Comparison of Microprocessor and Microcontroller in 8051

Microprocessor have less number of registers, hence more operations are memory based. Micro controller have more number of registers, hence the programs are easier to write. The INTEL 8051 is an 8 bit microcontroller with 128 byte internal RAM and 4K bytes internal ROM.

Microprocessor	**Microcontroller**
Since memory and I/O are connected externally, the circuit becomes large in size.	Since memory and I/O are present together, the internal circuit is small in size.
It cannot be used in compact systems	It can be used in compact systems.
Cost is high	Cost is low
It is not suitable for devices that run on stored power since total power consumption is high due to external components.	It can be used on devices that use stored power since total power consumption is low due to less external components.
RAM, ROM, I/O units, and other peripherals are not embedded on a single chip.	RAM, ROM, CPU and other peripherals are embedded on a single chip.
Do not have power saving mode.	Have a power-saving mode.
Used in personal computers.	Used in embedded systems.
Less number of registers.	More number of registers.
Uses an external bus.	Uses an internal controlling bus.
Based on the Von Neumann model	Based on the Harvard architecture
It is a central processing unit on a single silicon-based integrated chip.	It is a byproduct of the development of microprocessors with a CPU along with other peripherals.
Complex and expensive due to a large number of instructions to process.	Simple and inexpensive due to less number of instructions to process.
Can run at a very high speed.	Can run up to 200MHz or more.

Differences Between Microprocessor and Microcontroller

Microprocessor and Microcontroller are different in the following ways:

- Microprocessor only consists of Central Processing Unit, whereas Microcontroller has memory, a CPU and I/O. All these are integrated into one chip.
- A microprocessor uses external bus to interface to ROM, RAM, and other peripherals. Microcontroller, on the other hand, uses internal controlling bus.
- A microprocessor is used in personal computers whereas microcontroller is used in embedded system.
- Microprocessor is based on the Von Neumann model whereas Microcontroller is based on the Harvard architecture.
- A microprocessor is complicated in nature, with a large set of instructions to process. Microcontroller is not that expensive and less complex with fewer instructions to process.