NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
DECEMBER EXAMINATIONS 2004

COURSE: **Computer Architecture**

CODE: **SCS 2102**

INSTRUCTIONS TO CANDIDATES

This question paper consists of **Five** questions.
Answer **any four (4)** questions

3 HOURS

QUESTION ONE

a) What is the relationship between IC technological development and computer architecture? [5]

b) Describe in detail the different types of memories found in computer systems [6]

c) The following devices are compatible with Intel 8085 microprocessor:
- 2K x 8 ROM (8755 ROM)
- 1K x 4 RAM (2114 RAM)

How many 8755 ROM and 2114RAM ICs will you require and why? [3]

d) Outline the functions of any:
i) two control signals of an Intel 8085 microprocessor [2]
ii) three status signals of an Intel 8085 microprocessor [3]
iii) six interrupt signals of an Intel 8085 microprocessor [6]

QUESTION TWO

a) Interface the following ICs to an Intel 8085 microprocessor using a demultiplexed bus and also show clearly all the signals involved.
- 2K x 8 ROM (8755 ROM)
- 1K x 4 RAM (2114 RAM) [10]

b) Explain the importance of buffers in interfacing electronic devices. [5]

c) Distinguish between Peripheral I/O technique and the Memory Mapped I/O technique [10]

QUESTION THREE

a) The table below represents details of a partially decoded system. Study the table and answer the questions that follow.

Lines used for IC selection	Lines used for IC addressing	Device	Bi-directional Data lines	Number of Input lines	Number of Output lines
$A_{11}.A_{12}$	$A_0 \ldots A_{10}$	ROM			8
$\overline{A_{11}}..A_{12}$		OUTPUT			8
$A_{11}.\overline{A_{12}}$		INPUT		8	
$\overline{A_{11}}.\overline{A_{12}}$	$A_0 \ldots A_9$	RAM	8		

Table 1.1

i) Draw a memory map for this system [10]

ii) Redesign the system using full-address decoding and draw the corresponding memory map [3]

iii) How does the Intel 8085 identify and service the INTR interrupt [2]

b) Describe in detail the two methods which the DMA controller can use to gain access to the address and data bus for data transfer in a computer system [4]

c) Given two system one that employs multiprocessing techniques and the other that employs parallel processing approach which of the two systems would you recommend for a Meteorological Service Center and why? [6]

QUESTION FOUR

a) Give brief description of each of the steps in an interrupt sequence. [10]

b) In an Intel 8085, bus contention can occur if memory places data byte on the bus $AD_7 \ldots AD_0$. before the low-order address bus. Explain the two methods in which this can be solved. [5]

c) Identify the addressing modes in the following Intel 8085 microprocessor instructions:

i) STAX B

ii) LDA 0457H

iii) MOV A,C

iv) LXI H, 7000H [2]

d) The microprocessor communicates with the peripherals in either of the two formats: asynchronous or synchronous. Similarly it transfers data in either of the two modes: parallel I/O or serial I/O.

With the aid of diagrams explain the underlined concepts. [8]

QUESTION FIVE

a) In the peripheral I/O method explain why data can not be transferred directly from register to an output port without using the Accumulator. [5]

b) With the aid of diagrams describe the main components of a CRT controller and how it interfaces with the processor. [10]

c) BIOS is usually stored in EPROM and its memory address has some restrictions. Give a detailed account of these restrictions with respect to computer architecture [10]

END OF QUESTION PAPER

GOOD LUCK