Sétif 1 University
Faculty of Sciences
Common Core Mathematics and Computer Science

1st semester (year 2025/26)
Machine Structures 1 course
Kara Abdelaziz professor

Machine Structures 1 exam (CS)

(duration 1h30)

Exercise 1 :(4 points)

1. What is the definition of Computer Science ?
2. What is the base for the decimal, binary, octal, and hexadecimal systems ?
3. What is the symbol for the logical OR operation ?
4. What is the range for unsigned integers using N bits ?

Exercise 2 :(5 points)

1. Convert $(371)_8$ to hexadecimal (Hint: go through binary first).
2. Convert $(0.8125)_{10}$ to a Binary fraction.
3. Determine the base x such that: $(101)_x=(37)_{10}$
4. Perform the following binary subtraction: $(1010)_2 - (0111)_2$
5. Convert $(2047)_{10}$ to hexadecimal.

Exercise 3 :(5 points)

1. Decimal $(-15)_{10}$: Encode in 6-bit Unsigned Integer (UI), Sign-Magnitude (SM), One's Complement (1C), and Two's Complement (2C).
2. Decode the following 32-bit floating-point number: $[C1200000]_{FP32}$
3. Encode the word "Binary" into its 8-bit ASCII hexadecimal representation.

Exercise 4 :(6 points)

1. Trace the Truth Table for the following 3-variable Boolean function: $F(A,B,C)=(A\oplus B)+\overline{C}$.
2. Derive the Sum of Products (SoP) canonical form for a 4-variable function F(A,B,C,D) where F=1 only if the decimal value of the binary input is a prime number (عدد أولي) (2,3,5,7,11,13).
3. Use the Karnaugh map using 1s (SoP form) to minimize the previous function.

دعوة بالتوفيق