Key to Additional Exam S1
Computer Architecture

Answer on the worksheet **Duration: 45 min**

Last name: ..... First name: ..... Group: .....

Exercise 1 (2 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
100111010.1101	Binary	Decimal	**314.8125**
E7.C	Hexadecimal	Decimal	**231.75**
305	Base 9	Base 3	**100012**
1110101100.110100101	Binary	Hexadecimal	**3AC.D28**

Exercise 2 (5 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. Write down the result only (do not show any calculation).

Operation	Binary Result	Decimal Value	
		Unsigned	Signed
10001011 – 11011111	1010 1100	**ERROR**	**–84**
01001101 + 01001110	1001 1011	**155**	**ERROR**
11111111 + 10000001	1000 0000	**ERROR**	**–128**

Exercise 4 (5 points)

For the whole exercise, write down the result only (do not show any calculation).

Let us consider the following expression:

$S1 = (\overline{A} + B + C).(B + \overline{C}).(\overline{A} + \overline{B})$

1. Give the most simplified expression of *S1*. **The result must be given as a sum of products.**

$S1 = \overline{A}.B + \overline{A}.\overline{C}$

2. Write down the minterm canonical form of *S1*.

$S1 = \overline{A}.B.C + \overline{A}.B.\overline{C} + \overline{A}.\overline{B}.\overline{C}$

3. Write down the maxterm canonical form of *S1*.

$S1 = (A + B + \overline{C}).(\overline{A} + B + C).(\overline{A} + B + \overline{C}).(\overline{A} + \overline{B} + C).(\overline{A} + \overline{B} + \overline{C})$

4. Complete the Karnaugh maps below (circles included) and give the most simplified expressions for *X* and *Y*. **No points will be given to an expression if its Karnaugh map is wrong.**

CD

AB \ X	00	01	11	10
00	1	0	1	1
01	1	0	0	1
11	1	0	0	1
10	1	0	1	1

$X = \overline{D} + \overline{B}.C$

CD

AB \ Y	00	01	11	10
00	1	0	1	1
01	0	0	0	1
11	0	0	1	1
10	1	0	0	1

$Y = \overline{B}.\overline{D} + C.\overline{D} + A.B.C + \overline{A}.\overline{B}.C$