Assignment - 03
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Ques 1. Study and write the basic features of 8085 microprocessor in detail.

8085 is pronounced as "eighty-eighty-five" microprocessor. it is an 8-bit microprocessor designed by Intel in 1977 using NMOS technology it has following configuration.

1. 8-bit data bus
2. 16-bit address bus, which can address upto 64 KB.
3. A 16-bit program counter
4. A 16-bit stack pointer
5. Six 8-bit register arranged in pair: BC, DE, HL
6. Requires +5V supply to operate at 3.2 MHZ single phase clock.

It is used in washing machine, microwave, mobile phones etc.

8085 Microprocessor - Functional units

8085 consist of the following functional units -

Accumulator :- It is an 8 bit register use to performed arithmatic logic operations I/O & LOAD/STORE operations it is connected to internal data bus and ALU.

Arithmetic and logic unit :- As the name suggest it performs arithmatic and logic operations like addition substraction, AND, OR etc, on 8 bit data.

General purpose register :-
there are 6 general purpose register in 8085 processor i.e. B, C, D, E, H & L each register can hold 8-bit data.

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these register can work in pair to hold 16-bit data & their pairing combination is like B-C, D-E & H-L.

Program Counter :- It is an 16-bit register used to store the memory address location of the next instruction to be executed. microprocessor increments the programs whenever an istruction is being executed, so that the program counter points to the memory address of the next instruction that is going to be executed.

Stack Pointer :- It is also a 16 bit register work like stack which is always incremented/decremented by during push & pop operation.

Temporary Register :-
It is an 8-bit register which holds the temporary data of arithmetic and logic operation.

Flag Register :-
It is an 8-bit register having five 1-bit flip-flops which holds either 0 or 1 depending upon the result stored in the accumulator.
These are the set of 5 flip-flops -

a. Sign (S)
b. Zero (Z)
c. Auxiliary Carry (AC)
d. Parity (P)
e. Carry (C)

D7	D6	D5	D4	D3	D2	D1	D0
S	Z		AC		P		CY

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Instruction register and decoder :- It is an 8-bit register when an instruction is fetched from memory then it is stored in the instruction register. Instruction decoder decodes the information present in the instruction register.

Timing and Control unit :- It provides timing and control signal to the microprocessor to perform operations following are the timing and control signals, which external and internal circuits -

a. Control Signals : READY, RD, WR, ALE
Status Signals : S0, S1, IO/M
DMA Signals : HOLD, HLDA
RESET Signals : RESET IN, RESET OUT

Interrupt Control :- As the name suggest it controls the the interrupts during a process. When a processor is executing a main programs and whenever an interrupts occurs, the microprocessor shifts the control from the main program to process the incoming request. after the request is completed the control goes to the main programs.
There are 5 interrupt signals in 8085 microprocessor : INTR, RST 7.5, RST 6.5, RST 5.5 TRAP.

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Serial Input / Output Control :- It controls the serial data communication by using these these two instruction: SID (Serial input data) and SOD (Serial output data).

Address buffer and address - data buffer :- the content stored in the stack pointer and program counter is loaded into the address buffer and address - data buffer to communicate with CPU. the memory and I/O chips are connected to these buses. the CPU can exchange the desired data with the memory and I/O chips.

Address bus and data bus :-
Data bus carries the data to be stored. it is bidirectional, whereas address bus carries the location to where it should be stored and it is uni-direction. It is used to transfer the data & address I/O devices.

Architecture of 8085

We have tried to depict the architecture of 8085 with this following image —

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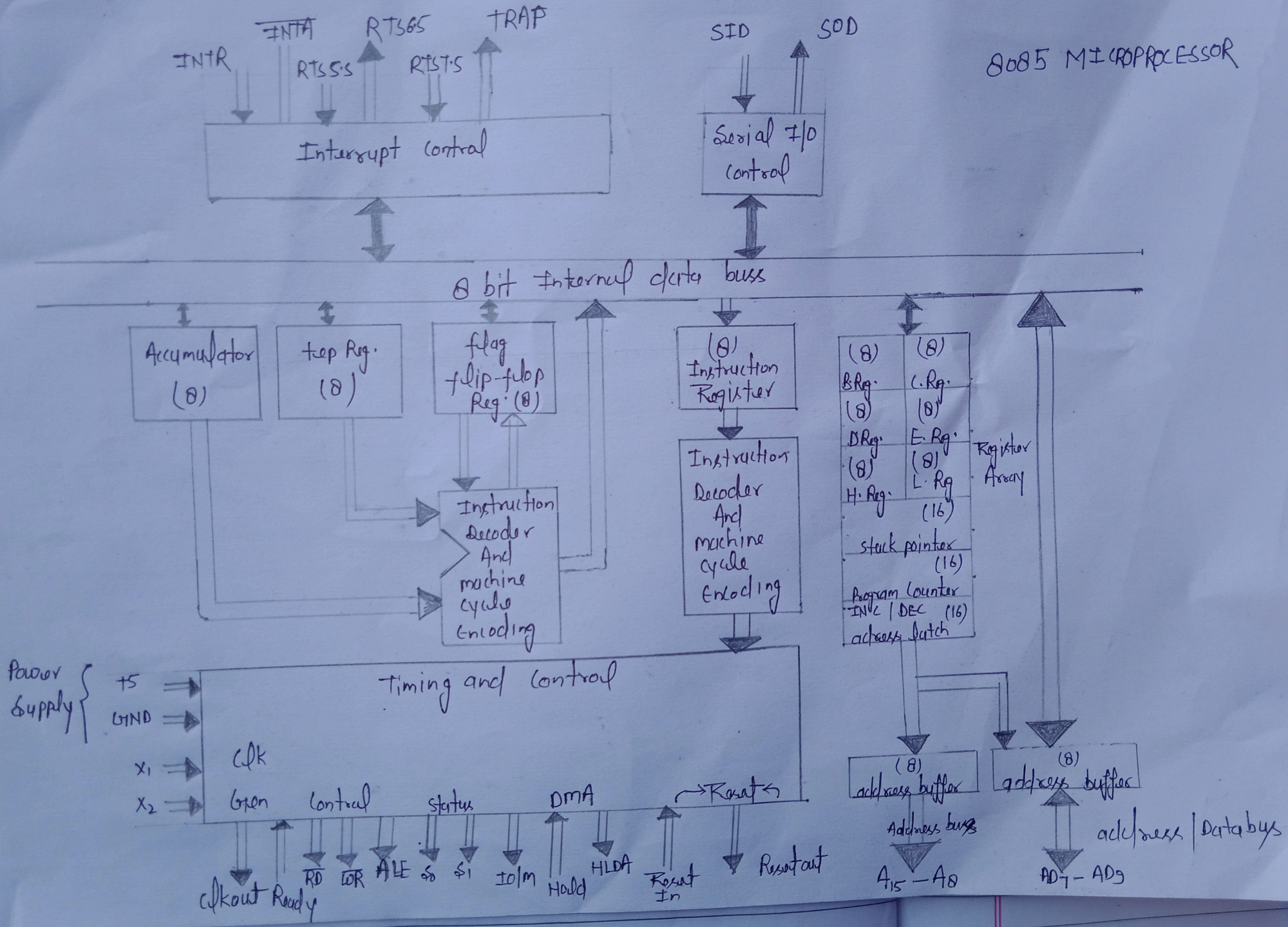
8085 MICROPROCESSOR



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Que2: Study and draw the pin architecture of 8085 microprocessor in details?

The pins of a 8085 microprocessor can be classified into seven groups –

Address bus :-
A15 - A8, it carries the most significant 8-bits of memory I/O address.

Data bus :-
AD7 - AD0, it carries the least significant 8-bit address and bus.

Control and status signal :-
these signal are used to identify the nature of operation, there are 3 control signal and 3 status signals.
three control signals are RD, WR & ALE.

RD :- This signal indicates that the selected IO or memory device is to be read and is ready for accepting data available on the data bus.

WR :- this signal indicates that the data on the data bus is to be written into a selected memory or IO location.

ALE :- It is positive going pulse generated when a new operation is started by the microprocessor. when the pulse goes high. it indicates address when the pulse goes down it indicates data.

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three status signal are I/O M, S0 & S1.

IO/M :- This signal is used to differentiate between IO and memory operations i.e. when it is high indicates IO operation and when it is Low then it indicates memory operation

S1 & S0 :-
These signals are used to identify the type of current operation.

Power Supply :- ~~These signals are used to identify~~
there are 2 power supply signals - Vcc & Vss
Vcc indicates +5V power supply and Vss indicates ground signal.

Clock signals :-
there are '3' clock signal i.e. X1, X2, CLK OUT.
X1, X2 :- A crystal (RC, LC, M/W) is connected at these two pins and is used to set frequency of the internal clock generator this frequency is internally divided by 2.
CLK OUT :- This signal is used as the system clock for devices connected with the microprocessor.

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Interrupts / externally initiated signals :-
Interrupts are the signals generated by external devices to request the microprocessor to perform a task. there are 5 intrupt signals i.e. TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR. we will discuss interrupts in detail one by one.

INTA - It is an interrupt acknowledgment signal.

RESET IN - This signal is used to reset the microprocessor by setting the program counter to zero.

RESET OUT - This signal is used to reset all the connected devices when the microprocessor is reset.

READY - This signal indicates that the device is reddy to send or receive data. if READY is low then CPU has to wait for READY to go high.

HOLD - This signal indicates that the another master is requesting the use of the address and data buses.

HLDA (HOLD Acknowledge) :- it indicates that the CPU has received the HOLD request and it will relinquish the bus in the next clock cycle. HLDA is sent to low after the HOLD signal is removed.

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Serial I/O Signals :-

There are 2 signal i.e. SID and SOD and these signals are used for serial communication.

SOD (Serial output data line) - The output SOD is set / reset as specified by the SIM instruction.

SID (Serial Input data line) - The data on this line is loaded into accumulator whenever a SIP instruction is executed.

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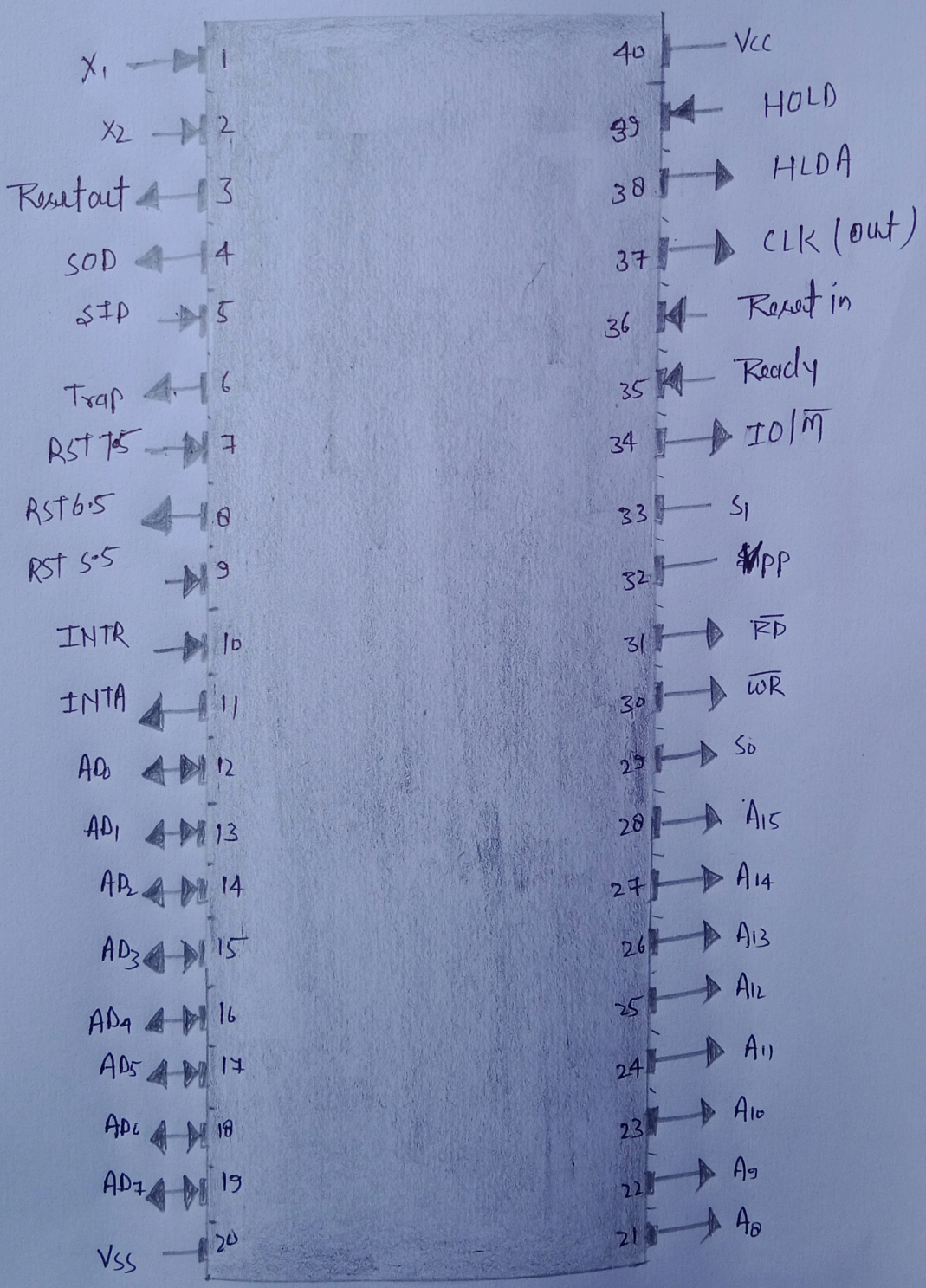
This image depcts the pin diagram of 8085 microprocessor —



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