LNMIIT
The LNM Institute of Information Technology

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Computer Science & Engineering

Computer Organization and Architecture

Exam Type: Mid Term

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Attempt all questions in sequence
Please be precise while writing your answer

Time: 90 Minutes | **Date:** 27-Sep-2018 | **Max. Marks:** 30

Q1. Consider the following program segment. Here R1, R2 and R3 are the general-purpose registers of a 32-bit machine.

	Instruction	Operation	Instruction size (no.of words)
	MOV R1, (3000)	R1 ← m[3000]	2
LOOP:	MOV R2, (R3)	R2 ← M[R3]	1
	ADD R2, R1	R2 ← R1 + R2	1
	MOV (R3), R2	M[R3] ← R2	1
	INC R3	R3 ← R3 + 1	1
	DEC R1	R1 ← R1 - 1	1
	BNZ LOOP	Branch on not zero	2
	HALT	Stop	1

Assume that the content of memory location 3000 is 10 and the content of the register R3 is 2000. The content of each of the memory locations from 2000 to 2010 is 100. The program is loaded starting from the memory location 1000. All the numbers are in decimal. Assume that the memory is word addressable.

a) What is the total number of memory references for accessing the data in executing the program completely. (Do not count memory references for bringing instructions). (4)
b) Draw the symbol table which will be created in the first pass by the assembler. (2)
c) What relocation constant will be used and in which statement? (2)
d) In the statement 'BNZ LOOP' if relative addressing mode is to be used, what offset value will be there? (2)
e) What is the addressing mode used in statement 'MOV R2, (R3)'? (1)
f) What will be the value in PC when statement 'DEC R1' is being executed? (1)

Q2. A computer has 32-bit instructions and 12-bit addresses. Suppose there are 250 2-address instructions. How many 1-address instructions can be formulated? Explain your answer. (3)

Q.3. a. Calculate the gate delay of 32 bit ripple carry adder. (1.5)

b. What is the meaning of C_n XOR C_{n-1} . Explain with example. (1.5)

Q4. Perform 10101 / 00101 using restoring division method. (4)

Q.5. During some arithmetic operation there is a need of storing + 0.01565 at an 8 bit memory location. Design a structure similar to IEEE floating point representation (with minimum number of bits for exponent) to store this number. Also write the bit patterns for ±0, ±Infinite, and NaN. (5+0.5+0.5+0.5+0.5+1)