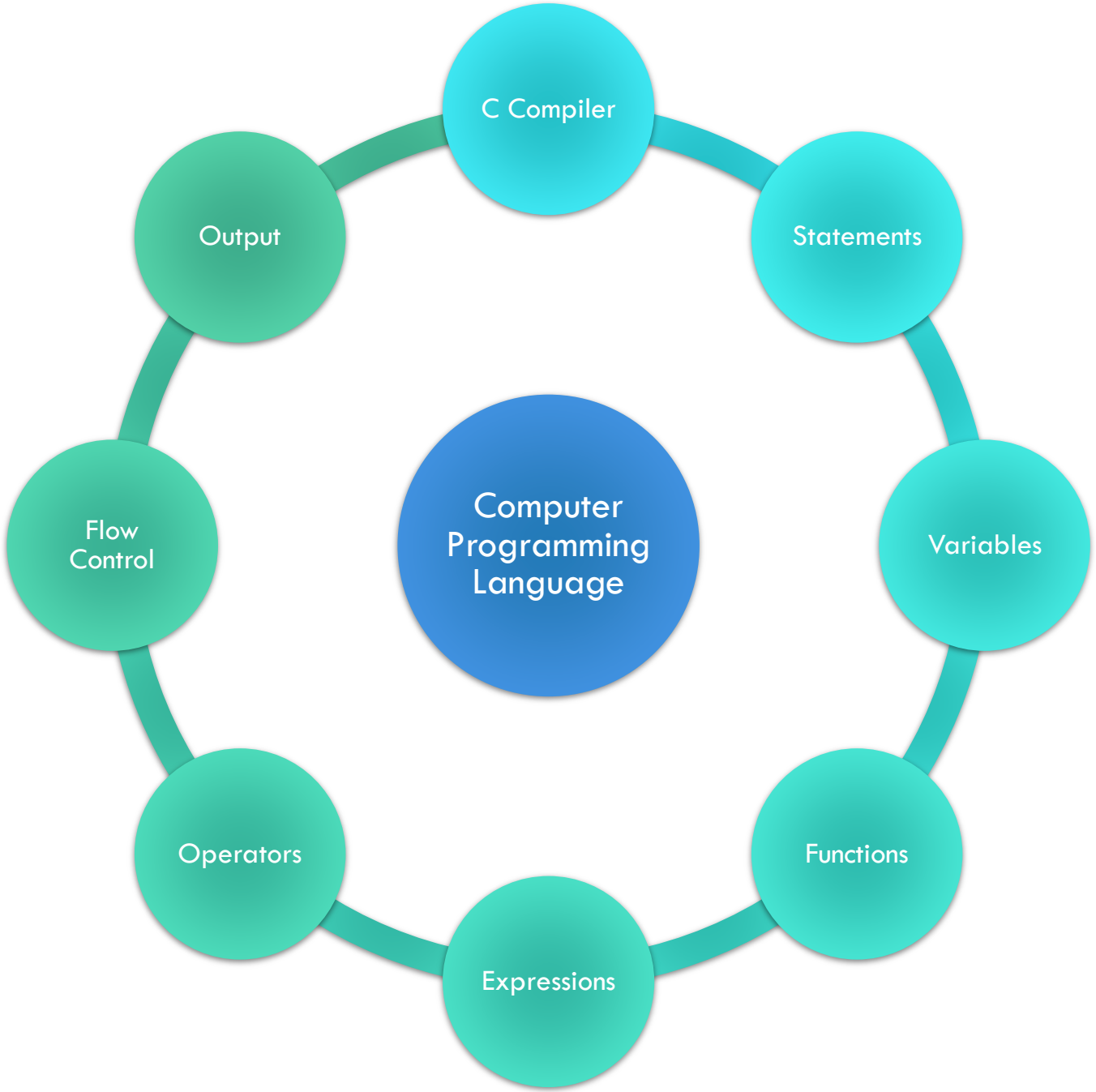
C-PROGRAMMING

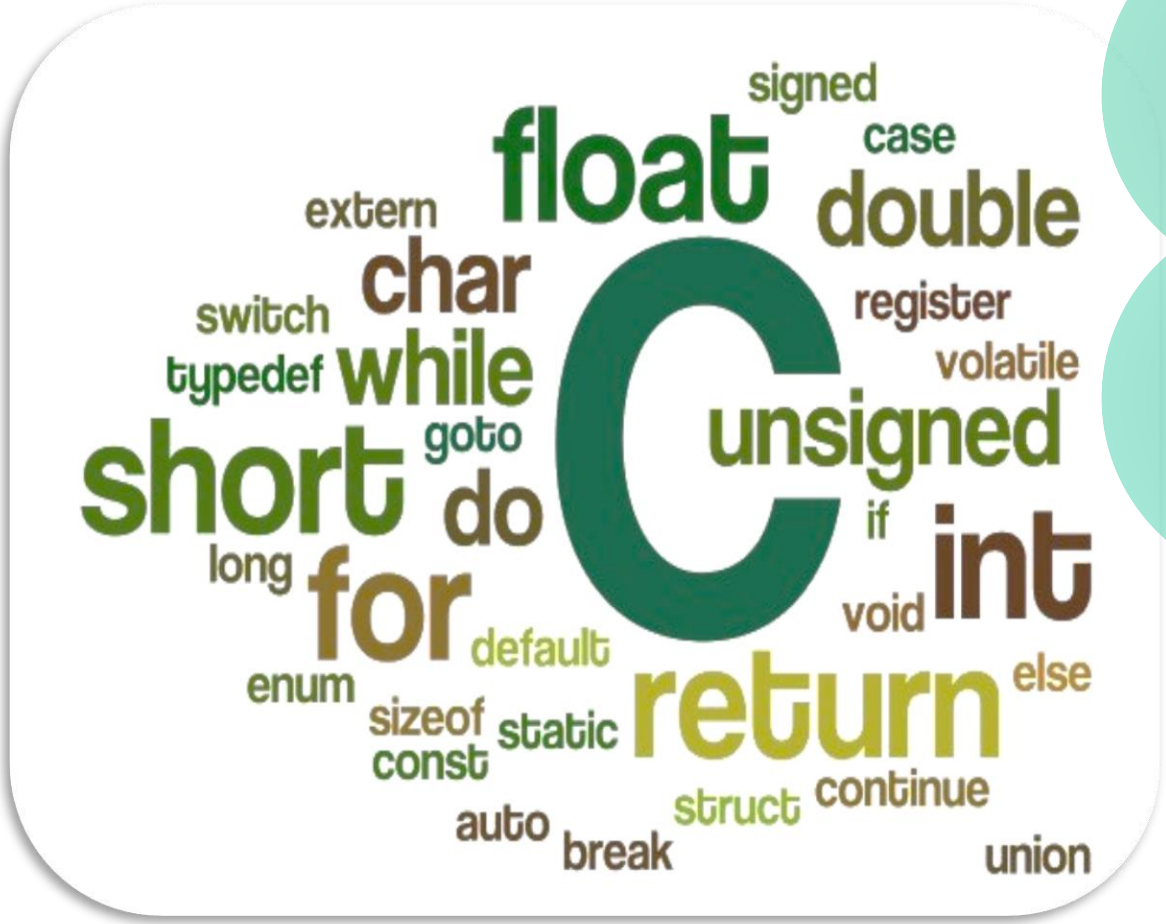
Er. Shiva K. Shrestha
Head, Computer Department
Khwopa College of Engineering

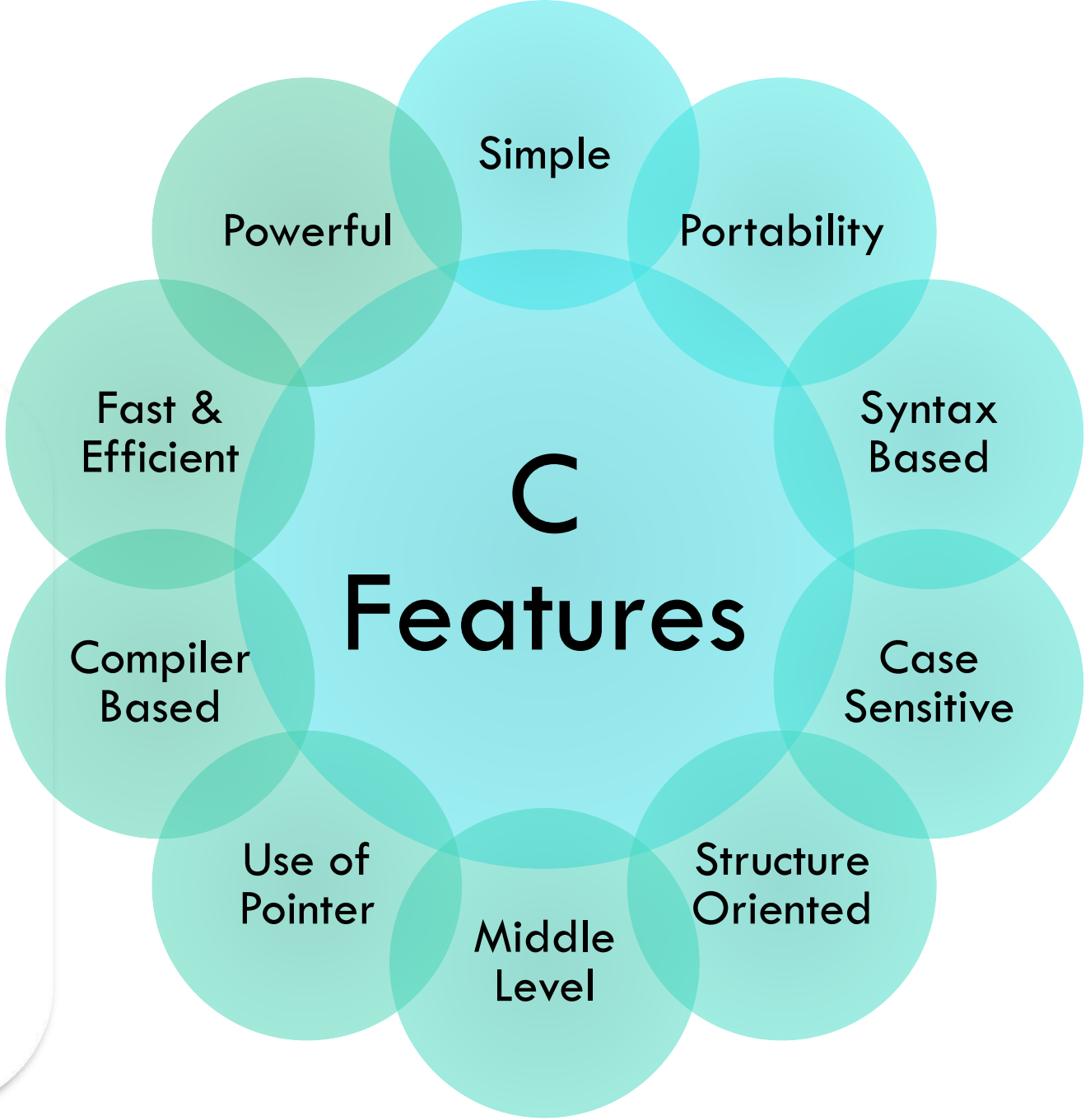
C LANGUAGE

- General-purpose Programming Language
- In 1972 Dennis Ritchie writes C at Bell Labs
- "ANSI C“, was completed late 1988
- Middle-level Language

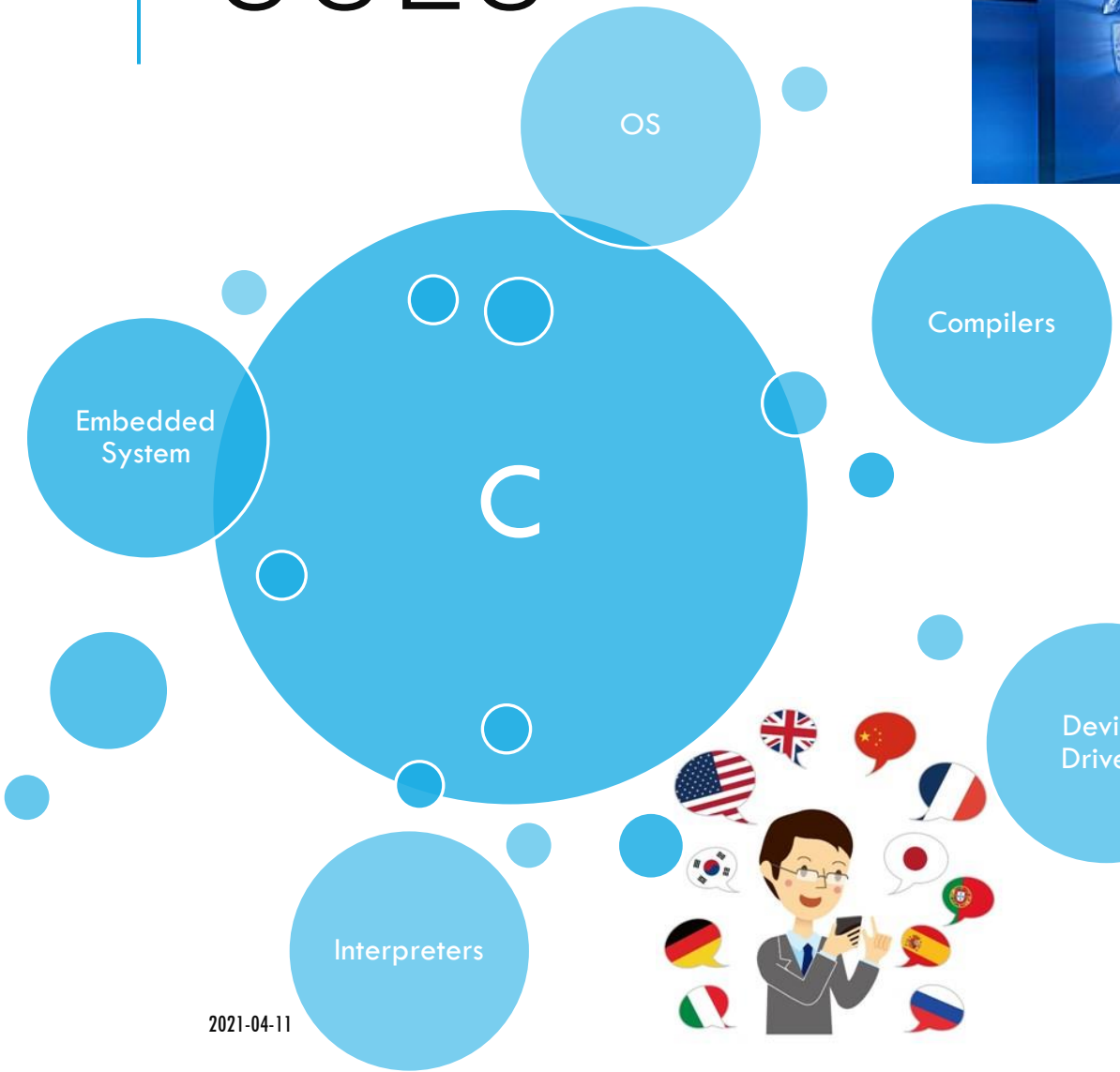


FEATURES

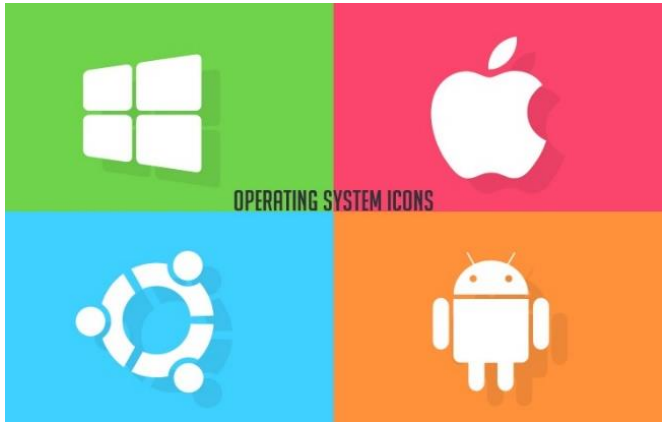

signed
float
case
double
extern
char
register
switch
volatile
typedef
while
C
unsigned
goto
short
do
if
int
long
for
void
default
enum
return
else
sizeof
static
const
continue
struct
auto
break
union

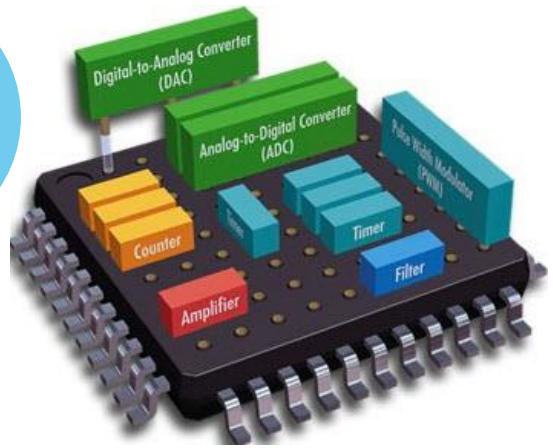

Simple
Powerful
Portability
Fast &
Efficient
Syntax
Based
C
Features
Compiler
Based
Case
Sensitive
Use of
Pointer
Structure
Oriented
Middle
Level

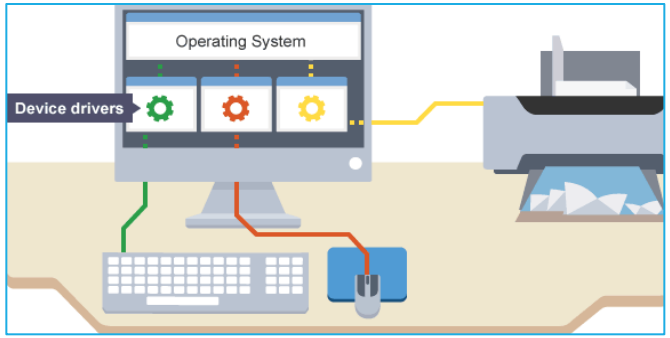
USES


OS
Compilers
Embedded System
C
Device Drivers
Interpreters


Oh, now I understand!
#include <iostream>
using namespace std;
int main ()
{
count <<"Hello World!";
return 0;
}
Compiler

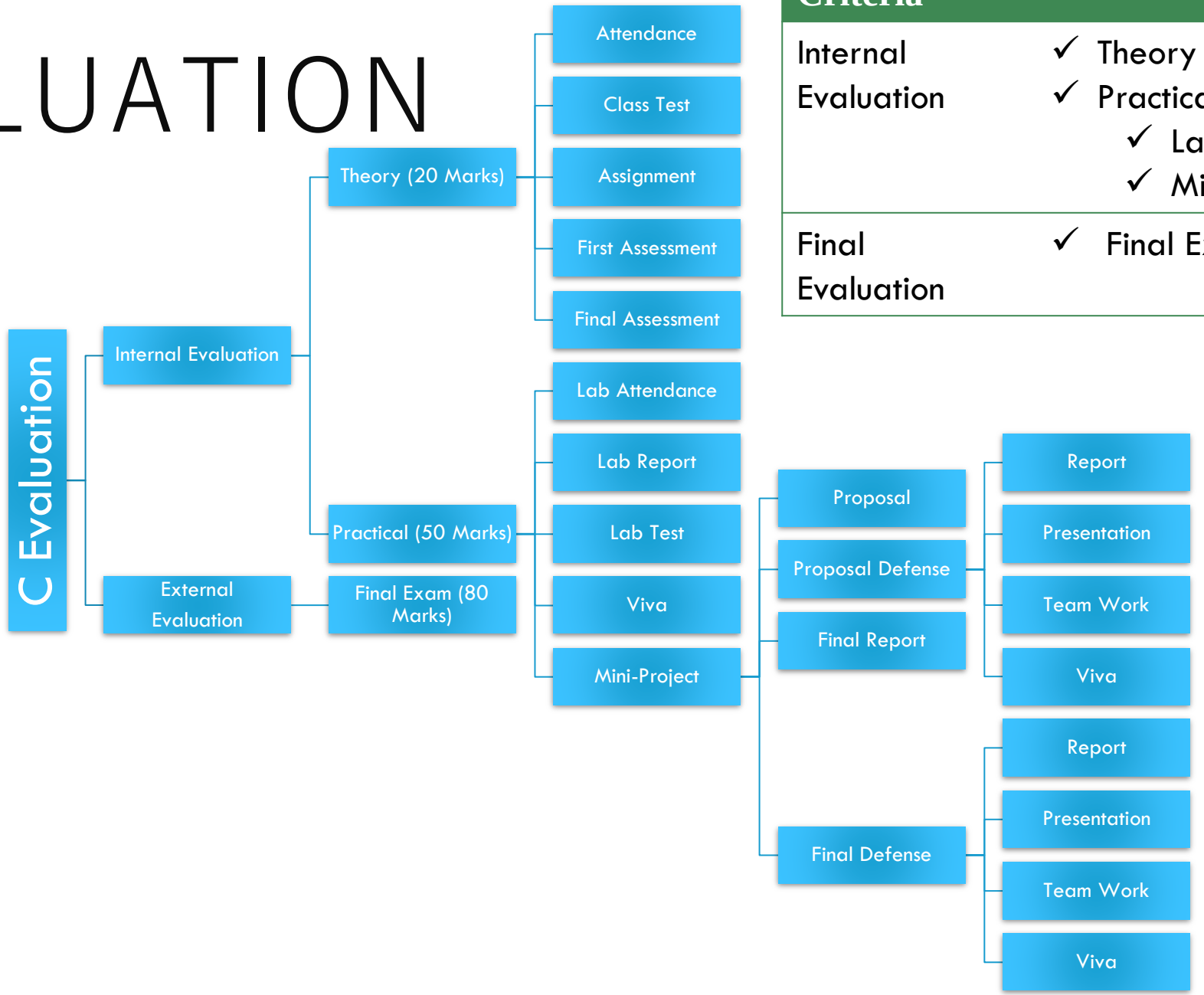

OPERATING SYSTEM ICONS


Digital-to-Analog Converter (DAC)
Analog-to-Digital Converter (ADC)
Counter
Timer
Filter
Amplifier


Operating System
Device drivers

EVALUATION

Evaluation Criteria	Details
Internal Evaluation	✓ Theory (20) ✓ Practical (50) ✓ Lab Performance (30) ✓ Mini-Project (20)
Final Evaluation	✓ Final Exam (80)



COLLABORATION & CHEATING POLICY

- You are welcome to discuss assignments & laboratory projects with other students, provided that all work turned in must be your own.
- If you do discuss your work with other students on assignments, please list your collaborators at the top of your assignment, underneath your name.
- This does not excuse you from submitting your own work.
- Students caught engaging in an academically dishonest practice will receive an NQ for the course.
- Plagiarism detection tools may be used.

COURSE CONTENT

1. Overview of Computer Software & Programming Languages
2. Problem Solving using Computer
3. Introduction to 'C' programming
4. Input and Output
5. Control Statements
6. User-Defined Functions
7. Arrays and Strings
8. Structures
9. Pointers
10. Data Files
11. Programming Language: FORTRAN

OVERVIEW OF COMPUTER SOFTWARE & PROGRAMMING LANGUAGES (3H)

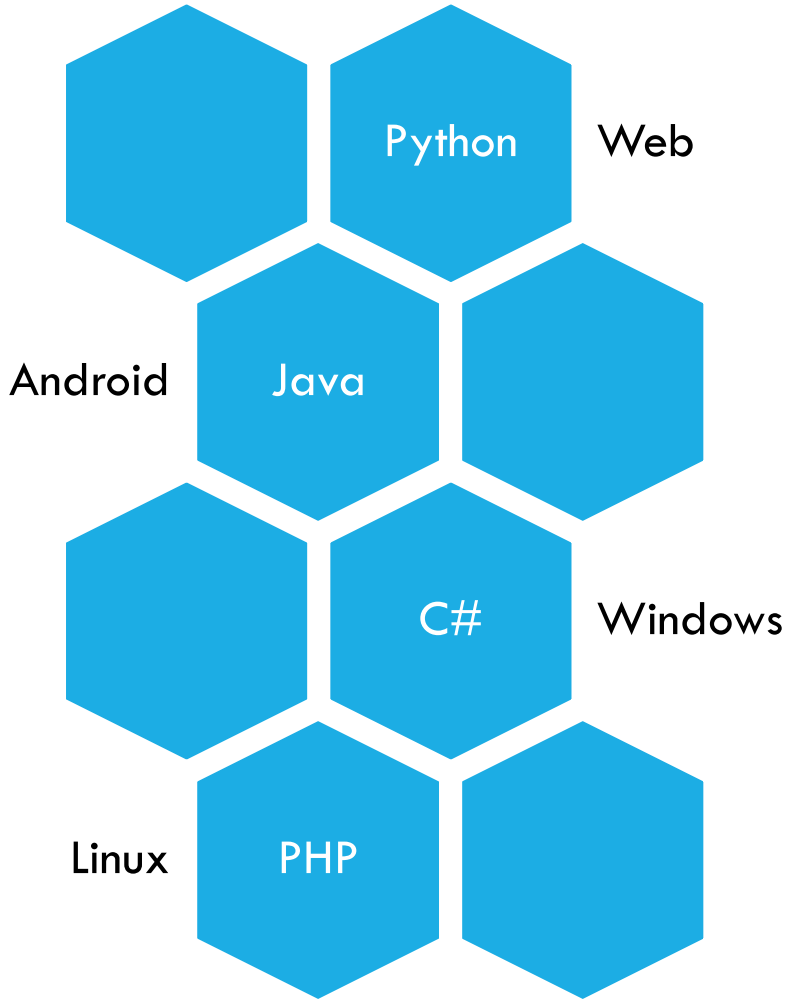
1.1. System Software

1.2. Application Software

1.3. General Software Features and Recent Trends

1.4. Generation of Programming Languages

1.5. Categorization of High Level Languages



PROBLEM SOLVING USING COMPUTER (3H)

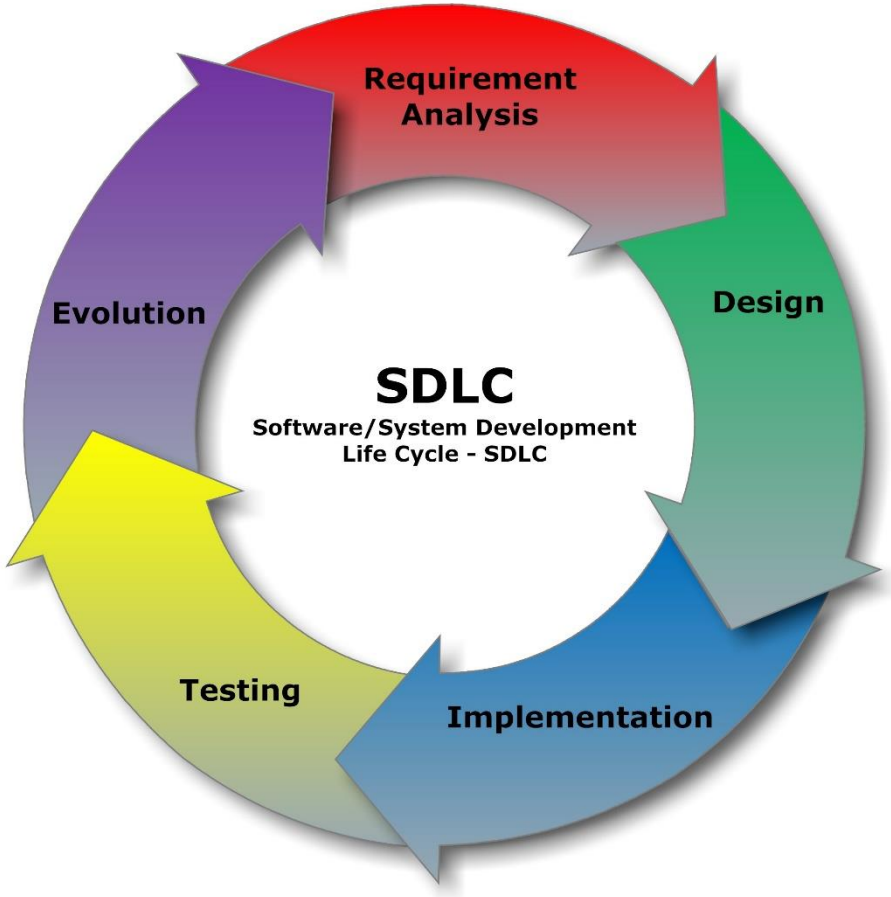
2.1. Problem Analysis

2.2. Algorithm Development and Flowchart

2.3. Compilation and Execution

2.4. Debugging and Testing

2.5. Programming Documentation



INTRODUCTION TO‘C’PROGRAMMING (4H)

3.1. Character Set, Keywords, & Data Types

3.2. Preprocessor Directives

3.3. Constants and Variables

3.4. Operators and Statements

INPUT AND OUTPUT (3H)

4.1. Formatted Input/Output

4.2. Character Input/Output

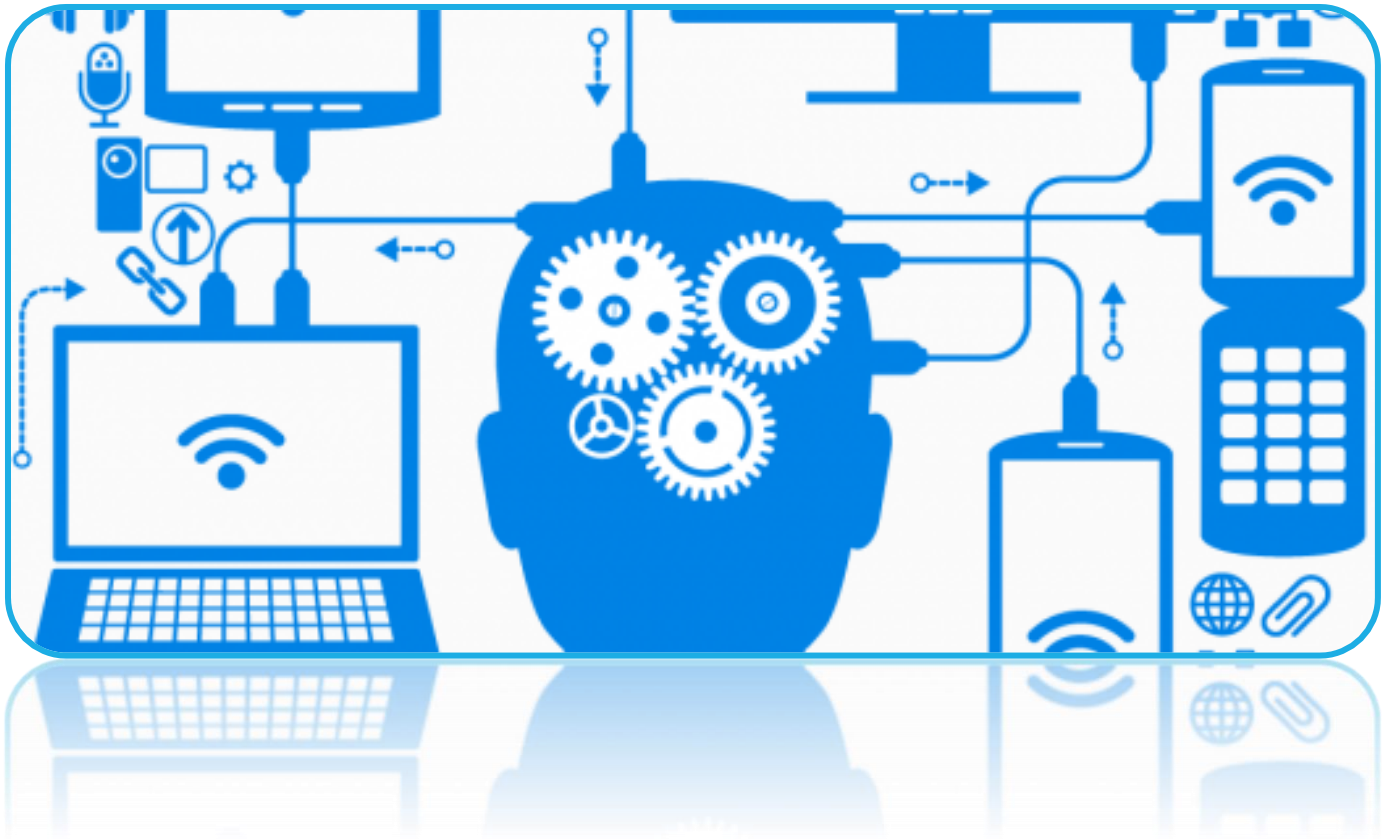
4.3. Programs using Input/Output Statements

CONTROL STATEMENTS (6H)

5.1. Introduction

5.2. The goto, if, if… …else, switch Statements

5.3. The while, do…while, for Statements



USER-DEFINED FUNCTIONS (4H)

6.1. Introduction

6.2. Function Definition & Return Statement

6.3. Function Prototypes

6.4. Function Invocation, Call By Value and Call By Reference, Recursive Functions

ARRAYS AND STRINGS (5H)

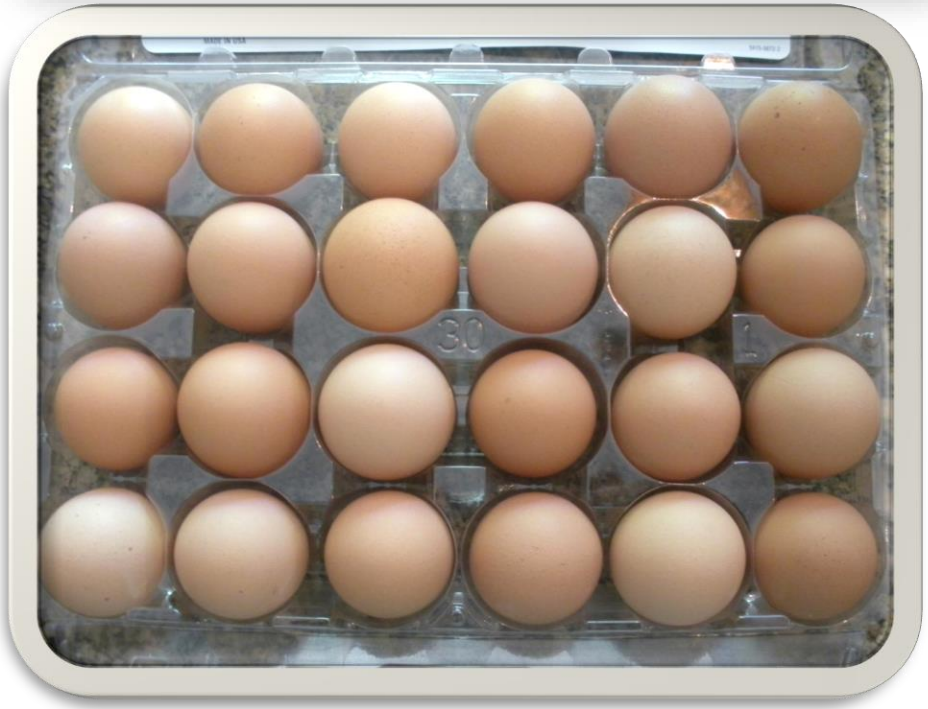
7.1. Defining an Array

7.2. One-dimensional Arrays

7.3. Multi-dimensional Arrays

7.4. Strings & String Manipulation

7.5. Passing Array & String to Function



STRUCTURES (4H)

8.1. Introduction

8.2. Processing a Structure

8.3. Arrays of Structures

8.4. Arrays Within Structures

8.5. Structures and Function

POINTERS (4H)

9.1. Introduction

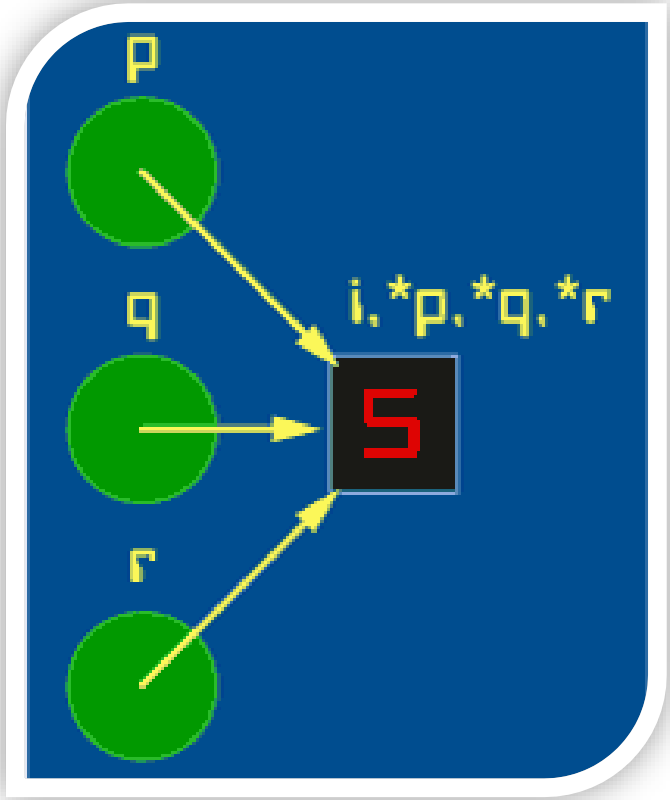
9.2. Pointer Declaration

9.3. Pointer Arithmetic

9.4. Pointer and Array

9.5. Passing Pointers to a Function

9.6. Pointers and Structures



DATA FILES (5H)

10.1. Defining Opening and Closing a File

10.2. Input/Output Operations on Files

10.3. Error Handling During Input/Output Operations

PROGRAMMING LANGUAGE: FORTRAN (4H)

11.1. Character Set

11.2. Data Types, Constants and Variables

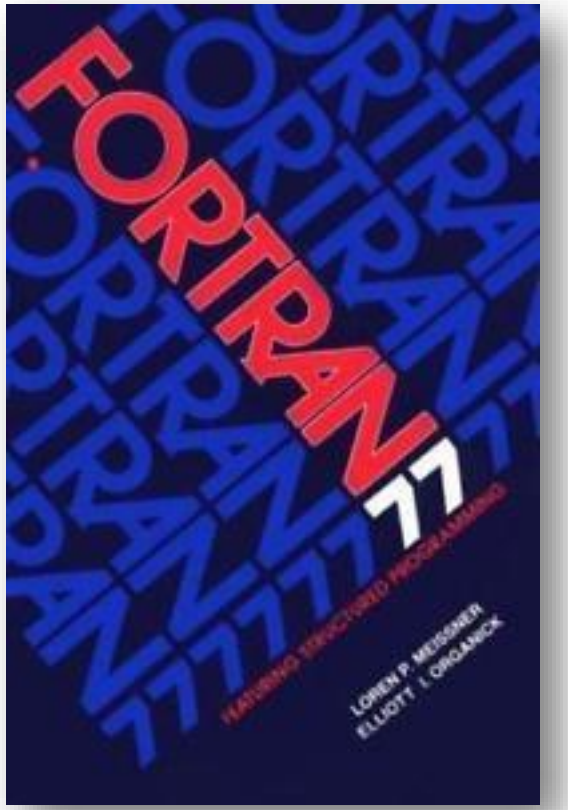
11.3. Arithmetic Operations, Library Functions

11.4. Structure of a FORTRAN Program

11.5. Formatted and Unformatted Input/Output Statements

11.6. Control Structures: Goto, Logical IF, Arithmetic IF, Do Loops

11.7. Arrays: One Dimensional and Two Dimensional



PRACTICAL

- Minimum 6 Sets of Computer Programs in C (From Chapter 4 to Chapter 10) and 2 Sets in FORTRAN (From Chapter 11) should be done individually. (30 Marks out of 50 Marks)
- Student (Maximum 4 Persons in a Group) should submit mini project at the end of course. (20 Marks out of 50 Marks)

REFERENCES

1. Kelly & Pohl, "**A Book on C**", Benjamin/Cumming
2. Brian W. Keringhan & Dennis M. Ritchie, "**The 'C' Programming Language**", PHI
3. Daya Sagar Baral, Diwakar Baral and Sharad Kumar Ghimire "**The Secrets of C Programming Language**", Bhundipuran Publication
4. Bryons S. Gotterfried, "**Programming with C**", TMH
5. Yashavant Kanetkar, "**Let Us C**", BPB
6. Ram Datta Bhatta, Babu Ram Dawadi, "**A Textbook of C Programming**", Vidyarthi Pustak Bhandar
7. Krishna Kandel, "**Learning C By Examples**", Shree Chandeshwori Publication
8. Alexis Leon, Mathews Leon, "**Fundamentals of Information Technology**", Leon Press and Vikas Publishing House
9. C. Xavier, "**FORTAN *77* and Numerical Methods**", New Age International (P) Limited
10. D. M. Etter, "**Structured Fortran & for Engineers and Scientist**", The Benjamin/Cummings Publishing Company, Inc.
11. Rama N. Reddy and Carol A. Ziegler, "**FORTRAN *77* with Applications for Scientists and Engineers**", Jaico Publishing House

CRYPTO-ARITHMETIC PROBLEM SOLVING (CSP)

CSP Rules

- Each Letter/Symbol represents only one digit (0-9) throughout the problem.
- Numbers must not begin with zero i.e. 0567 (wrong), 567 (correct).
- After replacing letters by their digits, the resulting arithmetic operations must be correct.
- Aim is to find the value of each letter.

SOLUTIONS

```
long+live=nepal (9 variables)
7513+7294=14807
7213+7594=14807
7812+7495=15307
7412+7895=15307
7612+7485=15097
7412+7685=15097
CPU time = 10 msec

6 solution(s)
```

Tasks

- Q.1 Solve the following CSPs with necessary steps:
  - $NINA + SING = AGAIN$
  - SEND + MORE = MONEY

$$\begin{array}{cccccc} C_4 & C_3 & C_2 & C_1 & & \\ & N & I & N & A & \\ + & S & I & N & G & \\ \hline A & G & A & I & N & \end{array}$$

$$\begin{array}{cccccc} R_4 & R_3 & R_2 & R_1 & & \\ & S & E & N & D & \\ + & M & O & R & E & \\ \hline M & O & N & E & Y & \\ R_4 & R_3 & R_2 & R_1 & & \end{array}$$

QUESTIONS

1. What do you mean by Programming Language? Explain about the evolution of programming languages. Distinguish between High-level & Low-level programming language. [1+3+3]
2. Explain different generations of computer along with technology used in each generation. [5]
3. What is a program? Briefly describe types of computer software. What are the features of good program? [2+2+3]
4. What is Computer Program & Computer Programming? Explain the steps that are required to build a computer program for solving a certain problem. [2+6]
5. Categorize programming languages on the basis of their uses and applications. Among them which programming language is C programming? [4]
6. How High-level programming languages are similar to natural languages? Describe [4]
7. Draw the block diagram of a computer & explain the function of each block.
8. Differentiate: Compiler vs. Assembler vs. Interpreter
9. Define Programming Language. Explain its type.

LINKS TO FURTHER READING

1. https://www.geeksforgeeks.org/c-programming-language/
2. https://www.programiz.com/c-programming
3. https://www.codesansar.com/c-programming/
4. https://www.tutorialspoint.com/cprogramming/index.htm
5. https://www.javatpoint.com/c-programming-language-tutorial
6. https://www.cprogramming.com/
7. https://www.learn-c.org/
8. https://www.guru99.com/c-programming-language.html
9. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/
10. https://www.computerhope.com/jargon/c/c.htm

Q/A?

Computer Programming

Thank You!

Er. Shiva K. Shrestha

Head, Dept. of Computer Engineering

Khwopa College of Engineering

c.khwopa@gmail.com | computer.khwopa@gmail.com

https://github.com/ErSKS/C