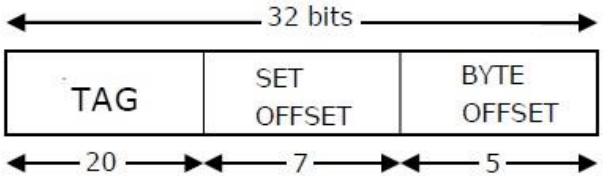
Answer on Question #45245 – Engineering - Other

A 4-way set-associative cache memory unit with a capacity of 16 KB is built using a block size of 8 words. The word length is 32 bits. The size of the physical address space is 4 GB. The number of bits for the TAG field is

Solution



Physical address size $= 32\ bits$.

Cache size $= 16k\ bytes = 2^{14}\ Bytes$.

Block size $= 8\ words = 8 \cdot 4\ Byte = 32\ Bytes$ (where each word = 4 Bytes).

No. of blocks $= \frac{2^{14}}{2^5} = 2^9$.

Block offset $= 9\ bits$.

No. of sets $= \frac{2^9}{4} = 2^7$.

Set offset $= 7\ bits$

Byte offset $= 8 \cdot 4\ Bytes = 32\ Bytes = 2^5 = 5$ bits.

$$TAG = 32 - (7 + 5) = 20\ bits.$$

Answer: $20\ bits$.