



Shri Yashwantrao Bhonsale Education Society's
YASHWANTRAO BHONSALE INSTITUTE OF TECHNOLOGY

(DTE CODE : 3470) (MSBTE Code : 1742)

Approved by AICTE, DTE & Affiliated to Mumbai University & MSBTE Mumbai
(NBA Accredited ME, CE, EE Diploma Programs)

Practical No 19

Aim

Develop a Python script to create two arrays of the same shape and perform element-wise addition, subtraction, multiplication, and division. Calculate the dot product and cross product of two vectors.

Apparatus / Software Required

- Python Interpreter (Python 3.14.2)

Theory

NumPy is a powerful Python library used for numerical operations on arrays. It supports element-wise operations and advanced mathematical computations like dot product and cross product.

In this practical, two arrays of the same shape are created, and operations such as:

- Addition
- Subtraction
- Multiplication
- Division

are performed element-wise.

Additionally:

- Dot product gives a scalar value (for vectors)
- Cross product gives a vector perpendicular to both vectors

These operations are widely used in:

- Mathematics
- Physics
- Machine Learning



◆ Important Methods Used

★ 1. `np.array()` (Most Important)

- Creates NumPy arrays

`np.array(data)`

👉 This is the **main function used in this practical**.

★ 2. Element-wise Operations

- Performed directly using operators

`a + b` # Addition

`a - b` # Subtraction

`a * b` # Multiplication

`a / b` # Division

👉 These operations work on each corresponding element.

★ 3. `np.dot()`

- Calculates **dot product** of two arrays

`np.dot(a, b)`

👉 Returns scalar (for 1D vectors).

★ 4. `np.cross()`

- Calculates **cross product** of two vectors

`np.cross(a, b)`

👉 Returns a vector.



Shri Yashwantrao Bhonsale Education Society's
YASHWANTRAO BHONSALE INSTITUTE OF TECHNOLOGY

(DTE CODE : 3470) (MSBTE Code : 1742)

Approved by AICTE, DTE & Affiliated to Mumbai University & MSBTE Mumbai
(NBA Accredited ME, CE, EE Diploma Programs)

Conclusion

.....

.....

.....

.....

.....

.....

.....

.....

.....