

# NCERT Math 11.9.2 Q8

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**Question:** An 8 bit ADC converts analog voltage in the range of 0 to +5 V to the corresponding digital code as per the conversion characteristics shown in figure. For  $V_{in} = 1.9922$  V, which of the following digital output, given in hex, is true?

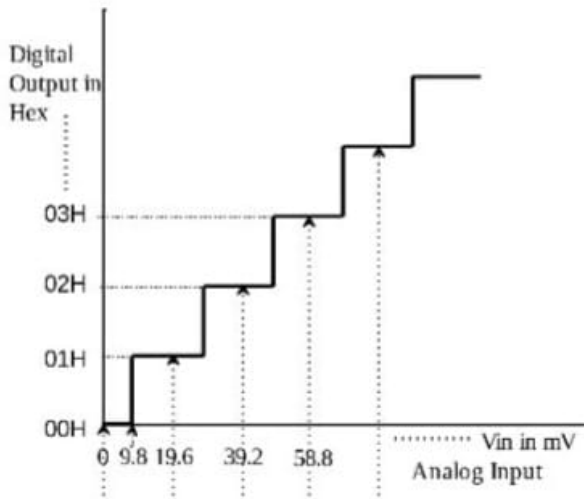


Fig. 1

- (a) 64H
- (b) 65H
- (c) 66H
- (d) 67H

**Solution:**

Symbol	Value	Description
$n$	8	Number of bits of ADC
$V_{min}$	0V	Minimum Analog Voltage
$V_{max}$	5V	Maximum Analog Voltage
$V_{in}$	1.9922V	Input Voltage
$V_{out}$		Output Voltage

TABLE I: Given Parameters

Calculating the step-size:

$$\Delta V_{in} = \frac{V_{max} - V_{min}}{2^n - 1} \quad (1)$$

$$= \frac{5 - 0}{2^8 - 1} \quad (2)$$

$$= \frac{5}{255} \quad (3)$$

$$\Rightarrow V_{out} = \frac{V_{in}}{\Delta V_{in}} \quad (4)$$

$$= \frac{1.9922 \times 255}{5} \quad (5)$$

$$= 101.59 \quad (6)$$

$$\approx 102_{10} \quad (7)$$

$$= (66)_H \quad (8)$$

$\therefore$  correct answer is option (c).

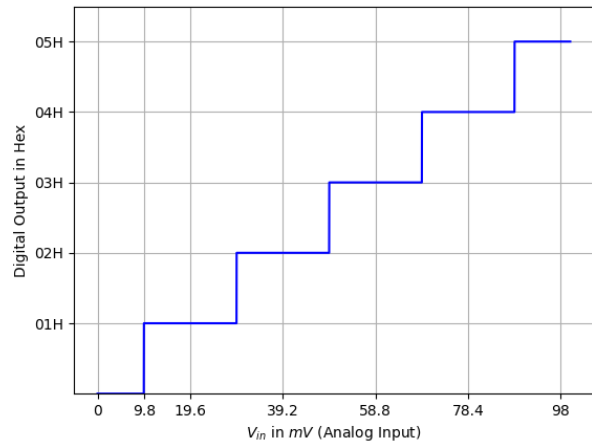


Fig. 2