**FINAL EXAM**  
**SECOND SEMESTER SESSION 2011/2012**

**COURSE CODE / NAME:** STIW3013 System Programming  
**DATE:** 4 JUNE 2012 (Monday)  
**TIME:** 9.00 - 11.30 a.m (2 ½ hours)  
**VENUE:** DSB K.T/WD

**INSTRUCTION:**

1. This book script contains TWELVE (12) questions printed on SEVEN (7) pages excluding the cover page.
2. Answer ALL the questions in the spaces provided.

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**LECTURER:**

**GROUP:** ☐ □ TABLE NO.:  

**DO NOT OPEN THIS EXAMINATION PAPER UNTIL INSTRUCTED**
1. Briefly explain with the help of a diagram, the memory protection function of an operating system. Assume that there are four jobs loaded in memory and the address range is from 0 to 1024000. (7 marks)

2. Define the THREE (3) fundamental units that make up the architecture of the UNIX operating system. (6 marks)
3. List and define the purpose of at least FIVE (5) directories typically found on various UNIX distributions.

(5 marks)

4. What is the purpose of system calls? List at least THREE (3) categories of UNIX system calls.

(8 marks)
5. Write a complete C program in which the main program spawns a single child process. The program should display the Process ID (PID) for the parent and the child. The parent process should wait for the child process to exit. Please use comments to explain your code.

(20 marks)
6. Write a short C program to shut down or turn off a computer in Microsoft Windows. 

(8 marks)

7. What is the difference between ‘Pass by Value’ and ‘Pass by Reference’? 

(6 marks)
8. Draw a finite state machine to simulate the following scenario:

Inputs: switch 0 and 1

Actions: 1 to "turn bit on"
2 to "turn bit off"

States: on, off

The bit is on if and only if both switches were flipped an odd number of times.

(10 marks)

9. Construct a finite state machine that accepts the language: \( L = \{010, 1\} \)

(10 marks)
10. Describe any **FIVE (5)** open source UNIX distributions that are currently available for home and business users.

(10 marks)
11. Why is there a general need to maintain system software? Explain **TWO (2)** types of maintenance usually performed on software.

(4 marks)

12. List the steps required to program a device driver in a UNIX environment.

(6 marks)

END OF QUESTIONS