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Section: 03

Serial: 71

1. What is Microprocessor?

Answer: A semiconductor device(integrated circuit) manufactured by using the LSI

technique. It includes the ALU, register arrays, and control circuits on a single

chip.

2. What are the basic units of a microprocessor?

Answer: The basic units or blocks of a microprocessor are ALU, an array of registers and control unit.

3.What are the functions of an accumulator?

Answer: The accumulator is the register associated with the ALU operations and sometimes I/O operations. It is an integral part of ALU. It holds one of d a t a t o be processed by ALU. It also temporarily stores the result of the operation performed by the ALU.

4. What are the features of Intel 8086 ?

Answer:

• Released by Intel in 1978

• Produced from 1978 to 1990s

• A 16-bit microprocessor chip.

• Max. CPU clock rate:5 MHz to 10 MHz

• Instruction set: x86-16

• Package: 40 pin DIP

• 16-bit Arithmetic Logic Unit

• 16-bit data bus

5. What is meant by interrupt?

Answer: Interrupt is an external    signal                that       causes      a  microprocessor to  jump     to  a  specific subroutine.

6. What is a microcomputer?

Answer: A computer that is designed using a microprocessor as its CPU is called microcomputer.

7. What is the disadvantage of microprocessor?

Answer: It has limitations on size of data. Most Microprocessor does not support floating point operations.

8. Distinguish between Microprocessor & Microcontroller.

Answer:

• The microprocessor is a digital integrated circuit device that can be programmed with a series of instructions to perform specified functions on data.

• But micro controller is a computer on a chip which has memory, input, output on the chip itself.

• So, microprocessor can perform only few functions but micro controller can perform so many functions.

9. What is a bus?

Answer: Bus is a group of conducting lines that carries data, address and control signals.

10. Why data bus is bi-directional?

Answer: The microprocessor has to fetch (read) the data from memory or input device for processing and after processing, it has to store (write) the data to memory or output device. Hence the data bus is bi-directional.

11. What is the use of ALE?

Answer: The ALE is used to latch the lower order address so that it can be available in T2 and T3 and used for identifying the memory address. During T1 the ALE goes high, the latch is transparent ie, the output changes according to the input data, so the output of the latch is the lower order address. When ALE goes low, the lower order address is latched until the next ALE.

12. Why address bus is unidirectional?

Answer: The address is an identification number used by the microprocessor to identify or access a memory location or I / O device. It is an output signal from the processor. Hence the address bus is unidirectional.

13. How many memory locations can be addressed by a microprocessor with 14

address lines?

Answer: The 8085 MPU with its 14-bit address is capable of addressing 214=16,384 (ie) 16K memory locations.

14. Define control bus?

Answer: This is single line that is generated by the MPU to provide timing of various operations.

15. What is a flag?

Answer: The data conditions, after arithmetic or logical operations, are indicated by setting or resetting the flip-flops called flags.

16. Define memory word?

Answer: The number of bits stored in a register is called a memory word.

17. What is meant by micro controller?

Answer: Microcontroller is a small chip that has in-build Micro processor, memory, ports, timers and converter. Micro controllers are designed for specific use. For instance, micro controller in TV remote is mainly designed for controlling TV.

18. **What is difference between microprocessor and microcontroller?**

Answer: The microprocessor has no ROM, RAM and no I/O ports on the chip itself. Whereas the microcontroller has a CPU in addition to a fixed amount of RAM,ROM, I/O ports and a timer all on a single chip.

19. **What are the various types of memories used in microcontroller/microprocessor?**

**Answer:**

ROM - Read Only Memory  
RAM - Random Access Memory  
PROM - Programmable Read Only Memory  
EPROM - Erasable Programmable Read Only Memory  
EEROM - Electrically Erasable Programmable Read Only Memory

20. What are the flags in 8086?

Answer: In 8086 Carry flag, Parity flag, Auxiliary carry flag, Zero flag, Overflow flag, Trace flag, Interrupt flag, Direction flag, and Sign flag.

21. What is Program counter?

Answer: Program counter holds the address of either the first byte of the next instruction to be fetched for execution or the address of the next byte of a multi byte instruction, which has not been completely fetched. In both the cases it gets incremented automatically one by one as the instruction bytes get fetched. Also Program register keeps the address of the next instruction.

22. What does EU do?

Answer: Execution Unit receives program instruction codes and data from BIU, executes these instructions and store the result in general registers.

23. Have you studied buses? What types?

Answer: There are three types of buses.  
Address bus: This is used to carry the Address to the memory to fetch either Instruction or Data.  
Data bus : This is used to carry the Data from the memory.  
Control bus : This is used to carry the Control signals like RD/WR, Select etc.

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25. What is pipelined architecture?

Answer: In pipelined architecture the processor will have number of functional units and the execution time of functional units is overlapped. Each functional unit works independently most of the time.

26. List the features of 8086.

Answer: 16-bit Data bus

•Can operate upon 16 bit / 32 bit data.

•20-bit address bus.

•More memory addressing capability (2

20

= 1MB)

•16 bit Flag register with 9 Flags

•Can be operated in Minimum mode and Maximum mode

•It has two stage pipelined architecture

•No internal clock generation

•40 pin DIP IC - HMOS technology

•Operates on +5V supply voltage

•Has more powerful instruction se

27. What are the functions of BIU?

Answer: The BIU contains the circuit for physical address calculations and a pre – coding instruction byte queue & it makes the bus signals available for external interfacing of the devices.

28. Difference between static and dynamic RAM?

Answer: Static RAM: No refreshing, 6 to 8 MOS transistors are required to form one memory cell, Information stored as voltage level in a flip flop. Dynamic RAM: Refreshed periodically, 3 to 4 transistors are required to form one memory cell, Information is stored as a charge in the gate to substrate capacitance.

29. Write difference between SRAM and DRAM.

Ans: i) SRAM is static while DRAM is dynamic

ii) SRAM is faster compared to DRAM

iii) SRAM consumes less power than DRAM

iv) SRAM uses more transistors per bit of memory compared to DRAM

v) SRAM is more expensive than DRAM

vi) Cheaper DRAM is used in main memory while SRAM is commonly used in cache memory

30. What is virtual memory?

Ans: Virtual memory is a memory management capability of an OS that uses hardware and software to allow a computer to compensate for physical memory shortages by temporarily transferring data from random access memory (RAM) to disk storage.

31. What is RAM disk?

Ans: Software can partition a portion of a computer's RAM, allowing it to act as a much faster hard drive that is called a RAM disk. It loses the stored data when the computer is shut down, unless memory is arranged to have a standby battery source.

32. What is Eco-RAM?

Ans: RAM that use low power or energy is called eco-RAM. Eco-RAM are specifically designed for server farms, where low power consumption is more important than speed.

33. What is the role of instruction decoder?

Ans: This unit receives the programming instructions and decodes them into a form that is understandable by the processing units (ALU or FPU). Then, it passes on the decoded instruction to the ALU or FPU.

34. Write briefly about ALU and FPU.

Ans: ALU performs whole-number mathematics calculations (subtract, multiply, divide, etc.), comparisons (<, >, etc.) and logical operations (NOT, OR, AND, etc.). The new breed of popular microprocessors has not one but two almost identical ALU’s that can do calculations simultaneously, doubling the capability.

FPU performs calculations that involve numbers represented in the scientific notation (floating-point numbers). This notation can represent extremely small and extremely large numbers in a compact form. Floating-point calculations are required for doing graphics, engineering and scientific work.

35. How to enhance the capability of microprocessor?

Ans: i) increasing the clock frequency

ii) increasing the word-width

iii) having a more effective caching algorithm and the right cache size

iv) adding more functional units (e.g. ALU’s, FPU’s, Vector/SIMD units, etc.)

v) improving the architecture

vi) using optimization software.

vii) increasing graphics based frequency

viii) increasing memory use

ix) increasing maximum number of PCI express lanes

x) increasing maximum number of memory channels

36. Draw the internal block diagram of 8086.

Answer:



37. Draw the internal block diagram of 80186.

Answer:



38. Write the name of 10 internal blocks of 80186 microprocessors.

Ans: 1. Clock generator, 2. 16-bit ALU, 3. Programmable interrupt controller, 4. Programmable timer, 5. Programmable DMA unit, 6. Chip select unit, 7. Main registers, 8. Segment registers, 9. Control unit and 10. Refresh queue.

39. Write 10 similar points of 8086 and 80186 microprocessor.

Ans: i) data bus width is 16

ii) address bus width is 20

iii) memory size is 1 MB

iv) address bit and data bits are multiplexed.

v) register architecture is same.

vi) register size is 16-bit.

vii) both microprocessors can handle interrupt.

viii) ALU can perform operation of 16-bit at a time.

ix) Both microprocessors use pipeline and clock generator.

x) 16-bit of data and address can pass at the same time for both microprocessors.

40. How to enhance the capability of intel core i5 processor?

Ans: i) increasing memory use

ii) increasing graphics based frequency

iii) increasing max regulation

iv) increasing maximum number of PCI express lanes

v) increasing maximum number of memory channels

41. If 8086 has less RAM e.g. 64 KB that needs 16 address pins, then what are the internal and external changes you need to make to redesign the process.

Ans: As we need 16 address pins, so we don’t have to use a16 to a19 pins, which are muxed with s3 to s6 respectively. So, status bits can be used independently.

42. To increase the RAM size by 4 MB of 8086/80186, what are the changed that need to be made?

Ans: 1 MB RAM = 2^20 bytes = 20 address bits

4 MB RAM = 2^22 bytes = 22 address bits

So, we have to add two more address pins. In that case, we can remove any two control pins which are less important.

43. What are the response of a microprocessors in time of interrupt?

Ans: In response to an interrupt microprocessor does the following things-

1. i) the microprocessor stops executing its normal programs
2. ii) it calls a procedure which services the interrupt
3. iii) An IRET instruction at the end of the interrupt-service procedure returns execution to the interrupted program.

44.What is embedded system? Briefly describe it.

Ans: An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is designed for a specific function or for specific functions within a larger system. Industrial machines, agricultural and process industry devices, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines and toys as well as mobile devices are all possible locations for an embedded system.

45. Describe the instruction sets of microcontroller unit.

Ans: There are two types of instruction sets. They are RISC and CISC.

i) CISC- it means Complicated instruction set computing. It has an instruction set that supports many addressing modes. It offers flexibility in choosing various ways of performing the data transfer and ALU operations.

ii) RISC-it means Reduced instruction set computing. It supports 1/2 addressing modes. It needs many registers. So, need less fetching from external memories for operations which creates higher performance in computing than CISC.

46. Describe the types of microcontroller based on memory architecture.

Ans: We can divide MCU in two types based on memory architecture. They are Harvard memory architecture and Princeton memory architecture.

i) Harvard memory architecture: It has a distinct memory address space for Program memory and Data memory. It has separate instructions, hence separate control signals for data transfers from these two memories.

ii) Princeton memory architecture: It has a common memory space for both. So, no need for separate control signals.

47. Draw a block diagram of microcontroller.

Answer: 

48. Write briefly about peripherals.

Ans: A peripheral is a device used to put information into and get information out of the computer. It is not the part of core computer architecture. A peripheral device is generally

defined as any auxiliary device such as a mouse or keyboard that connects to and work with the computer in some way.

49. Write names of 10 different peripherals for a microcontroller.

Ans: 1. ADC- Analog to digital converter, 2. CAN- controller area network, 3. LIN- local interconnect network, 4. USART- Universal Synchronous Asynchronous Receiver Transmitter, 5. SPI- Serial peripheral interface, 6. I2C- Inter Integrated Circuit 7. CCP- Capture, Compare and PWM mode 8. CLG- Configurable Logic Cell 9. CWG- Complimentary Wave form Generator 10. COG- Complimentary Output Generator 11. DAC- Digital to Analog Converter. 12. FVR- Fixed Voltage Reference. 13. Serial Communications, 14. Oscillators, 15. Timers.

50. Describe PROM burner.

Ans: PROM stands for Programmable Read Only Memory. It is a memory chip on which data can be written only once. Once a program has been written onto a PROM, it remains there forever. Unlike RAM, PROM retain their contents when the computer is turned off.