1. Define pipelining?

Ans: In 8086, to speed up the execution of program, the instructions fetching and execution of instructions are overlapped each other. This technique is known as pipelining. In pipelining, when the $n^{th}$ instruction is executed, the $n+1^{th}$ instruction is fetched and thus the processing speed is increased.

2. Discuss the function of instruction queue in 8086?

Ans: In 8086, a 6-byte instruction queue is presented at the Bus Interface Unit (BIU). It is used to prefetching and store at the maximum of 6 bytes of instruction code from the memory. Due to this, overlapping instruction fetch with instruction execution increases the processing speed.

3. What is the maximum memory size that can be addressed by 8086?

Ans: In 8086, a memory location is addressed by 20 bit address and the address bus is 20 bit address and the address bus is 20 bits. So it can address up to one megabyte ($2^{20}$) of memory space.

4. What is the function of the signal in 8086?

Ans: BHE signal means Bus High Enable signal. The BHE signal is made low when there is some read or write operation is carried out. I.e. whenever the data bus of the system is busy i.e. whenever there is some data transfer then the BHE signal is made low.

5. What are the predefined interrupts in 8086?

Ans: The various predefined interrupts are,

    DIVISION BY ZERO -- (type 0) Interrupt.
    SINGLE STEP      -- (type 1) Interrupt.
    NONMASKABLE      -- (type2) Interrupt.

BREAK POINT     -- (type 3) Interrupt.
OVER FLOW     -- (type 4) Interrupt.

6. What are the different flag available in status register of 8086?

Ans: There are 6 one bit flags are present. They are,

> AF - Auxiliary Carry Flag
> CF - Carry Flag
> OF - Overflow Flag
> SF - Sign Flag
> PF - Parity Flag
> ZF - Zero Flag

7. List the various addressing modes present in 8086?

Ans: There are 12 addressing modes present in 8086. They are,

(a) Register and immediate addressing modes

- Register addressing modes
- Immediate addressing mode

(b) Memory addressing modes.

- Direct addressing modes
- Register indirect addressing modes
- Based addressing modes
- Indexed addressing modes
- Based Indexed addressing modes
- String addressing modes

(c) I/O addressing modes

- Direct addressing mode
- Indirect addressing mode

(d)Relativeaddressingmode
(e) Implied addressing mode

8. How single stepping can be done in 8086?

Ans: By setting the Trace Flag (TF) the 8086 goes to single-step mode. In this mode, after the execution of each instruction s 8086 generates an internal interrupt and by writing some interrupt service routine we can display the content of desired registers and memory locations. So it is useful for debugging the program.

9. State the significance of LOCK signal in 8086?

Ans: If 8086 is working at maximum mode, there are multiprocessors are present. If the system bus is given to a processor then the LOCK signal is made low. That means the system bus is busy and it cannot be given of any other processors. After the use of the system bus again the LOCK signal is made high. That means it is ready to give the system bus to any processor.

10. What are the functions of bus interface unit (BIU) in 8086?

Ans:

(a) Fetch instructions from memory.
(b) Fetch data from memory and I/O ports.
(c) Write data to memory and I/O ports.
(d) To communicate with outside world.
(e) Provide external bus operations and bus control signals.

11. What is the clock frequency of 8086?

Ans:

| Microprocessor | 8086 | 8086-2 | 8086-4 |
|---|---|---|---|
| Internal    clock | 5 MHz | 8MHz | 4MHz |

| Frequency | | | |
|---|---|---|---|
| External Clock Frequency | 15MHZ | 24MHZ | 12MHZ |

12. What are the two modes of operations present in 8086?

Ans:

      i. Minimum mode (or) Uniprocessor system
      ii. Maximum mode (or) Multiprocessor system

13. Explain the process control instructions

Ans:

STC – It sets the carry flag & does not affect any other flag
CLC – it resets the carry flag to zero &does not affect any other flag
CMC – It complements the carry flag & does not affect any other flag
STD – It sets the direction flag to 1 so that SI and/or DI can be decremented automatically after execution of string instruction & does not affect other flags
CLD – It resets the direction flag to 0 so that SI and/or DI can be incremented automatically after execution of string instruction & does not affect other flags
STI – Sets the interrupt flag to 1. Enables INTR of 8086.
CLI – Resets the interrupt flagto0. 8086 will not respond to INTR.

14. Explain REPEAT-UNTIL statements

Ans: REPEAT-UNTIL statements allow executing a series of instructions repeatedly until some condition occurs. The REPEAT defines the start of the loop & UNTIL the end of the loop. UNTIL has a condition when the condition is true the loop is terminated.

15. What is the purpose of segment registers in 8086?

Ans: There are 4 segment registers present in 8086. They are

Code Segment (CS ) register - The code segment register gives the address of the current code segment. ie. It will points out where the instructions, to be executed, are stored in the memory.

Data Segment (DS ) register - The data segment register points out where the operands are stored in the memory.

Stack Segment (SS ) register - The stack segment registers points out the address of the current stack, which is used to store the temporary results.

Extra Segment (ES ) register - If the amount of data used is more the Extra segment register points out where the large amount of data is stored in the memory.

16. What is assembler?

Ans: The assembler translates the assembly language program text which is given as input to the assembler to their binary equivalents known as object code. The time required to translate the assembly code to object code is called access time. The assembler checks for syntax errors & displays them before giving the object code.

17. What is loader?

Ans: The loader copies the program into the computer's main memory at load time and begins the program execution at execution time.

18. What is linker?

A linker is a program used to join together several object files into one large object file. For large programs it is more efficient to divide the large program modules into smaller modules. Each module is individually written, tested & debugged. When all the modules work they are linked together to form a large functioning program.

19. Explain ALIGN & ASSUME:

Ans: The ALIGN directive forces the assembler to align the next segment at an address divisible by specified divisor. The format is ALIGN number where number can be 2, 4, 8 or 16. Example ALIGN 8.

The ASSUME directive assigns a logical segment to a physical segment at any given time. It tells the assembler what address will be in the segment registers at execution time. Example ASSUME CS: code, DS: data, SS: stack

20. Explain PTR & GROUP

Ans: A program may contain several segments of the same type. The GROUP directive collects them under a single name so they can reside in a single segment, usually a data segment. The format is Name GROUP Seg-name,.....Seg-name PTR is used to assign a specific type to a variable or a label. It is also used to override the declared type of a variable.

21. What are the three classifications of 8086 interrupts?

Ans:

(1) Predefined interrupts

(2) User defined Hardware interrupts

(3) User defined software interrupts.

22. What are the functions of status pins in 8086?

Ans:

| S2 | S1 | S0 | Functions |
|----|----|----|-----------|
| 0 | 0 | 0 | Interrupt acknowledge |

| | | | |
|---|---|---|---|
| 0 | 0 | 1 | Read I/O |
| 0 | 1 | 0 | Write I/O |
| 0 | 1 | 1 | Halt |
| 1 | 0 | 0 | Code access |
| 1 | 0 | 1 | Read memory |
| 1 | 1 | 0 | Write memory |
| 1 | 1 | 1 | inactive |

| S4 | S3 | Functions |
|---|---|---|
| 0 | 0 | I/O from extra segment |
| 0 | 1 | I/O from Stack Segment |
| 1 | 0 | I/O from Code segment |
| 1 | 0 | I/O from Data segment |

S5 --Status of interrupt enable flag

S6 --Hold acknowledge for system bus

S7 --Address transfer.