(Knowledge for Development)

KIBABII UNIVERSITY
(KIBU)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

END OF SEMESTER EXAMINATION

2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATION

FOR THE DIPLOMA IN

(INFORMATION TECHNOLOGY)

COURSE CODE: DIT 075

COURSE TITLE: COMPUTER ORGANIZATION AND ARCHITECTURE

DATE: 10/05/2022   **TIME:** 9.00 A.M. – 11.00 A.M.   2HRS

INSTRUCTIONS TO CANDIDATES:

Answer Question ONE and ANY OTHER TWO.

Paper Consists of 3 Printed Pages. Please Turn Over ➡

QUESTION ONE (COMPULSARY) [24 MARKS]

a) Differentiate between computer organization and computer architecture. **[4 Marks]**

b) Briefly explain the role of the following components. **[8 Marks]**
   i. Registers.
   ii. ALU.
   iii. Control Unit.
   iv. Buses.

c) Giving appropriate examples, define input/output. **[5 Marks]**

d) Briefly discuss the following terms as used in computing. **[3 Marks]**
   i. PROM
   ii. EPROM
   iii. Cache Memory

e) Explain how the terms bit, byte, nibble, and word are related as used in data representation. **[4 Marks]**

QUESTION TWO [18 MARKS]

a) Convert 110010011101_2 to octal and hexadecimal. **[4 Marks]**

b) Add 01001111_2 to 01100011_2 using signed-magnitude arithmetic. **[4 Marks]**

c) Perform the following conversions **[10 Marks]**
   i. Convert 3121_4 to base 3.
   ii. Convert 0.4304_{10} to base 5.
   iii. Convert 147_{10} to binary
   iv. Convert the hexadecimal number to decimal number *DEF* .

QUESTION THREE [18 MARKS]

a) Briefly explain ISA. **[3 Marks]**

b) According to what are instruction set architectures measured? **[4 Marks]**

c) Explain three reasons an instruction set may stall or be flushed. **[3 Marks]**

d) Discuss two ways in which instructions can be formatted? **[4 Marks]**

e) Explain what the CPU should do when an interrupt occurs. Include in your answer the method the CPU uses to detect an interrupt, how it is handled and what happens when the interrupt has been serviced. **[4 Marks]**

QUESTION FOUR [18 MARKS]

a) Explain the following terms as used in simple computer. **[3 Marks]**
   i. *fetch-decode-execute cycle*
   ii. Datapath
   iii. Address lines

b) Briefly discuss characteristics of the MARIE architecture. **[8 Marks]**

c) Identify and describe MARIE's seven registers. **[7 Marks]**

QUESTION FIVE [18 MARKS]

a) Define the following terms as used in computer memory. **[5 Marks]**
   i. Virtual address
   ii. Physical address
   iii. Mapping
   iv. Page frames
   v. Pages

b) Explain the difference between RAM and ROM   [2 Marks]
c) Name three different applications where ROMs are often used   [3 Marks]
d) An entire block of data is copied after a hit because the principle of locality tells us that once a byte is accessed, it is likely that the nearby data element will be accessed soon. Briefly discuss three forms of locality.   [3 Marks]

e) Describe the following terminologies as used when referring to memory hierarchy.   [5 Marks]
   i.   Hit   iv.   Miss rate
  ii.   Miss   v.   Hit time
 iii.   Hit rate