



*(Knowledge for development)*  
**KIBABII UNIVERSITY**  
**(KIBU)**

**UNIVERSITY EXAMINATIONS**  
**2020/2021 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS**  
**YEAR FOUR SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE OF**  
**BACHELOR OF SCIENCE**  
**(COMPUTER SCIENCE)**

**COURSE CODE** : CSC 453E  
**COURSE TITLE** : COMPUTER SYSTEMS ENGINEERING

**DATE:** 13/01/2022 **TIME:** 08.00 A.M – 10.00 A.M

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

**QUESTION ONE (COMPULSORY) [30 MARKS]**

- (a) State the meaning of the following terms used in computer systems engineering **[4 marks]**
- (i) Atomic action
  - (ii) System Complexity
  - (iii) Data Encryption
  - (iv) Thread
- (b) List four advantages of threads in computer systems **[4 marks]**
- (c) The two types of threats in computer systems security are system threats and program threats. Briefly distinguish between the forms of threats **[4 marks]**
- (d) Illustrate using a diagram the client – server modular organization in which modules interact with messages **[6 marks]**
- (e) In a given Intel 8088-based system, port address 22H is an input port for monitoring the temperature. Write assembly language instructions to monitor that port continuously for the temperature of 100 degrees. If it reaches 100, then BH should contain 'Y'. **[4 marks]**
- (f) Briefly discuss the impact of computer systems in four different sectors in today's society **[8 marks]**

## QUESTION TWO [20 MARKS]

- (a) State three sources of system complexity in computer systems engineering [3 marks]
- (b) Differentiate between all -or-nothing and before-or after atomicity in computer systems engineering [4 marks]
- (c) There are several events that lead to invoking an exception handler in the case of all-or nothing atomic actions in computer systems. Enumerate and briefly describe any three events [6 marks]
- (d) State four distinguishing characteristics between a microcontroller and a microprocessor [4 marks]
- (e) Unix provides access to serial ports via device files. Prepare a code for writing data to the port that returns the number of bytes sent or -1 if an error occurs [3 marks]

## QUESTION THREE [20 MARKS]

- (a) (i) Define the meaning of the term “virtual memory” and state the advantage of this scheme in computer systems [3 marks]
- (ii) State two purposes that the virtual memory serves in a computer system [2 marks]
- (b) State and briefly explain four methods of coping with computer system complexity [6 marks]
- (c) (i) An action that changes several data values can have any or all of at least four independent properties. Enumerate and briefly describe each of the four properties [4 mark]
- (ii) Explain how all-or-nothing atomicity and before-or-after atomicity provide a particularly strong form of modularity [1 mark]
- (d) State four clear differences between user level threads and kernel level threads [4 marks]

#### QUESTION FOUR [20 MARKS]

- (a) Define the following terminologies applicable in computer systems security policies and procedures [6 marks]
- i. Information Privacy
  - ii. Data Privacy
  - iii. Data Security
- (b) State two ways in which threads can be implemented in a computer system [2 marks]
- (c) State four roles of client – server enforced modularity in computer systems [4marks]
- (d) Briefly state the difference between full duplex and half duplex in computer system communication [4 marks]
- (e) List two main types of data encryption in computer systems [2 marks]
- (f) State two roles that the virtual memory serves in a computer system [2 marks]

#### QUESTION FIVE [20 MARKS]

- (a) Define the following terms applicable in computer systems engineering? [4 marks]
- (i) System Security
  - (ii) Serial communication
- (b) The computer systems security algorithms provide confidentiality and drive key security initiatives including authentication, integrity and non-repudiation. Briefly state the roles of authentication, integrity and non-repudiation [3 marks]
- (c) State and briefly describe three well-known program threats in computer systems [6 marks]
- (d) Using block diagram, briefly discuss the microcontroller system based on Intel 8051 microcontroller architecture [7 marks]