*Ahmednagar Jilha Maratha Vidya Prasarak Samaj's*

# New Arts, Commerce, and Science College Ahmednagar (Autonomous)

*(Affiliated to Savitribai Phule Pune University, Pune)*

## National Education Policy (NEP)
## Choice Based Credit System (CBCS)

**Programme Framework**

## B. Sc. - I (Computer Science)

*Implemented from*

## Academic Year 2024-25

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

# New Arts, Commerce and Science College, Ahmednagar (Autonomous)

## Board of Studies in Computer Science

| Sr. No. | Name | Designation |
|---|---|---|
| 1. | Prof. M.B. Bhingare | **Chairman** |
| 2. | Prof. A.D. Gangarde | **Member** |
| 3. | Prof. M.B. Gobare | **Member** |
| 4. | Prof. B.M. Danve | **Member** |
| 5. | Dr.P.P. Mulay | **Hon.Vice-Chancellor Nominee** |
| 6. | Dr. V.S. Kumbhar | **Academi Council Nominee** |
| 7. | Prof. S.D. Pachpande | **Academi Council Nominee** |
| 8. | Mr. U.C. Temkar | **Industrial Expert** |
| 9. | Mrs. Aboli J.Joshi Potnis | **Post Graduate Meriot irious Allumnus** |
| 10. | Prof. S.D. Shelke | **Co-Opt (Electronics)** |
| 11. | Prof. S.A. Tarate | **Co-Opt (Mathematics)** |
| 12. | Dr. A.A. Kulkarni | **Co-Opt (Statistics)** |

## 1. Prologue/ Introduction of the programme:

**2.** Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Sustained initiatives are required to reform the present higher education system for improving and upgrading the academic resources and learning environments by raising the quality of teaching and standards of achievements in learning outcomes across all undergraduate programs in science, humanities, commerce and professional streams of higher education including computer science. B.Sc. (Computer Science) has been evolving as an important branch of science and engineering throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Computer science has a wide range of specialties. These include

Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Science is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Computer Science education at undergraduate level (+3) will result in earning Bachelor of Science (BSc) degree in Computer Science. The coursework required to earn a BSc is equally weighted in mathematics and science. B.Sc. with Computer Science are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in Computer Science and can be employable at IT industries. There are several employment opportunities and after successful completion of an undergraduate programme in Computer Science, graduating students can fetch employment directly in companies as Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

## 2. *Programme Outcomes (POs)*

1. Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
2. Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation.
3. Ability to link knowledge of Computer Science with other two auxiliary disciplines of study.
4. Display ethical code of conduct in usage of Internet and Cyber systems.
5. Ability to pursue higher studies of specialization and to take up technical employment.
6. Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate.
7. Ability to operate, manage, deploy, configure computer network, hardware, software operation of an organization.
8. Ability to present result using different presentation tools.
9. Ability to appreciate emerging technologies and tools.
10. Apply standard Software Engineering practices and strategies in real-time software project development.
11. Design and develop computer programs/computer -based systems in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics.
12. The ability to work independently on a substantial software project and as an effective team member.

# B. Sc. Programme Framework: Credit Distribution

| Level / Difficulty | Sem | Subject-1 (Selected as Major) | | | | Subject-2 | | Subject-3 | | (SEC) | GE/OE | | IKS | AEC | VEC | CC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T | | P | | T | P | P | T | P | T | P | | | | | |
| Certificate 4.5 / 100 | I | 02 | | 02 | | 02 | 02 | 02 | 02 | - | 02 | | 02 | 02 | 02 | 02 | 22 |
| | II | 02 | | 02 | | 02 | 02 | 02 | 02 | 02 | - | 02 | -- | 02 | 02 | 02 | 22 |
| | | Credits Related to Major | | | | | | Selected as Minor | | | | | | | | | |
| | | Core | | Elective | | VSC | FP / OJT/ CEP/RP | | | | | | | | | | |
| | | T | P | T | P | P | P | T | P | - | P | T | P | - | - | - | - |
| Diploma 5.0 / 200 | III | 04 | 02 | -- | | 02 | 02 | 02 | 02 | - | 02 | 02 | | - | 02 | - | 02 | 22 |
| | IV | 04 | 02 | -- | | 02 | 02 | 02 | 02 | - | 02 | | 02 | -- | 02 | - | 02 | 22 |
| Degree 5.5 /300 | V | 06 | 04 | 02 | 02 | 2 | 2 | 02 | - | - | - | - | | 02 | - | - | - | 22 |
| | VI | 06 | 04 | 02 | 02 | 2 | 4 | 02 | - | - | - | - | | - | - | - | - | 22 |
| Total | | 24 | 16 | 04 | 04 | 08 | 10 | 10 | 08 | 04 | 04 | 06 | 08 | 04 | 08 | 04 | 08 | 132 |
| 6.0/400 Honours | VII | 08 | 06 | 02 | 02 | - | RM-04 | | | | | | | | | | | 22 |
| | VIII | 08 | 06 | 02 | 02 | | OJT-04 | | | | | | | | | | | 22 |
| 6.0/400 Honours with Research | VII | 06 | 04 | 02 | 02 | | RM-04 RM-04 | | | | | | | | | | | 22 |
| | VIII | 06 | 04 | 02 | 02 | | RM-08 | | | | | | | | | | | 22 |
| Total | | 40/36 | 28/24 | 08 | 08 | 08 | 18/26 | 10 | 08 | 04 | 04 | 06 | 04 | 04 | 04 | 08 | 04 | 08 | 176 |

# B.Sc. Programme Framework: Course Distribution

| Level / Difficulty | Sem | Subject-1 (Selected as Major) | | | | | | Subject-2 | | Subject-3 | | (SEC) | GE/OE | | IKS | AEC | VEC | CC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T | | P | | | | T | P | P | T | P | T | P | | | | | |
| Certificate 4.5 / 100 | I | 01 | | 01 | | | | 01 | 01 | 01 | 01 | - | 01 | | 01 | 01 | 01 | 01 | 11 |
| | II | 01 | | 01 | | | | 01 | 01 | 01 | 01 | 01 | - | 01 | -- | 01 | 01 | 01 | 11 |
| | | Credits Related to Major | | | | | | Selected as Minor | | | | | | | | | | | |
| | | Core | | Elective | | VSC | FP / OJT/ CEP/RP | | | | | | | | | | | | |
| | | T | P | T | P | P | P | T | P | - | | P | T | P | - | - | - | - | - |
| Diploma 5.0 / 200 | III | 02 | 01 | -- | | 01 | FP-01 | 01 | 01 | - | | 01 | 01 | | - | 01 | - | 01 | 11 |
| | IV | 02 | 01 | -- | | 01 | CEP-01 | 01 | 01 | - | | 01 | | 01 | -- | 01 | - | 01 | 11 |
| Degree 5.5 /300 | V | 03 | 02 | 01 | 01 | 01 | FP-01 | 01 | - | - | | - | - | | 01 | - | - | - | 11 |
| | VI | 03 | 02 | 01 | 01 | 01 | OJT-01 | 01 | - | - | | - | - | | - | - | - | - | 10 |
| **Total** | | 12 | 08 | 02 | 02 | 04 | 04 | | | 02 | 02 | 03 | 04 | | 02 | 04 | 02 | 04 | 65 |
| 6.0/400 Honours | VII | 03 | 03 | 01 | 01 | - | RM-01 | | | | | | | | | | | | 09 |
| | VIII | 03 | 03 | 01 | 01 | | OJT-01 | | | | | | | | | | | | 09 |
| 6.0/400 Honours with Research | VII | 02 | 02 | 01 | 01 | | RM-01 RM-01 | | | | | | | | | | | | 08 |
| | VIII | 02 | 02 | 01 | 01 | | RM-01 | | | | | | | | | | | | 07 |
| **Total** | | 18/16 | 14/12 | 04 | 04 | 04 | 06/07 | 06 | 04 | 02 | 02 | 03 | 04 | | 02 | 04 | 02 | 04 | 83/80 |

## B. Sc. –Computer Science: Credit and Course Distribution in Brackets

| Level / Difficulty | Sem | Subject-1 | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | T | | P | | | | | |
| 4.5 | I | 02 (01) | | 02 (01) | | | | | 04(02) |
| | II | 02 (01) | | 02 (01) | | | | | 04(02) |
| | | Credits Related to Major | | | | | | IKS | |
| | | Core | | Elective | | VSC | FP / OJT/ CEP | | |
| | | T | P | T | P | P | P | T | |
| 5.0 | III | 04(02) | 02(01) | -- | | 02(01) | FP-02(01) | | 10(05) |
| | IV | 04(02) | 02(01) | -- | | 02(01) | CEP-02(01) | | 10(05) |
| 5.5 | V | 06(03) | 04(02) | 02(01) | 02(01) | 02(01) | FP-02(01) | 02(01) | 20 (10) |
| | VI | 06(03) | 04(02) | 02(01) | 02(01) | 02(01) | OJT-04(01) | | 20(09) |
| Total | | 12 | 08 | (02) | (02) | 04 | 04 | (01) | 33 |
| 6.0 | VII | 03 | 03 | (01) | (01) | - | RM-04(01) | | 22(09) |
| | VIII | 03 | 03 | (01) | (01) | | OJT-04(01) | | 22(09) |
| 6.0 | VII | (02) | (02) | (01) | (01) | | RM-04(01) RP-04(01) | | 22(08) |
| | VIII | (02) | (02) | (01) | (01) | | RM-08(01) | | 22(07) |
| | | 18/16 | 14/12 | 04 | 04 | 04 | 06/07 | (01) | 51/48 |

### Programme Framework (Courses and Credits): B. Sc. Computer Science

| Sr. No. | Year | Semester | Level | Course Type | Course Code | Title | Credits |
|---|---|---|---|---|---|---|---|
| 1. | I | I | 4.5 | DSC-01 | BS-CS 111T | Problem Solving using Computer and 'C' Programming | 02 |
| 2. | I | I | 4.5 | DSC-02 | BS-CS 112P | Lab Course Based on BS-CS 111T | 02 |
| 3. | I | II | 4.5 | DSC-03 | BS-CS 121T | Advanced 'C' | 02 |
| 4. | I | II | 4.5 | DSC-04 | BS-CS 122P | Lab Course Based on BS-CS 121T | 02 |
| 5. | II | III | 5.0 | DSC-05 | BS-CS 231T | Data Structures and Algorithms Using 'C' | 02 |
| 6. | II | III | 5.0 | DSC-06 | BS-CS 232T | NoSQL | 02 |
| 7. | II | III | 5.0 | DSC-07 | BS-CS 233P | Lab Course Based on BS-CS 231T and BS-CS 232T | 02 |
| 8. | II | III | 5.0 | VSC-01 | BS-CS 234T/P | Software Engineerring | 02 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **9.** | II | III | 5.0 | FP-01 | BS-CS 235T/P | Field Project using Software Engineering Concepts. | **02** |
| **10.** | II | IV | 5.0 | DSC-08 | BS-CS 241T | Object Oriented Concepts using C++ | **02** |
| **11.** | II | IV | 5.0 | DSC-09 | BS-CS 242T | Core Python | **02** |
| **12.** | II | IV | 5.0 | DSC-10 | BS-CS 243P | Lab Course Based on BS-CS 241T | **02** |
| **13.** | II | IV | 5.0 | VSC-02 | BS-CS 243T | Lab Course Based on BS-CS 242T | **02** |
| **14.** | II | IV | 5.0 | CEP-01 | BS-CS 245P | Community Engagement Project | 02 |
| **15.** | III | V | 5.5 | DSC-11 | BS-CS 351T | Operating Systems | 02 |
| **16.** | III | V | 5.5 | DSC-12 | BS-CS 352T | Web Technology | 02 |
| **17.** | III | V | 5.5 | DSC-13 | BS-CS 353T | React | 02 |
| **18.** | III | V | 5.5 | DSC-14 | BS-CS 354P | Lab Course Based on BS-CS 351T | 02 |
| **19.** | III | V | 5.5 | DSC-15 | BS-CS 355P | Lab Course Based on BS-CS 352T | 02 |
| **20.** | III | V | 5.5 | DSE-01 | BS-CS 356T | Object oriented software Engineering | 02 |
| **21.** | III | V | 5.5 | DSE-02 | BS-CS 357P | Lab Course Based on BS-CS 353T | 02 |
| **22.** | III | V | 5.5 | VSC-03 | BS-CS 358P | Lab Course Based on BS-CS 356T | 02 |
| **23.** | III | V | 5.5 | FP-02 | BS-CS 359P | Project | 02 |
| **24.** | III | V | 5.5 | IKS-02 | BS-CS 360T | IKS (Major Specific) | 02 |
| **25.** | III | VI | 5.5 | DSC-16 | BS-CS 361T | Foundation of Data Science | 02 |
| **26.** | III | VI | 5.5 | DSC-17 | BS-CS 362T | Object Oriented Programming using Java | 02 |
| **27.** | III | VI | 5.5 | DSC-18 | BS-CS 363T | Python Programming | 02 |
| **28.** | III | VI | 5.5 | DSC-19 | BS-CS 364P | Lab Course Based on BS-CS 361T | 02 |
| **29.** | III | VI | 5.5 | DSC-20 | BS-CS 365P | Lab Course Based on BS-CS 362T | 02 |
| **30.** | III | VI | 5.5 | DSE-03 | BS-CS 366T | Data Analytics | 02 |
| **31.** | III | VI | 5.5 | DSE-04 | BS-CS 367P | Lab Course Based on BS-CS 363T | 02 |
| **32.** | III | VI | 5.5 | VSC-04 | BS-CS 368T | Software Testing | 02 |
| **33.** | III | VI | 5.5 | OJT-01 | BS-CS 369T/P | OJT | 04 |

**B. Sc Computer Science (Honours)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 34. | IV | VII | 6.0 | DSC-21 | BS-ZO 471T | KLM | 03 |
| 35. | IV | VII | 6.0 | DSC-22 | BS-ZO 472T | NOP | 03 |
| 36. | IV | VII | 6.0 | DSC-23 | BS-ZO 473T | QRS | 02 |
| 37. | IV | VII | 6.0 | DSC-24 | BS-ZO 474P | TUV | 02 |
| 38. | IV | VII | 6.0 | DSC-25 | BS-ZO 475P | TUV | 02 |
| 39. | IV | VII | 6.0 | DSC-26 | BS-ZO 476TP | TUV | 02 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 40. | IV | VII | 6.0 | DSE-05 | BS-ZO 477T | WXY | 02 |
| 41. | IV | VII | 6.0 | DSE-06 | BS-ZO 478T | WXY | 02 |
| 42. | IV | VII | 6.0 | RM-01 | BS-ZO 479T | WXY | 04 |
| 43. | IV | VIII | 6.0 | DSC-27 | BS-ZO 481T | CDE | 03 |
| 44. | IV | VIII | 6.0 | DSC-28 | BS-ZO 482T | FGH | 03 |
| 45. | IV | VIII | 6.0 | DSC-29 | BS-ZO 483T | IJK | 02 |
| 46. | IV | VIII | 6.0 | DSC-30 | BS-ZO 484T | LMN | 02 |
| 47. | IV | VIII | 6.0 | DSC-31 | BS-ZO 483T | IJK | 02 |
| 48. | IV | VIII | 6.0 | DSC-32 | BS-ZO 484T | LMN | 02 |
| 49. | IV | VIII | 6.0 | DSE-07 | BS-ZO 485T | OPQ | 02 |
| 50. | IV | VIII | 6.0 | DSE-08 | BS-ZO 485T | OPQ | 02 |
| 51. | IV | VIII | 6.0 | OJT-02 | BS-ZO 486T | RST | 04 |

**B. Sc. Computer Science (Honours with Research)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **34.** | IV | VII | 6.0 | DSC-21 | BS-ZO 471T | KLM | 03 |
| **35.** | IV | VII | 6.0 | DSC-22 | BS-ZO 472T | NOP | 03 |
| 36. | IV | VII | 6.0 | DSC-23 | BS-ZO 473P | TUV | 02 |
| **37.** | IV | VII | 6.0 | DSC-24 | BS-ZO 474P | WXY | 02 |
| 38. | IV | VII | 6.0 | DSE-05 | BS-ZO 473T | TUV | **02** |
| 39. | IV | VII | 6.0 | DSE-06 | BS-ZO 474P | WXY | **02** |
| 40. | IV | VII | 6.0 | RM-01 | BS-ZO 476T | ZAB | 04 |
| 41. | IV | VII | 6.0 | RP-01 | BS-ZO 477T | ABC | 04 |
| 42. | IV | VIII | 6.0 | DSC-19 | BS-ZO 481T | CDE | 03 |
| 43. | IV | VIII | 6.0 | DSC-20 | BS-ZO 482T | FGH | 03 |
| 44. | IV | VIII | 6.0 | DSC-21 | BS-ZO 483T | IJK | 02 |
| 45. | IV | VIII | 6.0 | DSE-04 | BS-ZO 485T | OPQ | 02 |
| 46. | IV | VIII | 6.0 | DSE-07 | BS-ZO 473T | TUV | **02** |
| 47. | IV | VIII | 6.0 | DSE-08 | BS-ZO 474P | WXY | **02** |
| 48. | IV | VIII | 6.0 | PR-02 | BS-ZO 486T | RST | 08 |

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**Syllabus**

# B. Sc. -I (Computer Science)

| **Title of the Course: Problem Solving using Computer and 'C' Programming** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year: I** | | | | **Semester: I** | | | | |
| Course Type | Course Code | Credit Distribution | | Credits | Allotted Hours | Allotted Marks | | |
| | | Theory | Practical | | | CIE | ESE | Total |
| **DSC-01** | BS-CS 111T | 02 | 00 | 02 | 30 | 15 | 35 | 50 |

**Learning Objectives:**

Ability to work with arrays of complex objects. Understanding a concept of object thinking within the framework of functional model. Understanding a concept of functional hierarchical code organization.

**Course Outcomes (Cos)**

- Explore algorithmic approaches to problem solving.
- Formulate algorithms, pseudocodes and flowcharts for arithmetic and logical problems.
- Understand structured programming approach.
- Develop the basic concepts and terminology of programming in general.
- Develop modular programs using control structures and arrays in 'C'.

**Detailed Syllabus:**

**Unit I: Fundamental of Computer (Allotted Lectures : 04)**

1.1 Introduction – uses of computer, history of computer, generation of computer.

1.2 Different parts of computer (Hardware and Software) – the monitor, the system box, keyboard, mouse, peripherals, disc size conversion chart.

1.3 Computer Hardware – CPU, input devices, output devices, storage devices, system memory.

1.4 Computer Software – operating system, utility software, application software.

**Unit II: Problem Solving Aspects (Allotted Lectures 04)**

2.1 Introduction to problem solving using computers.

2.2 Problem solving steps.

2.3 Algorithms-definition, characteristics, examples, advantages and limitations.

2.4 Flowcharts - definition, notations, examples, advantages and limitations, Comparison with algorithms.

2.5 Pseudo codes - notations, examples, advantages and limitations.

2.6 Programming Languages as tools, programming paradigms, types of languages.

2.7 Converting pseudo-code to programs.

2.8 Compilation process (compilers, interpreters), linking and loading, syntax and semantic errors, testing a program.

2.9 Good Programming Practices (naming conventions, documentation, indentation).

**Unit III: 'C' Fundamentals (Allotted Lectures 06)**

3.1 History of 'C' language.

3.2 Application areas.

3.3 Structure of a 'C' program.

3.4 'C' Program development life cycle.

3.5 'C' tokens.

3.5.1 Character set, Keywords, Identifiers.

3.5.2 Variables, Constants.

3.5.3 Operators, Expressions, types of operators, Operator precedence and Order of evaluation.

3.6 Data Types (Built-in and user defined data types).

3.7 Operators, Expressions, types of operators, Operator precedence and order of evaluation.

3.8 Character input and output.

3.9 String input and output.

3.10 Formatted input and output.

**Unit IV: Control Structures (Allotted Lectures 05)**

4.1 Decision making structures: - if, if-else, switch and conditional operator. 4.2 Loop control structures: - while, do while, for.

4.3 Loop interruption statements - break and continue, goto, exit. 4.4 Nested Loops.

**Unit V: Functions (Allotted Lectures 05)**

5.1 Concept of function, Advantages.

5.2 Standard library functions.

5.3 User defined functions: - declaration, definition, call, parameter passing (by value, by reference - overview), return statement.

5.4 Recursive functions.

5.5 Scope of variables and Storage classes.

**Unit Vi: Functions (Allotted Lectures 05)**

6.1 Concept of Array.

6.2 Types of Arrays – One, Two and Multidimensional array.

6.3 Array Operations - declaration, initialization, accessing array elements.

6.4 Memory representation of two-dimensional array (row major and column major)

6.5 Multidimensional Array - 3D Array, visualizing 3D array, declaring 3D array, updating 3D array.

6.6 Passing arrays to function.

6.7 Array applications - finding maximum and minimum, occurrences count, linear search, binary search, sorting an array, merging two sorted arrays, Matrix operations (trace of matrix, addition, transpose, multiplication, symmetric, upper/ lower triangular matrix)

**Suggested Readings/Material:**

1. How to Solve it by Computer, R.G. Dromey, Pearson Education.
2. Problem Solving and Programming Concept, Maureen Sprankle,7th Edition, Pearson Publication.
3. C: The Complete Reference, Schildt Herbert, 4th edition, McGraw Hill.
4. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India.
5. The ‘C’ programming language, Brian Kernighan, Dennis Ritchie, PHI.
6. Programming in C, A Practical Approach, Ajay Mittal, Pearson.
7. Programming with C, B. Gottfried, 3rd edition, Schaum’s outline Series, Tata McGraw Hill.
8. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.

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**Syllabus**

# B. Sc. -I (Computer Science)

| **Title of the Course: Lab Course Based on BS-CS 111T** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year: I** | | | | **Semester: I** | | | | |
| Course Type | Course Code | Credit Distribution | | Credits | Allotted Hours | Allotted Marks | | |
| | | Theory | Practical | | | CIE | ESE | Total |
| DSC-02 | BS-CS 112P | 00 | 02 | 02 | 60 | 15 | 35 | 50 |

**Learning Objectives:**

1. To develop programming skills using the fundamentals and basics of C language.
2. To learn problem solving techniques.
3. To study the advantages of user defined data type which provides flexibility for application development
4. To study the basics of pre-processors available with C compiler.
5. To enable effective usage of arrays, structures, functions and pointers.

**Course Outcomes (Cos)**

1. Devise pseudocodes and flowchart for computational problems.
2. Write, debug and execute simple programs in 'C'.
3. Develop a C program.
4. Control the sequence of the program and give logical outputs.
5. Implement strings in your C program.
6. Store different data types in the same memory.
7. Manage I/O operations in your C program.

**Detailed Syllabus:**

**Unit** **Suggested List of Assignments:**

**1.** **Assignment 1.** **04**

Problem Solving using Pseudo code and Flowchart, Simple programs, Understanding errors and error handling.

**2.** **Assignment 2.** **02**

HTML

| | | |
|---|---|---|
| **3.** | **Assignment 3.** | **04** |
| | Decision Making Control Structures. | |
| **4.** | **Assignment 4.** | **04** |
| | Loop Control Structures | |
| **5.** | **Assignment 5.** | **04** |
| | Functions (User Defined functions, Library functions and Recursion). | |
| 6 | **Assignment 6.** | **04** |
| | Arrays (1-D and 2-D, 3-D). | |

**Suggested Readings:**

Laboratory handbook prepared by the college.

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**(Autonomous)**

**Syllabus**

# B. Sc. -I (Computer Science)

| **Title of the Course: Advanced 'C' Programming** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year: I** | | | | **Semester: II** | | | | |
| Course Type | Course Code | Credit Distribution | | Credits | Allotted Hours | Allotted Marks | | |
| | | Theory | Practical | | | CIE | ESE | Total |
| DSC-03 | BS-CS121T | 02 | 00 | 02 | 30 | 15 | 35 | 50 |

**Learning Objectives:**

- Implement problem solving skills using pointer concept of the programming languages.
- Work efficiently with files using the programming languages.
- Efficiently use data structures for problem solving.
- Learn the functions of Structures and Unions

**Course Outcomes (Cos):**

1. Develop modular programs using control structures, pointers, arrays, strings and structures.

2.Design and develop solutions to real world

problems using C.3.Organization of code with

complex data types and structures.

4.Develop programs using files.

5.Develop advanced concepts of programming using the 'C' language.

**Detailed Syllabus:**

| Unit | Course Contents | Allocated Hours |
|---|---|---|
| I | **Pointers:**<br>1.1 Introduction to Pointers.<br>1.2 Declaration, definition, initialization, dereferencing.<br>1.3 Pointer arithmetic.<br>1.4 Relationship between Arrays & Pointers- Pointer to array, | 10 |

| | | |
|---|---|---|
| | Array ofpointers. | |
| | 1.5 Multiple indirection (pointer to pointer). | |
| | 1.6 Functions and pointers- Passing pointer to function, Returningpointer from function, Function pointer. | |
| | 1.7 Dynamic memory management. | |
| | 1.8 Memory leak, dangling pointers. | |
| | 1.9 Types of pointers. | |
| **II** | **Strings:** | **07** |
| | 1.1 String Literals, string variables, declaration, definition,initialization. | |
| | 1.2 Syntax and use of predefined string functions | |
| | 1.3 Array of strings. | |
| | 1.4 Strings and Pointers. | |
| | Command line arguments. | |
| **III** | **Structures and Unions:** | **10** |
| | 3.1 Concept of structure, definition and initialization, use of typedef. | |
| | 3.2 Accessing structure members. | |
| | 3.3 Nested Structures. | |
| | 3.4 Arrays of Structures. | |
| | 3.5 Structures and functions- Passing each member of structure as aseparate argument, Passing structure by value / address. | |
| | 3.6 Pointers and structures. | |
| | 3.7 Concept of Union, declaration, definition, accessing unionmembers. | |
| | Difference between structures and union. | |
| **IV** | **File Handling:** | **06** |
| | 4.1 Introduction to streams. | |
| | 4.2 Types of files. | |
| | 4.3 Operations on text files. | |
| | 4.4 Standard library input/output functions. | |
| | Random access to files. | |

**V** **Preprocessor:** **04**

5.1 Role of Preprocessor.

5.2 Format of preprocessor directive.

5.3 File inclusion directives (#include).
**5.4** Macro substitution directive, argumented and nested macro.
**5.5** Macros versus functions

**VI** **Graphics using C:** **08**

6.1 Introduction – definition, applications.

6.2 Interactive and passive graphics.

6.3 Basic concept of Computer Graphics - pixel, resolution, lines,polylines, polygon, curves, filled region, text.

6.4 Display processor.

6.5 CRT, Color Monitor.

6.6 Random scan and Raster scan display.

6.7 Direct view storage tube.

6.8 Flat panel display.

Programs on graphics.

**Suggested Readings:**

1. C: The Complete Reference, Schildt Herbert, 4th edition, McGrawHill.
2. A Structured Programming Approach Using C, Behrouz A.Forouzan, Richard F. Gilberg, Cengage Learning India
3. The 'C' programming language, Brian Kernighan, Dennis Ritchie,PHI.
4. Programming in C, A Practical Approach, Ajay Mittal, Pearson.
5. Programming with C, B. Gottfried, 3rd edition, Schaum's outlineSeries, Tata McGraw Hill.
6. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

**New Arts, Commerce and Science College, Ahmednagar**

**(Autonomous)**

**Syllabus**

# B. Sc. -I (Computer Science)

| **Title of the Course: Lab Course Based on BS-CS 121T** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year: I** | | | | **Semester: II** | | | | |
| Course Type | Course Code | Credit Distribution | | Credits | Allotted Hours | Allotted Marks | | |
| | | Theory | Practical | | | CIE | ESE | Total |
| **DSC-0**4 | BS-CS 122P | 00 | 02 | 02 | 60 | 15 | 35 | 50 |

**Learning Objectives:**

- Imbibe thorough knowledge in advanced C programming concepts.
- Have proficiency in applying advanced C programming concepts to solve any real world problem.
- Ease to sort and find information, which helps organizations make business decisions more efficiently and minimize costs.
- To work well with structured data.

**Course Outcomes (Cos)**

1. Write, debug and execute programs using advanced features in 'C'.
2. Develop code related to function and procedure.
3. Develop program on file handling.

**Detailed Syllabus:**

| Unit | Suggested List of Assignments: | Allocated Hours |
|---|---|---|
| I) | **A) Advanced C Programming:** | |
| 1. | **Assignment 1.**<br>Simple Pointers:<br>a) Pointer initialization and use of pointers.<br>b) Pointer Arithmetic. | 04 |
| 2. | **Assignment 2.**<br>Dynamic Memory Allocation. | 04 |
| 3. | **Assignment 3.**<br>String handling using standard library functions. | 04 |
| 4. | **Assignment 4.**<br>Structure and<br>Unions. | 03 |
| 5. | **Assignment 5.**<br>File Handling. | 03 |
| 6. | **Assignment 6.**<br>C Preprocessors. | 03 |
| 7. | **Assignment 7.**<br>Graphics programs using C<br>1) Basic graphics shapes construction (Line, circle, arc, ellipse,rectangle)<br>2) Animation using increasing circle field with different color andpattern.<br>3) Making screen saver.<br>4) Moving coloured car using inbuilt function.<br>5) Print name in hindi script on console output.<br>6) Control a ball using arrow keys. | |

**Suggested Readings:**

Laboratory handbook prepared by the College.