The conversion to binary is a two-step process. First each ASCII character is converted into an unpacked BCD form with the four MSBs set to zeros, and then Homer's rule is applied to the string of unpacked digits to produce the binary number.

If the ASCII string is

$$d_n \ldots d_1 d_0$$

where $d_n \ldots d_1 d_0$ represent the decimal digits, then the binary number can be found by evaluating

$$((\ldots ((10d_n + d_{n-1})10 + d_{n-2}) \ldots)10 + d_1)10 + d_0$$

LIST OF QUESTIONS
PART A

1. What is microprocessor?

Microprocessor is a multipurpose programmable clock driven register based electronic device that fetches the instruction from the storage device called memory accepts the input from the user process the instruction and produce the result as output.

2. List the advantages of microprocessor.
- It simplifies system design.
- It reduces development time
- It reduces cost and size
- It has flexible operation

3. List few applications of microprocessor.
- It is used for speed control of machines.
- Used for traffic control and industrial tool control.

4. How many memory locations can be accessed by 11 address lines in 8086 processor?

The number of memory locations that can be accessed is 2^{11}

*5. What are the advantages of using segment registers?*

The advantages of using segment registers are that they:
1. Allow the memory capacity to be 1 megabyte even though the addresses associated with the individual instructions are only 16 bits wide.
2. Allow the instruction, data, or stack portion of a program to be more than 64K bytes long by using more than one code, data, or stack segment.
3. Facilitate the use of separate memory areas for a program, its data, and the stack.
4. Permit a program and/or its data to be put into different areas of memory each time the program is executed.

6. Explain how the physical address is calculated in 8086 processor?

The physical address is determined by the EA and the appropriate data segment (DS), extra segment (ES), or stack segment (SS) register. The selected segmented register contents are left shifted by 4 bits. This represents the starting address of the segment in memory. By adding the contents of effective address and segment address the physical address is calculated.

```
        341B   Effective address
    +   123A0  Beginning segment address
        157BB  physical address of instruction
```
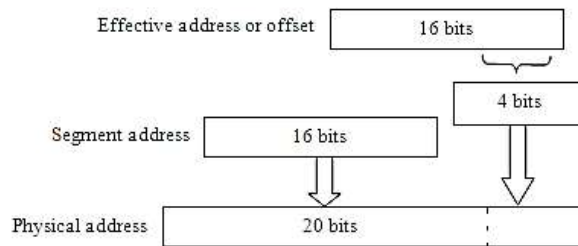

7. Draw the flag register format and name the flags in 8086 processor
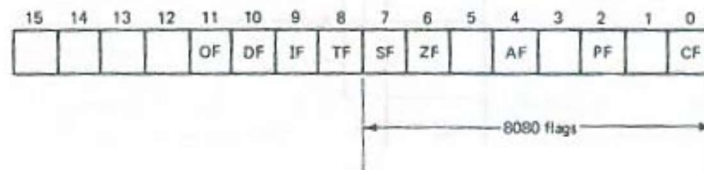
The condition flags are:

SF (Sign Flag), ZF (Zero Flag), PF (Parity Flag) , CF (Carry Flag) , AF (Auxiliary Carry Flag , OF (Overflow Flag)

The control flags are:

DF (Direction Flag), IF (Interrupt Enable Flag) , TF (Trap Flag)

8. What are assembler directive? Give examples?

There are certain instructions in assembly language program which are not the actual instructions of the processor and they are not translated to machine language instructions. Such instructions are called as assembler directives.

Example:

The directive EVEN forces the address of the next byte to be even. The directive ORG address will start at the memory location pointed by address.

9. Define modular programming?

The formulation of complex programs from numerous small sequences, called program modules (or simply modules) each of which performs a well-defined task. Such formulation of computer code is referred to as modular programming.

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10. State some reason for breaking the program codes.

The reasons for breaking a program into small parts are that:

1. Modules are easier to comprehend.

2. Different .modules can be assigned to different programmers.

3. Debugging and testing can be done in a more orderly fashion.

4. Documentation can be more easily understood.

5. Modifications may be localized.

6. Frequently used tasks can be programmed into modules that are stored in libraries and used by several programs.

11. What is meant by local identifier and external identifier?

If an identifier is defined in an object module, then it is said to be a local (or internal) identifier relative to the module, and if it is not defined in the module but is defined in one of the other modules being linked, then it is referred to as an external (or global) identifier relative to the module.

12. Define procedure?

A procedure (or subroutine) is a set of code that can be branched to and returned from in such a way that the code is as if it were inserted at the point from which it is branched to.

Procedures provide the primary means of breaking the code in a program into modules. Although not all modules are procedures, most of them are because procedures can easily be individually designed, tested, and documented. They can also be stored in libraries and used by a variety of programs.

13. What are the advantages and disadvantages of procedure?

Advantages of Procedure:

- They save memory and programming time by allowing code to be reused
- It provides a modularity that makes it easier to debug and modify a program.

Disadvantages of Procedure:

- It sometimes requires more code to program the linkage than is needed to perform the task.
- The execution time is increased.

14. What is meant by parameters?

Procedures are communicated by passing a message using parameters are variable. The variables whose addresses are passed are called *parameters.* There are two principal ways of passing parameter addresses:

- to construct a parameter address table (or array) and pass the address of the table via a register, and
- to push the parameter addresses onto the stack.

15. Define macro?

A macro is a segment of code that needs to be written only once but whose basic structure can be caused to be repeated several times within a source module by placing a single statement at the point of each appearance. A macro is unlike a procedure in that the machine instructions are repeated each time the macro is referenced; therefore, no memory is saved, but programming time is conserved and some degree of modularity is achieved.

16. Explain the following terms: a) Prototype code b) Macro definition c) Macro calls d) Macro expansion

Prototype code:

The code that is to be repeated is called the prototype code,

Macro Definition:

The prototype code along with the statements for referencing and terminating it is called the macro definition.

Macro calls:

The procedure for using a macro is to give the macro definition and then cause the macro to be inserted at various points within a program by placing a statement that includes ,the macro's name at these points. These statements are known as macro calls.

Macro expansion:

Then a macro call is encountered by the assembler, the assembler replaces the call with the macro's code. This replacement action is referred to as a macro expansion.

17. Define interrupt?

When microprocessor is executing the normal program if any interrupt arises, microprocessor executes the current instruction execution and saves the address and current status in the stack and then executes the interrupt service routine.

18. What is meant by interrupt service routine?

The program that is executed to service the interrupt is called interrupt service routine.

19. What are the two classes of interrupt?

There are two general classes of interrupts. They are:

1. Internal interrupts that are initiated by the state of the CPU or by an instruction
2. External interrupts that are caused by a signal being sent to the CPU from elsewhere in the computer system.

20. What are the interrupts that are present in 8086 processor?

Type 0: Division error
Type 1: Single step trap
Type 2: Non maskable interrupt
Type 3: INT
Type 4: INTO