CHAPTER 2

Fundamentals of C Language

Q.1: Fill in the blanks.
   (i) Quantities whose values do not change during the execution of the program are called ________.
   (ii) A ________ is a memory location that is identified by a name to store an item of data of a particular type.
   (iii) ________ should be matched to the type of variable you want to print or read.
   (iv) You can enter control characters in a C program by means of an ________.

Answers: (i) constants  (ii) variable  (iii) data  (iv) escape sequence

Q.2: Answer the following as True or False.
   (i) Type integers can accommodate numbers from 0 to 32,767.
   (ii) Type long variables can hold numbers twice as big as type int.
   (iii) Type float occupies 4 times as many bytes of memory as char.
   (iv) Two variables can be declared in one statement.

Answers: (a) False (b) True (c) True (d) True

Q.3: Express the following numbers in exponential notation.
   (a) 256.75
   (b) 0.0115
   (c) -35.123
   (d) 0.0000456
   (e) 1,000,000

Answers: (a) 256.75e+0  (b) 0.0115e+0  (c) -35.123e+0  (d) 0.0000456e+0  (e) 1000000.e+0

Q.4: Express the following numbers in decimal notation.
   (a) 2.3e6  (b) 5.25e-4  (c) 1.23456e3  (d) -7.8843e-3
   (e) -8.488e2
Answers: (a) 2300000 (b) 0.000525 (c) 1234.56 (d) -0.0078843 (e) -348.8

Q.5: Which of the following are arithmetic operators?
(a) + (b) & (c) % (d) <

Answers: (a) + and (c) % are arithmetic operators.

Q.6: The function scanf() reads
(i) A single character
(ii) Characters and strings
(iii) Any possible numbers
(iv) Any possible variable type

Answers: The function scanf() reads any possible variable type.

Q.7: Precedence determines which operator
(i) is most important
(ii) is used first
(iii) is faster
(iv) operates on the largest number
(v)

Answers: Precedence determines which operator is used first.

Q.8: What is the meaning of the characters \t and \n?

Answers:
Escape sequence \t is used to issue a tab character and \n is used to issue a new line.

Objective Questions and Answers

Multiple Choice Questions

1. Which of the following symbol is used to denote a pre-processor statement?
(a) ! (b) #
(c) ~ (d) ;

2. Which of the following is a Scalar Data type?
(a) Float (b) Union
(c) Array (d) Pointer

3. Which of the following are tokens in C?
4. Only the first characters of a variable are significant.
   (a) 21  (b) 31  
   (c) 11  (d) 41  

5. ________ values do not change during program execution.
   (a) Constants  (b) Variable  
   (c) Coefficient  (d) None of all  

6. Constant may be
   (a) Numeric  (b) Characters  
   (c) Variables  (d) a & b both  

7. Numeric constants are of ________ types.
   (a) two  (b) three  
   (c) four  (d) five  

8. All the reserved words of C programs must be written in ________ letters.
   (a) Uppercase  (b) Lowercase  
   (c) Smaller case  (d) Middle case  

9. What is the valid range of numbers for int type of data?
   (a) 0 to 256  (b) -32768 to +32767  
   (c) -65536 to +65536  (d) No specific range  

10. Which symbol is used as a statement terminator in C?
    (a) !  (b) #  
     (c) ~  (d) ;  

11. Which escape character can be used to begin a new line in C?
    (a) \a  (b) \b  
     (c) \m  (d) \n  

12. Character constants should be enclosed between ________
    (a) Single quotes  (b) Double quotes  
     (c) Both a and b  (d) None of these  

13. Which of the following is invalid?
    (a) ‘ ‘  (b) “ “  
     (c) ‘a’  (d) ‘abc’  

14. What will be the maximum size of a float variable?
    (a) 1 byte  (b) 2 bytes  
     (c) 4 bytes  (d) 8 bytes  

15. A declaration float a,b; occupies ________ of memory
16. Which of the following is an example of compounded assignment statement?
   (a) \( a = 5 \)  
   (b) \( a += 5 \)  
   (c) \( a = b = c \)  
   (d) \( a = b \)  

17. The operator \&\& is an example for ___ operator.
   (a) Assignment  
   (b) Increment  
   (c) Logical  
   (d) Rational  

18. Relational operators are used to compare ________ values of the same type.
   (a) Two  
   (b) Four  
   (c) Five  
   (d) Six  

19. The operator \& is used for
   (a) Bitwise AND  
   (b) Bitwise OR  
   (c) Logical AND  
   (d) Logical OR  

20. The equality operator is represented by
   (a) :=  
   (b) .EQ.  
   (c) =  
   (d) ==  

21. Operators have hierarchy. It is used to know which operator
   (a) is most important  
   (b) is used first  
   (c) is faster  
   (d) operates on large numbers  

22. Which of the following operator has the highest precedence?
   (a) *  
   (b) ==  
   (c) =>  
   (d) +  

23. Which operator has the lowest priority?
   (a) ++  
   (b) %  
   (c) +  
   (d) ||  

24. Operators have precedence. A precedence determines which operator is
   (a) faster  
   (b) takes less memory  
   (c) evaluated first  
   (d) takes no arguments  

25. The operator + in \( a+=4 \) means
   (a) \( a = a + 4 \)  
   (b) \( a + 4 = a \)  
   (c) \( a = 4 \)  
   (d) \( a + 4 + 4 \)  

26. \( a++ \) executes faster than \( a+1 \) because
   (a) \( a \) uses registers  
   (b) \( a++ \) is a single instruction  
   (c) ++ is faster than +  
   (d) None of these

27. The printf() function returns which value when an error occurs?
(a) Positive value • (b) Zero
(c) Negative value (d) None of these

28. Symbolic constants can be defined using
(a) #define (b) const
(c) symbols (d) None of these

29. The number of the relational operators in the C language is
(a) Four (b) Six
(c) Three (d) One

30. In C true is represented by the integer.
(a) 0 (b) 1
(c) 10 (d) 101

31. A Link is
(a) a compiler (b) an active debugger
(c) a C interpreter (d) an analyzing tool in C

32. Which of the following is the correct way of declaring a float pointer.
(a) float ptr; (b) float *ptr;
(c) *float ptr; (d) None of the above

33. It is the process of making sure that the program performs the intended task.
(a) Erroring (b) Detecting
(c) Testing (d) Debugging

34. It is the process of finding and eliminating program errors.
(a) Registering (b) Debugging
(c) Executing (d) Programming

35. Most of the programs will contain errors or bug when you first them.
(a) Calculate (b) Read
(c) Complete (d) Compiled

Check Your Answer

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<tr>
<td>1.</td>
<td>b</td>
<td>2.</td>
<td>a</td>
<td>3.</td>
<td>d</td>
<td>4.</td>
<td>b</td>
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<td>5.</td>
<td>a</td>
<td>6.</td>
<td>d</td>
<td>7.</td>
<td>a</td>
<td>8.</td>
<td>b</td>
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<td>13.</td>
<td>d</td>
<td>14.</td>
<td>c</td>
<td>15.</td>
<td>c</td>
<td>16.</td>
<td>b</td>
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<td>17.</td>
<td>c</td>
<td>18.</td>
<td>a</td>
<td>19.</td>
<td>a</td>
<td>20.</td>
<td>d</td>
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<tr>
<td>21.</td>
<td>b</td>
<td>22.</td>
<td>d</td>
<td>23.</td>
<td>d</td>
<td>24.</td>
<td>c</td>
</tr>
<tr>
<td>25.</td>
<td>a</td>
<td>26.</td>
<td>b</td>
<td>27.</td>
<td>c</td>
<td>28.</td>
<td>b</td>
</tr>
</tbody>
</table>
Q.1. Define constant.
Ans.: The quantities whose values do not change during program execution are known as constants.

Q.2. How many types of constants?
Ans.: Constants are of two types i.e., numeric and character/string.

Q.3. Write the types of Numeric Constants.
Ans.: Numeric Constants are of two types. i.e.
   i. Integers ii. Floating-point numbers

Q.4. What are integers?
Ans.: Integers represent values that are counted like the number of students in a class.

Q.5. What is an integer constant?
Ans.: An integer constant is a string of digits that does not include commas or a decimal point.

Q.6. Write down some examples of valid integer constants.
Ans.: Some examples of valid integer constants are:
0,  714  - 234,  24494

Q.7. Define Floating-point Constants.
Ans.: Floating-point constants are also called real constants. Floating-point constants are used to represent values that are measured, like the height of a person which might have a value of 166.75 cm.

Q.8. What is a character Constant?
Ans.: A character Constant is one of the symbols in the C character set. Although this character set may vary from one C implementation to another, it usually includes digits 0 through 9, upper case letters. Although Z, lower case letters a through z, punctuation symbols such as semicolon (;), Comma (,), period ( ) and special symbols such as +, -, =, > etc.
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Ans: Some examples of valid integer constants are:
0, 714 - 234, 24494

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Q.9. How do enclose a character constant?
Ans: A character-constant is enclosed by single quotes such as ‘a’.

Q.10. Define a variable.
Ans: A variable is a location in memory that is identified by a name that we supply and which we can use to store an item of data of particular type.

Q.11. How many things are required for specifying a variable?
Ans: Specifying a variable therefore requires two things i.e.
   i. We must give it a name.
   ii. We must identify what kind of data we shall store in it.

Q.12. How does a variable begin?
Ans: A variable begins with a better or underscore ( _ ) and may consist of betters, underscores and /or digits.

Q.13. What is the use of the underscore?
Ans: The underscore may be used to improve readability of the variable name.

Q.14. What is meant by only the first 31 characters of a variable are significant?
Ans: Only the first 31 characters of a variable are significant. This means that if two variables have the same first 31 characters they are considered to be the same variables.

Q.15. What do you know about the keywords of C language?
Ans: C language has a very small set of keywords such as int, do, if, etc. Which are part of the programming language and may not be used as variable names. These keywords are also known as reserved words.

Q.16. Write down the types of variables in “C”.
Ans: C provides three types of variables.
   i. Integer variables
   ii. Floating-point variables
   iii. Character variables

Q.17. Write down the Integer variable declaration statement.
Ans: Integer variable declaration statement has the form: int sum;

Q.18. How can you precede the declaration of an integer variable?
Ans: Declaration of an integer variable can be preceded by the qualifiers short, long unsigned or signed.
Q.19. What is the use of Floating-point variables?
Ans: Floating-point variables are used for storing floating-point numbers.

Q.20. In which part floating-point number are stored in memory?
Ans: Floating-point numbers are stored in memory in two parts. The first part is the mantissa and the second part is the exponent.

Q.21. What is the difference between the mantissa and the exponent?
Ans: The mantissa is the value of the number and the exponent is the power to which it is raised.

Q.22. Write down two examples of floating-point variable declaration statements.
Ans: Some examples of floating-point variable declaration statements are:
float base, height;
double float a, b, total;

Q.23. Define character variables.
Ans: The variables which are used to store character constants are known as character variables.

Q.24. How many characters can a character variable store?
Ans: A character variable can only store one character.

Q.25. Describe the input and output statements.
Ans: C language uses standard output function printf() and the standard input function scanf(). Format specifiers are used in the printf() function to control the format of output of a particular variable. They are material to the type of variable we are printing. Similarly, format specifiers are also used with the input function scanf() to store values in variables.

Ans: The CPU of a computer system can only execute instructions expressed in binary form known as machine language.

Q.27. What is the function of machine language?
Ans: Machine language is the only language that is directly understood by the computer without any translation.

Q.28. What is an escape sequence?
Ans: An escape sequence is an indirect way of specifying a character and always begins with a backs slash e.g., \n issues a newline and \t issues a tab.
Q.29. What are expressions?
Ans: Expressions Consist of Constants and variables Combined together with operators.

Q.30. How many types of operators are used in “C” language?
Ans: Five types of operators are used in “C” language.

Q31. Write down the name of operators in C language.
Ans: 1. Arithmetic operators 2. Assignment operators
3. Relational operators 4. Logical operators
5. Increment and Decrement operators

Q.32. Which arithmetic operators are used in “C”?
Ans: Following five arithmetic operators are used in “C”.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Addition</td>
</tr>
<tr>
<td>-</td>
<td>Subtraction</td>
</tr>
<tr>
<td>*</td>
<td>Multiplication</td>
</tr>
<tr>
<td>/</td>
<td>Division</td>
</tr>
<tr>
<td>%</td>
<td>Modulus (remainder)</td>
</tr>
</tbody>
</table>

Q.33. Which is the basic assignment operator?
Ans: The basic assignment operator is =. This is used to assign value of an expression to variable.

Q.34. Write down the general form of assignment operator.
Ans: It has the general form
Variable = expression

Q.35. What is the use of relational operators?
Ans: Relational operators are used to compare two values of the same type.

Q.36. How many types of relational operators in “C”?
Ans: In “C” there are six types of relational operators.

Q.37. Write down the relational operators and their definition.
Ans:

<table>
<thead>
<tr>
<th>Relational operators</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>==</td>
<td>equal to</td>
</tr>
<tr>
<td>!=</td>
<td>not equal to</td>
</tr>
<tr>
<td>&lt;</td>
<td>less than</td>
</tr>
</tbody>
</table>
Q.38. **What is the use of logical operators?**
*Ans*: The logical operators are used for forming compound conditions from simple ones.

Q.39. **How many types of logical operators in “C”?**
*Ans*: There are three types of logical operators in “C”.

Q.40. **Write down the logical operators and their definition.**
*Ans:*

<table>
<thead>
<tr>
<th>Logical operator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>not</td>
</tr>
<tr>
<td>&amp; &amp;</td>
<td>and</td>
</tr>
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<td></td>
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</tbody>
</table>

Q.41. **Write down the Increment and Decrement operators and their definition.**
*Ans:*

<table>
<thead>
<tr>
<th>Operator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>++</td>
<td>increment by 1</td>
</tr>
<tr>
<td>--</td>
<td>decrement by 1</td>
</tr>
</tbody>
</table>

Q.42. **What is a bug?**
*Ans*: Computer programs are subject to errors as they are written by human beings. Program errors are known as bugs.

Q.43. **Define debugging.**
*Ans*: The process of detecting and correcting the errors is called debugging.

Q.44. **What is the difference between testing and debugging?**
*Ans*: In general testing is the process of making sure that the program performs the intended task and debugging is the process of finding and eliminating program errors.

Q.45. **Which steps are important in developing computer program?**
*Ans*: Testing and debugging are important steps in developing computer programs.

Q.46. **Write the types of errors that occur in a computer program.**
*Ans*: In general there are two types of errors that occur in a computer program, syntax errors and logical errors.
Q47. Define syntax errors.
Ans: Syntax errors occur when the rules or grammar of the programming language is not followed and they are detected by the computer.

Q.48. Define Logical errors.
Ans: Logical errors occur when the logic of the program is incorrect and they are difficult to find and remove since they are not detected by the compiler.

Q.49. Which language processors are designed to detect syntax errors?
Ans: Interpreters and Assemblers are designed to detect syntax errors.

Q.50. What does a single syntax error cause in high level languages?
Ans: In high level languages such as FORTRAN, COBOL, C and Pascal, a single syntax error often causes multiple error messages.