Unit 2:

Design of control Unit

→ A control unit- generates a set of signals that are in sync with the master clock.

→ Two major operations perform by control unit are:-

① To fetch the data from the main memory determines the devices and the operations involved with it.

② Produce control signals to execute the operations.

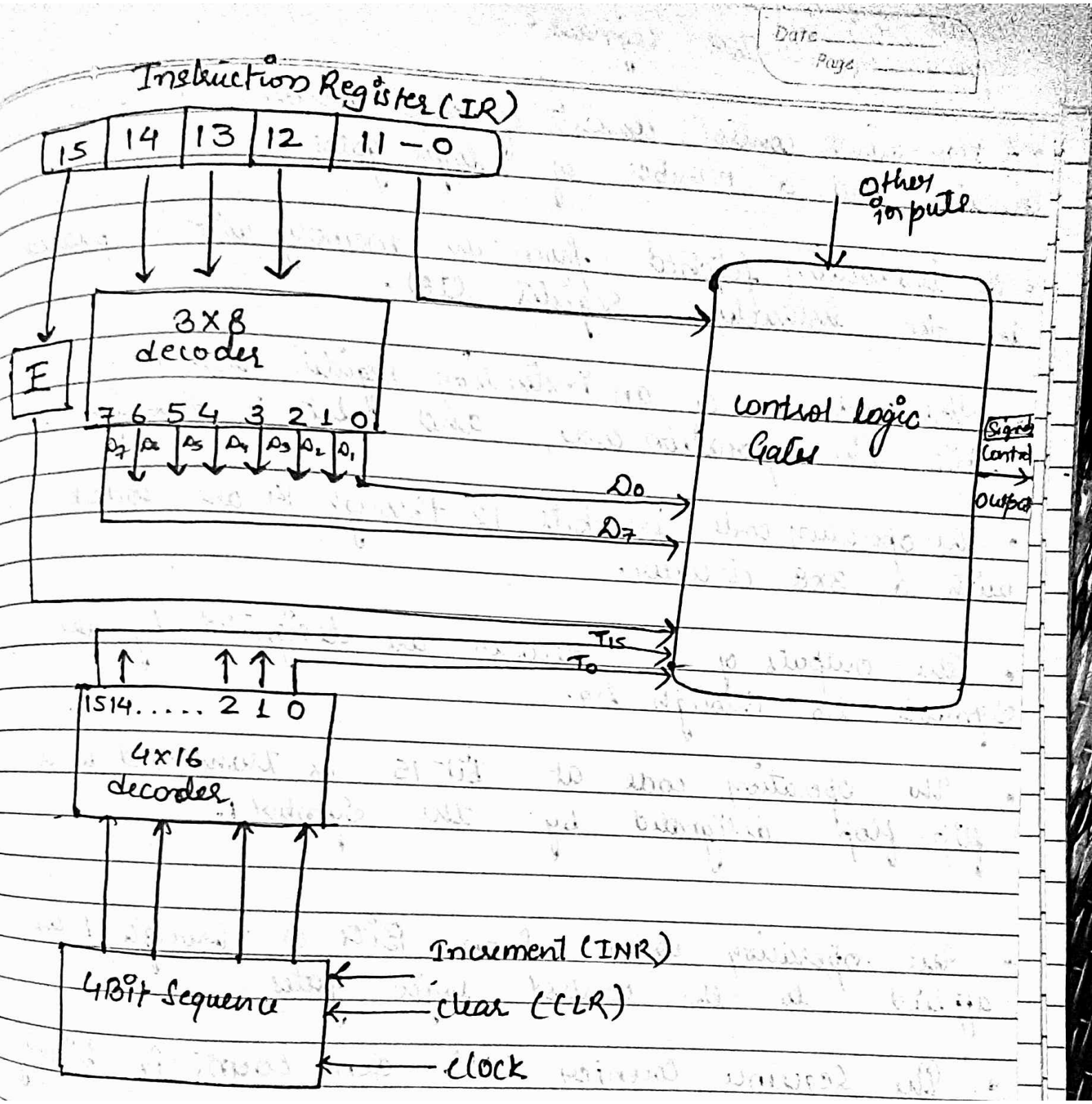
Types of Control unit

① Hardwired Control

② Microprogrammed control

① Hardwired Control

This organization involves the control logic to be implemented with gates, flip flops, decoders, and other digital circuits


Instruction Register (IR)
15
14
13
12
11 - 0
Other inputs
3 x 8 decoder
E
7 6 5 4 3 2 1 0
D7 D6 D5 D4 D3 D2 D1
D0
D7
Control logic Gates
Signals Control outputs
I15
I0
15 14 ..... 2 1 0
4 x 16 decoder
4 Bit Sequence
Increment (INR)
Clear (CLR)
Clock

- A Hardwired control consists of two decoders, a sequence counter, and a number of logic gates.
- An instruction fetched from the memory unit is placed in the instruction register (IR).
- The component of an instruction register includes; I bit, the operation code, and bits 0 through 11.
- The operation code in bits 12 through 14 are coded with a 3x8 decoder.
- The outputs of the decoder are designated by the symbols D_0 through D_7.
- The operation code at bit 15 is transferred to a flip-flop designated by the symbol I.
- The operation codes from Bits 0 through 11 are applied to the control logic gates.
- The sequence counter (SC) can count in binary from 0 through 15.