CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE (GENERAL) AND BACHELOR OF EDUCATION (SCIENCE)

PHYS 418: MICROPROCESSORS I

STREAMS: B. Sc (Gen) & B. Ed (Sc): Y4S1 **TIME: 2 HOURS**

DAY/DATE: FRIDAY 07/12/2018 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS: Answer Question ONE and any other TWO questions

QUESTION ONE(30 MARKS)

(a) With reference to Intel 8085 microprocessor in figure 5.1, discuss the following signal lines

(i) $\overline{RD}$ (pin 32)

(ii) $\overline{WR}$ (pin 31) (4marks)

(b) An interrupt signal pin in a microprocessor is very important. What is it function? (2marks)

(c) What is the function of a stack pointer in a microprocessor (2mark)

(d) Describe briefly the fields of a basic assembly language program;(4marks)

(e) Data in a microprocessor is represented in form of numbers. Convert the following numbersinto the indicated number system,

(i) 2345_{10} into binary number (2marks)

(ii) $3DF6_{16}$ into decimal number (2marks)

(iii) 101000111010_2 into hexadecimal number (2marks)

(f) With a well labeled diagram, describe the registers and how they are organized with reference to Z-80 microprocessor(5marks)

(g) Microprocessors are intelligent systems that are able to write data to the memory with instructions from the user. Describe how this is achieved. (4marks)

(h) Why is the data bus multiplexed with address bus in microprocessors (3marks)

QUESTION TWO (20 MARKS)

(a) In your fourth year project, you decide to design microprocessor based instrumentation system that will be installed at Chuka University main gate to open and closed the gate instead of the gatekeeper. Discuss the main factors to note before choosing the type of a microprocessor to use. (6marks)

(b) Discuss the functions of the following in a microprocessor: Program counter, accumulator and instruction register. (6marks)

(c) Discuss six (6) functions that are performed by the arithmetic logic unitin a microprocessor (8marks)

QUESTION THREE (20 MARKS)

(a) Discuss the functions of the following buses in a microprocessor: Address bus, data bus and control bus. (6marks)

(b) With a well labeled diagram, illustrate the architecture and bus structure of an Intel 8085 microprocessor based system showing clearly the data bus, address bus and the control bus(8marks)

(c) Describe the timing diagram of a memory read and memory write operation with reference to Z-80 microprocessor. (6marks)

QUESTION FOUR(20 MARKS)

(a) Memories are essential to microprocessor operations. Discuss ROM, RAM and EPROM memories. (6marks)

(b) Describe how a microprocessor and external peripherals transfer data through direct memory access (DMA) and programmed data transfer facilities.(6marks)

(c) With reference to Z-80 microprocessor, discuss the functions of the following pins: BUSACK, BUSREQ, HALT and MREQ. (8marks)

QUESTION FIVE(20 MARKS)

(a) Figure 5.1 shows pin assignment of a typical 8 bit microprocessor chip.

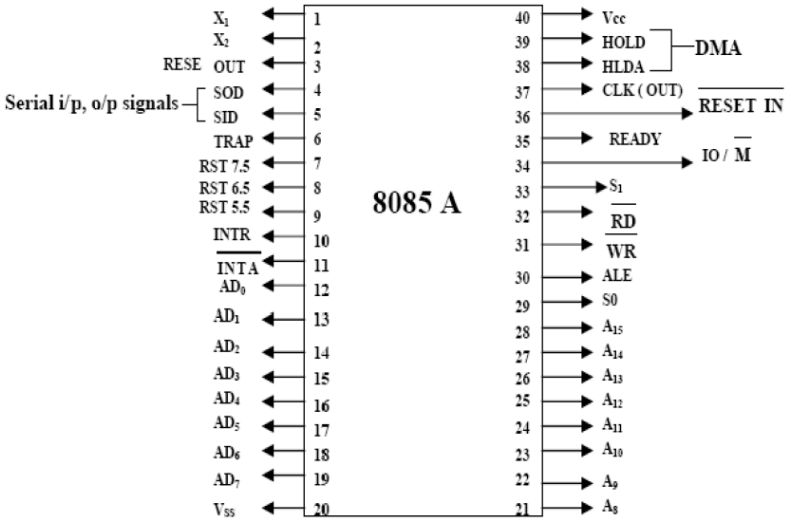

Figure 5.1. Intel 8085 microprocessor pin assignment.

(a) Discuss the function of the following pins; (i) $AD_0 – AD_7$(pins 12 -19) (3marks)

(ii) $A_8 – A_{15}$ (pins 21 - 28) (3marks)

(iii) CLK (pins 37) (2marks)

(iv) Vcc (pin 40) and Vss (pin 20) (2marks)

(v) S_0 (pin 29) and S_1 (pin 33) (2marks)

(b) Flag register contains 8-bits with five flip flops in Intel 8085 microprocessor chip to indicate the status of an arithmetic operation in the accumulator.Draw a table to represent the 8 bits and show the positions of the five flip flops (flags) and describe how each one of them will behave due to the result of an arithmetic operation.

(8marks)
