



Electrical and Computer Engineering Department

ENCS 238: Computer Organization

Quiz#1 – ABET outcome (a)

Name: Solution

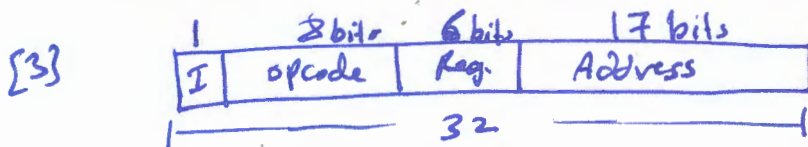
ID:

A computer uses a memory unit with 128K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 34 registers, and an address part.

a) How many different operations this machine can support?

[3] $opcode = 32 - (17 + 6 + 1) = 8 \text{ bits}$
 $\Rightarrow \# \text{ of operations or instructions} = 2^8 = 256 \text{ operations}$

b) Draw the instruction format and indicate number of bits of each field?



$128k = 2^7 \cdot 2^{10} = 2^{17}$
 $\Rightarrow 17 \text{ bit address}$

c) Find memory size in bytes?

[2] $memory \text{ size} = 128k \text{ Words} = 2^{17} \text{ Words}$, $word = 32 \text{ bits} = 4 \text{ bytes}$
 $= 2^{17} \cdot 2^2 \text{ Bytes} = 2^{19} \text{ bytes} = 512k \text{ bytes.}$

d) How many bits are there in the data bus and address bus inputs of the memory.

