

# ASSIGNMENT 11 : PAPOULLIS CHAPTER : 9

## EXERCISE : 9-13

AI21BTECH11016

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# Outline

1 Question

2 Solution

# Question

Show that  $|R_{xy}(\tau)| \leq \frac{1}{2} [R_{xx}(0) + R_{yy}(0)]$

# Solution

We know that,  
For any a, b

$$4ab \leq (a + b)^2 \quad (1)$$

$$\left| \int_a^b S_{xy}(\omega) d\omega \right|^2 = \int_a^b S_{xx}(\omega) d\omega \int_a^b S_{yy}(\omega) d\omega \quad (2)$$

# Solution

From equations 1 and 2 it follows that,

$$|R_{xy}(\tau)|^2 \leq R_{xx}(0)R_{yy}(0) \leq \frac{1}{4} [R_{xx}(0) + R_{yy}(0)]^2 \quad (3)$$

$$\Rightarrow |R_{xy}(\tau)|^2 \leq \frac{1}{4} [R_{xx}(0) + R_{yy}(0)]^2 \quad (4)$$

$$\therefore |R_{xy}(\tau)| \leq \frac{1}{2} [R_{xx}(0) + R_{yy}(0)]$$