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MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN ELECTRICAL AND COMMUNICATIONS ENGINEERING

COURSE CODE: ECE 414

COURSE TITLE: MICROPROCESSORS

DATE: FRIDAY, APRIL, 29TH, 2022.　　　　**TIME:** 3:00 – 5:00 PM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS.
QUESTION ONE CARRIES 30 MARKS AND ALL OTHERS 20 MARKS EACH.

QUESTION ONE

(a) Explain briefly any FOUR key features and supported applications of the seventh generation microprocessors [8marks]

(b) State any THREE applications for each of the following types of microprocessors

    (i) 4-bit [3marks]
    (ii) 8-bit [3marks]
    (iii)16-bit [9marks]

(c) Determine the status of different flags after addition of the following numbers.
    (i) 07_H and CF_H [3marks]
    (ii) CE_H and $9B_H$ [3marks]

(d) Explain briefly the functions of the following special purpose registers
    (i)   Program counter [2marks]
    (ii)   Stack Pointer [2marks]
    (iii) Control unit [3marks]

QUESTION TWO

(a) Write instructions to multiply two unpacked BCD numbers 4 and 6 and use AAM for adjustment of the result. [4marks]

(b) Determine the memory location accessed by the following instructions. Assume CS = 2300, BX = 1000H, SI = 0100
    i.   MOV AL, [0100] [2marks]
    ii.   MOV CL, [BX + 0200] [2marks]

(c) By giving two examples in each case, explain the following types of instructions of an 8086 microprocessor.
    i.   Data transfer instructions [2marks]
    ii.   Arithmetic instructions [2marks]
    iii.   Branch instructions [2marks]
    iv.   Loop instructions [2marks]
    v.   Flag manipulation instructions [2marks]

(d) If SI = 0200H, determine the content of the register AH after the execution of MOV AX, [SI] instruction. Assume DS=4000H.

QUESTION THREE

(a) State ANY FOUR advantages of memory segmentation [4marks]

(b) The contents of different registers are AX=1000H, BX=2000H, SI=3000H, DI=4000H, BP=5000H, SP=6000H, CS=8000H, DS=1000H, SS=2000H, IP=7000H. Determine the 16-bit effective addresses and 20-bit physical address for the following addressing modes. Assume Offset (displacement) = 0500H
    i.   Direct addressing [2marks]
    ii.   Register indirect addressing [2marks]
    iii.   Based Indexed addressing [2marks]
    iv.   Based Indexed with displacement addressing [2marks]

(c) By giving ANY TWO examples in each, explain briefly the following registers of an 8086 microprocessor

    i.   Data registers   [4marks]

    ii.   Pointer and Index registers   [4marks]

QUESTION FOUR

(a) By giving any THREE examples, explain briefly the following addressing modes of the 8085 microprocessor.

    i.   Direct addressing   [4marks]

    ii.   Register addressing   [4marks]

    iii. Immediate addressing   [4marks]

(b) Using 8085 instruction set, write an assembly language program to perform the following operations   [5marks]

    i.   Transfer data from accumulator to Register B respectively

    ii.   Load FFH in Register C

    iii. Load HL register pair by the data 8150H

    iv. Load the content of memory location 8100H in the accumulator

    v.   Store the content of accumulator in 8001H location

(c) State the type of operation executed by the following 8085 assembly language instructions   [3marks]

    (i) LDA 9000H

    (ii) MVI B, 55H

    (iii)SUB B

QUESTION FIVE

(a) Using the 8086 instruction set, write instructions for the following operations   [8marks]

    i.   Load 16-bit data from memory location offset address 0300 to AX

    ii.   Exchange the word between DX and AX registers

    iii. Push the content of memory location offset address 0500 on to the stack.

    iv. Subtract immediately 2345 from the BX register with borrow

    v.   Decrement the contents of memory location specified by the BX register

    vi. Divide AX by the content of memory location represented by BX

    vii. Multiply the content of AX by the content of CX

   viii. XOR operation between AL and DL registers

(b) Explain briefly how the following operations occur in a microprocessor system

    i.   Fetch   [3marks]

    ii.   Execute   [3marks]

(c) Explain briefly the FOUR types of segment registers in an 8086 microprocessor

                                                               [6marks]