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Batch - 04

Tutorial 2

10/9/2020

Computer Architecture & Microprocessors

Final Answers -

Q.1 → B

Q.2 → A

Q.3 → D

Q.4 → B

Q.5 → D

Q.6 → 256

Q.7 → C

Q.8 → 1023

Q.9 → C

Tutorial 2 – Computer Architecture & Microprocessors

Q.1. The ASCII code for letter A is,

$65 = (1000001)_2$

Option : (B)

Q.2. $\overline{(\overline{A+B})+\overline{C}} = (A+B)C$ – **Option : (A)**

Q.3. A negative number can be represented by any of the forms shown in (A), (B) or (C) but 2's complement is used in computers. ⇒ All of the above.

Option : (D)

Q.4. No. of RAM chips $= \frac{2048 \times 8}{128 \times 8} = \overset{16}{16}$

Option : (B)

Q.5. $A \oplus B \oplus C$; $A \odot B \odot C$

$A \oplus B \oplus C = (A\bar{B} + \bar{A}B) \oplus C$

$= (A\bar{B} + \bar{A}B)\bar{C} + \overline{(A\bar{B} + \bar{A}B)}C$

$= A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}C + ABC$

$A \odot B \odot C = (AB + \bar{A}\bar{B}) \odot C$

$= (AB + \bar{A}\bar{B})C + \overline{(AB + \bar{A}\bar{B})}\bar{C}$

$= ABC + \bar{A}\bar{B}C + A\bar{B}\bar{C} + \bar{A}B\bar{C}$

⇒ It holds for all values

⇒ **Option : (D)**

Q.6. 11 bit computer $\Rightarrow 2^{11}$ encodings.

Address field is 4 bits long

5 2-address instructions = $5 \times 2^4 \times 2^4 = 5 \times 2^8$ encodings.

32 1-address instructions = $32 \times 2^4 = 2^9$ encodings.

$\Rightarrow$ No. of zero-address instructions

$= 2^{11} - [5 \times 2^8 + 2^9]$

$= 8 \times 2^8 - 5 \times 2^8 - 2 \times 2^8$

$= 2^8$

$= \underline{256}$

Q.7 → Instruction opcode is an instruction code, not a type of memory.

Option: (c)

Q.8 → Processor has 128 different instructions

$\Rightarrow$ 7 bits of instructions.

No. of bits available for operand field = 7 (given)

$\Rightarrow$ Remaining bits = $24 - (7+7)$

$= \underline{10}$

→ The maximum value stored in a 10 bit register

$= (1111111111)_2 = \underline{(1023)_{10}}$

Q.9. Instruction size = 16 bit.

Size of address field = 7 bits.

No. of total encodings = 2^{16}

No. of encodings for 2 2-address = $2 \times 2^7 \times 2^7 = 2^{15}$

No. of encodings for 250 1-address = $250 \times 2^7 = 125 \times 2^8$

$\Rightarrow$ Remaining = $2^{16} - (2^{15} + 125 \times 2^8)$

$= (128 - 125) \times 2^8 = 3 \times 2^8 = \underline{768}$

Option: (c)