

Notre Dame University
 Faculty of Applied and Natural Science
 Computer Organization & Assembly Language. CSC 222
 Midterm Exam
 16 May 2002

1. Answer by writing True or False in the corresponding box: (8 points)

- a) A microoperation is a term that describes small and fast operations.
- b) $DR \leftarrow M[AR]$ represents a write operation.
- c) You cannot get an overflow when you're adding or subtracting unsigned numbers.
- d) The ALU of a computer is usually made of Sequential circuits and not combinational logic.

2. The binary values of register A=11110010 and B= 10101110. Write the register transfer language for each operation and show the corresponding results where applicable in the following table:
 (20 points)

Operation	Register Transfer Language	Result of Operation
An Arithmetic shift right of Register A. Followed by a Logic shift right.		
AND A with B. (Result in A)		
XOR A with B. (Result in A)		
	$D \leftarrow A + \overline{B} + 1$	
	$D \leftarrow \overline{B}$	

3. Perform the following conversions: (24 points)

Decimal	Binary	Hexadecimal	Octal	BCD
17.25				
	11001010.001			

4. Derive the following (r)'s complement and (r-1)'s complement for the following numbers:
 (12 points)

	r's Complement	(r-1)'s complement
$(1352700)_8$		
$(0000000)_{10}$		

*Calculators are not allowed.
 Please turn off your cellular phones.
 Any attempt to talk to anyone while exam is in session will earn you an F.*

5. Write the following numbers using 16 digits in the following bases: (6 points)

	Number	Result
Base 16	- 3DCA09	
Base 8	- 6542170	

6. Perform the subtractions with the following UNSIGNED numbers: (10 Points)

$$\begin{array}{r} 1\ 2\ 0\ 0 \\ -\quad 9\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 1\ 1\ 1\ 0\ 0\ 0 \\ -\quad 0\ 1\ 1\ 1 \\ \hline \end{array}$$

7. Draw the circuit diagram of a shift circuit that selects and generates arithmetic shift right and arithmetic shift left operations. Explain! (10 points)

8. Design a 2-bit logic circuit capable of generating any of the following 4 logic functions: (10 points)

Boolean Function	Name
F_1	Set to all 1's
F_2	Clear
F_3	NAND
F_4	Complement

Good Luck

*Calculators are not allowed.
Please turn off your cellular phones.
Any attempt to talk to anyone while exam is in session will earn you an F.*