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Victoria University of Bangladesh

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Computer Peripherals and Interfacing

CSE-333

Mid Assessment

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Answer to the Question No- 1 (a)

Computer Interfacing: The Process of connecting peripherals with the microprocessor for transferring instructions and results is known as interfacing.

Computer Peripheral: A peripheral is a device that is used to put information into or get information out of the computer.

Three different types of peripherals-

① Input: Used to interact with, or send data to the computer (mouse, keybords, etc.)

① Output: Which provides output to the user from the computer (monitors, printers, etc.)

① Storage: Which stores data processed by the computer (hard drives, flash drived, etc.)

Answer to the Question No- 1 (b)

Interrupt: This is a method of creating a temporary halt during program execution and allows peripheral devices to access the microprocessor. The microprocessor responds to that interrupt with an ISR (Interrupt Service Routine), which is a short program to instruct the microprocessor on how to handle the interrupt.

One example of hardware interrupt is moving or pressing a keyboard key. In these examples of interrupts, the processor must stop to read the mouse position or keystroke at that instant.

Answer to the Question No- 2 (a)

There are 03 (three) sources of Interrupts:

    ① Hardware-based Interrupt.

    ② Software-based Interrupt.
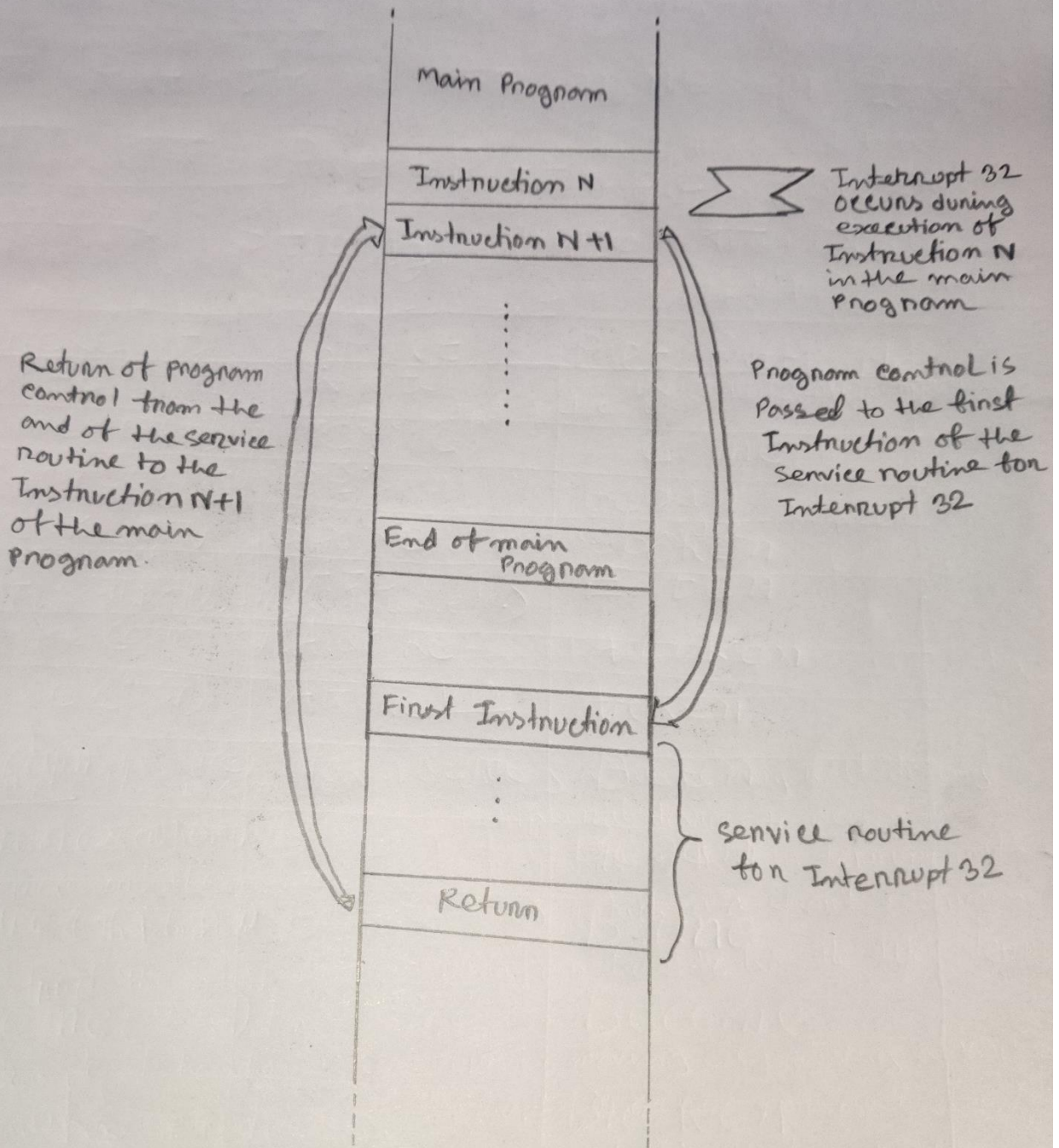
    ③ Internal Interrupt.

① Hardware-based Interrupt: An external hardware applying voltage/signal to the INTR pin (Interrupt pin) of the microprocessor, which indicates that the external device, such as a printer or a keyboard, requires service.

② Software-based Interrupt: Execution of the Interrupt instruction, INT. Example- INT type number.

③ Internal Interrupt: Some error condition produced by the execution of an instruction. Example-Divide-by-zero interrupt.
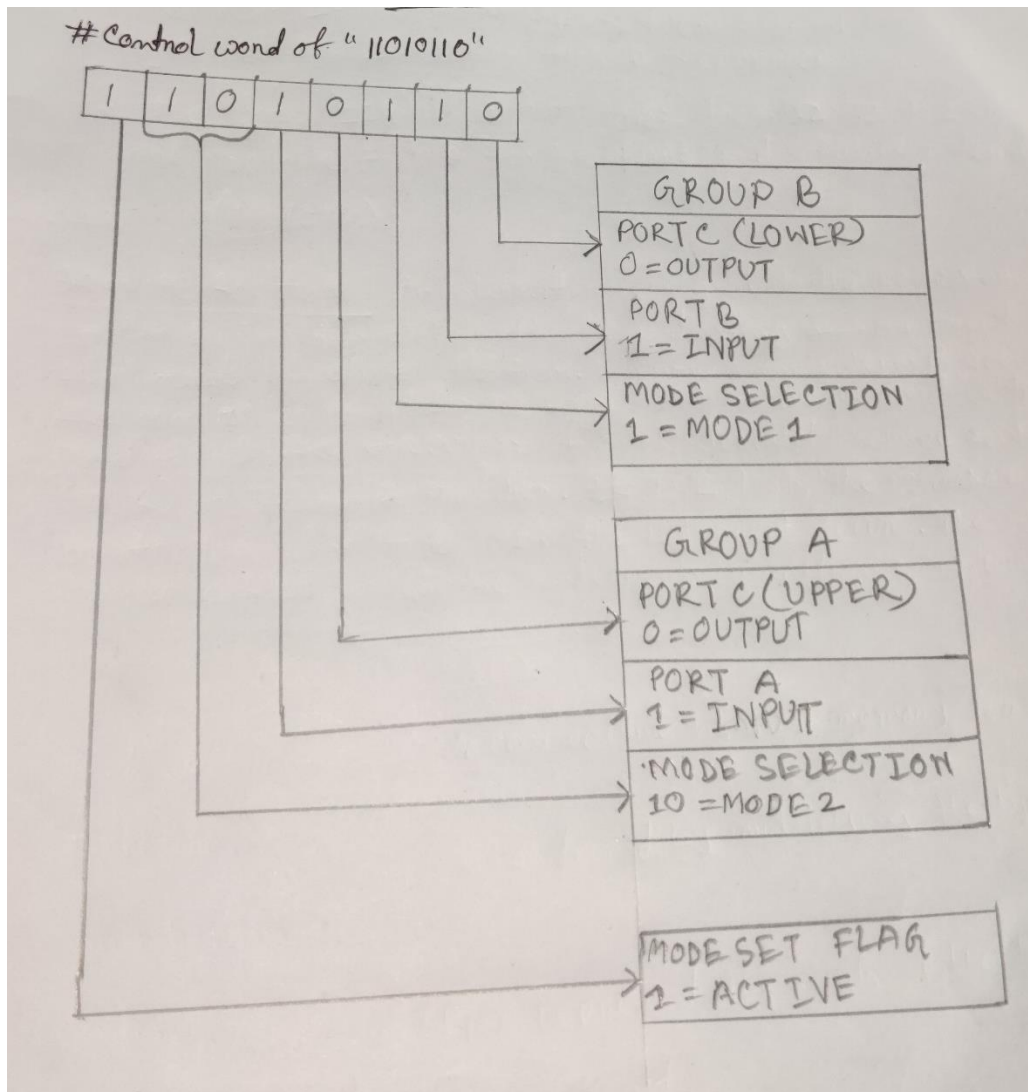
Interrupt program context switching mechanism:

Main Program

Instruction N

Instruction N+1

End of main
Program

First Instruction

Return

Interrupt 32
occurs during
execution of
Instruction N
in the main
Program

Program control is
Passed to the first
Instruction of the
Service routine for
Interrupt 32

Return of program
control from the
end of the service
routine to the
Instruction N+1
of the main
Program.
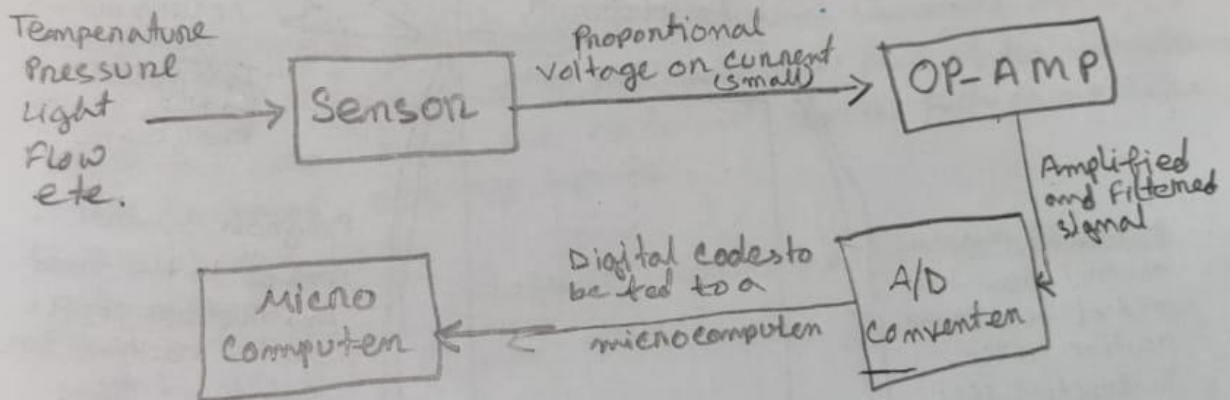
service routine
for Interrupt 32

when an interrupt signal occurs, the MPU must suspend what it is doing in the main part of the program and pass control to a special routine ISR (the interrupt-service routine) that performs the function required by the external device.

Answer to the Question No- 2 (c)

Control word of "11010110"

| 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |

GROUP B
PORT C (LOWER)
0 = OUTPUT

PORT B
1 = INPUT

MODE SELECTION
1 = MODE 1

GROUP A
PORT C (UPPER)
0 = OUTPUT

PORT A
1 = INPUT

MODE SELECTION
10 = MODE 2

MODE SET FLAG
1 = ACTIVE

Answer to the Question No- 3 (a)

<u>Basic concept of Analog Interfacing</u>: In order to control the e machines in- Electronics Factory, Medical Instruments, Automobiles etc., we need to determine the values of some variables like pressure, temperature, Light, flow etc.

Temperature
Pressure
Light ———> Sensor ——Proportional voltage on current (small)——> OP-AMP
Flow
etc.

OP-AMP ——Amplified and Filtered signal——> A/D Converter

A/D Converter ——Digital codes to be fed to a microcomputer——> Micro Computer

Interrupt Vector Table: An interrupt vector table is stored in the first 1 kbyte of memory (starting at address 00000h and ending at 003FFh). This is a pointer table to indicate the location of service routines corresponding to interrupt types 0 to 255.

- Each entry is 4 bytes.
- The CS (Code Segment register) and IP (Instruction Pointer register) in the interrupt vector table indicate the location of the service routine for the corresponding interrupt.
- The lowest five types are dedicated to specific interrupts such as the divide by zero interrupt and the non maskable interrupt.

- The next 27 interrupt types, from 5 to 31 are reserved by Intel for use in future microprocessors.

- The upper 224 interrupt types, from 32 to 255, are available to use for hardware and software interrupts.

Service Routine: An interrupt is a signal to the processor, emitted by hardware or software indicating an event that needs immediate attention. Whenever an interrupt occurs, the controller completes the execution of the current instruction and starts the execution of an Interrupt Service Routine (ISR) or Interrupt Handler. ISR tells the processor or controller what to do when the interrupt occurs. The interrupts can be either hardware interrupts or software interrupts.

⇒ Each vector requires 4 consecutive bytes of memory for storage.

Therefore,
its address can be found by multiplying the type number by 4.

Since, CS_{150} and IP_{150} represent the words of the type 150 interrupt pointer, we get,

$$\text{Address} = 4 \times 150 = 600$$

Converting to binary from gives.

$$\text{Address} = (1001011000)_2 = 258_{16}$$

Therefore,

\# IP_{150} is stored at 00258_{16}

\# CS_{150} is stored at $0025A_{16}$