

# Computer Architecture 1 Final Exam

ELE319, Hanyang University, 2019 Spring.  
 ID: \_\_\_\_\_ Name: \_\_\_\_\_

Department: \_\_\_\_\_

The first two problems are mandatory. If you fail to answer the questions, you will not receive any credit.

- (5pt) Specify the 5-stage pipeline and explain what operation is performed at each stage.
- (5pt) Specify three hazards in processor pipelining and explain hardware and software approaches to solve the hazards.
- (5pt) Write the output value (C) for the given circuits if  $A=1$  and  $B=1$ .



- (5pt) We construct a 2-bit multiplier using Mux as following. Two inputs are provided to a selector in Mux. For instance,  $01 * 01 = 0001$  and  $00 * 00 = 0000$  in the following figure. Fill the remained constant input values in the Mux to complete the multiplier. (1.5pt)



- (5pt) Similarly, we are constructing a divider using a ROM as following. In the example, if dividend is 5 and divisor is 2 then quotient is 2 and remainder is 1. Hence,  $0x21$  is stored at address  $0x52$ . What value should be stored at address  $0x53$  in the ROM to support the divider? (1.5pt)



- (5pt) What is the difference between latch and flip-flop? (5pt)
- (5pt) For the following arithmetic unit, we want to compute  $A-B$  where 2's complement number is used. Determine proper values for  $S1, S0, Cin$  to make  $F = A-B$ .



- (24pt) The following figure shows single cycle implementation for datapath and control path for MIPS architecture.



Fill 0, 1 or X(don't care) in the following table to implement for the architecture.

Instruction	ALU Op	MEMOp	Reg Write	Mem Read	Mem Write	Branch
R-type instruction	(1)	(2)	(3)	(4)	(5)	(6)
Load	(7)	(8)	(9)	(10)	(11)	(12)
Store	(13)	(14)	(15)	(16)	(17)	(18)
branch	(19)	(20)	(21)	(22)	(23)	(24)

# Computer Architecture Final Exam Solutions

**Victor M. Corman**



## **Computer Architecture Final Exam Solutions:**

**United States Air Force Academy** United States Air Force Academy, **Annual Catalogue** United States Air Force Academy, 1983 **Engineering Education** John Heywood, 2006-01-24 A synthesis of nearly 2 000 articles to help make engineers better educators While a significant body of knowledge has evolved in the field of engineering education over the years much of the published information has been restricted to scholarly journals and has not found a broad audience This publication rectifies that situation by reviewing the findings of nearly 2 000 scholarly articles to help engineers become better educators devise more effective curricula and be more effective leaders and advocates in curriculum and research development The author s first objective is to provide an illustrative review of research and development in engineering education since 1960 His second objective is with the examples given to encourage the practice of classroom assessment and research and his third objective is to promote the idea of curriculum leadership The publication is divided into four main parts Part I demonstrates how the underpinnings of education history philosophy psychology sociology determine the aims and objectives of the curriculum and the curriculum s internal structure which integrates assessment content teaching and learning Part II focuses on the curriculum itself considering such key issues as content organization trends and change A chapter on interdisciplinary and integrated study and a chapter on project and problem based models of curriculum are included Part III examines problem solving creativity and design Part IV delves into teaching assessment and evaluation beginning with a chapter on the lecture cooperative learning and teamwork The book ends with a brief insightful forecast of the future of engineering education Because this is a practical tool and reference for engineers each chapter is self contained and may be read independently of the others Unlike other works in engineering education which are generally intended for educational researchers this publication is written not only for researchers in the field of engineering education but also for all engineers who teach All readers acquire a host of practical skills and knowledge in the fields of learning philosophy sociology and history as they specifically apply to the process of engineering curriculum improvement and evaluation

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## **Table of Contents Computer Architecture Final Exam Solutions**

1. Understanding the eBook Computer Architecture Final Exam Solutions
  - The Rise of Digital Reading Computer Architecture Final Exam Solutions
  - Advantages of eBooks Over Traditional Books
2. Identifying Computer Architecture Final Exam Solutions
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Computer Architecture Final Exam Solutions
  - User-Friendly Interface
4. Exploring eBook Recommendations from Computer Architecture Final Exam Solutions
  - Personalized Recommendations
  - Computer Architecture Final Exam Solutions User Reviews and Ratings
  - Computer Architecture Final Exam Solutions and Bestseller Lists
5. Accessing Computer Architecture Final Exam Solutions Free and Paid eBooks
  - Computer Architecture Final Exam Solutions Public Domain eBooks
  - Computer Architecture Final Exam Solutions eBook Subscription Services

- Computer Architecture Final Exam Solutions Budget-Friendly Options
- 6. Navigating Computer Architecture Final Exam Solutions eBook Formats
  - ePub, PDF, MOBI, and More
  - Computer Architecture Final Exam Solutions Compatibility with Devices
  - Computer Architecture Final Exam Solutions Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Computer Architecture Final Exam Solutions
  - Highlighting and Note-Taking Computer Architecture Final Exam Solutions
  - Interactive Elements Computer Architecture Final Exam Solutions
- 8. Staying Engaged with Computer Architecture Final Exam Solutions
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Computer Architecture Final Exam Solutions
- 9. Balancing eBooks and Physical Books Computer Architecture Final Exam Solutions
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Computer Architecture Final Exam Solutions
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Computer Architecture Final Exam Solutions
  - Setting Reading Goals Computer Architecture Final Exam Solutions
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Computer Architecture Final Exam Solutions
  - Fact-Checking eBook Content of Computer Architecture Final Exam Solutions
  - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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