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Addressing Modes

Effective Address

* Address of operand in a computation type instruction or
* The target address in a branch type instruction.

Addressing Modes

* It specifies how and from where the operands are obtained for an instruction using address.

(1) Implied Mode

* The opcode definition itself defines the operand.

Opcode	Mode	Address

For eg:- INC A → Increment Accumulator
CMP A → Complement Accumulator

* There is zero memory reference.

(2) Immediate Mode.

* The address field of instruction specifies the operand value.

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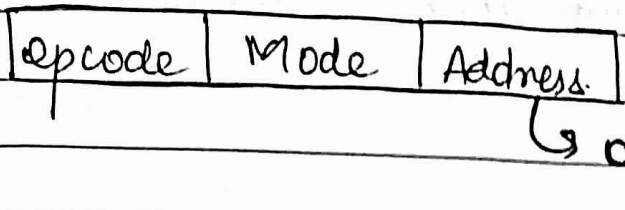
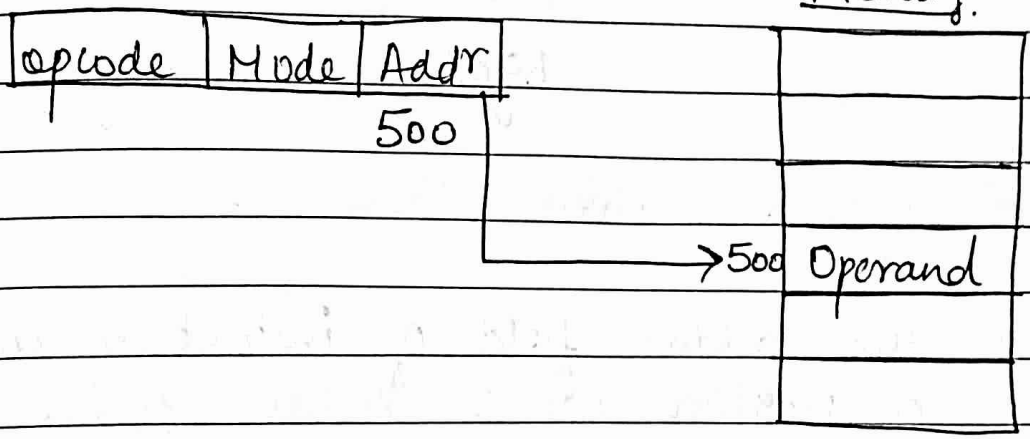


for eg:- int a = 5;

(3) Direct Mode (Absolute Mode)

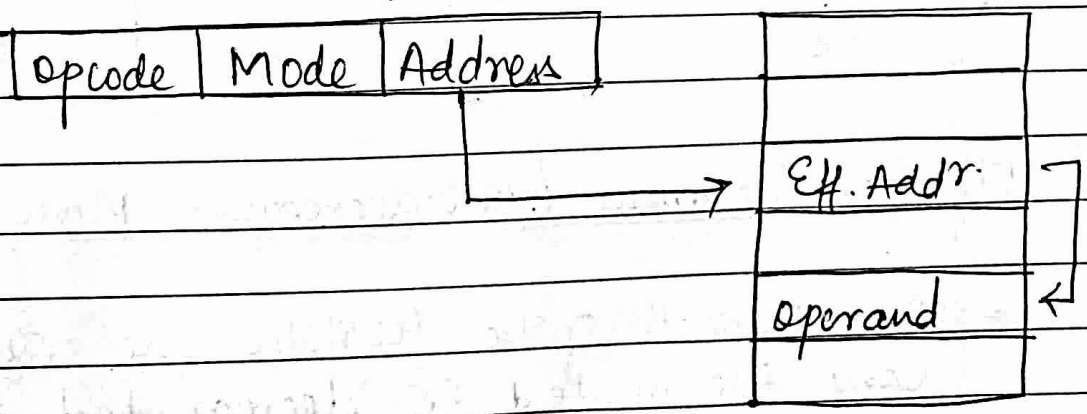
* The address field of instruction specifies the effective address.



* There is one memory reference.

(4) Indirect Mode.

* The address field of instruction specifies the address of effective address.



* It is used to implement pointers.

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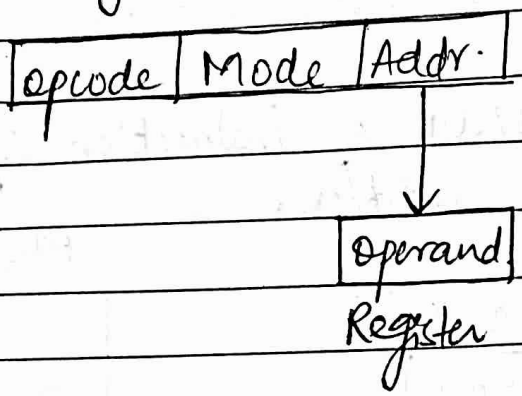
* There are two memory references.

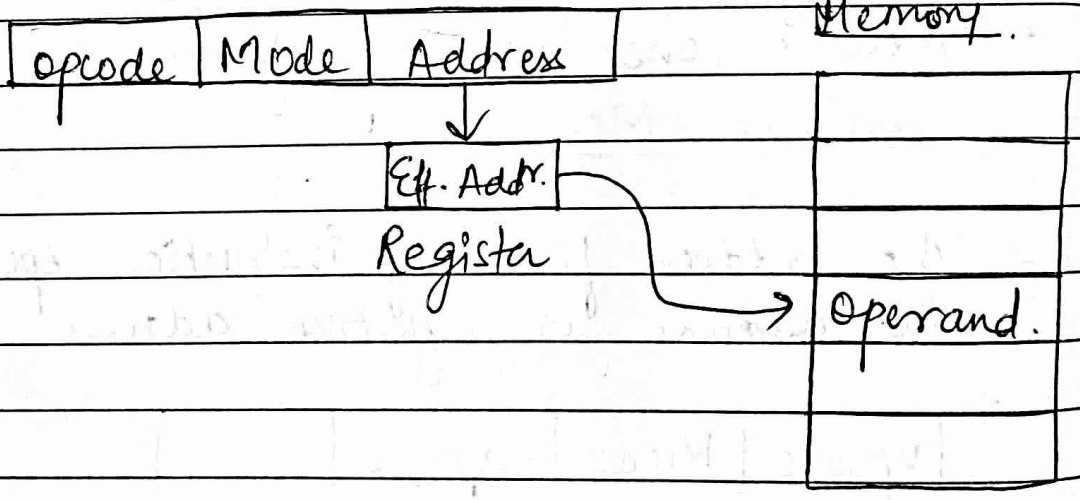
(5) Register Mode

* The address field of instruction specifies a register which holds operand.



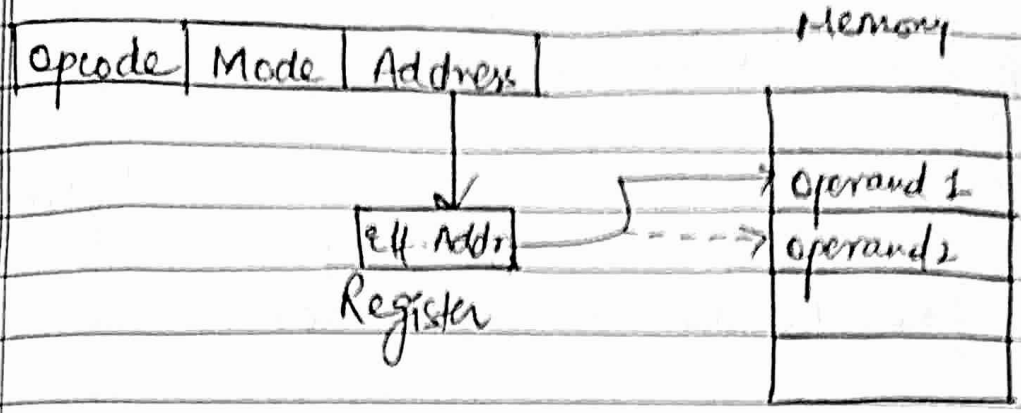
(6) Register Indirect Mode

* The address field of instruction specifies a register which holds effective address.



(7) Auto increment / Autodecrement Mode.

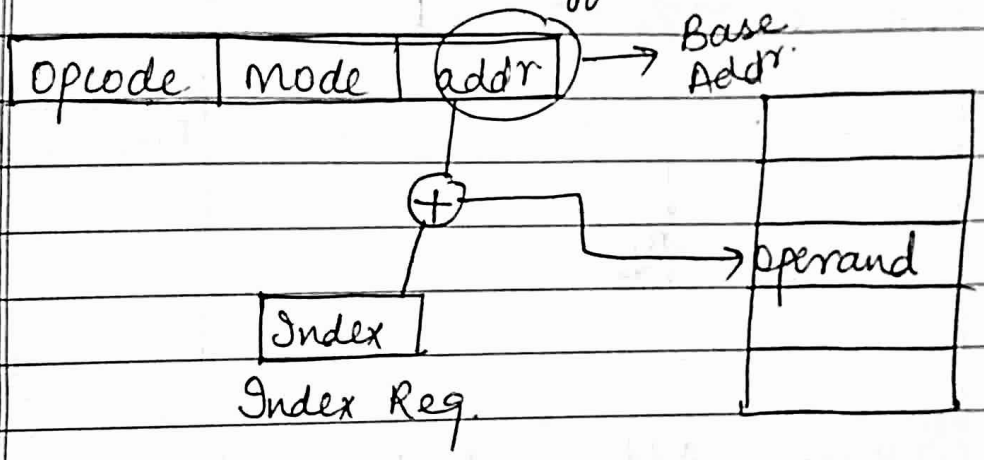
* The contents of the register are automatically incremented or decremented to point to address of the operand.



* It is used to access table of content (array) sequentially.

(8) Indexed Mode / Index Register Mode

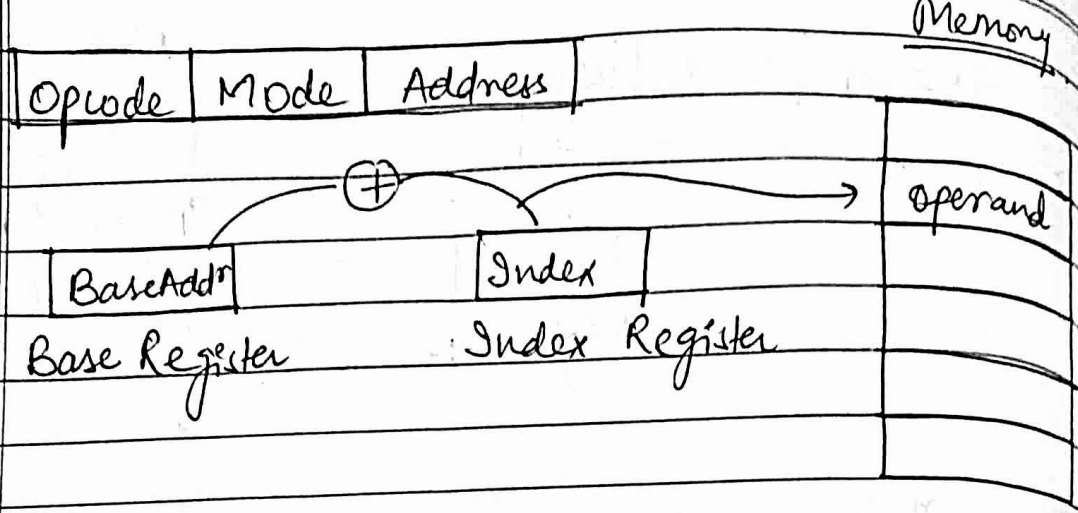
* The content of the address field is added ~~the~~ to the value of the index register to calculate the effective address.



Effective Addr = Base + Index addr

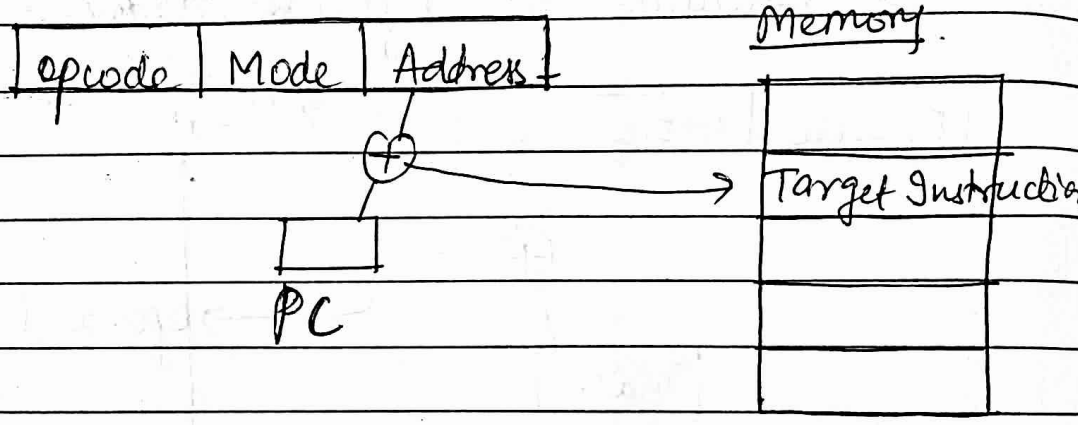
(9) Base, Index Register Mode

* Base addr. taken from base register and index value from index register.



(10) PC Relative.

* PC value added in address field value (offset) of instruction to get Effective address.



Effective Addr = PC value + offset

(11) Base Register Mode

* Base register value added in address field value (offset) of instruction to get effective address.

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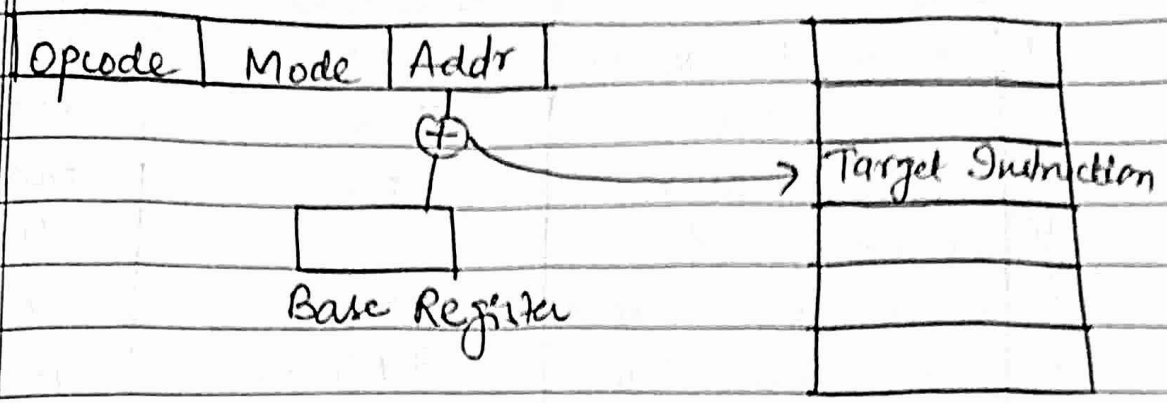

Example.

Opcode	Mode
Address = 500	
Next Instruction	
450	
700	
800	
900	
Target Instruction	
300	

PC=200

R1 = 400

XR = 100

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	Mode	Effective Addr.	Operand
1	Immediate Mode	201	500
2	Direct Mode	500	800
3.	Indirect Mode	800	300
4.	Register Mode	—	400
5.	Register Indirect Mode	400	700
6.	Autodecrement Mode	399	450
7.	Indexed Mode	500 + 100 = 600	~~500~~ 900
8.	PC-Relative Mode	500 + 202 = 702	—