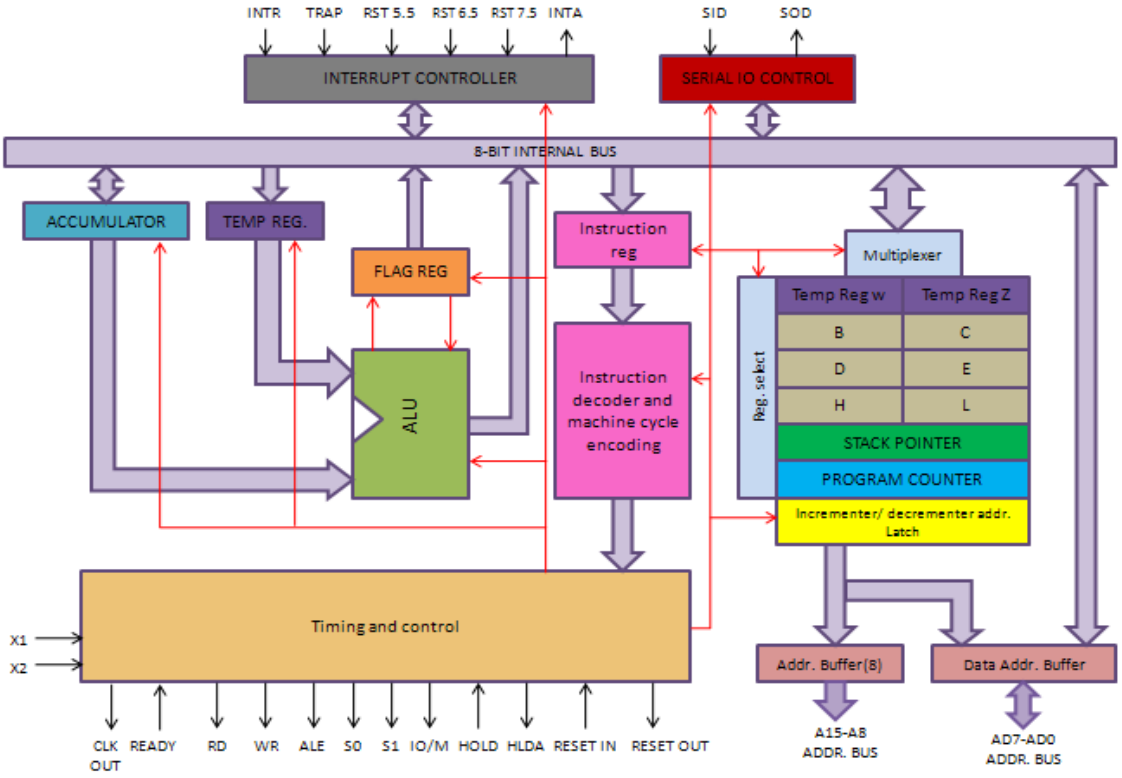
1. **Explain the Architecture of 8051 microcontroller.**

The 8051 is an 8-bit microcontroller designed in by Intel. Its has 8-bit address bus (A_0-A_7) and Data bus(D_0-D_7) are multiplexed to reduce number of external pins.

8051 microcontroller has following functional blocks.



1. Arithmetic Logic Unit(ALU): All arithmetic and logical functions are carried out by the ALU. Addition, subtraction with carry, and multiplication come under arithmetic operations. Logical AND, OR and exclusive OR (XOR) come under logical operations.
2. Program Counter(PC): A program counter is a 16-bit register and it has no internal address. The basic function of program counter is to fetch from memory the address of the next instruction to be executed. This way the PC increments automatically, holding the address of the next instruction.
3. Register: Registers are usually known as data storage devices. 8051 microcontroller has 2 registers, namely Register A and Register B. Register A serves as an accumulator while Register B functions as a general purpose register. These registers are used to store the output of mathematical and logical instructions.
4. Data Bus: The purpose of data bus is to transfer data. It acts as an electronic channel using which data travels. Data bus is bi-directional means data can be send in both direction.

5. Address Bus: The purpose of address bus is to transfer information but not data. The information tells from where within the components, the data should be sent to or received from. Address bus is uni-directional.
6. Stack Pointer(SP): The stack pointer is reversed are of the memory in rhe RAM where temporary information may be stored. A 16-bit stack pointer is used to hold the address of most recent stack entry.
7. Flag Register: It is 8-bit, in which five of the bits carry significant information in the form of flags: S(sign flag), Z(Zero flag), CF(Carry flag), PF(Parity flag), AC(Auxiliary carry flag).

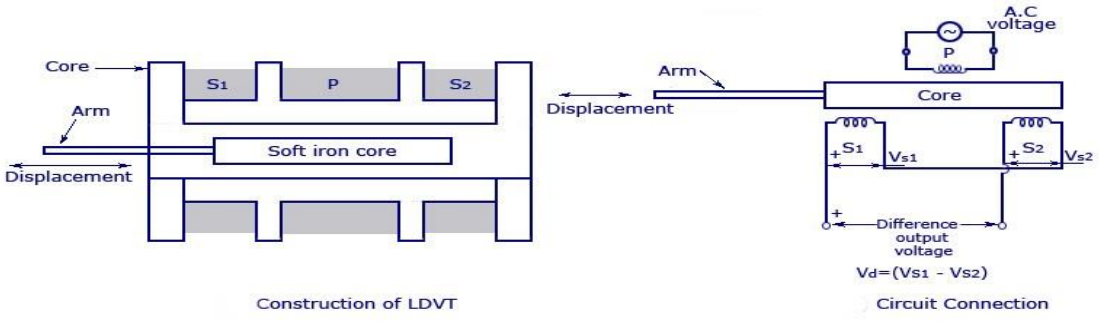
S	Z	X	AC	X	P	X	CY

2. Give the difference between microprocessor and microcontroller.

1. Microprocessors are mainly used in designing general purpose systems from small to large and complex systems like super computers	1. Microcontrollers are used in automatically controlled devices.
2. Power consumption and dissipation is high because of the external devices.	2. Power consumption is less.
3. It has many instruction to move data between memory and CPU	3. It has one or two instruction two move data between memory and CPU.
4. It has single memory map for data and code.	4. It has separate memory map for data ad code.
5. Less number of pins are multi functioned.	5. More no of pins are multi functioned.
6. It has one or two bit handle instruction	6. It has many bit handle instructions.

3. Explain the Construction and principle of operation of LVDT.

Linear variable differentiable transducer(LVDT) is a variable inductance displacement transducer in which the inductance is varied according to displacement.



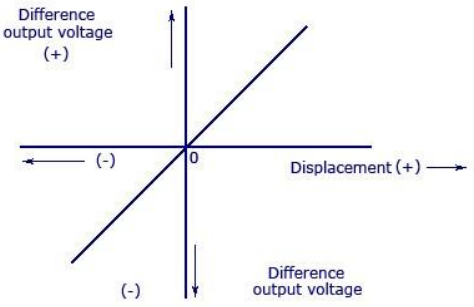
Construction and Circuit Connection of LVDT

The device consists of a primary winding (P) and two secondary windings named S1 and S2. Both of them are wound on one cylindrical former, side by side, and they have equal number of turns. Their arrangement is such that they maintain symmetry with either side of the primary winding (P). A movable soft iron core is placed parallel to the axis of the cylindrical former. An arm is connected to the other end of the soft iron core and it moves according to the displacement produced.

An ac voltage with a frequency between (50-400) Hz is supplied to the primary winding. Thus, two voltages VS1 and VS2 are obtained at the two secondary windings S1 and S2 respectively. The output voltage will be the difference between the two voltages (VS1-VS2) as they are combined in series.

- **Null Position** – This is also called the central position as the soft iron core will remain in the exact center of the former. Thus the linking magnetic flux produced in the two secondary windings will be equal. The voltage induced because of them will also be equal. Thus the resulting voltage VS1-VS2 = 0.
- **Right of Null Position** – In this position, the linking flux at the winding S2 has a value more than the linking flux at the winding S1. Thus, the resulting voltage VS1-VS2 will be in phase with VS2.
- **Left of Null Position** – In this position, the linking flux at the winding S2 has a value less than the linking flux at the winding S1. Thus, the resulting voltage VS1-VS2 will be in phase with VS1.

The magnitude and displacement can be easily calculated or plotted by calculating the magnitude and phase of the resulting voltage.



Difference output Voltage Versus Displacement Curve For LVDT

Advantage:

1. Produces a high resolution of more than 10 millimeter.
2. Small in size and weighs less. It is rugged in design and can also be assigned easily.
3. Produces low hysteresis and thus has easy repeatability.