

Moderate

Assistant Engineer (Electrical), Class 2025

Building Department

A periodic square wave is formed by rectangular pulses ranging from  $-1$  to  $+1$  and period = 2 units. The ratio of the power in the 7th harmonic to the power in the

A

1

B

0.5

Correct

C

2

D

2.5

## Correct Answer: B

### Full Detailed Explanation

Concept & Reasoning The Fourier series of a bipolar 50% duty square wave contains odd terms  $1, 1/3, 1/5, 1/7, \dots$ . If the load resistance is the same for every harmonic, power contributed by one sinusoidal harmonic is proportional to  $V_n^2$ . Thus the ratio is the square of the amplitude ratio. How to Solve It in the Exam Square-wave harmonic power falls as  $1/n^2$ . Important Exam Point Use amplitude  $1/n$ , but power  $1/n^2$ . Related Revision Path This question sits in the revision path Signals and Systems → Fourier Series → Harmonics.

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