



CIRCULAR NO.SU/B.Sc.CS/Honors/22/2022

It is hereby inform to all concerned that, the syllabus prepared by the Ad-hoc Board and recommended by the Dean, Faculty of Science & Technology, **the Academic Council at its meeting held on 29 August 2022 has accepted the revised Syllabus of Honors Degree Course of B.Sc. Computer Science under the scheme of Choice Based Credit & Grading System** as appended herewith run at Model College, Ghansawangi Dist.-Jalna.

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.No.SU/2022/10417-25
Date: 30.08.2022.

★
★
★
★

[Signature]
**Deputy Registrar,
Academic Section**

Copy forwarded with compliments to :-

- 1] **The Principal of Model College, Ghansawangi, Dist. Jalna**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] **The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.**
- 2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
- 6] The Public Relation Officer, Dr.BAMU,A'bad.
- 7] The Record Keeper, Dr.BAMU,A'bad.

NAAC 'A' Accreditation

Dr. Babasaheb Ambedkar Marathwada University
Aurangabad-431004.

Model Degree College , Ghansawangi Dist. Jalna

Undergraduate Bachelor Degree Program
B.Sc. (Honours) Computer Science

Course Structure and Curriculum
(Outcome based Curriculum)
Choice Based Credit System (CBCS)

First Year Computer Science- I & II Semester
(With Effective from: Academic Year 2022-23)

Dr. Babasaheb Ambedkar Marathwada University
Aurangabad-431004.
Tel.No. : 0240-2403400/431, Fax:0240-2403113
Website: www.bamu.ac.in, <http://bamua.digitaluniversity.ac.in>

INDEX

Sr. No.	Contents	Pg. No.
1	Preamble	03
2	Course Structure	08
3	Program Educational Objectives	03
4	Program Outcome and Program Specific Outcomes	04
5	Eligibility	06
6	Duration	06
7	Medium of Instructions	06
8	Attendance	06
9	Pattern of Evaluation	06
10	Curriculum: Semester – I	10
11	Curriculum: Semester – II	21

2. Preamble

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 professional streams of higher education including computer science.

Computer Science (CS) 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. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. 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 practised by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

3. Program Educational Objectives:

Program Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. These objectives describe the expected accomplishments of our graduates during the several years following graduation.

Objective 1: Our graduates will apply their knowledge and skills to succeed in their careers and/or obtain advanced degrees.

Objective 2: Our graduates will behave ethically and responsibly, and will remain informed and involved as full participants in their profession and society.

Objective 3: Our graduates will creatively solve problems, communicate effectively, and successfully function in diverse and inclusive multi-disciplinary teams.

Objective 4: Our graduates will apply principles and practices of computing grounded in mathematics and science to successfully complete software-related projects to meet customer business objectives and/or productively engage in research.

4. Program Outcomes (POs) and Program Specific Outcomes:

Program Outcomes (POs)

S.No	Program Outcomes (POs)
1	Engineering knowledge: Apply the knowledge of algorithm, data structure and programming to the solution of real time problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the computer science practice.
5	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

6	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
7	Project management: Demonstrate knowledge and understanding of the science principles and apply these for real time applications.
8	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

S.No	Program Specific Outcomes (PSOs)
1	Model computational problems by applying mathematical concepts and design solutions using suitable data structures and algorithmic techniques
2	Design and develop solutions by following standard software engineering principles and implement by using suitable programming languages and platforms
3	Develop system solutions involving both hardware and software modules

5. Course Structure of B.Sc.(Honours) Computer Science

The B.Sc.(Honours) Computer Science curriculum is divided into three streams namely Language Curriculum, Major Curriculum and Life Skill Curriculum. The Major Curriculum is divided into core, supportive and applied group.

The B.Sc. (Hons) in Computer Science programme consists of 180 credits in accordance with UGC's CBCS with 1 contact-hour per week for each credit for Theory/Tutorial and 2 contacts - hour per week for each credit for practical. The course is design for three year (06 semesters). Each semester is having 30 credits.

From total 180 credits student is expected to acquire 32 credits in Language, 116 in Major and 32 in Life Skill Courses.

6. Eligibility:

- i. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / 0technical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.
- ii. OR He / She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.
- iii. He/ She must have passed at qualifying examination. A candidate who has passed the B.Sc. Honors (Computer Science) examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s).
- iv. **A candidate shall not be allowed to appear for such examination if he has passed the higher examination.**

7. Duration

The undergraduate program in Computer Science is offered through the courses designed for granting the following B.Sc. Honors (Computer Science) degrees. All the courses are of 3-year duration spread over six semesters.

8. Medium of Instructions

The medium of instruction for this course is English.

9. Attendance:

This course is the practical course so, student should need minimum 40 % attendance for appearing the examination.

10. Pattern of Evaluation

A) Internal Class Test : A class test is to be conducted after completion of 15-20 Lecturers.

B) THEORY Examination: - Each theory paper will carry Maximum 30 marks; duration of examination of theory paper will be 2 hours.

C) PRACTICALS: - Total marks 50 marks Each Practical paper will carry Maximum 50 marks, duration of examination of each practical paper will be 02 hours. Journal/ Record book (certified by teacher and head of department) is necessary for the practical examination.

Note:

The practical examination will be done for each semester.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Curriculum Structure and Scheme of Evaluation: B.Sc. Honours (Computer Science.) F.Y. (I Semester)

Sr. No	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/week	P hrs/ week	Total hrs/ week	Total Credit	Class Tests + Tutorial	Univ. Th. Exam.	Uni. Pract. Exam.	Uni. Exam Duration (in hrs.)	Total Marks
1	CSC-E-101	Compulsory English	04	---	04	04	40	60	00	03	100
2	CSC-IL-102	Indian Language (Marathi/Hindi)	04	---	04	04	40	60	00	03	100
3	Core-A CSC103T	Computer Fundamentals	03	---	03	03	20	30	00	02	50
4	Core-B CSC104T	Basic Operating System	03	---	03	03	20	30	00	02	50
5	Supportive CSC105T	Basic Data Structure	03	---	03	03	20	30	00	02	50
6	Applied CSC106T	Basic C Programming	03	---	03	03	20	30	00	02	50
7	Lab Core A and Core B CSC 104P	Lab : Computer Fundamentals and Basic O.S.	--	04	04	02	---	---	50	02	50
8	Lab-Supportive CSC105P	Lab based on 105T Lab: Basic Data Structure	--	04	04	02	---	---	50	02	50
9	Lab- Applied CSC106P	Lab based on 106T Lab: Basic C Programming	--	04	04	02	---	---	50	02	50
10	CSC107	Life Skill Curriculum (Job Oriented Soft Skill)	02	---	02	02	20	30	00	02	50
11	CSC108	Life Skill Curriculum (Value Oriented Courses)	02	---	02	02	20	30	00	02	50
12	Non Credit Course		00	--	02	--	--	--	--	--	--
Total			24	12	36	30					650
Total Credits for Semester I : 30 (Theory : 24 ; Laboratory : 06)											

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Curriculum Structure and Scheme of Evaluation: B.Sc. Honours (Computer Science.) F.Y. (II Semester)

Sr. No	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/week	P hrs/ week	Total hrs/ week	Total Credit	Class Tests + Tutorial	Univ. Th. Exam.	Uni. Pract. Exam.	Uni. Exam Duration (in hrs.)	Total Marks
1	CSC-E-201	Compulsory English	04	---	04	04	40	60	00	03	100
2	CSC-IL-202	Indian Language (Marathi/Hindi)	04	---	04	04	40	60	00	03	100
3	Core-A CSC203T	Computer System Architecture	03	---	03	03	20	30	00	02	50
4	Core-B CSC204T	Advance Operating System	03	---	03	03	20	30	00	02	50
5	Supportive CSC205T	Advance Data Structure	03	---	03	03	20	30	00	02	50
6	Applied CSC206T	Advance C Programming	03	---	03	03	20	30	00	02	50
7	Lab Core A and Core B CSC 204P	Lab : C.S.A and Advance O.S.	--	04	04	02	---	---	50	02	50
8	Lab- Supportive CSC205P	Lab based on 205T Lab: Advance Data Structure	--	04	04	02	---	---	50	02	50
9	Lab- Applied CSC206P	Lab based on 106T Lab: Advance C Programming	--	04	04	02	---	---	50	02	50
10	CSC207	Life Skill Curriculum (Job Oriented Soft Skill)	02	---	02	02	20	30	00	02	50
11	CSC208	Life Skill Curriculum (Value Oriented Courses)	02	---	02	02	20	30	00	02	50
12	NC-I Non Credit Course	Constitution of India	02		02						
Total			26	12	38	30					650
Total Credits for Semester II : 30 (Theory : 24 ; Laboratory : 06)											

B.Sc. Honours (Computer Science)
First Year (Semester I)

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

Year and Semester: **First Year (Semester-I)**

Total credit: 03

Course Code: **CSC103T**

Course Title: Computer Fundamentals

Computer Fundamentals

Objective:

To impart basic introduction to computer hardware, components, computer number system, how the CPU works, fundamental about algorithms and flowchart as well as different type of software.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Introduction to Computer Definition of Computer, History and Generations of Computer, Characteristics of computer, Classification of Computer. Fundamental Block diagram of Computer: CPU, Input & Output Unit. Input devices, Output devices, Types of printer's, Memory, CD-ROM, Hard disk, Floppy disk.	1/1	10
Unit-II			
02	Software Definition of Software, Types of Software-System software, Application software and Utility software. Computer Languages: Definition, types of Programming languages, Language Processors: Assemblers, Interpreters, Compiler and Editors. Introduction to Operating Systems: Types of Operating System, Functions of Operating System examples. MS-DOS Internal and External Commands.	1/2	10
Unit-III			
03	Internet, World Wide Web Introduction to Internet, Internet Access, Internet Basics, Protocols-TCP/IP,HTTP,FTP, Addressing, World Wide Web(WWW), Web Pages & HTML, Web browsers, Searching for information-search engines. Internet chat. Applications of Internet. Advantages and Disadvantages of Internet.	3/2	10
Unit-IV			
04	E-mail Introduction to e-mail, Mailing basics, e-mail ethics, creating an e-mail id, spanning, composing a mail, receiving and replying the	3/3	05

	mail, Advantages and Disadvantages of email services, Mailing lists, News groups. The need and use of Computer Networks. Concepts of Networking-LAN, WAN, MAN. ISP's in India and their responsibilities. Video Conference, downloading and uploading files.		
Unit-V			
05	Number Systems and Arithmetic Decimal Number System & Binary Number System, Decimal to Binary conversion, Binary to Decimal Conversion. Binary Arithmetic : Binary addition, subtraction, Multiplication & division Hexadecimal number system , Hexadecimal to binary, Binary to Hexadecimal, Hexadecimal to decimal conversion Binary subtraction using 1' complement, 2's complement method.	5/3	10

References

1. Fundamentals of Computers, V. Rajaraman 6th edition PHI Learning Private Limited 2014
2. Fundamentals of Information Technology By Chetan Srivastava, Kalyani Publishers
3. Fundamentals of Computers By V.Rajaraman, PHI Publication ,IVth Edition.
4. Fundamentals of Programming By Raj K.Jain, S.Chand Publication
5. Digital Electronics and Micro-Computers – R.K.Gaur ,Dhanpat Rai Publication

Additional Reference:

1. Computer Today By Suresh K. Basandra, Galgotia Publication, Updated Edition
2. Computer Fundamental By B.Ram, BPB Publication.
3. Digital Electronics and Logic Design – N.G.Palan, Technova Publication

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-I)	Total credit: 03
Course Code: CSC104T	Course Title: Basic Operating System

Basic Operating System

Objective:

Describe the important computer system resources and the role of operating system in their management policies and algorithms. To understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time. Understanding of design issues associated with operating systems. Understand various process management concepts including scheduling, synchronization, and deadlocks.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Introduction to Operating System What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.	1/1	10
Unit-II			
02	Operating System Organization Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy	1/2	10
Unit-III			
03	Process Characterization Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre-emptive Scheduling Algorithms.	3/2	10
Unit-IV			
04	Process Management Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery	3/3	10
Unit-V			
05	DOS operating system Structure of DOS operating system. DOS Internal commands DOS External commands Case study on DOS operating system	5/3	05

TEXT BOOKS

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008

Reference Book

1. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
2. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
3. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
4. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-I)	Total credit: 03
Course Code: CSC105T	Course Title: Basic Data Structure

Basic Data Structure**Objective:**

To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles .To have a knowledge of complexity of basic operations like insert, delete, search on these data structures.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Introduction to Data Structure Introduction, Basic Terminology: Data item, Fields, Records, Files, Entity, Attributes, Data Organization and Data Structure.	1/1	10
Unit-II			

02	Arrays Representation of Linear Arrays, Traversing, Insertion and Deletions, Sorting & Searching Algorithms, Multidimensional Arrays : 2D & M-D Concept, Record: Record Structures, Representation in Memory	1/2	10
Unit-III			
03	Stack Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation,	3/2	10
Unit-IV			
04	Queue- Definition and Operations, Array and Linked Implementations, Circular Queues Insertion and Deletion Operations, Dequeue (Double Ended Queue)	3/3	05
Unit-V			
05	Searching and Sorting Introduction, searching, binary search tree, Sorting, Insertion sort, Selection sort, Merging, Merge-Sort, Radix Sort.	5/3	10

TEXT BOOKS

1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.

Reference Book

2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Pearson Education., New Delhi
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", AddisonWesley, (AnImprint of Pearson Education), Mexico City

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

Year and Semester: **First Year (Semester-I)**

Total credit: 03

Course Code: **CSC106T**

Course Title: Basic C Programming

Basic C Programming

Objective:

To expose students to algorithmic thinking and problem solving and impart moderate skills in programming using C Language in an industry-standard. Introduce students to learn basic features, Create, execute simple C programs using conditional statements, loops and arrays.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Basic Concept of Programming Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies, Introduction to C Programming - Basic Program Structure In C, Variables and Assignments, Input and Output, Selection and Repetition Statements	1/1	10
Unit-II			
02	Basic Elements & Operators Character set, C Token, Identifier & Keywords, Variables, Constant and its types. Integer constant, floating point constant, character constant, string constants, Operators: Arithmetic, Relational, Logical, Unary operators, Increment & decrement Assignment and Conditional operator.	1/2	10
Unit-III			
03	C Program & I/O statements Structure of C Program, Compilation & Execution of C program, I/O: Introduction, Formatted Input/output function: scanf & printf, Escape sequence characters.	3/2	10
Unit-IV			
04	Control and Iterative Statement Statements- Selection Statements(making decisions) - if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping - break, continue, go to, Simple C	3/3	05

	Program example		
Unit-V			
05	Arrays Introduction, Declaration and initialization Accessing array elements, Memory representation of array. One dimension and multidimensional arrays, character array, Introduction to string	5/3	10

TEXT BOOKS

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill].

Reference Book

1. The C Programming Language by Brian Kernighan and Dennis Ritchie 2nd edition
2. Absolute beginner's guide to C, Greg M. Perry, Edition 2, Publisher: Sams Pub., 1994.
3. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-I)	Total credit: 02
Course Code: CSC104P	Course Title: Lab Computer Fundamentals and Basic O.S.

Lab: Computer Fundamentals and Basic O.S.

Sr. No	Name of Practical	No. of Practical
01	Computer Fundamentals 1. Prepare a report based on computer component such as monitor, printer, CPU, Pen drive, CD –ROM , Hard Disk. 2. Create a partition of computer drive creation, formatting the drive and deleting the partition. 3. Create a user and password of computer user and Reset a computer password using CMOS battery. 4. Practical on office word tool as a creation, edit, insertion of table in the new word file. 5. Practical based on Ms-Excel for creation of student data with name, marks, roll no for sorting and marksheet creation. 6. Perform practical of DOS internal commands. DIR,TYPE,DEL,MD,CD,COPY,RMDIR,VER,DATE,TIME,CLS EXIT. 7. Write a comparative report of different web browser such as opera,	25

	Microsoft edge, chrome and mozilla Firefox. 8. Create a IP setting and home network setting for the computer. 9. Connect internet using wifi for a computer. 10. Create an email account based on Gmail and send the email using the parameter as CC, BCC and schedule send option. 11. Practical based on online meeting using zoom, Google meet and skype 12. Practical based on remote desktop using any desk software. 13. Solve one example of binary to decimal, octal and hexadecimal number. 14. Solve one example of decimal to binary, octal and hexadecimal Solve one example of octal to hexadecimal, decimal and binary.	
02	Basic Operating System 1. Study and execution of the DOS Command 2. Case study on DOS Operating System 3. Write a program to implement the FCFS Scheduling Algorithms. 4. Write a program to implement the SJF Scheduling Algorithms. 5. Write a program to implement the Priority Scheduling Algorithms. 6. Write a program to implement the Round Robin Scheduling Algorithms.	20

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-I)	Total credit: 02
Course Code: CSC105P	Course Title: Lab basic data structure based on CSC105T

Lab: Basic Data structure

Sr. No	Name of Practical	No. of Practical
01	1. Write program that uses functions to perform the following: a) Creation of list of elements where the sizes of the list, elements to be inserted and deleted are dynamically given as input. b) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list c) To display the elements in forward / reverse order 2. Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion) 3. Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code atleast one application using queues	25

02	Minimum three program for each unit of syllabus	20
----	---	----

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-I)	Total credit: 02
Course Code: CSC106P	Course Title: Lab basic C programming based on CSC106T

Lab: Basic C programming

Sr. No	Name of Practical	No. of Practical
01	Simple C Programs - Hello World Program in C - C program to check whether the given number is positive or negative - Reverse an input number using recursion - Program to find greatest of three numbers - C Program to print Fibonacci series in a given range - C Program to find factorial of a given number - Find Prime numbers in a given range - C Program to check if given number is Armstrong or not - C Program to check if given number is palindrome or not - C program to display palindrome numbers in a given range - C Program to find out the ASCII value of a character - C Program to find the size of int, float, double and char - C Program to find sum of first n natural numbers - C program to print integer entered by user	15
02	Decision making and loop C Programs for practice - C Program to check if number is odd or even - C Program to check whether an alphabet is vowel or consonant - C Program to check leap year - C Program to generate multiplication table - C Program to display characters from 'A' to 'Z' using loop	15
03	Number Programs C Programs related to numbers with solutions. - C Program to Add two integers - C Program to find GCD of two numbers - C Program to find LCM of two numbers - C Program to check whether number is prime or not - C Program to count number of digits in an integer - C Program to calculate the power of a number	15

String Programs

- Program to convert string from upper case to lower case
- Program to convert string from lower case to upper case
- Sort a set of strings in ascending alphabetical order
- Find length of a string without using strlen()
- String concatenation without using strcat
- Reverse a String using recursion

B.Sc. Honours (Computer Science)
First Year (Semester II)

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-II)	Total credit: 03
Course Code: CSC204T	Course Title: Computer System Architecture

Computer System Architecture

Objective:

To impart basic knowledge of digital logic and circuit towards understanding of basic concept of digital communication. Student will be able to understand functionalities of numerous digital logic and its circuit towards the implementation of this knowledge for real time application design. The understanding of logic designing is useful for student to design and develop computer based electronic circuit development.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Boolean Algebra and Logic Gate Postulates of Boolean algebra, theorem of Boolean algebra, commutative, associative, distributive, absorption laws. De-morgan's theorem. Logic gates: AND, OR, NOT, Ex-OR, Ex-NOR, NAND, NOR gates as universal building blocks. Logic diagram, Boolean expression and truth tables of each gate.	1/1	10
Unit-II			
02	Minimization Techniques Introduction, Minterm and Maxterm, K-Map, K-Map for 2 variables. K-Map for 3 variables, K-Map for 4 variables Combinational and Sequential Circuit Half adder and Full adder, Binary parallel adder, Half subtractor and Full subtractor, Adder/Subtractor for 2's complement system, BCD to decimal decoder, 2:4 De-multiplexer, 4 line to 1 line multiplexer	1/2	10
Unit-III			
03	Flip Flops Introduction of Flip Flops, RS Flip Flop, Clocked RS FF, D Flip Flops, triggering, preset and clear, JK Flip flops, T Flip Flops, race around condition, Master slave Flip Flops.	3/2	10
Unit-IV			
04	Counters Introduction, Asynchronous /ripple counter,	3/3	05

	Modulus counter, MOD-12 counter Synchronous counter: synchronous serial and synch parallel counter BCD counter, ring counter and Johnson counter		
Unit-V			
05	Shift Register Introduction, buffer register, Serial-in Serial-out, serial- in parallel-out, Parallel –in serial –out, parallel –in parallel –out. Memory and I/O Systems Peripheral Devices, I/O Interface, Data Transfer Schemes, Program Control, Interrupt, DMA Transfer, Cache Memory, Associative Memory, Interleave, Virtual Memory	5/3	10

TEXT BOOKS

1. Computer System Architecture, M. Morris Mano, 3rd Edition, Prentice Hall.

Reference Book

1. Computer Organization and Architecture, William Stallings, Prentice Hall.
2. Introduction to computers –Norton –McGraw Hill
3. Digital fundamentals –Floyd & Jain –Pearson Education

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-II)	Total credit: 03
Course Code: CSC205T	Course Title: Advance Operating System

Advance Operating System

Objective:

Describe the important computer system resources and the role of operating system in their management policies and algorithms. To have a basic knowledge about multithreading. To understand concepts of memory management including virtual memory. To understand issues related to file system interface and implementation, disk management. To understand and identify potential threats to operating systems and the security features design to guard against them. To have sound knowledge of various types of operating systems including Unix and Android. Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Inter Process Communication and Synchronization Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.	1/1	10
Unit-II			
02	Memory Management Physical and Virtual Address Space; Memory Allocation Strategies- Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory	1/2	10
Unit-III			
03	File and I/O Management Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory	3/2	10
Unit-IV			
04	OS security Security Policy Mechanism, Protection, Authentication and Internal Access Authorization	3/3	05
Unit-V			
05	Introduction to Android Operating System Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.	5/3	10

TEXT BOOKS

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008

Reference Book

1. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
2. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
3. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
4. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-II)	Total credit: 03
Course Code: CSC205T	Course Title: Advance Data Structure

Advance Data Structure**Objective:**

Ability to choose a data structure to suitably model any data used in computer applications. Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc. Ability to assess efficiency tradeoffs among different data structure implementations. Implement and know the applications of algorithms for sorting, pattern matching etc.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Linked List Concept of Linked List, Representation of linked List in memory, Traversing a linked list, Searching a linked list : sorted and unsorted,	1/1	10

	Insertion & Deletion in Linked List, Header Linked List & Two way List		
Unit-II			
02	Binary Trees: Representing Binary, Trees in Memory, Traversing Binary Trees, Traversal Algorithms using Stacks, Header Nodes; Threads, Binary Search Trees Searching and Inserting in Binary Search Trees, Deleting in Binary Search Tree	1/2	10
Unit-III			
03	AVL Search Trees AVL Search Trees, Insertion in an AVL Search Tree, Deletion in an AVL Search Tree, m-way Search Trees, Searching, Insertion and Deletion in an m-way Search, B Trees, Searching, Insertion and Deletion in a Btree	3/2	10
Unit-IV			
04	Graph Theory Terminology, Sequential Representation of Graphs; Adjacency matrix, Path Matrix, Warshall's Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets	3/3	05
Unit-V			
05	Searching & Sorting Introduction, Sorting, Insertion sort, Selection sort, Merging, Merge-Sort, Radix Sort, Searching and Data Modification, Hashing	5/3	10

TEXT BOOKS

2. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.

Reference Book

2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Pearson Education., New Delhi
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", AddisonWesley, (AnImprint of Pearson Education), Mexico City

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-II)	Total credit: 03
Course Code: CSC206T	Course Title: Advance C Programming

Advance C Programming

Objective:

The course covers the basics of programming and demonstrates fundamental programming techniques, customs and terms including the most common library functions and the usage of the pre processor. This course helps the students in gaining the knowledge to write simple C language applications, mathematical and engineering problems. This course helps to undertake future courses that assume this programming language as a background in computer programming. Topics include

variables, data types, functions, control structures, pointers, strings, arrays and dynamic allocation principles. This course is reached to student by power point presentations, lecture notes, and lab involve the problem solving in mathematical and engineering areas.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
01	Function Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication (call by value, call by reference), Standard functions. Storage classes-auto, register, static, extern, scope rules, arrays to functions, recursive functions, example C programs	1/1	10
Unit-II			
02	Pointers Introduction (Basic Concepts), pointers to pointers, compatibility, Pointer Applications, Arrays and Pointers, Pointer Arithmetic, memory allocation functions, array of pointers, pointers to pointers to void, pointers to functions, command -line arguments, Introduction to structures and unions.	1/2	10
Unit-III			
03	String Handling Strings – Concepts, C Strings, String Input / Output functions, string manipulation functions, string /data conversion.	3/2	10
Unit-IV			
04	File Handling Input and Output – Concept of a file, streams, text files and	3/3	10

	binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions.		
Unit-V			
05	Graphics Programming in C Introduction, graphics.h function and its working, various function used by graphics.h. draw circle, line , rectangle etc examples.	5/3	05

TEXT BOOKS

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill].

Reference Book

1. The C Programming Language by Brian Kernighan and Dennis Ritchie 2nd edition
2. Absolute beginner's guide to C, Greg M. Perry, Edition 2, Publisher: Sams Pub., 1994.
3. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.

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

Year and Semester: **First Year (Semester-II)**

Total credit: 02

Course Code: **CSC204P**

Course Title: Lab C.S.A and Advance O.S.

Lab: Advance Data Structure

Sr. No	Name of Practical	No. of Practical
01	Practical based on Digital Electronic The practical should be done on kit for AND, OR , NOT, NAND, NOR , X-OR and X-Nor gate (If kit not available use the software simulation for practical) 1. Testing of AND, OR and NOT Gate. 2. Testing of NAND and NOR gate 3. Testing of XOR and X-NOR gate 4. Implementation of Boolean Functions using MUX 5. Construction of half and full adder using XOR and NAND gates and verification of its operation. 6. The practical for Half adder. Full adder, encoder and Multiplexer. 7. Practical for SR Flip flop 8. Practical for JK Flip Flop 9. Practical based on D-Flip flops 10. Design and verify the 4- Bit Synchronous or Asynchronous Counter using JK Flip Flop 11. Verify Binary to Gray and Gray to Binary conversion using NAND gates only 12. Design and Verify the counter functionalities using simulator. 13. Design and Verify the 4-Bit Serial In - Parallel Out Shift Registers 14. Design and Verify the 4-Bit parallel In - serial Out Shift Registers 15. Experiment for DMA based on simulator. The link of virtual lab as is below. The Digital Electronic Circuits Virtual Laboratory is an initiative of Ministry of Human Resource Development (MHRD), Govt. of India, under the National Mission on Education through Information and Communication Technology (NME-ICT). 1. https://www.vlab.co.in : Virtual Lab for IIT Delhi 2. http://vlabs.iitkgp.ernet.in/dec/ 3. https://www.iitg.ac.in/cseweb/vlab/Digital-System-Lab/experiments.php	25
02	Practical based on Advance O.S. Minimum three program on each unit	20

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

Year and Semester: **First Year (Semester-II)**

Total credit: 02

Course Code: **CSC205P**

Course Title: Lab Advance Data
Structure based on CSC205T

Lab: Advance Data Structure

Sr. No	Name of Practical	No. of Practical
01	String Programs • Program to convert string from upper case to lower case • Program to convert string from lower case to upper case • Sort a set of strings in ascending alphabetical order • Find length of a string without using strlen() • String concatenation without using strcat • Reverse a String using recursion Array Programs • Program to sort array in ascending order • Find largest element of given array • C program to find sum of array elements • C Program to find number of elements in an array Sorting programs • Bubble sort program in C • Insertion sort program in C • Selection sort program in C • Quicksort program in C	45

Course : B.Sc. Honours (Computer Science)	
Year and Semester: First Year (Semester-II)	Total credit: 02
Course Code: CSC206P	Course Title: Lab Advance C programming based on CSC206T

Lab: Advance C programming

Sr. No	Name of Practical	No. of Practical
01	C Pointer programs • C program to find the largest of three numbers using Pointers • C program to count vowels and consonants in a String using pointer • C program to print String using Pointer • C program to swap two numbers using pointers • C program to create initialize and access a pointer variable Programs on calculation • Find the value of nPr for given value of n & r • Find the value of nCr for given value of n & r • C Program to multiply two floating numbers • C Program to find out Quotient and Remainder • C Program to find average of two numbers Number system conversion programs • Binary to decimal conversion • C Program to convert Decimal to Binary • C Program to convert Decimal to Octal • C Program to convert Octal to Decimal • C Program to convert Binary to Octal • C Program to convert Octal to Binary Programs to find out areas of Geometric figures • C program to find area and circumference of circle • C program to find area of equilateral triangle File handling Programs • C Program to read the first line from a file • C Program to write a sentence to a file	45

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

Year and Semester: **First Year (Semester-II)**

Total credit: Non-Credit Course

Course Code: **NC-I**

Course Title: Constitution of India
Contact Hours: 30 (Clock Hours)
Periods: 45 (45 minutes each)

Constitution of India

Sr. No	Topic
1	Unit-I: (05 periods) 1. Meaning and concept of Indian Constitution. 2. Nature of constitution. 3. Brief idea of Indian Constitution.
2	Unit-II: Silent Feature of Indian Constitution (10 periods) Written and Enacted Constitution; The longest and most detailed Constitution of the World; Rigidity and Flexibility Constitution; Parliamentary system of Government; Federal system with unitary basis; Adult Franchise; Single Citizenship; Sovereign, Democratic, Republic; Secularism; directive Principles of state policy; independent Judiciary; Fundamental Rights; Fundamental Duties.
3	Unit-III: (10 periods) A. Fundamental Rights Concept of State (Art-12); Right of Equality (Art-14 to 18); Right to Freedom (Art-19 to 22); Right against Exploitation (Art-23 & 24); Right to Religion (Art-25 to 28) ; Right to Minorities (Art-29 & 30) Constitutional Remedies(Art-32). B. Fundamental Duties (Art-51 A)
4	Unit-IV: Directive Principles of State Policy (DPSP's) (15 periods) 1. Meaning and Significance of Directive Principles. 2. Classification / Principles of D. P. S. P. 3. Relationship between F. Rs. and D. P. S. P. Executives A) Union Government : The President, Council of Ministers and Prime Minister B) State Government: The Governor, Council of Ministers and Chief Minister
5	UNIT-5: Tutorial and Assignment (05 periods)

References

1. Constitution of India, Bare Act. Govt. of India.
2. Subhash C. Kashyap, Our Constitution (An Introduction of Indian Constitution and Constitutional) low, National Book Trust, India 2001.
3. Avasti & Maheshwari, Indian Constitution, Lakshmi Narain Agrwal Agra 2017.
4. Basu D. D. , Introduction to the Constitution of India, Laxis Nexis 2013.
5. Sharma L. N. Indian Prime Minister, The MacMillan company of India, 1976.
6. Jain H. M. Union Executive, Chaitanya Publication House 1969.
7. Dr. S. N. Busi, Dr. B. R. Ambedkar, Framing of Indian Constitution, 1st Edition 2015.
8. M. P. Jain, Indian Constitution Law 7th Edition Nexis 2014
9. M. P. Jain, Outline of Indian Legal and Constitutional History Laxis Nexis 2014
10. भारताचे संविधान
11. प्रदीप गायकवाड, (संपादक) भारताचे संविधान शिल्पकार डॉ. बाबासाहेब आंबेडकर दीक्षाभूमी संदेश, नागपूर २००६
12. डॉ. भा.ल. भोळे, भारताचे शासन आणि राजकारण, विद्या प्रकाशन नागपूर

**NOTE: All latest volumes of above-mentioned books must be preferred.
The above list of books is not an exhaustive one.**

Two Internal Test (45 Minutes)	10 Marks
Two Home Assignment	10 Marks