



# **BENGALURU CITY UNIVERSITY**

**CHOICE BASED CREDIT SYSTEM**

**(as per SEP 2024)**

## **Syllabus for I & II Semester BCA**

**2024-25**

**BENGALURU CITY UNIVERSITY**  
**Department of Computer Science and Applications**

**BCA Course Structure**

**AS PER STATE EDUCATION POLICY**

<b>Sem</b>	<b>Course/ Paper Code</b>	<b>Title of the Paper</b>	<b>Teaching Hours / we ek</b>	<b>Sem End Exam</b>	<b>Internal Assess ment</b>	<b>Total Marks</b>	<b>Credits</b>
1	24BCA11	Discrete Structure	03	80	20	100	3
	24BCA12	Problem Solving Technique	03	80	20	100	3
	24BCA13	Computer Architecture	03	80	20	100	3
	24BCA12P	Problem Solving Technique Lab	04	40	10	50	2
	24BCA13P	Computer Architecture Lab	04	40	10	50	2
	24BCA1P	Office Automation Tools	4	40	10	50	2
	24BCAL11	Language L1	04	80	20	100	3
	24BCAL12	Language L2	04	80	20	100	3
	24BCACC1	The Constitution of India	02	40	10	50	2
2	24BCA21	Data Structure	03	80	20	100	3
	24BCA22	Object Oriented Programming Using JAVA	03	80	20	100	3
	24BCA23	Operating Systems	05	80	20	100	5
	24BCA21P	Data Structure Lab	04	40	10	50	2
	24BCA22P	Operating Systems Lab	04	40	10	50	2
	24BCA21P	LINUX and Shell Programming Lab	04	40	10	50	2
	24BCAL21	Language L1	04	80	20	100	3
	24BCAL22	Language L2	04	80	20	100	3
	24BCACC2	Environmental Studies	02	40	10	50	2

# DISCRETE STRUCTURE

## UNIT – I

11 Hours

**Set Theory:** Fundamentals of Set theory, Set Operations, Laws of Set Theory, Counting and Venn Diagrams, Cartesian Product, Relations, Types of Relations, Functions, Types of Functions, Function Composition, Inverse Functions. Mathematical Induction.

## UNIT – II

11 Hours

**Logic and Counting:** Fundamentals of Logic, Propositional Logic, Logical Connectives and Truth Tables, Logic Equivalence, Tautology and Contradiction. Basics of counting, Counting Principles, Pigeonhole Principle, Permutation, Combinations.

## UNIT - III

11 Hours

**Matrices:** Basics of Matrix, Types of Matrices, Operations on Matrices, Inverse of a matrix, Solution for system of linear equations, Determinant, Properties of Determinant, Cramer's Rule, Introduction to Eigen Values and Eigen Vectors.

## UNIT - IV

12 Hours

**Graph Theory:** Graphs: Introduction, Representing Graphs, Operations on graphs, Directed Graphs Graph Isomorphism, Paths, Cycles, Euler Graph, Hamilton Graph, Planar Graphs. Trees: Introduction, Applications of Trees, Spanning Trees, Minimum Spanning Trees, Prim's and Kruskal's Algorithms.

### Text Book

- 1 Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education.
- 2 Richard Bronson, Schaum's Outline of Matrix Operations, McGraw-Hill publications, 2nd Edition,

### Reference Books

- 1 Gregory Hartman, Fundamentals of Matrix Algebra, Third Edition
- 2 Gary Haggard, John Schlipf, Discrete Mathematics for Computer Science, , Thomson Books

## PROBLEM SOLVING TECHNIQUE

UNIT –1 12 Hours

Introduction: The Role of Algorithms in computing, Algorithms as a technology, analyzing algorithms, Designing algorithms, Growth of Functions, Asymptotic notation, Standard notations and common functions. Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Generating of Fibonacci sequence, Reversing the digits of an integer, Character to number conversion.

UNIT-II 11 Hours

C Programming: Getting Started, Variables, Operators and Arithmetic expressions. Input and Output: Standard input and output, formatted input and output. Selection statements: Statements and Blocks, If, If-else, if-else-if ladder, nested if, switch. Control Structure: while loop, for loop, do-while loop, break and continue, goto and labels. Pointers and Arrays: Pointers and address, Pointers and function arguments, One Dimensional array, Two-Dimensional array, Multidimensional array, Command line arguments.

UNIT - III 11 Hours

Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, computing the prime factor of an integer, raising a number to a large power. Array Techniques: Array order reversal, Array counting, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, finding the kth smallest element, multiplication of two matrices.

UNIT - IV 11 Hours

Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: Linear Search, Binary search, Hash search. Text processing and Pattern searching: Text line length adjustment, keyboard searching in text, text line editing, linear pattern searching.

### Text Book

- 1 R. G. Dromey, “How to Solve it by Computer”, Person Education India, 2008.
- 2 Brain M. Kernighan and Dennis M. Ritchie, “ The C Programming Language”, 2<sup>nd</sup> edition, Princeton Hall Software Series, 2012.
- 3 Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 3<sup>rd</sup> Edition, The MIT Press Cambridge, Massachusetts London, England, 2008.

### Reference Books

- 1 E. Balaguruswamy, “Programming In ANSI C”, 4th edition, TMH Publications, 2007
- 2 Greg Perry and Dean Miller, “C programming Absolute Beginner’s Guide”, 3rd edition, Pearson Education, Inc, 2014.
- 3 Donald E. Knuth, The Art of Computer Programming”, Volume 2: Seminumerical Algorithms, 3rd Edition, Addison Wesley Longman, 1998.

# COMPUTER ARCHITECTURE

## UNIT-1

[12Hours]

Number Systems: Decimal, Binary, Hexadecimal, Octal Number System Conversions, Binary Arithmetic, Complements-  $r$ 's complement,  $(r-1)$ 's complement, Addition and subtraction of BCD, Octal Arithmetic, Hexadecimal Arithmetic, Binary Codes, Decimal Codes, Error detecting and correcting codes, ASCII, EBCDIC, UNICODE, Digital Logic Circuits: Digital Computers, Logic Gates, Universal Gates, Boolean algebra, Map Simplification.

## UNIT-2

[11Hours]

Combinational Circuits- Half Adder and Full Adder, Flip-Flops- SR Flip- Flop, D Flip-Flop, J-K Flip-Flop, T Flip-Flop, Sequential Circuits- Flip-Flop input equations, State Table, State Diagram and problems. Digital Components: Integrated Circuits, Decoders-3-to-8-line decoder, NAND gate Decoder, Octal to Binary Encoder, Multiplexers- 4-to-1 line Multiplexer, Registers- 4 bit register with parallel load, Shift Registers- Bidirectional shift register with parallel load, Binary Counters-4-bit synchronous binary counter.

## UNIT-3

[11Hours]

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator logic. Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), CISC Vs RISC.

## UNIT-4

[11Hours]

Introduction to 8085 Assembly language programming: Architecture of 8085, Pin Configuration, The 8085-programming model, Instruction classification, Instruction, data formats, and storage. How to write assemble and execute a simple program, overview of 8085 instruction set. Introduction to 8085 Instructions: Instruction classification of 8085 based on word length and functions, Data Transfer operations, Arithmetic operations, Logic Operations, Branch operations, Writing Assembly language programs, Addressing modes of 8085.

### Text Book

- 1 M. Morris Mano- "Computer System Architecture", 3<sup>rd</sup> Edition Pearson India, 2019.
- 2 Ramesh Gaonkar- "Microprocessor Architecture, Programming and Applications with the 8085", 5<sup>th</sup> Edition, Penram International Publishing (India) Private Limited,2007
- 3 Andrew S. Tanenbaum, Todd Austin –"Structured Computer Organization", PHI /Pearson 6th Edition,2013.

### Reference Books

- 1 William Stallings- "Computer Organization and Architecture", Pearson/PHI, 6<sup>th</sup> Edition,2007.
- 2 Andrew S. Tanenbaum-" Structured Computer Organization", PHI /Pearson 4th Edition,1998.
- 3 M.V .Subramanyam, "Switching Theory and Logic Design", Laxmi Publications (P) Ltd,2011.

## PROBLEM SOLVING TECHNIQUE LAB

1. Write, and execute C Program for the following:
2. To read the radius of the circle and to find area and circumference.
3. To read the numbers and find the biggest of three.
4. To check whether the number is prime or not.
5. To find the root of quadratic equation.
6. To read a number, find the sum of the digits, reverse the number and check it for palindrome.
7. To read the numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers.
8. To read percentage of marks and to display appropriate message. If a percentage is 70 and above- Distinction, 60-69 – First Class, 50-59 – Second Class, 40-49 Pass, below 40 – Fail. (Demonstrate of if-else ladder)
9. To simulate a simple calculator with addition, subtraction, multiplication, division and it should display the error message for division of zero using switch case.
10. To read marks scored by n students and find the average of mark (Demonstration of single dimensional array)
11. To remove duplicate elements in a single dimensional array.
12. To find the factorial of a number.
13. To generate Fibonacci series.
14. To demonstrate string functions. (String Length, String Copy, String Concatenate, String Comparison)
15. To find the length of the string without using built-in function.
16. To read, display and add two n x m matrices using function.
17. To read a string and to find the number of alphabets, digits, vowels, consonants, space and special characters.
18. To swap two numbers using pointers.
19. To demonstrate student structure to read & display records of n students.
20. To demonstrate the difference between structure and union for the following Student name (String), Student roll no(integer), Student mark(float)
21. To design the following pattern using nested for loop:

```
      *
     *  *
    *  *  *
   *  *  *  *
  *  *  *  *  *
```

## COMPUTER ARCHITECTURE LAB

1. Write an 8085 Program to swap two 8-bit numbers.
2. a. Write a Program to find the largest of two numbers  
b. Write an 8085 Program to find the smallest of two numbers
3. Write an 8085 Program to find whether an 8-bit number is positive, negative or zero.  
If positive display EE, if negative display FF, if zero display DD.
4. Write an 8085 Program to check whether 4<sup>th</sup> bit of a number is zero or one.  
If 4<sup>th</sup> bit is 1 display FF, if 4<sup>th</sup> bit is 0 display DD.
5. Write an 8085 Program to calculate the sum of first ten natural numbers.
6. Write an assembly language program in 8085 microprocessors to find the sum of digits of an 8-bit number.
7. Write an 8085 Program to find the reverse of an 8-bit number
8. Write an 8085 Program to check whether 1-byte number is a palindrome or not. If it is a palindrome display FF otherwise display DD.
9. Write an 8085 Program to check whether a number is ODD or EVEN. If Even no. display DD, if odd no. display FF.
10. Write an 8085 program to count a number of ones in the given 8-bit number.
11. Write an 8085 program to find Addition & Subtraction of two 8 –bit HEX numbers.
12. Write an 8085 program to find Addition of two 16 –bit numbers.
13. Write an 8085 program to find Subtraction of two 16 –bit numbers.
14. Write an 8085 program for Swapping of two 16-bit numbers.
15. Write an 8085 program to implement 2 out of 5 codes
16. Write an 8085 program to generate Fibonacci series
17. Write an 8085 program to find the first ten terms of odd and even numbers.
18. Write an 8085 program to find 4-Digit BCD addition.
19. Write an 8085 program to find Multiplication of 2-digit BCD numbers.
20. Write an 8085 program to find division of two 8-bit umbers.