Kafrelsheikh University
Faculty of Engineering
Electrical Engineering Department
Final Exam, 2018 - 2019
Subject: Computer Architecture.

Year: 3th Computer Engineering & systems
Academic Number : ECS3009
Date: 16 / 1 / 2019
Time: 3 Hours.
Full Mark: 60, 2 pages

This exam measures ILOs no: a3, a4, a8, a13, a14, b4, b5 b6, b13, c3, c6, c14, d1, d4

Question #1: Answer briefly on the following questions [20 Marks]

1. What, in general terms, is the distinction between computer organization and computer architecture?
2. What is the difference between RISC and CISC? Give example for each.
3. Discus the different between direct and indirect addressing modes? Use drawing whenever you can.
4. Mention the instruction cycle.
5. Discuss in briefly, the types of ROM.
6. What is a pipeline hazard? What are their types?
7. Compare between SRAM & DRAM.
8. List the techniques used for overcoming hazard.
9- What are the modes of I/O transfer data? Discuss briefly
10- What is a priority interrupt?

Question #2: Choose the correct answer: [5 Marks]

1- Execution of a Program in the Von Neumann system is done
    a. Concurrently   b. Randomly   c. Sequentially   d. None of these

2- In IEEE 32-bit representations, the mantissa of the fraction is said to occupy _____ bits.
    a. 24   b. 23   c. 20   d. 16

3- Given set of instructions
    add $s0, $t0, $t1;
    sub $t2, $s0, $t3;   shows:
  a. Structural hazards   b. Data hazards   c. forwarding bypassing   d. Pipeline stall

4- In CISC architecture most of the complex instructions are stored in _____
  a. Register   b. Diodes   c. CMOS   d. Transistors

5- A data bus is
  a.   Bidirectional   c. Provides path for moving data between system modules
  b.   Transfers bits of a word in parallel   d. All of above

Question #3: Answer by explanations the following questions [25 Marks]

1- Design a 3-bit binary ALU operations due to the following truth table of the control signals.
                                       [5 Marks]

S1	S2	operation
0	0	A OR B
0	1	A AND B
1	0	A XOR B
1	1	A + B

2- Use the Booth algorithm to multiply 23 (multiplicand) by 29 (Multiplier), where each number is represented using 6 bits. [4 marks]

3- Carry out the calculation steps for 4-bit binary division of positive numbers 1001/0100 (i.e., 9/4) using the division algorithm. [4 marks]

4- Show the IEEE 754 binary representation for the following floating-point numbers in single precision 356.75. [4 marks]

5- If x = 1 011 1011 1 100 1000 0000 0000 0000 0000

   y = 0 100 0100 1 001 0100 1000 0000 0000 0000

With these single precision IEEE 754 floating- point numbers, perform, showing all work:

   a) x+y   b) x*y   [8 marks]

Question #4: Pipeline   [10 marks]

Consider the following sequence of instructions being processed on the pipelined 5-stage RISC processor. Assume that this pipeline does not use operand forwarding. Also, assume that the only sources of pipeline stalls are the data hazards.

> Add   R4, R2, R3
> Store   R5, #100(R4)
> Load   R6, #200(R4)
> Subtract   R7, R5, R6

(a) Draw a diagram that represents instruction flow through the pipeline during each clock cycle. How long does it take for the instruction sequence to complete?

(b) Now, assume that the pipeline uses operand forwarding. There are separate forwarding paths from the outputs of stage-3 and stage-4 to the input of stage-3, Draw a diagram that represents the flow of instructions through the pipeline during each clock cycle. Indicate operand forwarding by arrows.

***************** With Best Wishes ******************

Dr. Wessam Fikry, *Committee of Correctors and Testers*