

CHUKA



UNIVERSITY

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**FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF SCIENCE IN APPLIED COMPUTER SCIENCE**

ACMP 102: COMPUTER SYSTEMS

STREAM: BSC. (APPLIED COMP. SCIENCE) Y1 S1

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 19/12/2012

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS

1. Answer question **ONE** and any other **TWO** questions
2. Marks are awarded for clear and concise answers

SECTION A (Compulsory)

QUESTION ONE COMPULSORY (30 MARKS)

- (a) Briefly describe the following terms as used in today's world of computers.
- (i) Compiler [2 mark]
 - (ii) Addressing [2 mark]
 - (iii) Cache [2 mark]
- (b) Explain the difference between machine language and assembly language. [2 marks]
- (c) Give the standard logic symbols and a description of the operation of each of the following gates:
- (i) **AND** gate
 - (ii) **NOT** gate [4 marks]
- (d) With the aid of diagrams, explain the main difference between **SRAMs** and **DRAMs**. [4 marks]
- (e) Explain the basic structure of a High Level Assembly program. [2 marks]

- (g) Convert the following decimal number to binary. (Show your working). [2 marks]
42.0625
- (g) What is the **LOOK** scheduling policy for a disk system? [2 marks]
- (h) Explain how an inkjet printer prints characters on a page. [3 marks]
- (i) List the **THREE** techniques for performing I/O. [3 marks]
- (k) Complete the truth tables for the logic operations in the table below. [2 marks]

INPUTS				OUTPUTS	
A	B	C	D	NAND	XOR A,B
LOW	HIGH	LOW	HIGH		

SECTION B (ANSWER ANY TWO QUESTIONS FROM THIS SECTION)

QUESTION TWO (20 MARKS)

- (a) Give the key characteristics of each of the following memory types: [2 marks]
 (i) **EPROM**
 (ii) **EEPROM**
- (b) Draw a block diagram of a basic stored program computer at the register level, carefully label your diagram. [6 marks]
- (c) Explain the role of each of the main components in the machine code fetch/execute cycle of basic computer in (b) above. [5 marks]
- (d) A Boolean function is given by:

$$F = AB + BC$$

Draw an implementation of the circuit using logic gates. [3 marks]

- (e) List and briefly explain any **FOUR** functional groups of signal lines for PCI bus. [4 marks]

QUESTION THREE (20 MARKS)

- (a) Briefly explain the characteristics that differentiate latches from flip-flops. Use the example of the **S-R** latch and the **S-R** flip-flop. [3 marks]

- (b) For the following function $F(x, y, z) = \sum m(0, 1, 3, 5, 7)$ show:
- (i) The truth table [1 mark]
 - (ii) An algebraic expression in sum of minterm form [1 mark]
 - (iii) A minimum sum of product expression using Karnaugh map [2 marks]
 - (iv) The minterms of F' (complement of F) in numeric form [1 mark]
- (c) Draw a well labeled block diagram illustrating the memory hierarchy of computer system. [5 marks]
- (d) Using 8-bit two's complement integers, show how to perform the following computation. [3 marks]

$$-25 + (-12)$$

- (e) Convert the following number to binary. (Show your working) [3 marks]

$$675_8$$

QUESTION FOUR (20 MARKS)

- (a) Define a bus and give its key characteristic. [2 marks]
- (b) Draw a diagram showing the interconnection scheme for a bus. [5 marks]
- (c) Explain the functions of the various units of the bus structure. [3 marks]
- (d) Draw another block diagram showing memory chip organization of modern computers. [6 marks]
- (e) Write a High Level Assembly program to compute the function $2 + (7 \times 3)$. Assume that the program reads in 16 bit integer values. The result of the computation may be left in any register. [4 marks]

QUESTION FIVE (20 MARKS)

- (a) Write short notes on each of the following parameters of a read/write operation on a disk:
 - (i) Seek time [2 marks]
 - (ii) Rotational latency [2 marks]
 - (iii) Transfer time [2 marks]

- (b) Briefly explain the working principle of a typical laser printer. [3 marks]
- (c) Each peripheral device installed in a computer system requires an interface. Provide well labeled block diagrams showing one major characteristic of the interface to a peripheral from an I/O module. [4 marks]
- (d) Briefly describe reduced instruction set and complex instruction set computer processors and state which you would select for a special purpose arithmetic co-processor. [3 marks]
- (e) Draw a truth table for each of the following.
- (i) $A + B = F$
 - (ii) $A = B$
 - (iii) $AB = F$
 - (iv) $A \text{ NOR } B = F$
- [4 marks]
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