

Easy

Deputy Executive Engineer (Electrician)

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Gujarat Public Service Commission / Assistant Engineer (Electrical)

Consider the following statements regarding ADC interfacing to 8051: 1. ADC converts analog signal to digital. 2. Start of conversion signal is required. 3. End

A

1 and 2 only

B

1, 2 and 3

Correct

C

1 only

D

1 and 3 only

Correct Answer: B

Full Detailed Explanation

Correct Answer: B - 1, 2 and 3 Quick Concept Explanation An n-bit ADC divides its input range into roughly 2^n quantization levels. Quantization error is inherent in finite resolution, while sampling frequency determines whether the signal can be reconstructed without aliasing. Key relation: $\text{LSB} = V_{\text{FS}}/2^n$; ideal quantization error $\approx 0.5 \text{ LSB}$. Exam focus: More bits improve amplitude resolution; higher sample rate improves time/frequency representation. Common trap: Resolution is not simply $1/n$ and sampling rate is not irrelevant. Statement-wise Verification Statement 1 - Correct. ADC converts analog signal to digital. An n-bit ADC divides its input range into roughly 2^n quantization levels. Statement 2 - Correct. Start of conversion signal is required. Sampling frequency determines whether the signal can be reconstructed without aliasing. Statement 3 - Correct. End of conversion signal indicates completion. Sampling frequency determines whether the signal can be reconstructed without aliasing. Core Concept An n-bit ADC divides its input range into roughly 2^n quantization levels. The LSB step/resolution is approximately full-scale range divided by 2^n . Quantization error is inherent in finite resolution, while sampling frequency determines whether the signal can be reconstructed without aliasing. Formula / Key Relationship $\text{LSB} = V_{\text{FS}}/2^n$; ideal quantization error $\approx 0.5 \text{ LSB}$. Why