

Assignment #1:- DAA:

$$1) 7n - 2 = O(n)$$

Solution:-

$$f(n) \leq (c \cdot g(n)) \forall n \geq k$$

$$f(n) = 7n - 2$$

$$g(n) = n$$

$$c = 7$$

$$7n - 2 \leq 7n$$

$$n = 1$$

$$7(1) - 2 \leq 7(1)$$

$$5 \leq 7 \forall n \geq 1$$

$$n = 2$$

$$7(2) - 2 \leq 7(2)$$

$$12 \leq 14 \forall n > 1$$

$$2) 3n^3 + 20n^2 + 5 = O(n^6)$$

Solution:-

$$f(n) = 3n^3 + 20n^2 + 5$$

$$g(n) = n^6$$

$$f(n) \leq (c \cdot g(n)) \forall n \geq k$$

$$3n^3 + 20n^2 + 5 \leq n^6 \forall n > k$$

$$n = 1$$

$$3(1)^3 + 20(1) + 5 \leq 28(1) \forall n > 1$$

$$28 \leq 28 \forall n \geq 1$$

$$1) 7n-2 = \Theta(n^2)$$

Solution:-

$$C_1 g(n) \leq f(n) \leq C_2 g(n)$$

$$f(n) = 7n-2$$

$$g(n) = n^2$$

$$C_1 = 5$$

$$C_2 = 7$$

$$n=1$$

$$5n^2 \leq 7n-2 \leq 7n^2$$

$$5(1)^2 \leq 7(1)-2 \leq 7(1)^2$$

$$5 \leq 5 \leq 7$$

$$n=2$$

$$5(2)^2 \leq 7(2)-2 \leq 7(2)^2$$

$$20 \leq 12 \leq 28$$

Hence it is False.

$$f(n) = n, g(n) = n^2$$

Bkhs Transpose Symmetric Property & its satisfy O & Ω notation.

$$n = 2$$

$$3(2)^3 + 20(2)^2 + 5 \leq 28(2)^6$$

$$109 \leq 1792 \quad \forall n \geq 1.$$

$$3) \quad 7n - 2 = \Theta(n)$$

Solution:-

$$C_1 g(n) \leq f(n) \leq C_2 g(n) \quad \forall n \geq 1$$

$$f(n) = 7n - 2$$

$$g(n) = n$$

$$C_1 = 5$$

$$C_2 = 7$$

$$5n \leq 7n - 2 \leq 7n \quad \forall n \geq 1$$

$$n = 1$$

$$5(1) \leq 7(1) - 2 \leq 7(1) \quad \forall n \geq 1$$

$$5 \leq 5 \leq 7 \quad \forall n = 1$$

$$n = 2$$

$$5(2) \leq 7(2) - 2 \leq 7(2) \quad \forall n \geq 1$$

$$10 \leq 12 \leq 14 \quad \forall n \geq 1.$$