Assignment on Correlation

Riyad Morshed Shoeb
Roll: 1603013
Section A
CSE 4203

Determine the correlation sequence for.

$$x(n) = \{ \ldots, 0, 0, \underset{\uparrow}{1}, 2, 3, 4, 0, 0, \ldots \}$$

$$y(n) = \{ \ldots, 0, 0, 1, 2, \underset{\uparrow}{1}, 2, 0, 0, \ldots \}$$

Solution:

We know that,

$$r_{xy}(l) = \sum_{n=-\infty}^{\infty} x(n)\, y(n-l)$$

$$\therefore r_{xy}(0) = \sum_{n=-\infty}^{\infty} x(n)\, y(n)$$

$$= \sum \{ \ldots, 0, 0, 1, 4, \underset{\uparrow}{3}, 8, 0, 0, \ldots \}$$

$$= 16$$

$$r_{xy}(1) = \sum_{n=-\infty}^{\infty} x(n)\, y(n-1)$$

$$= \sum \{ \ldots, 0, 2, \underset{\uparrow}{6}, 9, 0, 0, \ldots \}$$

$= 12$

$$r_{xy}(2) = \sum_{n=-\infty}^{\infty} x(n)\,y(n-2)$$

$$= \sum \{ \ldots, 0, 0, \underset{\uparrow}{3}, 8, 0, 0 \ldots \}$$

$$= 11$$

$$r_{xy}(3) = \sum_{n=-\infty}^{\infty} x(n)\,y(n-3)$$

$$= \sum \{ \ldots, 0, \underset{\uparrow}{0}, 4, 0, 0, \ldots \}$$

$$= 4$$

$$r_{xy}(4) = \sum_{n=-\infty}^{\infty} x(n)\,y(n-4)$$

$$= 0$$

$$r_{xy}(5) = \sum_{n=-\infty}^{\infty} x(n)\,y(n-5)$$

$$= 0$$

$$r_{xy}(-1) = \sum_{n=-\infty}^{\infty} x(n)\,y(n+1)$$

$$= \sum \{ \ldots, 0, 2, 2, \underset{\uparrow}{6}, 0, 0, \ldots \}$$

$$= 10$$

$$r_{xy}(-2) = \sum_{n=-\infty}^{\infty} x(n)\,y(n+2)$$

$$= \sum \{ \ldots, 0, 1, 4, \underset{\uparrow}{0}, 0, \ldots \}$$

$= 5$

$$r_{xy}(-3) = \sum_{n=-\infty}^{\infty} x(n)\,y(n+3)$$

$$= \sum \{ \ldots, 0, 2, 0, \underset{\uparrow}{0}, \ldots \}$$

$$= 2$$

$$r_{xy}(-4) = \sum_{n=-\infty}^{\infty} x(n)\,y(n+4)$$

$$= 0$$

$$r_{xy}(-5) = \sum_{n=-\infty}^{\infty} x(n)\,y(n+5)$$

$$= 0$$

$$\therefore r_{xy}(l) = \{ \ldots, 0, 0, 2, 5, 10, \underset{\uparrow}{16}, 12, 11, 4, 0, 0, \ldots \}$$

Ans.