Medium | Deputy Executive Engineer (Electric | 2026 | orts Authority of Gujarat / Assistant Engineer (El

With reference to aliasing in sampled signals, consider the following statements: 1. Aliasing occurs when higher frequency components overlap with lower frequencies

A 1 and 2 only

B 2 and 4 only

C 1, 2 and 4 only

D **1, 2 and 3 only** Correct

Correct Answer: D

Full Detailed Explanation

Correct Answer: D - 1, 2 and 3 only Quick Concept Explanation The sampling theorem requires a band-limited signal to be sampled at at least twice its highest frequency for ideal reconstruction. Anti-aliasing filters limit input bandwidth before sampling, and ideal reconstruction uses a low-pass interpolation filter. Key relation: f_s 2f_max; Nyquist rate=2f_max.Exam focus: Filter before the ADC, not after aliasing has already occurred. Common trap: Oversampling reduces aliasing risk; it does not create aliasing. Statement-wise Verification Statement 1 - Correct.Aliasing occurs when higher frequency components overlap with lower frequencies after sampling.The sampling theorem requires a band-limited signal to be sampled at at least twice its highest frequency for ideal reconstruction. Statement 2 - Correct.It results in irreversible distortion in the reconstructed signal.The sampling theorem requires a band-limited signal to be sampled at at least twice its highest frequency for ideal reconstruction. Statement 3 - Correct.Anti-aliasing filters are used prior to sampling to limit bandwidth.Anti-aliasing filters limit input bandwidth before sampling, and ideal reconstruction uses a low-pass interpolation filter. Statement 4 - Incorrect.Aliasing is more prominent when the signal is oversampled.Oversampling makes aliasing less likely; undersampling causes spectral