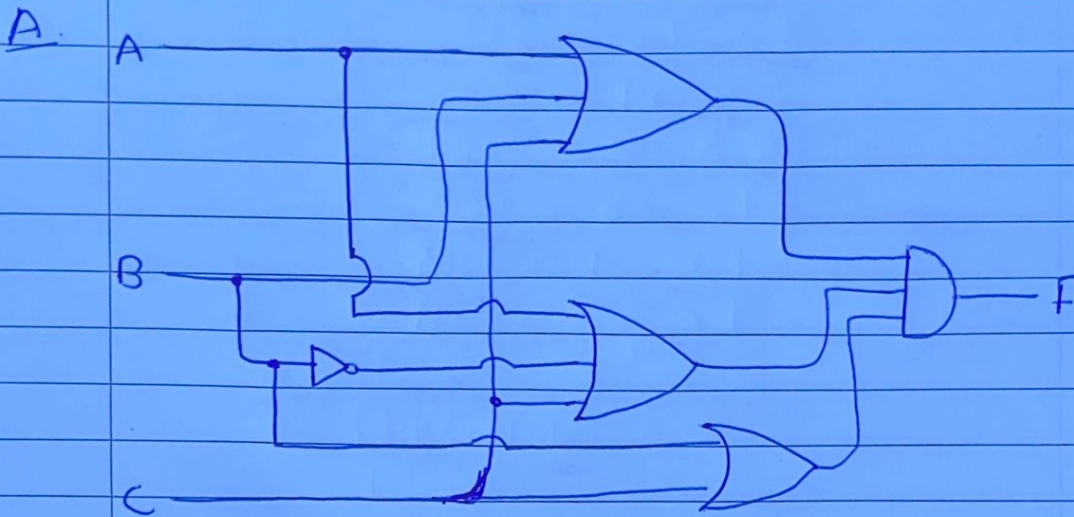


B.

x	y	f
0	0	1
0	1	0
1	0	1
1	1	0

S.  $f(x,y)$  is 1 whenever y input is 0.

P8.  $F(A, B, C) = (A+B+C)(A+\bar{B}+C)(B+C)$



B.

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1