



**THE UNIVERSITY OF ZAMBIA**  
**SCHOOL OF NATURAL SCIENCES**  
**DEPARTMENT OF COMPUTER SCIENCE**

**CSC 2101 – INTRODUCTION TO COMPUTER SYSTEMS**

**DURATION: 3 HOURS**

**DATE: 25<sup>TH</sup> FEBRUARY, 2015**

**INSTRUCTIONS**

- This paper has a total of five questions
- You must answer a total of four (4) questions
  - Section A is compulsory for all
  - Section B has four (4) questions, attempt any three (3)
- All questions carry equal marks (25 marks each)
- Clearly number all your answers
- Use the marks as a guide to the detail required in your answers while keeping your answers concise and relevant

## **SECTION A**

### **QUESTION ONE**

- a. Draw a block diagram showing principal components of an I/O module [5 marks]
- b. State 5 services provided by the Operating system, giving a brief explanation of how the OS works in providing each service [10 marks]
- c. What are 4 layers of the TCP/IP model and what is the function performed by each layer [8 marks]
- d. Briefly define each of the following: [2 marks]
  - i. Hardware
  - ii. Software

## **SECTION B (Choose any three)**

### **QUESTION TWO**

- a. Define the following; [6 marks]
  - i. Programming Language
  - ii. Syntax
  - iii. Semantics
- b. What is the meaning and what role do the following play in the CPU: [10 marks]
  - i. MAR
  - ii. MBR
  - iii. I/O AR
  - iv. I/O BR
  - v. PC
- c. Discuss the following network topologies: [9 marks]
  - i. Bus
  - ii. Star
  - iii. Ring

### QUESTION THREE

- a. Which of the following memories are possible and which are not? Explain [5 marks]
  - i. 7-Bit address, 8-bit cell-size, 128-bit memory
  - ii. 4-Bit address, 24-bit cell-size, 128-bit memory
  - iii. 4-Bit address, 12-bit cell-size, 96-bit memory
  - iv. 3-Bit address, 16-bit cell-size, 96-bit memory
  - v. 8-Bit address, 128-bit cell-size, 512-bit memory
- b. Using an n-bit address, determine the value of n required to address 1023 cells. With this value of n, what will be the addresses of the last two cells in binary? [5 marks]
- c. Compare and contrast the two RAM technologies, DRAM and SRAM [10 marks]
- d. Discuss the following ROM variations: [5 marks]
  - iv. PROM
  - v. EPROM

### QUESTION 4

- a. With the aid of a diagram, give the 7 layers of the OSI Reference model. Give a brief description of what each layer does. [14 marks]
- b. Compare and contrast the two physical network technologies, Circuit Switched (connection oriented) and Packet Switched (Store and Forward) [10 marks]
- c. What is the 8-bit binary representation of the integer 107? [1 mark]

### QUESTION 5

- a. A compiler operates in phases, each of which transforms the source program form one representation to another. Consider a particular compiler that outputs assembly code, given the following statement: *position := initial + rate \* 60*, show the various outputs from each phase of compilation. Assume all identifiers have been declared to be real numbers and that 60 by itself is declared to be an integer [10 marks]

- b. What is an interconnection structure? [3 marks]
- c. Define three functional groups into which bus lines can be classified and state the significance of each classification width. [6 marks]
- d. How many check bits would be needed for the following data bits? [6 marks]
- i. 64
  - ii. 128
  - iii. 256

***END OF EXAM***