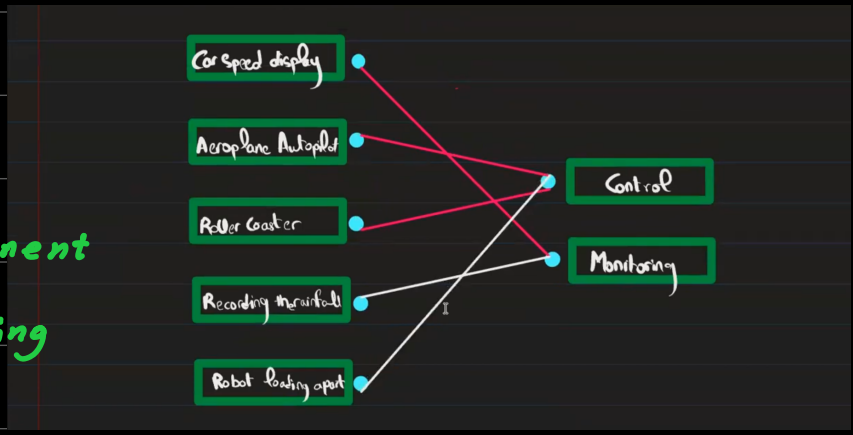
Monitoring and Control System

Q- What is the difference b/w monitoring and control System?

- Monitoring only gives information but control system also performs action
- Output in a control system can affect the input
- There is no feedback in a monitoring system but a control system relies on feedback

Sensors	Actuators
· It measures physical quantities such as temperature, speed, moisture, oxygen level.	· An actuator is a component that is responsible for moving and controlling a mechanism · It receives a signal from processor and adjusts a controlling device



Types Of Sensors And Their uses

Temperature: Measures and record temperature in a particular surrounding

Pressure: Detects pressure and measures it, can be used in lifts, factories

Infra-red: Detects motion. Can be used in Security Alarm system, automatic doors.

Sound: Detects sounds, can be used in hotels for turning on light.

pH: Measures the pH, Can be used in Chemical factories

Moisture: Measures level of moisture

Precipitation: Measures amount of Rainfall.

Hardware Devices

ADC: Analogue To Digital convertor. Converts analogue signal from a sensor to a digital value that can be recorded

Actuator: Turn the sprinkler on/off etc.

sensors

Processor: Compares values

Cable: To transfer signal

visible warning device: To give warning to human

Q- How monitoring and control system will achieve any work?

- Names of sensors used
- What will those sensors do.
- sensor reads value and sends to ADC. Tell what ADC will do
- ADC sends data to micro processor
- The microprocessor will compare values of the sensor with the pre-set values.
- If control system, then micro processor sends instruction to an actuator.
- Purpose of an actuator
- If more tasks need to be done then sends signal to another actuator
- Purpose of that actuator

Concept OF Feedback

- Feedback is the data which is collected from sensors and is analysed or used as input.

Q- What is the importance of feedback?

- To ensure that the system operates within the given criteria
- by enabling system output to affect subsequent system input. upcoming
- Thus enabling the system to automatically adjust conditions.

Q- What is the use of feedback? (according to a situation)

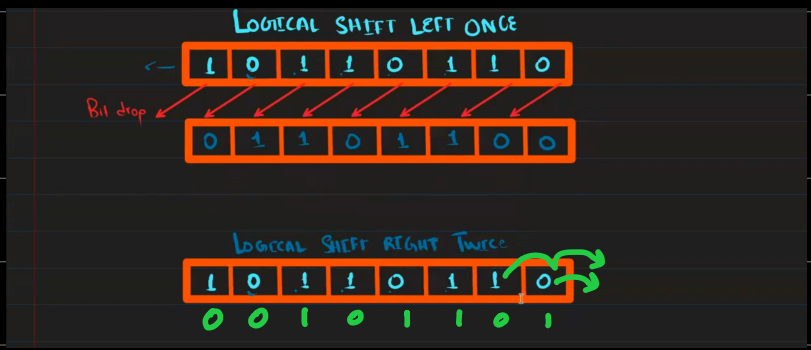
- Sensors will continually measure _____
- Readings are sent to processor and it compares readings with the preset value
- If readings out of range, then actuators will do _____
- Feedback will ensure that the reading remains in range.

Binary Shift

1. Logical Shift
2. Arithmetic Shift
3. Cyclic Shift

Logical Shift

- Bits shifted out of the register are replaced with zeroes

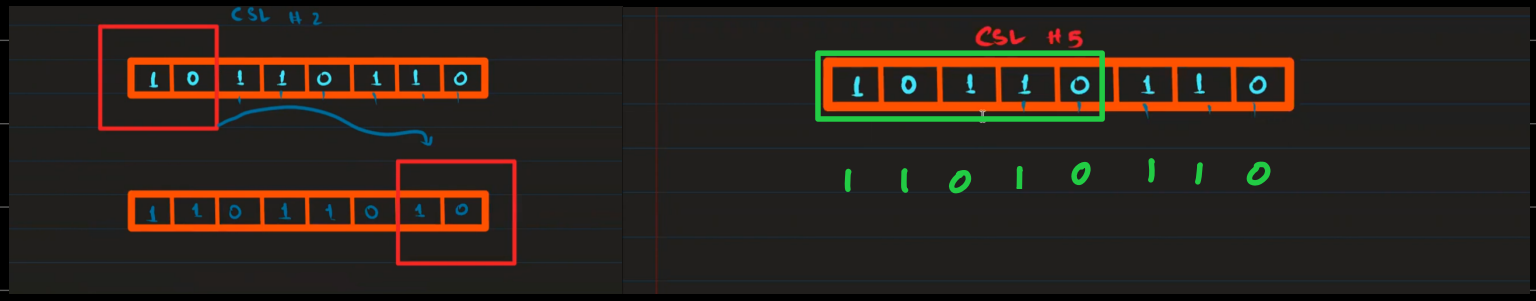


Logical Shift in Assembly Language

Opcode	Operand	Explanation
LSL	n	Bits in ACC are logically shifted n places to the left.
LSR	n	Bits in ACC are logically shifted n places to the right

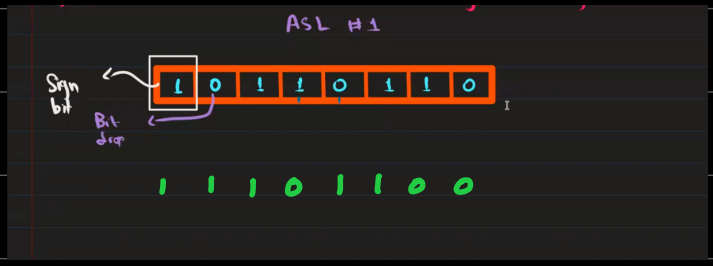
Cyclic Shift

- No bits are lost during a shift. Bits shifted out of the end of a register are introduced at the other end of the register.



Arithmetic Shift

- Sign bit remains same and rest is same as logical shift



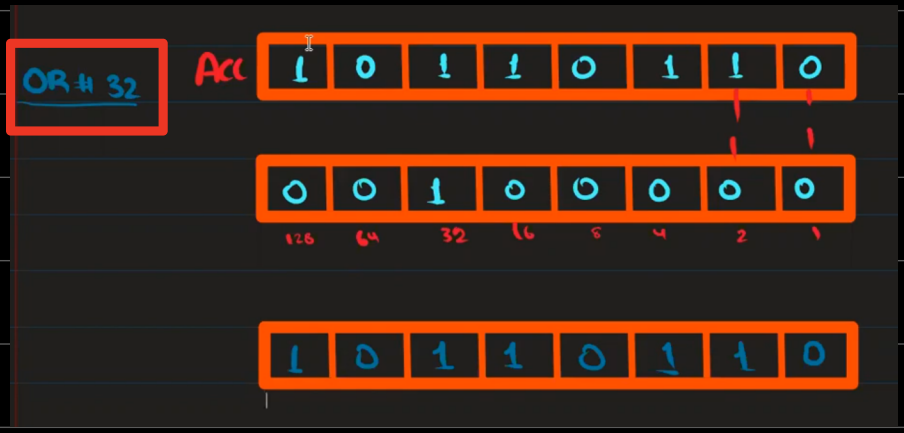
Bit Manipulation in Monitoring and Control System

- In monitoring and control, each bit in a register or memory location can be used as a flag and would need to be tested, set or cleared seperately.

- AND is used to check if the bit has been set
- OR is used to set the bit
- XOR is used to clear the bit that has been set.

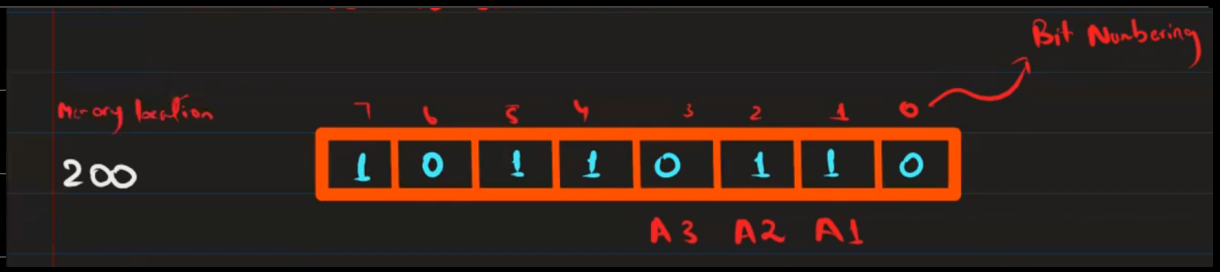
OR Bitwise Operation

Opcode	Operand	Explanation
OR	n	Bitwise OR operation of the content of Accumulator with the operand



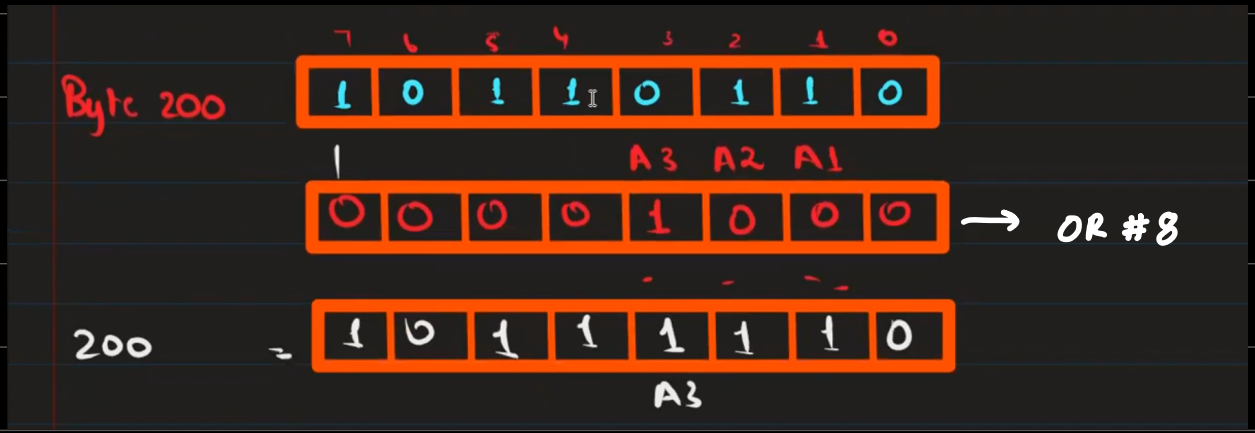
Use OF 'OR' Instruction in Monitoring and Control System

CASE 1 : Setting Bit



Q- Set Alarm 3 to on without changing other bits

- Step 1: Write 1 below Alarm 3 and rest should be zero
- Step 2: 'OR' that binary value



Q- Write this in assembly language code

```
LDD 200
OR  #8
STO 200
```

AND Bitwise operation

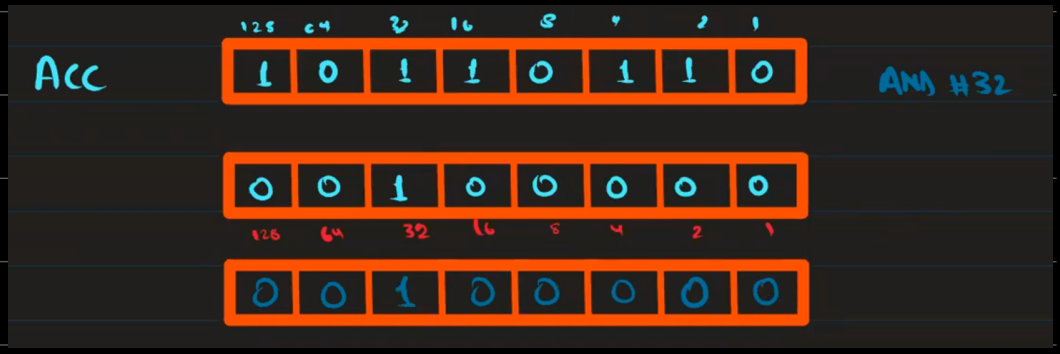
Hexadecimal

- In Assembly language Info is represented like this

- Convert the operands to binary and then perform logic operations.

```
OR #13 → Denary representation
OR B#10001111 → Binary representation
OR &8F → Hexadecimal representation
```

Opcode	Operand	Explanation
AND	n	Bitwise AND operation of the contents of ACC with the operand.



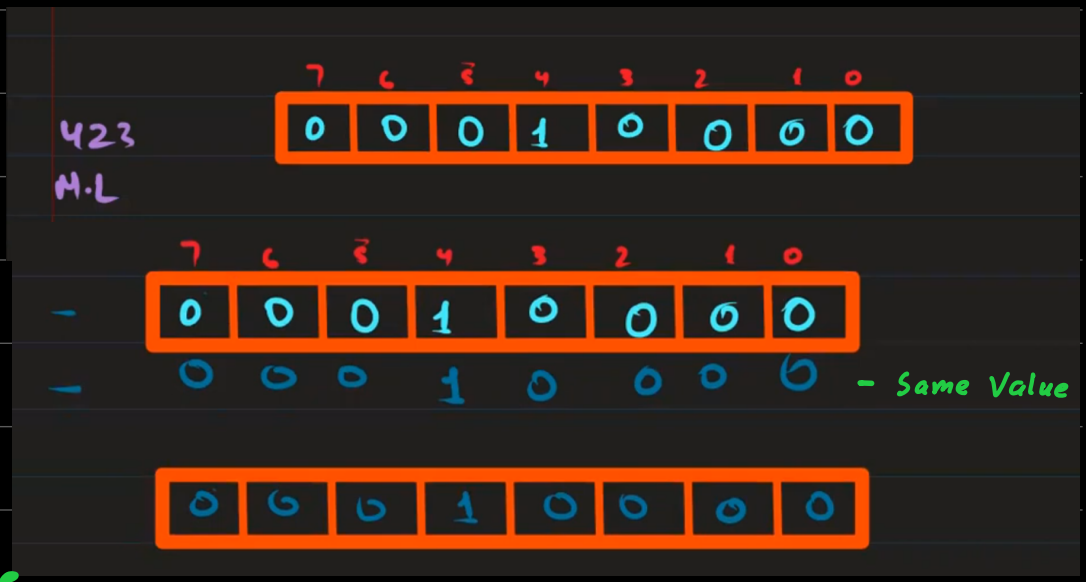
Use OF 'AND' Instruction in Monitoring and Control system

CASE 2: Checking bit

- AND is used to check if the Bit was 1 or 0.
- If you want to check then AND instruction is followed by CMP instruction of Assembly Language.

Q- Check, does bit 4 contains 1 or is set.

- Step 1: Put 1 below the bit you want to check.
- step2: AND the value in ACC with the new value.
- Step 3: Compare with the same value

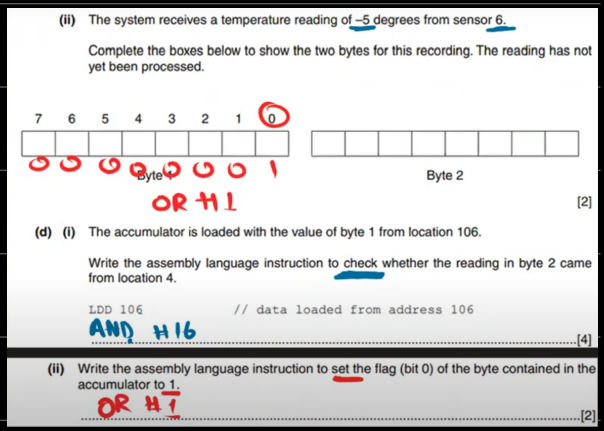


NOTE: If compare is true, there was 1 on that particular place. If compare was false then there was 0.

Q- Write assembly code

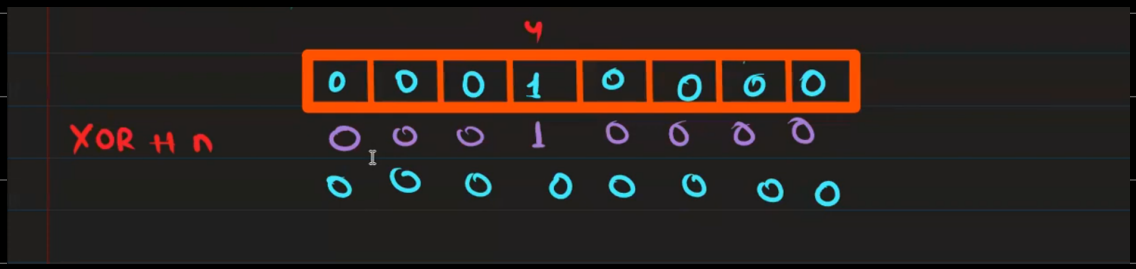
```
LDD 423
AND #16
CMP #16
```

- If only one space then write the AND instruction



XOR Bitwise Operation

- XOR is used to clear a bit
- Converting 1 to 0.



Step 1 : Put 1 below bit you want to clear

Step 2: Apply XOR with new value