

Roll No.....

CSE303: PRINCIPLES OF PROGRAMMING  
LANGAUGES

Time: 3 hours

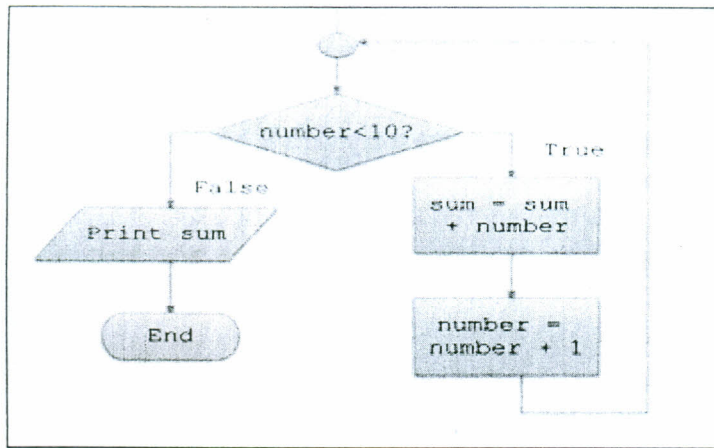
Max. Marks: 100

**Instructions to students:**

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- |                                                                                                                                                                                                                                                                                                |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Q.1A Objective type multiple choice questions (10 questions @ 1 mark)                                                                                                                                                                                                                          | 10 |
| i. Which of the following statements is TRUE?                                                                                                                                                                                                                                                  |    |
| (a) All functions must have formal parameter list                                                                                                                                                                                                                                              |    |
| (b) All functions must return a data value                                                                                                                                                                                                                                                     |    |
| (c) A program must have at least one function                                                                                                                                                                                                                                                  |    |
| (d) None of the above                                                                                                                                                                                                                                                                          |    |
| ii. <code>char txt [20] = "Hello world!\0";</code><br>How many bytes are allocated by the definition above?                                                                                                                                                                                    |    |
| (a)11 bytes (b)20 bytes (c)13 bytes (d)12 bytes                                                                                                                                                                                                                                                |    |
| iii. Which one of the following C operator is right associative?                                                                                                                                                                                                                               |    |
| * (b) , (c) [ ] (d) ^                                                                                                                                                                                                                                                                          |    |
| iv. In a high-level programming language, you can reference data using ____ rather than memory cell addresses. (a) functions (b) variables (c) commands (d) files                                                                                                                              |    |
| v. Which of the following statements is NOT TRUE about machine language? (a) It is the only language that the processor actually understand; (b) It consists of binary codes: 0 and 1; (c) Its code is difficult to understand and slow to write; (d) It is processor independent and portable |    |
| vi. Specify the correct order for operations of running a computer program. (a) Execution, translation, linking, loading; (b) Loading, translation, execution, linking; (c) Linking, loading, translation, execution; (d) Translation, linking, loading, execution                             |    |
| vii. A(n)_____ is an identifier whose content is read only and cannot be changed during the program's execution of the program. (a) constant; (b) integer; (c) literal; (d) variable                                                                                                           |    |

viii The following flowchart represents which control structure?



(a) While repetition structure; (b) Do/while repetition structure; (c) If/else selection structure; (d) Switch/case selection structure

ix Which of the following is a legal identifier? (a) 12age; (b) age+2; (c) \_my\_age; (d) my@age

x What is the output of the following program segment?

```

int a=5, b=15;
a *= b - 2 + ++b;
printf("%d", a);

```

(a) 140 ;(b) 145 ;(c) 150 (d) 5

|      |                                                                                                                       |    |
|------|-----------------------------------------------------------------------------------------------------------------------|----|
| Q.2  | Short answer type questions (4 questions @ 2.5 marks)                                                                 | 10 |
| a.   | Differentiate between free and fixed field format of Language. Give example of one language for each category.        |    |
| b.   | Define a left-recursive grammar rule.                                                                                 |    |
| c.   | Give an example of Exception Handling.                                                                                |    |
| d.   | Compare and contrast declaration of pointers in C++ and References in Java.                                           |    |
| Q.3A | How is the cost of compilers for a given language related to the design of that language?                             | 05 |
| Q.3B | List and explain three fundamental features of Object Oriented Language.                                              | 05 |
| Q.4A | Explain the role of Linker giving an example of a C programme.                                                        | 05 |
| Q.4B | List down advantages in implementing a language with a pure interpreter? Give names of two pure interpreted language. | 05 |
| Q.5A | What is the primary use of attribute grammars? Write an attribute grammar for an assignment Statement.                | 05 |
| Q.5B | Some languages distinguish between uppercase and lowercase in identifiers.                                            | 05 |

What are the pros and cons of this design decision?

Q.6A What do you understand by type conversion? Write a program in C showcasing type conversion. 05

Q.6B Floating point addition is not associative in Computers. Explain with example. 05

OR

Q.6B Prove that for an unambiguous grammar derivations could be different but parse tree would be unique. 05

Q.7A Write EBNF descriptions for the following: 05  
a. A C switch statement  
b. A C union definition

Q.7B Convert Following BNF Descriptions to EBNF. 05  
 $\langle \text{program} \rangle \rightarrow \text{begin } \langle \text{stmt\_list} \rangle \text{ end}$   
 $\langle \text{stmt\_list} \rangle \rightarrow \langle \text{stmt} \rangle \mid \langle \text{stmt} \rangle ; \langle \text{stmt\_list} \rangle$   
 $\langle \text{stmt} \rangle \rightarrow \langle \text{var} \rangle = \langle \text{expression} \rangle$   
 $\langle \text{var} \rangle \rightarrow A \mid B \mid C$   
 $\langle \text{expression} \rangle \rightarrow \langle \text{var} \rangle + \langle \text{var} \rangle \mid \langle \text{var} \rangle - \langle \text{var} \rangle \mid \langle \text{var} \rangle$

OR

Q.7B Illustrate the difference between Primitive and Non-primitive data types. List Primitive and Non-primitive data types of C. 05

Q.8A Rewrite the following pseudocode segment using a loop structure in the C/C++/Java languages. 10

```
k = (j + 13) / 27
loop:
if k > 10 then goto out
k = k + 1
i = 3 * k - 1
goto loop
out: ...
```

Assume all variables are floating type. Discuss which language, for this code, has the best writability, the best readability, and the best combination of the two.

Q.9A Define row major order and column major order in an array. Show array address calculations giving example for both the approaches. Write a C program to display array in Column major order. 10

9B Write a C function that includes the following sequence of statements:

10

```
x = 21;  
print x;  
int x;  
x = 42;  
print x;
```

Explain errors that would be raised. If no errors are raised, what would be the output? Rewrite the same code in C++ and Java and compare the results.

OR

Q.9B Consider the following Grammar:

10

```
<assign> → <id> = <expr>  
<id> → A | B | C  
<expr> → <expr> + <term> | <term>  
<term> → <term> * <factor> | <factor>  
<factor> → ( <expr> ) | <id>
```

- Rewrite the BNF to give + precedence over \* and force + to be right associative.
- Modify the grammar of Example 3.4 to add a unary minus operator that has higher precedence than either + or \*.
- Rewrite the BNF to add the ++ and -- unary operators of Java.
- Show a parse tree and a leftmost derivation for each of the following statements:
  - a.  $A = (A + B) * C$
  - b.  $A = B + C + A$
  - c.  $A = A * (B + C)$
  - d.  $A = B * (C * (A + B))$ , showcase how \* would be given precedence over + using tree diagram.