(Knowledge for Development)

KIBABII UNIVERSITY

(KIBU)

UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR TWO SEMESTER TWO EXAMINATIONS

FOR DIPLOMA
(INFORMATION TECHNOLOGY)

COURSE CODE : DIT 075

COURSE TITLE : COMPUTER ORGANIZATION AND ARCHITECTURE

DATE: 4/12/2023 **TIME:** 2.00 P.M. – 4.00 P.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [24 MARKS]

a) Identify three standards organization and explain their roles as far as computer organization and architecture is concerned. **[3 Marks]**

b) Explain the following terms as used in data representation in computer systems. **[4 Marks]**

i. Bit
ii. Byte
iii. Word
iv. Nibbles

c) All computers have a CPU that can be divided into two pieces; datapath and the control unit. Identify and explain the two components of a datapath. **[4 Marks]**

d) MARIE had an instruction length of 1 bits and could have at most one operand. Explain five ways how instruction sets are differentiated. **[5 Marks]**

e) 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]**

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

QUESTION TWO [18 MARKS]

a) Convert 110010011101_2 to octal and hexadecimal. **[6 Marks]**

b) Add 01001111_2 to 01100011_2 using signed-magnitude arithmetic. **[6 Marks]**

c) Perform the following conversions **[6 Marks]**

i. convert the decimal number to octal number 172.878
ii. Convert the hexadecimal number to decimal number ***DEF***

QUESTION THREE [18 MARKS]

a) The next consideration for design architecture concerns how CPU will store data. What three choices do we have? **[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) Briefly discuss the following terms as used in computing. **[8 Marks]**

i. PROM
ii. EPROM
iii. Cache Memory
iv. Virtual memory

c) Describe the following terminologies as used when referring to memory hierarchy. **[5 Marks]**

i. Hit
ii. Miss
iii. Hit rate
iv. Miss rate
v. Hit time