If bit = n ⟶

no: of functions it will allow = n^2

consider 4 bit opcode

$n = 4$

$n^2 = 16$

4 bit opcode will allow 16 different functions.

Tutorial ⑦

Quick Review Question ①

Consider a computer that is used for simple numerical problems it uses 9 bits for an opcode and 25 bits for a memory address.

a) What is the size of its instruction?

32 bits.

Instruction size = opcode + memory address.

= 9 bits + 25 bits

= 32 bits.

b) How many different instructions can it have?

$2^9 = 512$ bits.

c) What is the maximum memory size that it can address? $2^{25} / 2^{20} = 2^5 = 32$ M

(Hint: Assume that 2^{20} is about 1M).

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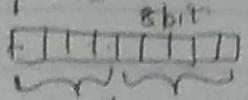
Question (2)

Given a CPU with a 8-bit word, 8 registers and instructions that are exactly 1 word long and which has 2 operands:

a) How long can the opcode field be in an instruction?

8 bit → 1 word

opcode size should be less than the memmory Address.



so the maximum size of opcode should be 4 bit.

b) How many instructions can the CPU support?

$2^8 = 256$ //

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Tutorial (8).

2

↓

ASCII value

to

↓

101 100|1010 ← result operand

Source operand

Op code

Memory Address

Ex:- Add D+4

Task

Source operand.

Result Operand } 6 //

(*) $2^{\text{size of the opcode}}$ = No: of operations could be done.

(*) $2^{\text{size of the Address field}}$ = No: instruction address could be there for an instruction/task.