MACHAKOS UNIVERSITY

University Examinations for 2023/2024 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (TELECOMMUNICATION AND INFORMATION TECHNOLOGY)

441: MICROPROCESSOR APPLICATIONS

DATE: **TIME:**

INSTRUCTIONS

Answer question one and any other two questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Differentiate between a microprocessor and a microcomputer (2 marks)

b) Convert the following numbers:

i. 80_{10} into the binary number system (2 marks)

ii. 1110101_2 into the decimal number system (2 marks)

iii. 623_{10} into the octal number system (2 marks)

iv. 1010101101_2 to the hexadecimal number system (2 marks)

v. $6B_{16}$ to binary number system (2 marks)

vi. 76_8 to decimal (2 marks)

c) With reference to ASCII chart, represent the word "Hello" in to its equivalent binary format (5 marks)

d) Given binary numbers:

i) 10100111 and 11010011,

ii) 00100101 and 011111, perform binary addition (4 marks)

e) Define programming languages (1 mark)

f) List three types of microprocessor programming languages (3 marks)

g) With the aid of an electronic circuit and a truth table, implement an AND gate logic operation (3 marks)

QUESTION TWO (20 MARKS)

a) Define registers as used in microprocessor system (1 mark)

b) State the functions of arithmetic and logic unit in a microprocessor (2 marks)

c) Outline the four basic microprocessor registers stating their functions (4 marks)

d) What is the function of assembler in low level language programming (1 mark)

e) With the aid of a block diagram, describe a microcontroller (4 marks)

f) Various peripherals are interfaced to different units within a microcomputer system. List at least three interface standard available (3 marks)

g) Outline one application of a microcontroller (1 mark)

h) Describe an embedded system (2 marks)

i) With reference to bit capacity, differentiate between 8085 and 8086 microprocessors (2 marks)

QUESTION THREE (20 MARKS)

a) Given two binary numbers 11101 and 110101, find the binary sum (2 marks)

b) Describe and give examples of high level languages for microprocessor programming (3 marks)

c) Describe the structure of an instruction set of an assembly language instruction (3 marks)

d) Given the registers and value below;

i) AX, BX

ii) AX, 9H

Write and interpret the instruction sets for i) and ii) to implement copy operation in 8086 microprocessors (4 marks)

e) With the aid of a block diagram, describe the process by which the microprocessor executes instructions (3 marks)

f) Outline one advantage and one disadvantage of cache memory in a microprocessor system (2 marks)

g) With the aid of discrete electronic components and a truth table, implement an OR-gate operation (2 marks)

h) Define a nibble as used in basic data representation (1 mark)

QUESTION FOUR (20 MARKS)

a) Outline four features of a microprocessor (4 marks)

b) Describe and give examples of " system bus" as used in microcomputer system (4 marks)

c) With the aid of a block diagram, describe the basic architecture of a microprocessor (5 marks)

d) Using instruction set of 8086 microprocessors, write an instruction to add two numbers 04H and 03H (2 marks)

e) Using the instruction set in 8086 assembly programming language, write an instruction to copy 16- bit data $4C_H$ to register CX (2 marks)

f) Differentiate between a bit, byte and word as used in data format (3 marks)

QUESTION FIVE (20 MARKS)

a) With the aid of a block diagram, describe the basic architecture of a microcomputer (6 marks)

b) List two types of primary memory in a microcomputer system (2 marks)

c) Describe memory READ & WRITE process in a typical static RAM cell (6 marks)

d) Describe the three components of Control Unit in computer system (3 marks)

e) Outline three basic characteristics of microprocessor (3 marks)