

Student ID:.....Name:.....

Prince of Songkla University
Faculty of Engineering

Midterm Exam Semester 2
Date: 13 December 2005
240-341 Computer System Design

Academic Year: 2005
Time: 1330-1630
Room: A401

Instruction Notes:

- The examination questions are divided in two parts, each part worth 15 points for total 30 points
- You **must** answer only 5 from 7 questions in **part I**
 - The answer of part I **must** be in **English**
- You **must** answer **all** questions in **part II**
- You may use the back of the paper for answer the questions
- Books and Calculator are **not** allowed

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Part I: Choose only 5 from these 7 questions, each question worth 3 points

1. Explain computer architecture and its components with neat diagram

2. Explain different addressing modes

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3. Explain MIPS Arithmetic Instructions with examples

4. Write a program for finding the biggest value of three values using MIPS instructions

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5. Explain 0-,1-,2- and 3-Address Machines

6. Explain multiply Algorithm version-3 with neat sketch

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7. Explain Divide Algorithm Version-2 with examples

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Part II: Answer all of these questions, each question worth 3 points

1. Using only instruction in following table

instruction class	C	Vax Assembly Language	
Data movement	a = b	MOV	a, b
Arithmetic/Logic	b = c + d * e	MPY	d, e, b
		ADD	c, b, b
Control Flow	goto LBL	BR	LBL

compile by hand the following C statements, into VAX11 assembly language. Assume all variable are integers.

- a. $A = (B + C) * (D + E);$
- b. $A = B * C + D * E;$
- c. $U = V; W = X * Y;$

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2. Using only the information in following table

MC68000 Assembly Language	Machine Language
MOVE.W D4, D5	0011 101 000 000 100
ADDI.W #9, D2	00000110 01 000 010 0000 0000 0000 1001

encode the following MC68000 assembly language instructions into machine language. Express your result in binary.

- a. MOVE.W D1, D7
- b. ADDI.W #511, D6

3. Explain the difference between the two addressing modes described in RTN as follows:

- a. $M[M[X + R[a]]]$
- b. $M[M[X] + R[a]]$

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4. Write the RTN equivalent of these SRC instructions

- a. ld r22, 24(r4)
- b. sub r3, r2, r1
- c. br r4

5. Using the hardware in figure 1 (next page)

write the RTN description and the control sequence that implements the following:

- a. $R[3] \leftarrow R[4] + R[6] + 1$
- b. $R[2] \leftarrow R[3] + R[4] + R[5]$

