

# PROGRAMMING CONCEPTS

Program can be defined as a set of instructions that need to be executed to accomplish a computing task. A person who writes or performs the program is known as **programmer**.

Programmer uses some specific languages to write program which is known as programming languages. e.g. C++, Java, etc.

**Note** *Ada Lovelace is regarded as the world's first programmer.*

## Programming Language

It is a set of commands, instructions and other syntax use to create a software program. Programming language must be simple, easy to learn and use. It must be consistent in terms of syntax and semantics.

*Programming languages are mainly categorised into three parts, which are as follows*

### Low Level Language (LLL)

These programming languages are more difficult to understand. It is designed to operate and handle the entire instruction set of a computer system directly which are generally used to write the system software.

*There are two types of low level language, which are as follows*

1. **Machine Language** It is the only language understood by the computers. Sometimes, it referred to as machine code or object code or binary language.

It is a collection of binary digits (0 or 1) or bits that the computer reads and interprets.

2. **Assembly Language** It is a low level programming language which is used as an interface with computer hardwares.

It uses structured commands as substitutions for numbers, allowing humans to read the code easier than looking at binary codes.

## Medium Level Language (MLL)

It serves as the bridge between raw hardware and programming layer of a computer system. It is designed to improve the translated code before it is executed by the processor. e.g. C.

## High Level Language (HLL)

It is an advanced computer programming language that is not limited to one computer, designed for a specific job and is easier to understand.

The main advantages of high level languages over low level languages is that they are easier to read, write and understand. e.g. BASIC, C, FORTRAN, Java, Python, etc.

Some High Level Languages and Their Application Areas

Language	Year	Developer	Application Area	Nature
<b>FORTRAN</b> (Formula Translation)	1957	A team of programmers at IBM	Calculation	Compiled
<b>ALGOL</b> (Algorithmic Language)	1958	A committee of European and American computer scientists	Scientific purpose	Compiled
<b>LISP</b> (List Processing)	1958	John McCarthy at the Massachusetts Institute of Technology (MIT)	Artificial intelligence	Compiled and Interpreted
<b>COBOL</b> (Common Business Oriented Language)	1959	Grace Hopper	Business management, String oriented	Compiled
<b>BASIC</b> (Beginner's All purpose Symbolic Instruction Code)	1964	John G. Kemeny and Thomas E. Kurtz at Dartmouth College in New Hampshire	Programming for educational purpose	Interpreted
<b>Pascal</b>	1970	Niklaus Wirth	Education	Compiled
<b>C</b>	1972	Dennis Ritchie at Bell Labs	System programming	Compiled
<b>C ++</b>	1985	Bjarne Stroustrup at Bell Labs	System object programming	Compiled
<b>Python</b>	1991	Guido Van Rossum	Multimedia, Mobile app, Image processing	Interpreted
<b>Java</b>	1995	James Gosling at Sun Microsystems	Internet oriented programming	Compiled and Interpreted
<b>Java Script</b>	1995	Brendan Eich	Games, animated 2D and 3D graphics	Compiled and Interpreted

## Terms Related to Programming

### Program Documentation

*It is a kind of documentation that gives a comprehensive procedural description of a program. It shows as to how software is written. The program documentation describes what exactly a program does by mentioning about the requirements of the input data and effect of performing a programming task.*

### OOPs

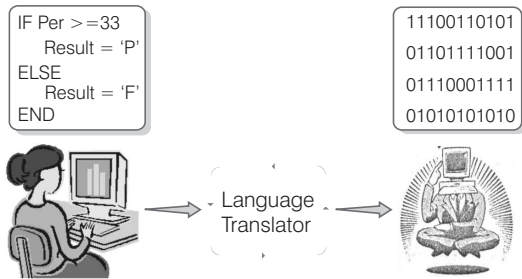
*OOPs stands for Object Oriented Programmings in which programs are considered as a collection of objects. Each object is nothing but an instance of a class.*

### De-Bugging

*It is the process of locating and fixing or bypassing bugs (errors) in computer program code.*

## Language Translator

It converts programming language into machine language.



The translated program is called the **object code**. Depending upon used programming languages, *language translator is divided into three categories, which are as follows*

1. **Assembler** It converts a program written in assembly language into machine language. Assembly language consists of mnemonic code, which are difficult to learn and are machine dependent.
2. **Interpreter** It converts a HLL program into machine language by converting it line-by-line. If there is any error in any line, it stops the execution of the program immediately and reports to the user at the same time.  
  
Program execution cannot resume until the error is rectified by the user. Interpreter is very useful for de-bugging and suitable for novice programmer. This is a slow process and consumes less memory space.
3. **Compiler** It converts HLL program into machine language, which can be understood by the processor. For each high level language, the machine requires a separate compiler.

A compiler creates a unique object program, i.e. if a source program is compiled, there is no need of that source program because output can be obtained by executing that object program.

Compiler converts the entire HLL program in one go and reports all the errors of the program alongwith the line numbers.

## Generation of Languages

The concept of language generations, sometimes called levels, is closely connected to the advances in technology that brought about computer generations.

*The five generations of language are as follows*

- (i) The **first generation languages** or **1 GLs** are low level languages like machine language.
- (ii) The **second generation languages** or **2 GLs** are also low level languages that generally consist of assembly language.
- (iii) The **third generation languages** or **3 GLs** are high level languages such as Java.
- (iv) The **fourth generation languages** or **4 GLs** are the languages that consist of statements similar to the statements of human language. 4 GLs are commonly used in database programming and scripting programming.
- (v) The **fifth generation languages** or **5 GLs** are programming languages that contain visual tools, which help to develop a program. A good example of 5 GLs is Visual Basic.

## Algorithm

An algorithm is a step-by-step method of solving a problem. It is commonly used for data processing, calculation and other related computer and mathematical operations.

## Flow Chart

A flow chart is a visual representation of the sequence of steps and decisions needed to perform a process. Each step in the sequence is noted within a diagram shape. Steps are linked by connecting lines and directional arrows.

## Error

An error in a program is called bug. It is a term used to describe any issue that arises unexpectedly that cause a computers not function properly.

## Types of Error

*The types of error are classified into four categories, which are as follows*

1. **Syntax Error** When the rules of the programming language are not followed, the compiler will show syntax error.

2. **Semantic Error** Semantic errors are reported by the compiler when the statements written in the program are not meaningful to the compiler.
3. **Logical Error** Logical errors are those errors that occur in the output of the program. The presence of logical errors leads to undesired or incorrect output.
4. **Runtime Error** Runtime errors are those errors that occur during the execution of a program. It generally occurs due to some illegal operation performed in the program.



## Tit-Bits

- **Reserved words** are words that a programming language has set aside for its own use.
- **Pseudocode** is not a programming language, but simply an informal way of describing a program. It does not follow any syntax strictly.
- **Looping** is a control structure which is used in a program to execute a particular set of statements repeatedly.
- **Data Flow Diagram (DFD)** describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation.

# QUESTION BANK

1. The instructions that tell a computer how to carry out the processing tasks are referred to as computer [IBPS PO 2015]
  - (1) programs
  - (2) processors
  - (3) input devices
  - (4) memory modules
  - (5) None of these
2. A set of rules for telling the computer what operations to perform is called a [IBPS PO 2012]
  - (1) Procedural language
  - (2) Structures
  - (3) Natural language
  - (4) Command language
  - (5) Programming language
3. Which of the following contains specific rules and words that express the logical steps of an algorithm? [IBPS Clerk 2014]
  - (1) Programming language
  - (2) Syntax
  - (3) Programming structure
  - (4) Logical chart
  - (5) Flow chart
4. A(n) ..... program is one that is ready to run and does not need to be altered in any way. [IBPS Clerk 2013]
  - (1) interpreter
  - (2) high level
  - (3) compiler
  - (4) COBOL
  - (5) executable
5. Who is regarded as the world's first programmer? [RRB NTPC 2016]
  - A. Alan Turing
  - B. Ada Lovelace
  - C. Tim Berners Lee
  - D. Steve Wozniak
6. A factor in the selection of source language is
  - (1) programmer's skill
  - (2) language availability
  - (3) program compatibility with other software
  - (4) All of the above
7. Languages which can easily interact with the hardware are called
  - (1) High level languages
  - (2) Low level languages
  - (3) Middle level languages
  - (4) All of the above
8. Machine language [SBI PO 2013]
  - (1) is the language in which programs were first written
  - (2) is the only language understood by the computer
  - (3) differs from one type of computer to another
  - (4) All of the above
  - (5) None of the above

9. The use of combination of 1's and 0's is feature of which of the following type of computer language? [IBPS PO 2016]  
(1) High Level Language  
(2) PASCAL  
(3) Machine Language  
(4) C  
(5) COBOL
10. Each model of a computer has a unique  
(1) assembly of a computer  
(2) machine language  
(3) high level language  
(4) All of the above
11. All computers execute  
(1) BASIC programs  
(2) COBOL programs  
(3) Machine language programs  
(4) FORTRAN programs
12. The language which can be relocated easily is  
(1) Machine language (2) Assembly language  
(3) Low level language (4) Middle level language
13. Assembly language [IBPS Clerk 2011]  
(1) uses alphabetic codes in place of binary numbers used in machine language  
(2) is the easiest language to write programs  
(3) need not be translated into machine language  
(4) All of the above  
(5) None of the above
14. Which language is CPU dependent ?  
(1) C (2) Assembly  
(3) Java (4) All except Java
15. .... serves as the bridge between raw hardware and programming layer of a computer system.  
(1) Medium level language  
(2) Low level language  
(3) High level language  
(4) Both (1) and (2)
16. Which of the following is a machine independent program?  
(1) High level language  
(2) Low level language  
(3) Assembly language  
(4) Machine language
17. Computer language used for calculation is  
(1) LOGO (2) FORTRAN  
(3) BASIC (4) C ++
18. Which of the following computer language is a mathematically oriented language used for scientific problems? [UPSSSC 2015]  
(1) FORTRAN (2) COBOL  
(3) LISP (4) PROLOG
19. FORTRAN stands for  
(1) Formal Translation  
(2) Formative Translation  
(3) Formal Transaction  
(4) Formula Translation
20. LISP is designed for  
(1) artificial intelligence (2) GUI  
(3) CUI (4) optical fibre
21. LISP is the second oldest high level programming language. Here, LISP stands for  
(1) Level Program (2) Level Process  
(3) List Processing (4) List Program
22. What does CO stand in COBOL?  
[UPSSSC 2015, IBPS Clerk 2012]  
(1) Common Object (2) Common Oriented  
(3) Common Operating (4) Computer Oriented  
(5) None of these
23. Which of the following is not characteristic of COBOL?  
(1) It is a very standardised language  
(2) It is a very efficient in terms of coding and execution  
(3) It had limited facilities for mathematical notation  
(4) It is very readable language
24. A computer program used for business application is  
(1) LOGO (2) COBOL  
(3) BASIC (4) FORTRAN
25. Who among the following invented the computer language, COBOL? [CHSL 2018]  
(1) Grace Murray Hopper  
(2) John McCarthy  
(3) Guido Van Rossum  
(4) Brendan Eich

- 26.** C programming language was developed by  
[SSC CGL 2017]  
(1) Charles Babbage (2) Larry Wall  
(3) James Gosling (4) Dennis Ritchie
- 27.** C++ language developed by  
[IBPS Clerk 2012]  
(1) Dennis Ritchie (2) Charles Babbage  
(3) Niklaus Wirth (4) Bjarne Stroustrup  
(5) John McCharthy
- 28.** Python is a .....  
[SSC CHSL 2019]  
(1) low level language (2) high level language  
(3) machine language (4) assembly language
- 29.** Java is referred to as a  
[SBI PO 2014]  
(1) high level language  
(2) complex language  
(3) hardware device driver  
(4) low level language  
(5) programming mid level language
- 30.** Computer language used on Internet is  
(1) PASCAL (2) Java  
(3) BASIC (4) LOGO
- 31.** The language used for development of various games is  
(1) C (2) C++ (3) Java (4) SQL
- 32.** Which of the following is a programming language for creating special programs like Applets?  
[IBPS Clerk 2012]  
(1) Java (2) Cable  
(3) Domain name (4) Net  
(5) COBOL
- 33.** Which is the official language for Android development?  
[RRB NTPC 2016]  
A. Java B. COBOL  
C. FORTRAN D. Ada  
(1) C (2) A (3) B (4) D
- 34.** Who invented Java Script programming language?  
[SSC CGL 2016]  
(1) Brendan Eich (2) Willam Einthoven  
(3) George Eastman (4) Emil Erlenmeyer
- 35.** In which year did the Java Script programming language come into existence?  
[SSC CHSL 2019]  
(1) 1995 (2) 1999  
(3) 1990 (4) 2000
- 36.** Which of the following is not a computer language?  
[UPSSSC 2016, SBI PO 2014]  
(1) BASIC (2) COBOL  
(3) LOTUS (4) FORTRAN  
(5) None of these
- 37.** C, BASIC, COBOL and Java are examples of ..... languages.  
[IBPS Clerk 2015]  
(1) low level (2) computer  
(3) system programming (4) high level  
(5) None of these
- 38.** ..... is a written description of a computer program's functions.  
[SBI PO 2014]  
(1) Explanatory instructions  
(2) Graphical user interface  
(3) Plug and play  
(4) README files  
(5) Documentation
- 39.** De-bugging is the process of  
[RRB NTPC 2016]  
A. rolling out a software program  
B. modifying a software program  
C. checking errors in a software program  
D. changing the design structure of a program  
(1) C (2) D (3) B (4) A
- 40.** Translator program used in assembly language is called  
[SBI Clerk 2012]  
(1) compiler (2) interpreter  
(3) translation (4) translator  
(5) assembler
- 41.** The ..... program is used to convert mnemonic code to machine code.  
(1) Debug (2) C++  
(3) FORTRAN (4) Assembler
- 42.** The function of an assembler is  
(1) to convert basic language into machine language  
(2) to convert high level language into machine language  
(3) to convert assembly language into machine language  
(4) to convert assembly language into low level language
- 43.** An assembler is a  
(1) programming language dependent  
(2) syntax dependent  
(3) machine dependent  
(4) data dependent



- 44.** Which of the following is not true about an assembler?  
 (1) Translates instructions of assembly language in machine language  
 (2) It translates the C program  
 (3) It is involved in program's execution  
 (4) It is a translating program
- 45.** Compiler is a [UPSSSC 2015]  
 (1) computer program  
 (2) part of software  
 (3) program for converting from high level to machine language  
 (4) All of the above
- 46.** Compiling creates a(n) [RBI Grade B 2012]  
 (1) error-free program (2) program specification  
 (3) subroutine (4) algorithm  
 (5) executable program
- 47.** Computer programs are written in a high level programming language, however the human readable version of a program is called [IBPS PO 2015]  
 (1) word size (2) source code  
 (3) instruction set (4) application  
 (5) hard drive
- 48.** Second generation languages are languages that consists of  
 (1) machine language (2) assembly language  
 (3) Java (4) visual basic
- 49.** Which of the following generation languages consist of statements similar to the statements of human language?  
 (1) 1GL (2) 2GL (3) 3GL (4) 4GL
- 50.** A set of step-by-step procedures for accomplishing a task is known as a(n) [IBPS Clerk 2015]  
 (1) Algorithm (2) Hardware program  
 (3) Software (4) Firmware program  
 (5) None of the above
- 51.** Error in a program is called  
 (1) bug (2) debug  
 (3) virus (4) noise
- 52.** Error which occurs when program tried to read from file without opening it is classified as  
 (1) execution error messages  
 (2) built in messages  
 (3) user defined messages  
 (4) half messages  
 (5) None of the above
- 53.** ..... are words that a programming language has set aside for its own use. [IBPS PO 2011]  
 (1) Control words (2) Control structures  
 (3) Reserved words (4) Reserved keys  
 (5) None of these
- 54.** ..... is a cross between human language and a programming language. [IBPS PO 2012]  
 (1) Pseudocode  
 (2) Java  
 (3) The Java virtual machine  
 (4) The compiler  
 (5) None of the above
- 55.** In programming, repeating some statements is usually called [SSC CGL 2013]  
 (1) looping (2) control structure  
 (3) compiling (4) structure
- 56.** What is the full name of DFD? [UPPSC Computer Assistant 2019]  
 (1) Data Flow Diagram (2) Data Full Document  
 (3) Data File Diagram (4) Data File Document

## ANSWERS

1. (1)	2. (5)	3. (3)	4. (5)	5. (3)	6. (3)	7. (2)	8. (4)	9. (3)	10. (2)
11. (3)	12. (2)	13. (1)	14. (2)	15. (1)	16. (1)	17. (2)	18. (1)	19. (4)	20. (1)
21. (3)	22. (2)	23. (2)	24. (2)	25. (1)	26. (4)	27. (4)	28. (2)	29. (1)	30. (2)
31. (3)	32. (1)	33. (2)	34. (1)	35. (1)	36. (3)	37. (4)	38. (5)	39. (1)	40. (5)
41. (4)	42. (3)	43. (3)	44. (2)	45. (4)	46. (5)	47. (2)	48. (2)	49. (4)	50. (1)
51. (1)	52. (1)	53. (3)	54. (1)	55. (1)	56. (1)				