**Design note and assumptions**

* Logic states and switches are included only for simulation purpose.
* This is not a bidirectional port design. Separate 8-bit port used for inputs and 16-bit port used for output
* This is a level trigger design

b)   Write a simple program in C to read a value from and write a value to your interface

#include <stdio.h>

#include <unistd.h>

#include <sys/io.h>

#include <asm/io.h>

#define ADDR 0x210 //base address from the address lines

void main(){

    //check for port access

    if (ioperm(ADDR, 1, 1)){

        fprintf(stderr, "Access denied to %x\n", ADDR),

        exit(1);

    }

    //write operation

    unsigned int value = 270;

    unsigned char lower\_byte = value;

    unsigned char higher\_byte = value >> 8;

    outb(lower\_byte, ADDR);

    outb(higher\_byte, ADDR + 1);

    // read operation

    unsigned char byte\_read = inb(ADDR);

    printf("%lu", byte\_read);

}

c)    Briefly explain the importance of using nIOW, nIOR, AENs line in an ISA bus based interface design.

The main purpose of having nIOW, nIOR, AENs signals are to work them as control signals of the interface. nIOW, nIOR signals are used to set the transaction process between read and write expected to be done

Sometimes the DAM controller mastering the ISA bus in order to complete data transferring between peripherals and memory. At that time the CPU cannot use the bus to do IO operations. The AEN is used by the controlling signals to indicate which is the master of the bus at the particular instance.

If AEN=1 DMA is the bus master.