Problem 1.

A program is run on a 40 MHz processor. The object code consists of 100000 instructions, with the following instruction mix and clock cycle count.

|  |  |  |
| --- | --- | --- |
| Instruction type | Instruction count | Clock cycle count |
| Integer arithmetic | 45000 | 1 |
| Data transfer | 32000 | 2 |
| Floating point | 15000 | 2 |
| Control transfer | 8000 | 2 |

Determine the effective CPI, MIPS and execution time of the program.

CPI =∑(Instruction count\*Cycle per instruction)/The number of instructions the program contains

=(45000\*1+32000\*2+15000\*2+8000\*2)/100000

CPI=1.55

#

MIPS=Ic /T \* 106

T= is processing time of the program

Ic=Instruction count

Processing time, T=Ic \* CPI \* t

t = constant cycle time, t=1/f

So, MIPS = Ic /(Ic\*CPI\*t\*106)

=1/CPI\*t\*106

=1/CPI\*(1/f)\*106

=f/CPI\*106

=(40\*106)/(1.55\*106)

=25.8

Program execution time, T=Ic \* CPI \* t

= 100000\*1.55\*1/f

=(100000\*1.55)/40\*106

=3.875 ms