

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

COMPUTER ENGINEERING DEPARTMENT

COE 308-01, Term 982 HW# 3 Cache Organization

SOLUTION

Q.1. Cache is direct-mapped.

- a) Number of cache locations = $16K/(4*8) = 2^9$.
Therefore, bit0 to bit2: word#; bit3 to bit11: cache location; bit12 to (bit24 or bit31): tag.
- b) Address 2002 is in main memory block# 250 (in decimal).
- c) Cache location is 0; tag is 0012BH (20 bits).

Q.2. Cache is fully-associative.

- a) bit0 to bit2: word#; bit3 to (bit24 or bit31): tag.
- b) Address 2002 is in main memory block# 250 (in decimal).
- c) Tag is 00025600H (29 bits).

Q.3. Cache is set-associative.

- a) Number of sets = $16K/(4*4*8) = 2^7$.
Therefore, bit0 to bit2: word#; bit3 to bit9: set#; bit9 to (bit24 or bit31): tag.
- b) Address 2002 is in main memory block# 250 (in decimal).
- c) Cache location is 0; tag is 0004ACH (22 bits).