JECRC Foundation

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

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Year & Semester - B.Tech I year (I Semester)

Subject - Programming for Problem Solving

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Designation - Asst. Professor

Department - Computer Science (First Year)

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VISSION OF INSTITUTE

To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities

MISSION OF INSTITUTE

- Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.
- Identify, based on informed perception of Indian, regional and global needs, the areas of focus and provide platform to gain knowledge and solutions.
- Offer opportunities for interaction between academia and industry.
- Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders may emerge.

Programming for Problem Solving : Course Outcomes

Students will be able to:

CO1: Understand concept of low-level and high-level languages, primary and secondary memory. Represent algorithm through flowchart and pseudo code for problem solving.

CO2: Represent and convert numbers & alphabets in various notations.

CO3: Analyze and implement decision making statements and looping.

CO4: Apply pointers, memory allocation and data handling through files in 'C' Programming Language.

Introduction to Number System

- The technique to represent numbers is called Number System.
- To represent the computer data, Number System is used.
- A Number System defines how a no can be represented using distinct symbols
- Types of Number Systems

✔ Non-Positional Number System –

- In this system , we have symbols, where each symbols represents the same value regardless of its position. Such as I for 1, II for 2 , III for 3 , IIII for 4 etc.
- The symbols are simply added to find out the value of a particular number.
- It is difficult to perform arithmetic with such a number system.

✔ Positional Number System –

- In a positional number system, there are few symbols called digits. The position a symbol occupies in the number determines the value it represents.
- The value of each digit is determined by -
  1. The digit itself
  2. The position of the digit in the number

Types of Positional Number System

- **Decimal Number System**

- It has 10 symbols or digits (0, 1, 2, 3, 4, 5, 6, 7, • • 8, 9). Hence, its base = 10.
- The maximum value of a single digit is 9 (one less than the value of the base).
- Each position of a digit represents a specific power of the base (10).
- We use this number system in our day-to-day life.
- Example -

$$2586_{10} = (2 \times 10^3) + (5 \times 10^2) + (8 \times 10^1) + (6 \times 10^0)$$

$$= 2000 + 500 + 80 + 6$$

Types of Positional Number System (Contd….)

- **Binary Number System**

➢ It has 2 symbols or digits (0 and 1). Hence, its base = 2.

➢ The maximum value of a single digit is 1(one less than the value of the base).

➢ Each position of a digit represents a specific power of the base (2).

➢ This number system is used in computer.

➢ Example – $10101_2 = (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0)$

$= 16 + 0 + 4 + 0 + 1$

$= 21_{10}$

➢ Bit

- Bit stands for binary digit
- A bit in computer terminology means either a 0 or a 1
- A binary number consisting of n bits is called an n-bit number.

Types of Positional Number System (Contd….)

- **Octal Number System**

- It has 8 symbols or digits (0,1,2,3,4 ……..7). Hence, its base = 8.
- The maximum value of a single digit is 7(one less than the value of the base).
- Each position of a digit represents a specific power of the base (8).
- Since there are only 8 digits, 3 bits ($2^3 = 8$) are sufficient to represent any octal number in binary.
- Example -

$$2025_8 = (2 \times 8^3) + (0 \times 8^2) + (2 \times 8^1) + (5 \times 8^0)$$
$$= 1024 + 0 + 16 + 5$$
$$= 1045_{10}$$

Types of Positional Number System (Contd….)

- **Hexadecimal Number System**

- It has 16 symbols or digits (0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F). Hence, its base = 16.
- The symbols A, B, C, D, E and F represent the decimal values 10, 11, 12, 13, 14 and 15 respectively.
- The maximum value of a single digit is 15(one less than the value of the base).
- Each position of a digit represents a specific power of the base (16).
- Since there are only 16 digits, 4 bits ($2^4 = 16$) are sufficient to represent any hexadecimal number in binary.
- Example -

$$1AC_{16} = (1 \times 16^2) + (10 \times 16^1) + (12 \times 16^0)$$

$$= 256 + 160 + 12$$

$$= 428_{10}$$

Relationship Between Number Systems

Decimal	Binary	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	-	8
9	1001	-	9
10	1010	-	A
11	1011	-	B
12	1100	-	C
13	1101	-	D
14	1110	-	E
15	1111	-	F

Thank You