

Name: \_\_\_\_\_

**CST8101 – Computer Essentials Mid-Term Assessment Part A**

**Test Duration: 50 Minutes**

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO**

**1) NO CALCULATORS, LAPTOPS, CELL PHONES, HEADPHONES or any other ELECTRONIC EQUIPMENT permitted. This is a CLOSED BOOK Assessment.**

- 1) There are 10 questions. Unless otherwise stated, each question is worth 5 marks. The test pages are **double-sided**. There are 13 pages in this test including this one.
- 2) This test is worth 20% of your final grade.
- 3) **This test must be written with a pencil. If you write the test using a pen, you will receive a mark of zero.**
- 4) Print your first and last name on the test paper
- 5) For each question, write your answer in the space provided
- 6) When you have finished the test, hand in your test, and scrap paper and leave the room. Scrap paper will be not be looked at for answers.
- 7) Avoid talking to other students as this may be interpreted as cheating.
- 8) Write neatly. If your instructor cannot read your handwriting, the answer will be marked as incorrect.

**When you are finished writing the test, leave the room quietly... NO TALKING!**

**Short Answer Questions**

1. Convert the octal number  $156_8$  to its binary form.

Answer:  $001\ 101\ 110_2$  or  $1\ 101\ 110_2$  (both answers are correct)

$$1 = 001$$

$$5 = 101$$

$$6 = 110$$

2. Convert the decimal number  $143_{10}$  to its' octal form.

Answer:            $217_8$           

Quotient	Remainder
$143/8 = 17$	7
$17/8 = 2$	1
$2-8=9$	2

□ Read the modulus from bottom to top

3. Convert the Hexadecimal number  $58_{16}$  to its' decimal form.

Answer:            $88_{10}$           

$$= (16^1 * 5) + (16^0 * 8)$$

$$= (16 * 5) + (1 * 8)$$

$$= 80 + 8$$

$$= 88_{10}$$

4. Convert the binary number  $110111100010_2$  to its' octal form.

Answer: 6742<sub>8</sub>

Split the number into groups of 3

$$110 = 6$$

$$111 = 7$$

$$100 = 4$$

$$010 = 2$$

Combine the numbers together 6742<sub>8</sub>

5. Convert the decimal number  $255_{10}$  to its' Hexadecimal form.

Answer: FF<sub>16</sub>

Quotient	Remainder
$255/16 = 15$	$15 = F$
$15/16 = 0$	$15 = F$

Read the modulus from bottom to top

6. Convert the binary number  $0101101010001101_2$  to its' Hexadecimal form.

Answer: 5A8D<sub>16</sub>

Split the number into groups of 4

$$0101 = 5$$

$$1010 = 10 = A$$

$$1000 = 8$$

$$1101 = D$$

Combine: 5A8D<sub>16</sub>

7. Convert the octal number  $257_8$  to its decimal form.

Answer:  $175_{10}$

$$= (8^2 * 2) + (8^1 * 5) + (8^0 * 7)$$

$$= (64 * 2) + (8 * 5) + (1 * 8)$$

$$= 128 + 40 + 7$$

$$= 128 + 47$$

$$= 175$$

8. What is the one's complement of  $0000010011000011_2$ ?

Answer:  $1111\ 1011\ 0011\ 1100_2$

$0000\ 0100\ 1100\ 0011$  --> flip the bits -->  $1111\ 1011\ 0011\ 1100$

9. Subtract these two unsigned numbers, using the two's complement method:

$$0111\ 0110_2 - 0011\ 0110_2 =$$

Answer:  $0100\ 0000_2$  or  $100\ 0000_2$  (both answers are correct)

10. Convert  $4.8125_{10}$  to an IEEE-754 32-bit floating point number. (10 Marks)

a) Is the sign bit positive or negative?  $0$  or positive (1 mark)

b) Convert  $4.8125$  to binary:  $100.1101$  (2 marks)

c) What is the mantissa/significand:  $001101$  (2 marks)

d) What is the exponent,  $k$ ? Write your answer in decimal:  $129$  (2 marks)

e) What is the exponent,  $k$ ? Write your answer in binary:  $1000\ 0001_2$  (1 mark)

f) Final Answer, in Hexadecimal?  $409A0000_{16}$  (2 marks)

Step 1. The number  $4.8125$  is positive so the sign bit is  $0$

Step 2: Convert 4.8125 to binary:  $100.1101_2$

$0.8125 * 2 = 1.625$  Harvest the **1** and continue with the rest

$0.625 * 2 = 1.25$  Harvest the **1** and continue with the rest

$0.25 * 2 = 0.50$  Harvest the **0** and continue with the rest

$0.50 * 2 = 1.0$  Harvest the **1** and stop

\* read the harvested bits from the top down: **1101**

Step 3. Normalize the number:  $100.1101 * 2^0$

Move the decimal two places to the left:  $1.001101 * 2^2$

Remove the hidden 1 to get the mantissa/significand: 001101

Step 4. Answer in binary:  $0100\ 0000\ 1001\ 1010\ 0000\ 0000\ 0000\ 0000_2$

Answer in Hex:  $409A0000_{16}$

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