University of Swaziland

Faculty of Science
Department of Computer Science

Final Examination, 2006

Title of Paper: Computer Organisation II

Course Number: CS341

Time Allowed: Three (3) hours

Instruction: Answer all questions. Questions carry equal marks.

You are reminded that in assessing your work, account will be taken of the accuracy of the material, of the language used and the general quality of expression, together with the layout and presentation of your answer. Remember full answers will usually *define, explain and exemplify*.

Special Requirement:

Calculators are prohibited.

This examination paper should not be opened until permission has been granted by the invigilator.

Question 1. [20]
The following is the opcode table used by an assembler. Each opcode has only one operand, the type of which is relative (*) or absolute (+)

opcode	hex code	address type	length of address (bytes)
LDA	C0	*	1
GO	10	+	1
JMP	10	*	1

Construct the symbol table for this program snippet, where the symbols have the conventional meanings, as introduced in the course:

```
            ENT     one, two
            EXT     printf
            EQU     OSsysCall 0xF4
one         LDA     data1
            printf
exit        GO      OSsysCall
two         LDA     data2
            printf
            JMP     exit
data1       NUM     1
data2       NUM     2
```

Question 2. [20]
a) Convert to reverse polish notation the following expression:
[(a+b)*c+d] / [e+f+g]

b) Evaluate the following reverse polish expression, where each number is one (decimal) digit:
825*+122*+4-/

c) Evaluate $222_{10} + 222_{16} + 222_{8}$. (Any of the number bases in the expression is acceptable for the answer.)

d) At a Unix system prompt, you type:
umask -S
and obtain:
u=rwx,g=r,o=
Give the result of typing:
umask

e) A user wishs to have a web page, that he has created, in the web server's file space. Having copied it what command must he use to give the appropriate permissions, given the umask setting in (d)?

Question 3. [20]
(a) Describe the different areas of JVM memory.
(b) Show, by means of a diagram, how they are mapped onto the picoJavaII hardware.

Question 4. [20]
There are several ways of classifying ISA instructions. Choose one method and explain each of the six or seven categories, giving examples from JVM.

Question 5. [20]
(a) Explain, to the casual listener, the Towers of Hanoi problem.
(b) Write down the outline of the solution as an algorithm; the use of a high level language is not expected - use simple English in the form of an algorithm.

Question 6. [20]
Direct Memory Access (DMA) is one of the three I/O methods commonly encountered in computers.
a) Explain DMA
b) Why is DMA sometimes preferred to the other two methods?

Question 7. [20]
Describe in detail all the steps needed to write a Java application and then convert it to run as an applet to run in a web page.

End of examination paper.