DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
EE6502 - MICROPROCESSORS AND MICRO CONTROLLERS

UNIT III -8086 PROCESSOR & PROGRAMMING OF 8086 PROCESSOR

1. Define pipelining?

Ans: In 8086, to speedup 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? [NOV/DEC-2011]

Ans: In 8086, a 6-byte instruction queue is presented at the Bus Interface Unit (BIU). It is used to pre fetch 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, an 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 mega byte (2^{20}) of memory space.

4. What is the function of the signal in 8086? [APRIL/MAY-2010]

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. ie . When ever 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? [APRIL/MAY-2009]

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) Relative addressing mode
(e) Implied addressing mode

8. How single stepping can be done in 8086? [NOV/DEC-2010]

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 Frequency	5 MHz	8MHz	4MHz
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

1. 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.
2. Data Segment (DS) register - The data segment register points out where the operands are stored in the memory.
3. Stack Segment (SS) register - The stack segment registers points out the address of the current stack, which is used to store the temporary results.
4. 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 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. [APRIL/MAY-2010]

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.

23. What are the schemes for establishing priority in order to resolve bus arbitration problem?

Ans: There are three basic bus access control and arbitration schemes

1. Daisy Chaining
2. Independent Request
3. Polling

24.What are the different types of methods used for data transmission?

Ans: The data transmission between two points involves unidirectional or bi-directional transmission of meaningful digital data through a medium. There are basically there modes of data transmission.

(a) Simplex
(b) Duplex
(c) Half Duplex

In simplex mode, data is transmitted only in one direction over a single communication channel.For example, a computer (CPU) may transmit data for a CRT display unit in this mode.
In duplex mode, data may be transferred between two transreceivers in both directions simultaneously.
In half duplex mode, on the other hand, data transmission may take pace in either direction, but at a time data may be transmitted only in one direction. For example, a computer may communicate with a terminal in this mode. When the terminal sends data (i.e. terminal is sender). The message is received by the computer (i.e the computer is receiver). However, it is not possible to transmit data from the computer to terminal and from terminal to the computer simultaneously.

25.What are the various programmed data transfer methods?

Ans:

i) Synchronous data transfer
ii) Asynchronous data transfer
iii) Interrupt driven data transfer

26. What is synchronous data transfer?

Ans: It is a data method which is used when the I/O device and the microprocessor match in speed. To transfer a data to or from the device, the user program issues a suitable instruction addressing the device. The data transfer is completed at the end of the execution of this instruction.

27. What is asynchronous data transfer?

Ans: It is a data transfer method which is used when the speed of an I/O device does not match with the speed of the microprocessor. Asynchronous data transfer is also called as Handshaking.

28.What are the different inter connection topologies?

Ans:

- Shared bus
- Multiport Memory
- Linked Input/Output
- Bus window
- Crossbar Switching.

29. What are the configurations used for physical interconnections?

Ans:

- Star Configuration
- Loop configuration
- Complete interconnection
- Regular topologies
- Irregular topologies

30. Give the instruction set of 8087?

Ans:

1. Data Transfer Instructions
2. Arithmetic Instructions
3. Comparison Instructions.
4. Transcendental Operations.
5. Constant Operations.
6. Coprocessor Control Operations.

POSSIBLE 16 MARK QUESTIONS:

1. Differentiate between a microprocessor and a micro controller
2. Differentiate between a microprocessor and digital signal processor
3. List the internal registers in 8086 microprocessor and their abbreviations and lengths.
4. Draw & discuss the internal block diagram of 8086.
5. What do you mean by pipelined architecture? How is it implemented in 8086?
6. Explain the concept of segmented memory? What are its advantages?
7. Explain the function of opcode pre-fetch queue in 8086. (APRIL/MAY-2010)
8. How does 8086 differentiated between an opcode and instruction data?
9. Draw and discuss the read and write cycle timing diagrams of 8086 in minimum mode.
10. Draw and discuss the read and write cycle timing diagrams of 8086 in maximum mode
11. Draw & discuss typical minimum mode 8086 systems. [NOV/DEC-2012]
12. Bring out the architectural and signal differences between 8086 and 8088.
13. What are the functions of the clock generator IC 8284, in the 8086 systems?
14. State and explain the different instruction formats of 8086.
15. What do you mean by addressing mode? What are the different addressing modes supported by 8086?
16. Explain all addressing modes of 8086 with example. (APRIL/MAY-11)
17. Explain physical address formation in different addressing mode.