Name: **SOLUTION**
Student #: _____

King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering

COE 308 – Computer Architecture (T041)

Quiz # 04 – Solution

***** Show all your work. No credit will be given if work is not shown! *****

Problem # 1 (10 points): What single-precision floating-point number does the following 32-bit word represent? **00101000101001010000000000000000**.

Solution:

Sign = 0_2 = (+)ve number

Exponent field = e = $01010001_2 = 81 \Rightarrow$ Exponent = 81 – 127 = – 46

Fraction field = f = $.01001010000000000000000_2$
$= 2^{-2} + 2^{-5} + 2^{-7}$
$= 0.25 + 0.03125 + 0.0078125$
$= 0.2890625$

$\Rightarrow$ FP # represented $= + 1.f \times 2^{e-127}$
$= + 1.2890625 \times 2^{-46}$
$= + 1.831867990631508291698992252349 9 \times 10^{-14}$

Problem # 2 (10 points): Show the single-precision floating-point representation of – 58.

Solution:

$-58 = -1.8125 \times 32 = -1.8125 \times 2^5 = -1.f \times 2^{e-127}$

(–)ve number $\Rightarrow$ Sign = 1_2

e – 127 = 5 $\Rightarrow$ e = 132 = 10000100_2

f = 0.8125 $\Rightarrow$ f = $.11010000000000000000000_2$

(Note:

0.8125 × 2	= 1.625	$\Rightarrow$ .1
0.625 × 2	= 1.25	$\Rightarrow$ .11
0.25 × 2	= 0.5	$\Rightarrow$ .110
0.5 × 2	= 1.0	$\Rightarrow$ .1101

)

$\Rightarrow$ FP # representation = **11000010011010000000000000000000**