

**BITS PILANI, DUBAI CAMPUS**  
**DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI**

**FIRST SEMESTER 2023 – 2024**

**COURSE:** CSF301 (Principles of Programming Languages)

**COMPONENT:** Tutorial Sheet 1

**DATE:** 22<sup>nd</sup> September 2023

**Q1:** Differentiate in between Imperative- and Declarative- Languages.

**Answer:**

<b>Imperative Programming</b>	<b>Declarative Programming</b>
In this, programs specify how it is to be done.	In this, programs specify what is to be done.
It simply describes the control flow of computation.	It simply expresses the logic of computation.
Its main goal is to describe how to get it or accomplish it.	Its main goal is to describe the desired result without direct dictation on how to get it.
Its advantages include ease to learn and read, the notional model is simple to understand, etc.	Its advantages include effective code, which can be applied by using ways, easy extension, high level of abstraction, etc.
Its type includes procedural programming, object-oriented programming, parallel processing approach.	Its type includes logic programming and functional programming.
In this, the user is allowed to make decisions and commands to the compiler.	In this, a compiler is allowed to make decisions.

**Q2:** How compilation can be more efficient than interpretation?

**Answer:**

Compiled languages are converted directly into machine code that the processor can execute. As a result, they tend to be faster and more efficient to execute than interpreted languages. They also give the developer more control over hardware aspects, like memory management and CPU usage.

**Q3:** What is orthogonality? Brief it with example.

**Answer:**

Refer PoPL Lecture 2 notes slides 6,7.

**Q4:** Which features of programming language should support for good writability? and how it is achieved in programming language like Java?

**Answer:**

Programming language should support simplicity, orthogonality, data types, syntax design, support for abstraction, expressivity.

Student should write the example of six features with respect to Java.

**Q5:** Enlist the most suitable programming languages for following application design,

- A. Launching a satellite in space : Assembly Language, Embedded C
- B. Predicting a soil moisture from available dataset: Python, Julia etc.
- C. Selecting an employee name and id from employee database with respect to specific conditions.: SQL
- D. Design of an operating system: C, C++
- E. Developing a E-commerce web application: Java, Javascript, html etc.

**Q6:** Multiple choice questions

- a. von Neumann machine is one of the most fundamental concepts in computer science. What programming paradigm most closely follows this concept?  
*A. Imperative B. Object-oriented D. Functional E. Logic*
- b. If you teach someone to make a food, you are in fact teaching,  
*A. Imperative programming B. Declarative Programming*
- c. If you teach someone to order food from restaurant, you are in fact teaching,  
*A. Imperative programming B. Declarative Programming*
- d. Which of the following languages nearer to be Turing-complete?  
*A. C B. Java D. C++ E. All of these*
- e. Which of the following programming languages satisfy most of the language evaluation criteria's and characteristics associated with it?  
*A. Java B. Python D. ALGOL E. Fortran*