

Shiksha Mandal's
Bajaj College of Science, Wardha
(Formerly known as Jankidevi Bajaj College of Science, Wardha)

Syllabus of
Bachelor of Science (B. Sc.) Three Year (Six Semesters) Degree Course
Semester I

Subject: Computer Science Minor

(Approved in BoS meeting held on 11.05.2023 w.e.f. Academic Session 2023-24)

Programme Objective:

There are two main objectives to the B.Sc. Computer Science Programme.

- a) The primary goal of the degree program in Computer Science is to provide students the foundations for the future work and careers in computation-based courses. These foundations support both a successful career path in computing as well as provide appropriate qualifications for further degree work in computation related disciplines. Our degree emphasizes development of analytical skills, acquisition of knowledge and understanding of systems, languages and tools required for effective computation-based problem solving.
- b) A Computer Science major will provide you with knowledge of programming, operating systems, compiler design and principles of programming language. These skills will prepare graduates to enter technological fields such as systems programming, technical support, research and teaching.

On completion of the B.Sc. Computer Science Programme, the students:

- a) Will have sound knowledge of the Programming languages such as C, C++, Java, VB and SQL. Also they will have knowledge about Information Technology, Operating System, System Analysis and Design and Development.
- b) Can participate in off-campus internships, independent study projects, part-time computer employment, lectures by guest speakers, Society of Computing Students programming and on campus employment as lab assistants, lab supervisors and Helpdesk assistants.
- c) Be in a position to develop industrial and entrepreneur applications.

Aim of the Course

To understand the basics of computer hardware, software, network and algorithms, flowcharts and programming and also to provide sound knowledge of object oriented programming concepts and their understanding, development, working process of software.

Syllabus for B.Sc. SEMESTER I (To be implemented from Academic Session 2023-24)

| Learning Objectives | Course Learning Outcomes |
|--|---|
| Students will try to learn: | After successful completion of the course student will be able to |
| 1. To understand the concepts of fundamentals of a computer system, number systems, generations of computer languages, and other system tools like translator programs. | 1. Understand various number systems, generations of computer languages and translators. |
| 2. To understand various types of memories, storage devices, input and output devices. | 2. Know various types of memories, storage devices, input and output devices. |
| 3. To get acquainted with concepts of networks and its associated terminologies, topologies, architecture, communication devices and recent technologies like Bluetooth and Wi-Fi. | 3. Learn the concepts of networks, topologies, architecture, communication devices and recent technologies. |
| 4. To understand the basics of 'C' programming. Also get knowledge of algorithm and flowcharts. | 4. Learn to make basics programs and also able to draw algorithm and flowcharts of programs. |
| 5. To know the concepts of control and looping structure. Also student get the idea about concepts of arrays and functions. | 5. Perform programs using control and looping structure also understand the basic programs on arrays and functions. |
| 6. To understand the basics of structures, pointers and file handling. | 6. Implementation of structures, pointers and file handling concepts in programming. |

Minor - I
FUNDAMENTALS OF INFORMATION TECHNOLOGY and PROGRAMMING IN 'C'
Course Code: UCS111T

Credits: 6 (4 Th, 2 Pr)

No. of Lectures: 60

No. of Practical: 60

Course Outline

Unit I

Evolution of Computers, Generations of Computer, Characteristics of a Computer, Computer Classification.

Basic Components of Digital Computers: Block Diagram. CPU: Functions of Each Unit: Primary Memory, ALU and CU, Instruction format. Bus: Data, Control and Address Bus. Number Systems: Binary, Octal, Decimal, Hexadecimal, Their Conversions, Binary Arithmetic. ASCII, BCD, EBCDIC.

Language Evolution: Generation of Languages: Machine, Assembly, High Level Languages. Characteristics of Good Language Translators: Compiler, Interpreter and Assembler. Source and object Program.

Unit II

Memory: Memory hierarchy, RAM, Static & dynamic RAM, Types of RAM (SDRAM, RDRAM, DDR), ROM, PROM, EPROM, EEPROM, Flash and Cache. Storage Devices: Hard Disk, Zip Disk and Optical Disk. Pen Drive, Blu Ray and SSD.

Input Devices: Keyboard, Mouse, Light Pen, Touch Screen, Voice Input, MICR, OCR, OMR, Barcode Reader and Flatbed Scanner. Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet. Plotters: Drum, Flat-Bed and Inkjet.

Unit III

Computer Network: Goals and applications - Business Application, Home Application, Network terminology, Topologies: Linear, Circular, Tree and Mesh. Types of Networks: LAN, WAN, MAN. Repeaters, Bridge, Routers, Brouters and Gateway. Modem for Communication between PC's, Wi-Fi network, Introduction of Bluetooth and Infrared devices. Network protocols. Architecture: Peer-to-Peer, Client/Server. TCP/IP Reference Model with functionality of each layer.

Internet services (Introduction only): WWW – Web browser, URL, Internet search engines, WWW development languages, Electronic mail – E-mail address, e-mail message format, e-mail services (application based e-mail, webmail), how email works (client-server model), File Transfer Protocol – How FTP works (client-server model), Terminal network, Uses of Internet

Unit IV

Programming Languages and Tools, Machine language, Assembly language, High level languages. Problem Solving techniques: Development Tools: **Algorithm,**

Flowcharts and Pseudo code (Definition and its characteristics) Developing Algorithm and Drawing flowcharts.

C character set, Tokens, Identifiers, Keywords, Variables, Data types, Qualifiers. Operators and Expressions: Arithmetic, Relational, Logical, Bit-Wise, Increment, Decrement, Conditional and Special operators. typedef, Type Conversion, Constants, Declaring Symbolic Constants, Character Strings, Enumerated Data Types, Operator Precedence and Associativity. Library functions: Maths, character and string handling Functions.

Unit V

Control Structure: Compound statement, Selection statement: if, if-else, nested if, switch. Iteration statement: for, while, do..while, Nested loops, Jump statement: break, continue, goto. (Special emphasis on problem solving).

Arrays: Need, Types: Single and Two Dimensional Array. Strings: Strings Manipulation, Arrays of Strings, Evaluation order

Function: Function Components, Return Data type, Parameter Passing, Return by Reference, Default Arguments, Recursive Functions, Arrays with Functions. Macro: single-line and multi-line. Storage Classes. (Special emphasis on problem solving)

Unit VI

Structure: Declaration, Definition, Accessing structure members, Initialization, Nesting of Structures. Union: Unions, Differences between Structure and Union

Pointer: Introduction, Address Operator (&), Pointer variables, void pointers, Pointer Arithmetic, Pointers to Pointers.

File handling: Hierarchy of File Stream Classes, Opening & closing a file, Testing for errors, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.

Graphics: Initializing graphics, Drawing basic shapes, Graphics Color system, Types of pens and brushes.

B.Sc. Semester I
COMPUTER SCIENCE PRACTICALS
Course Code: UCS111P

Section A

Minimum five study experiments based on unit I through unit III

Section B

1. Program to compute Fibonacci series.
2. Program to find if a given number is prime or not.
3. Program to accept number and display it in words.
4. Program to find sum of digits of any entered no.
5. Program to reverse the digit.
6. Program to find frequency of occurrence of a given number from an array of N elements.
7. Program to reverse an array.
8. Program to Insert an element in one dimensional array at a given position.
9. Program to Delete an element from one dimensional array.
10. Program to Arrange string data (name of students) in alphabetical order using bubble sort.
11. Program to search the element in an array of N elements using Linear search method & Binary search method.
12. Program to
 - a) Multiply two dimensional Array's (3X3 matrix)
 - b) Find largest element in two dimensional Array (3X3matrix)
13. Program to
 - a) Check if given string is Palindrome or not
 - b) Calculate number of blanks, vowels and words
14. Program to compute:
 - a) Cosine series: $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$
 - b) Sine series: $\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$
15. Program to find factorial of a number using recursive function.
16. Program using function to find sum of two numbers
 - a) With no argument & no return values,
 - b) With argument & no return values,
 - c) With argument & return values.
17. Program to demonstrate passing structure to functions by using
 - a) Call by Value and
 - b) Call by referenceFields names are empno, name, and basic.
18. Program to swap values of two variables by passing pointers.

19. Read two integers and determine bigger of the two with the help of function big() returning an integer pointer.
20. Create a sequential file and perform following operation:
 - a. Add records
 - b. Process & Display output.Field names are Roll, Name, M1, M2, and M3.
21. Program to draw basic shapes like lines, rectangles, ellipse, pie etc. using graphics.
22. Drawing concentric circles and rectangles with various colors.
23. Program to use various pens and brushes using graphics.
24. Creating a text file and copy contents to another file and print it.
25. Create a binary file, store n integers. Read the file and divide it into two different files containing odd and even values separately.
26. Create a menu driven program to add, modify, and delete a record an any entity.

REFERENCE BOOKS:

1. The Art of programming through flowcharts & algorithm by Anil B.Chaudhari, Firewall Media, Laxmi Publication, New Publication.
2. Programming in C by E. Balagurusamy.
3. C Programming – Kernighan & Ritchie
4. C Programming – Dr. Vishal M. Lichade Wiley-Dreamtech Publication
5. Let us C – Y. Kanetkar.
6. C Programming – Holzner, PHI Publication.
7. Programming in C – Ravichandran.
8. Information Technology Concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.]
9. Fundamentals of Information Technology By Alexis And Mathews Leon [Leon Press, Chennai & Vikas Publishing House Pvt. Ltd, New Delhi]

Web Resources:

Students are advised to make use of the resources available on the Internet. Some useful links related to computer science are given below.

1. www.tutorialspoint.com/cprogramming/
2. www.programiz.com/c-programming
3. www.w3schools.com
4. <https://ittutorials.net/>
5. http://www.tutorialspoint.com/computer_fundamentals/