

COMPUTER ORGANISATION

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ASSIGNMENT - L

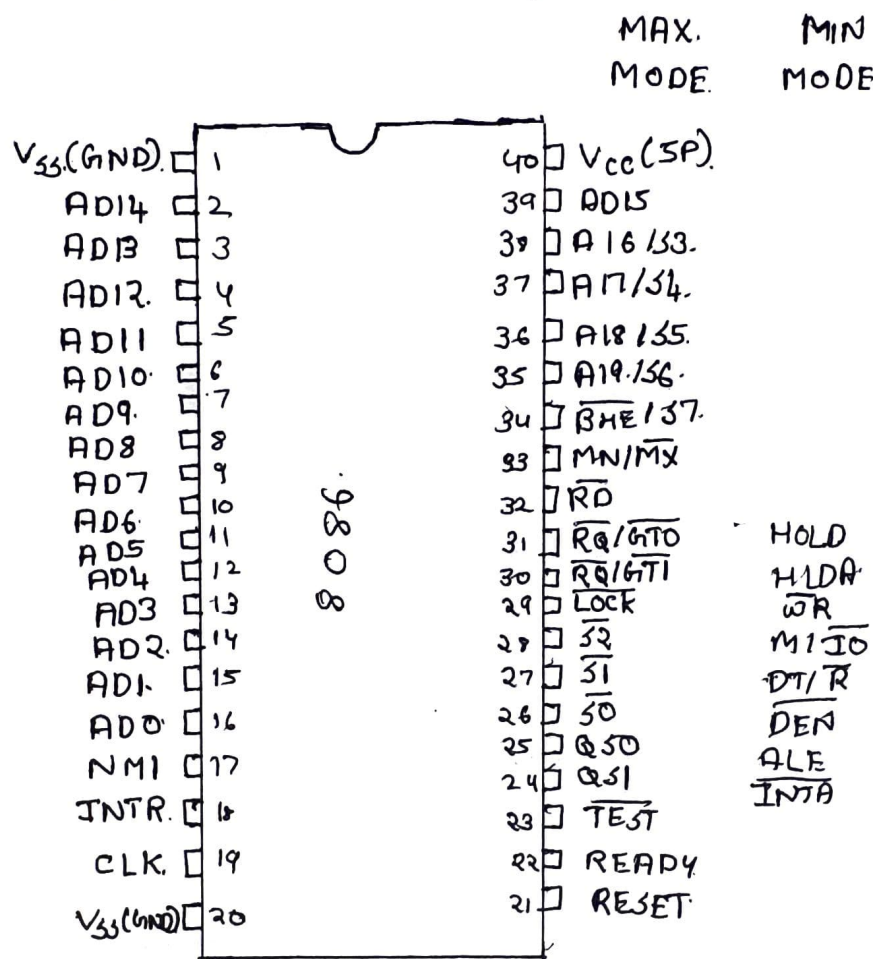
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CSE-A

1) Draw and explain the pin diagram of 8086 microprocessor.

Ans) Pin diagram and description of 8086:



The following pin function descriptions are for the microprocessor 8086 in minimum/maximum mode.

Common pin description: It consists of the following pins:

- AD0-AD15 (I/O): Address Data Bus
- A19/S6, A18/S5, A17/S4, A16/S3 (O): Address/Status
- S6
- S3/S4
- BHE/S7 (O): Bus High Enable/Status
- RD (O): READ
- TEST (I)
- INTR (I): Interrupt Request

- NMI (I): Non-Maskable Interrupt
- Reset (I)
- Ready (I)
- CLK (I): Clock
- MN/MX (I): Maximum/Minimum

Min mode pin descriptions:

The following 8 pin function descriptions are for the 8086 in minimum mode, MN/MX = 1.

- M/IO (O): Status line
- WR (O): Write
- INTA (O): Interrupt Acknowledge
- ALE (O): Address Latch Enable
- DT/R (O): Data Transmit/Receive
- DEN (O): Data Enable
- HOLD/HLDA (I/O): Hold and Hold Acknowledge

Max mode pin description:

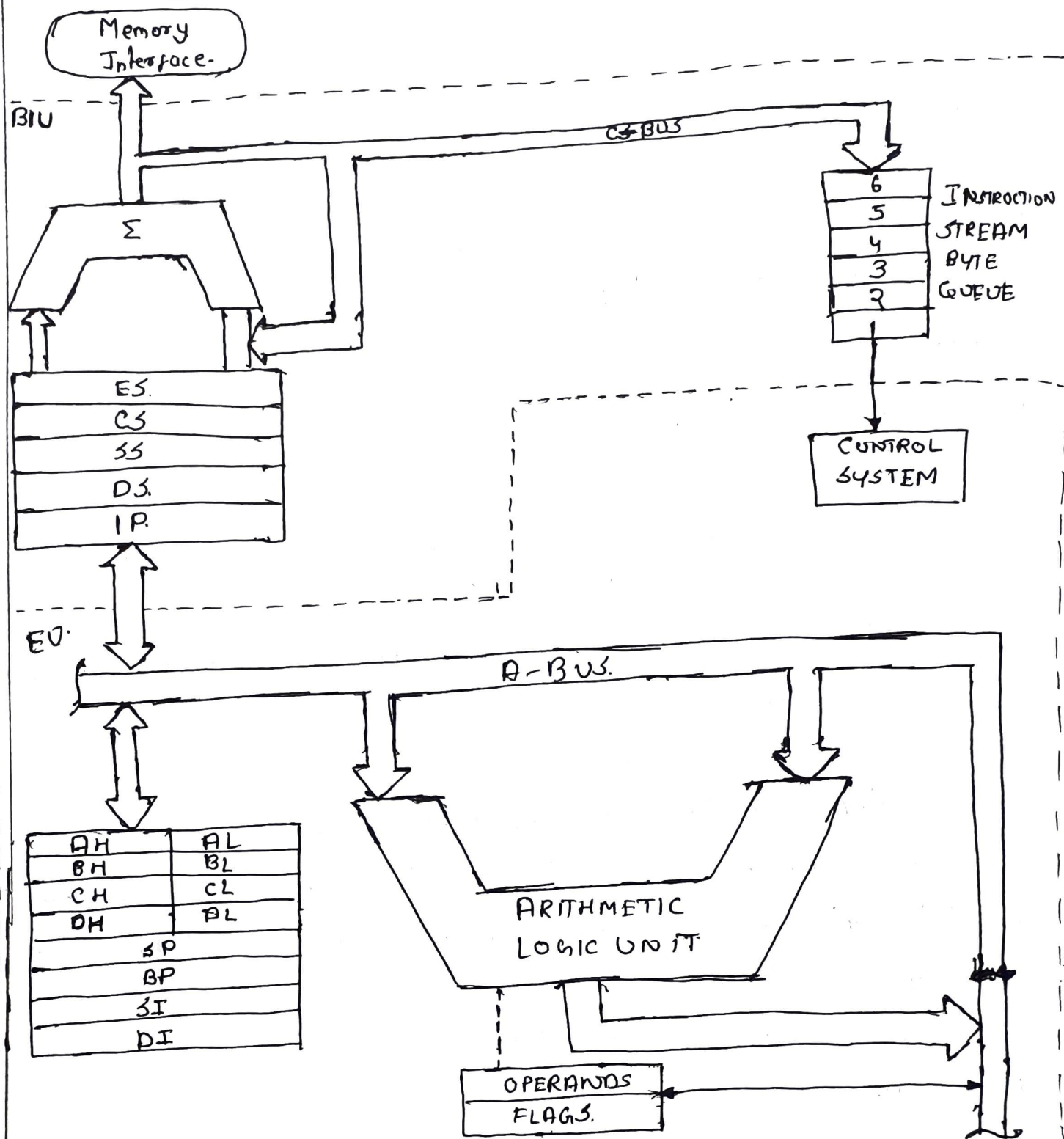
The following pin descriptions are for the 8086/8088 systems in maximum mode, i.e., MN/MX = 0.

- S2, S1, S0 (O): Status Pins
- GSO, GSI (O): Queue - Status
- Lock (O)
- RQ/GTO and RA/GTI (I/O): Request/Grant

Q2) Explain the architecture of 8086 microprocessor with a functional block diagram.

Ans) The 8086 CPU is divided into two independent functional units:

- Bus Interface Unit (BIU)
- Execution Unit (EU).



- 3) What is pipelining and advantages of pipelining.
- A). In 8086, to speed up the execution of program, the instructions fetching and execution of instructions are overlapped each other. The technique is known as pipelining. In pipelining, when the n th instruction is executed, the $n+1$ th execution is fetched and thus the processing speed is increased.

Advantages:

- instruction throughput increases.
- Increase in the number of pipeline stages increases the number of instructions executed simultaneously.
- Faster ALU can be designed when pipelining is used.
- Pipelined CPU's works at higher clock frequencies than the RAM.
- Pipeline increases the overall performance of the CPU.

4) List the features of 8086

A) Microprocessor 8086 features:

- It is a 16 bit microprocessor
- It has a 16 bit data bus, so it can read data from or write data to memory and ports either 16-bit or 8 bit at a time.
- It has 20 bit address bus and can access upto 2^{20} memory locations (1MB).
- It can support upto 64K I/O ports
- It provides 14, 16-bit registers.
- It has multiplexed address and data bus AD0-AD15, AD16-A19.
- It requires single phase clock with 33% duty cycle to provide internal timing.
- Prefetches upto 6 instruction bytes from memory and queues them in order to speed up the processing.
- 8086 supports 2 modes of operation:
 - a) Maximum mode
 - b) Minimum mode.

5) Explain memory segmentation. What are the registers used to access memory

A) Memory segmentation is the process in which the main memory of the computer is logically divided into different segments and each segment has its own base address. It is basically used to enhance the speed of execution of the computer system, so that the processor is able to fetch and execute the data from the memory easily and fast.

The index and registers used to access memory are:

IP - Instruction pointer - store memory location of next instruction to be executed.

BP - Base Pointer.

SP - Stack Pointer.

SI - Source Index.

DI - Destination index.

- The pointer registers contain offset within the particular segments.
- The pointer register IP contains offset within the code segment.
- The pointer register BP contains offset within stack segment.
- The pointer register SP contains offset within stack segment.
- The index registers are used as general purpose registers as well as for offset storage in case of indexed, base indexed and relative base indexed addressing modes.
- The register SI is used to store the offset of source data in data segment.
- The register DI is used to store the offset of destination in data or extra segment.
- The index registers are particularly useful for string manipulation.

6) Give the contents of the flag registers after addition of given two binary numbers.

0110 0101 1101 0001, 0010 1001 0010 1010

$$\begin{array}{r}
 0110 \ 0101 \ 1101 \ 0001 \\
 + 0010 \ 1001 \ 0010 \ 1010 \\
 \hline
 1000 \ 1110 \ 1111 \ 1011 \\
 \hline
 \end{array}$$

CF = 0 PF = 0 OF = 1 ZF = 0 SF = 0 OF = 0

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