Key to B1 Examination
Computer Architecture

Duration: 1 hr

Family Name ..... First Name ..... Class.....UID.....

Answer on the worksheet
Do not show any calculation unless you are explicitly asked.
Do not use a pencil or red ink.

Exercise 1 (4 points)

Convert the following numbers from the source form into the destination form. Do not write down the result in a fraction or a power form (e.g. write down 0.25 and not ¼ or 2^{-2}). Write down the result only (do not show any calculation).

Number to Convert	Source Form	Destination Form	Result
1 0110 1101	Binary	Decimal	**365**
1A5	Hexadecimal	Decimal	**421**
528	Decimal	Hexadecimal	**210**
1101.1000 1	Binary	Decimal	**13.53125**
28.28	Hexadecimal	Decimal	**40.15625**
40.35	Decimal	Binary (5 digits after the point)	**10 1000.0101 1**
22.84	Decimal	Hexadecimal (2 digits after the point)	**16.D7**
1011 1011.1011 01	Binary	Hexadecimal	**BB.B4**

Exercise 2 (6 points)

Perform the operations below. **Show all calculations.**

Base 2

		1	0	1	1	1	0	1	1	0
	–		1	1	0	1	1	0	1	1
			1	**0**	**0**	**1**	**1**	**0**	**1**	**1**

Base 16

			7	6	3	
+			F	A	A	
			5	B	6	
		1	**C**	**C**	**3**	

Base 2

		1	0	1	0	0	1	1	0	1	1	0	0	1		
					1	**0**	**1**	**1**			**1**	**0**	**0**	**1**	**0**	**1**
							1	0	0	**1**						
										0						

Base 2

									1	0	1	0	1	0	1	0	1	0	0	
								×						1	0	1	0	1	0	
								1	0	1	0	1	0	1	0	1	0	0		
		+				1	0	1	0	1	0	1	0	1	0	0				
		+		1	0	1	0	1	0	1	0	1	0	0						
				1	1	0	1	1	1	1	1	1	1	0	0	1	0	0	0	

Exercise 3 (6 points)

Perform the following 8-bit binary operations (the two operands and the result are 8 bits wide). Then, convert the result into unsigned and signed decimal values. If an overflow occurs, write down 'ERROR' instead of the decimal value.

Operation	Binary Result	Decimal Value	
		Unsigned	Signed
01010100 - 10011100	10111000	**ERROR**	**ERROR**
01110110 + 00011001	10001111	**143**	**ERROR**
11010011 - 00010110	10111101	**189**	**-67**

Exercise 4 (4 points)

1. Convert the numbers below into their **single-precision** IEEE-754 representations. Write down the final result in its **binary form** and specify the three fields.

Number	S	E	M
320	0	10000111	01000000000000000000000
0.09375	0	01111011	10000000000000000000000

2. Convert the **double-precision** IEEE-754 words below into their associated representations. If a representation is a number, use the base-10 following form: $k \times 2^n$ where k and n are integers (either positive or negative).

IEEE-754 Representation (base 16)	Associated Representation
2844 0000 0000 0000	5×2^{-381}
7FF0 0001 0000 0000	NaN

Feel free to use the blank space below if you need to: