1. Page size = 4096 = 2^{12} bytes

∴ Page Table Size = $2^{32-12} = 2^{20}$ bytes.

least significant 12 bits = $(456)_{16}$.

most significant 20 bits = $(11123)_{16}$.

Using hardware, we can generate physical address.

- since only 2^{18} bytes of physical memory, frame size is 6 bits.
- 6-bit frame address combined with 12-bit page displacement to generate physical address.

2. Effective access time = (1−P) ma + P(page fault service time).

mem access time = 100ns

Page $Fault_{empty/nonmodify}$ = 8ms

Page $Fault_{modify}$ = 20ms

Fault frequency = $\frac{7}{10}$.

∴ effective access time:

$$200ms = (1-p)100ms + P\left[(3/10)8ms + (7/10)20ms\right]$$
$$= 100ms - p100ms + P\left(12/5\ ms + 14ms\right)$$
$$100ms = P\left(\frac{82}{5}ms\right)\left(\frac{10\times10^{6}ns}{ms}\right) - 100ms(P)$$
$$= P(16399900ns)$$
$$\therefore P \approx 6.0976\times10^{-6}$$

$\Rightarrow$ ∴ max acceptable page fault rate for effective time of no more than 200ns