1.1 8-Bit Microcontroller:

- The microcontroller incorporates all the features that are found in microprocessor.
- The microcontroller has built in ROM, RAM, Input Output ports, Serial Port, timers, interrupts and clock circuit.
- A microcontroller is an entire computer manufactured on a single chip. Microcontrollers are usually dedicated devices embedded within an application.
- For example, microcontrollers are used as engine controllers in automobiles and as exposure and focus controllers in cameras. In order to serve these applications, they have a high concentration of on-chip facilities such as serial ports, parallel input output ports, timers, counters, interrupt control, analog-to-digital converters, random access memory, read only memory, etc. The I/O, memory, and on-chip peripherals of a microcontroller are selected depending on the specifics of the target application. Since microcontrollers are powerful digital processors, the degree of control and programmability they provide significantly enhances the effectiveness of the application.

➢ **Microcontrollers:**
   Microcontroller (MC) may be called computer on chip since it has basic features of microprocessor with internal ROM, RAM, Parallel and serial ports within single chip. Or we can say microprocessor with memory and ports is called as microcontroller. This is widely used in washing machines, vcd player, microwave oven, robotics or in industries.

- Microcontroller can be classified on the basis of their bits processed like 8bit MC, 16bit MC.
- 8 bit microcontroller, means it can read, write and process 8 bit data. Ex.8051 microcontroller. Basically 8 bit specifies the size of data bus. 8 bit microcontroller means 8 bit data can travel on the data bus or we can read, write process 8 bit data.

1.1.1 Difference Between Microcontroller and Microprocessor
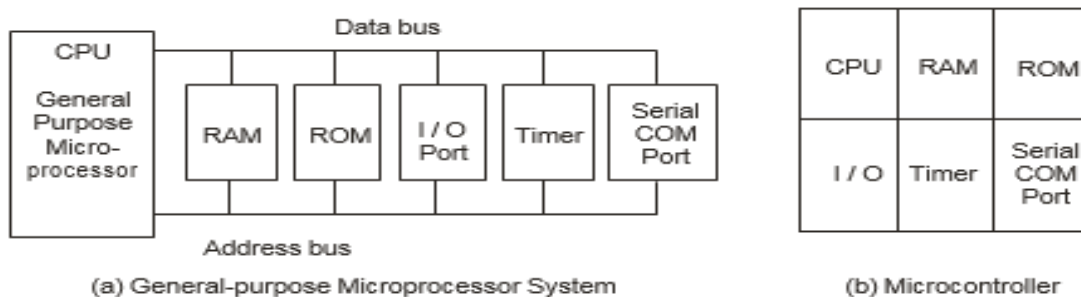

Fig. 1.1 Structure of microprocessor and microcontroller

It is very clear from figure that in microprocessor we have to interface additional circuitry for providing the function of memory and ports, for example we have to interface external RAM for data storage, ROM for program storage, programmable peripheral interface (PPI) 8255 for the Input Output ports, 8253 for timers, USART for serial port. While in the microcontroller RAM, ROM, I/O ports, timers and serial communication ports are in built. Because of this it is called as "system on chip". So in micro-controller there is no necessity of additional circuitry which is interfaced in the microprocessor because memory and input output ports are inbuilt in the microcontroller. Microcontroller gives the satisfactory performance for small applications. But for large applications the memory requirement is limited because only 64 KB memory is

available for program storage. So for large applications we prefer microprocessor than microcontroller due to its high processing speed.

1.1.2 Criteria for Selection of a Microcontroller in Embedded System
Criteria for selection of microcontroller in any embedded system is as following:
(a) Meeting the computing needs of task at hand efficiently and cost effectively
- Speed of operation
- Packing
- Power consumption
- Amount of RAM and ROM on chip
- No of I/O pins and timers on chip
- Cost
(b) Availability of software development tools such as compiler, assemblerand debugger.