



Rayat Shikshan Sanstha's

**Yashwantrao Chavan Institute of Science, Satara (Autonomous)**

**Lead College, Karmaveer Bhaurao Patil University**

**Reaccredited by NAAC (3rd Cycle) with 'A+' grade (CGPA 3.57).**

**ISO 9001:2015 Certified**

**Bachelor of Science**

**Part - I**

**Computer Science**

**Syllabus**

**to be implemented w.e. f. June, 2023**

**NEP 2020**

Rayat Shikshan Sanstha's  
Yashavantrao Chavan Institute of Science, Satara  
**Department of Computer Science**  
Syllabus for Bachelor of Science (Computer Science) Part I

**1. TITLE: COMPUTER SCIENCE**

**2. YEAR OF IMPLEMENTATION:** New Syllabi for the B.Sc. I Computer Science will be implemented from June 2023 onwards.

**3. PREAMBLE:**

Bachelor of Science is an integrated academic degree in the faculty of science. The revision of existing syllabus of Computer Science subject in Science Faculty is essential. This is a humble endeavor to initiate the process towards an era of knowledge. The students from science faculty should also be competent for this change in the technology. In this year, a student will be able to handle computers, develop the programs in languages and other peripherals with confidence. In the subject, the student will also get a basic and proper knowledge in the field of Programming skills.

**4. GENERAL OBJECTIVES OF THE COURSE:**

- 1) To learn basics of Computer, hardware, software, networking.
- 2) To inculcate the software development attitude and generate interest in the field of Technology.
- 3) To develop programming skills, management skills, writing skills, Project Analysis skill among students.
- 4) To inculcate research attitude among students.

**5. DURATION:**

- The course shall be a full-time course.

**6. PATTERN:** Semester Examination

**7. MEDIUM OF INSTRUCTION:** English

## Major Syllabus

### Course Structure for B.Sc. I (Semester- I)

Theory				Practical				
Course Title	Course Code	Lecture per week	Credits	Course	Course Title	Course Code	Lecture per week	Credits
C Programming-I	BCST-111	5	2	Practical -1	C Programming -I and Database Management Systems Lab-I	BCSP - 113	4	2
Database Management Systems	BCST-112		2					

### Course Structure for B.Sc. I. (Semester- II)

Theory				Practical				
Course Title	Course Code	Lecture per week	Credits	Course	Course Title	Course Code	Lecture per week	Credits
C Programming -II	BCST-121	5	2	Practical - 2	C Programming - II and Relational Database Management Systems Lab-II	BCSP - 123	4	2
Relational Database Management Systems	BCST-122		2					

**Note:** B: B. Sc. T=Theory and P= Practical

**Structure and Title of Courses of B. Sc. Course:**

**\* B. Sc. I Semester I \***

<b>Course Number</b>	<b>Course Code</b>	<b>Course Name</b>
I	BCST- 111	C Programming-I
II	BCST- 112	Database Management Systems
Lab-I	BCSP- 113	C Programming -I and Database Management Systems Lab-I

**\* B. Sc. I Semester II\***

<b>Course Number</b>	<b>Course Code</b>	<b>Course Name</b>
III	BCST- 121	C Programming-II
IV	BCST- 122	Relational Database Management Systems
Lab-II	BCSP- 123	C Programming -II and Relational Database Management Systems Lab-II

**Syllabus**  
**B.Sc. I- Semester-I**

**Theory: Course I: BCST111: C Programming-I**

**Course Objectives:** Students should be able to...

1. learn adequate knowledge on the need of programming languages.
2. understand the need of problem-solving techniques.
3. identify programming skills using the fundamentals and basics of C Language.
4. define algorithms and flowchart of programs in C and to solve the problems.

Credits=2	SEMESTER-I Course I: BCST111: C Programming-I	No. of hours per unit/ credits
<b>UNIT I</b>	<b>Computer fundamentals and Introduction to 'C' language</b> Types of Computers, Basic Organization of a Digital Computer; Number Systems, Input and Output Devices: Keyboard, mouse, touch screen, joystick, scanner, web camera, MICR, OCR, OMR, bar-code reader, monitor, printer, plotter. Memory: Primary, secondary, auxiliary memory; RAM, ROM, cache memory, magnetic tape, Algorithm, Characteristics, Flowcharts, Definition, Symbol, features. History of 'C' language, Structure of 'C' programs, 'C' Tokens, Character set and keywords, Constant and its type, Variable and its type, Data types, Operators and its types, Input/output using standard functions.	(8)
<b>UNIT II</b>	<b>Branching and Looping</b> Conditional branching, if, if else, else if ladder, switch, Nested statements. Looping – for, while, do-while statements. Unconditional control statements- goto, break and continue.	(8)
<b>UNIT III</b>	<b>Functions in C</b> Definition, types & parts of functions, Local and global variable, Library functions and User defined functions, Passing arguments to a function, return statement, recursion, Scope and lifetime of variables, Storage classes-Auto, Extern, Register, Static.	(7)
<b>UNIT IV</b>	<b>Arrays in C</b> Array definition and declaration, initialization of arrays, types of arrays, String handling functions, Arrays and functions.	(7)

**Course Outcomes:** Students will be able to...

1. analyse algorithm writing and flowchart drawing.
2. apply the compilation process and execution of any C Program.
3. explore the use of Functions and Arrays to solve in real life applications.
4. compute the use of Arrays to solve in real life applications.

**Reference Books:**

1. Yashwant Kanetkar (2018)Let Us C,BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Jeri R. Hanly and Elliot B. Koffman (2009)Problem Solving and Program Design in C (6th Edition)
4. E. Balagurusamy (2008)Programming in ANSI C , McGraw Hill Education Edition 6
5. Peter van der Linden (1994)Expert C Programming: Deep C Secrets
6. Brian Kernighan and Dennis Ritchie (1988)The C Programming Language –, Pearson Education India , Edition 2

## Syllabus B.Sc. I- Semester-I

### Theory: Course II: BCST112: Database Management Systems

**Course Objectives:** Students should be able to...

1. learn fundamental concepts of data.
2. understand principles of databases.
3. identify the database management operation.
4. discuss the concept of procedure oriented, object-oriented programming languages, Database Management.

Credits=2	SEMESTER-II Course IV: BCST112: Database Management Systems	No. of hours per unit/ credits
UNIT I	<b>Introduction to Database Management Systems</b>	(8)
	Definition of Database, Characteristics of database approach, data models, Importance of data models, ER Model, Relational Model, Network Model, Hierarchical Model, Object Oriented Model, Concept of DBMS, DBMS architecture and data independence	
UNIT II	<b>Entity Relationship Modeling and Relational Data Model</b>	(7)
	Entities, Attributes and Entity Sets, Relation and Relationships sets, Features of E-R Model Relational Model - Basic concepts, Types of constraints (relational constraints), DFD and its Types, ERD and types of relationship	
UNIT III	<b>Relational Algebra and Relational Calculus</b>	(7)
	Preliminaries, Relational algebra operators, Operations on Relational Algebra Select, Project, Union, Set different, Cartesian product, Rename, Operations on Relational Calculus- Tuple Relational Calculus, Domain Relational Calculus	
UNIT IV	<b>Basics of Structured Query Language</b>	(8)
	Basic SQL Queries – DDL (Create, Alter, Drop) Commands and DML (Insert, Update, Delete) Commands, Select Statement, Constraints (Primary Key, Foreign Key, Unique Key, Null, Check, Default, Super Key, Candidate Key), Datatypes, Operators, Functions.	

**Course Outcomes:** - students will able to...

1. apply the basics of data, information, system and Database.
2. evaluate basics of different database models for software development.
3. design the basics of Relational algebra operations and Relational Calculus.
4. demonstrate SQL basics and write queries to perform different operations on real world data.

**Reference Books:**

1. R. Elmasri, S.B. Navathe, (2010), Fundamentals of Database Systems 6th Edition, Pearson Education.
2. R. Ramakrishanan, J. Gehrke,( 2002),Database Management Systems 3rd Edition, McGraw-Hill.
3. Silberschatz, H.F. Korth, S. Sudarshan, (2010), Database System Concepts 6th Edition, McGraw Hill SQL,PL/SQL
4. The Programming Language of ORACLE – Ivan Bayross. BPB publication 4thEdition

## Lab Course I: BCSP113: Lab (based on BCST111 and BCST112)

**Course Objectives:** students should be able to...

1. learn basic concepts of C language.
2. understand skills for writing complex programs using 'C'.
3. study of concept of normalization, Transaction Processing and to learn File Structure and Indexing.
4. identify the different types of SQL queries performed on data.

Credits=2	SEMESTER-I BCSP113: Lab (based on BCST111 and BCST112)	No. of hours per unit/ Credits (60)
<b>Part A:</b>	<b>C Programming- I</b>	
	<ol style="list-style-type: none"> <li>1. Write a program to accept 5 subject marks and calculate total marks, percentage and grade of student.</li> <li>2. Write program to perform arithmetic operations.</li> <li>3. Write a program to input n numbers and find the Odd and Even numbers.</li> <li>4. Write a program to check number is positive and negative.</li> <li>5. Write a program to find an age of a person (Input birth date and today date).</li> <li>6. Write a program to find the sum of first n natural numbers.</li> <li>7. Write a program to accept the range and generate Fibonacci Series.</li> <li>8. Write a program to find prime numbers between given range.</li> <li>9. Write a program to calculate sum of numbers using simple function.</li> <li>10. a program to find prime number using function.</li> <li>11. Write a program to calculate factorial of number using Recursion.</li> <li>12. Write a program to enter array elements and perform arithmetic operations</li> <li>13. Write a program to sort the numbers in ascending and descending order using array.</li> <li>14. Write a program to find the product of given two matrices.</li> <li>15. Write a program to create a function to find the given number is Armstrong or not.</li> </ol>	



Part B:	Database Management Systems	
	<p>16. Create table Student, Teacher, Book_dtls ,Product and perform all DDL and DML Commands.</p> <p>17. Perform calculations on above created tables Conditions specification using Boolean and comparison operators (and, or, not, =, &lt;, &gt;, &lt;=, &gt;=)</p> <p>18. Use Aggregate functions and String handling functions.</p> <p>19. Create table and apply all constraints.</p> <ol style="list-style-type: none"> <li>a. Create tables with relevant foreign key constraints</li> <li>b. Populate the tables with data</li> <li>c. Display all the details of all employees working in the company and solve the following queries.</li> <li>d. Display ssn, lname, fname, address of employees who work in department no 7.</li> <li>e. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'</li> <li>f. Retrieve the name and salary of every employee</li> <li>g. Retrieve all distinct salary values</li> <li>h. Retrieve all employee names whose address is in 'Bellaire'</li> <li>i. Retrieve all employees who were born during the 1950s</li> </ol> <p>20. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)</p>	

**Course Outcomes:** - Students will be able to...

1. evaluate software's available for C programming and use the editor for writing Program.
2. explain and write algorithms, flowcharts and programs on operators, conditional branching, looping, functions and arrays.
3. create and write queries for any application software and able to handle database.
4. acquire the database commands and management skills

**Reference Books:**

1. Yashwant Kanetkar (2018) Let Us C, BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Ivan Bayross,(2012)SQL,PL/SQL The Programming Language of ORACLE BPB publication 4<sup>th</sup>Edition .
4. R. Elmasri, S.B. Navathe, (2010), Fundamentals of Database Systems 6th Edition, Pearson Education
5. A.Silberschatz, H.F. Korth, S. Sudarshan, (2010),Database System Concepts 6th Edition, McGraw Hill.
6. Jeri R. Hanly and Elliot B. Koffman (2009)Problem Solving and Program Design in C(6th Edition)
7. R. Ramakrishanan, J. Gehrke,(2002), Database Management Systems 3rd Edition, McGraw-Hill.

**B.Sc.I- Semester-II**  
**Theory: Course III: BCST121: C Programming-II**

**Course Objectives:** - Students should be able to...

1. define a programming logic.
2. learn advanced concepts of c language.
3. understand skills for writing complex programs using ‘C’.
4. describe and develop well-structured programs using C language

Credits=2	SEMESTER-II Course III: BCST121: C Programming-II	No. of hours per unit/ credits
<b>UNIT I</b>	<b>Pointers</b>	(8)
	Understanding the pointers, Definition and declaration, Operations on pointer, Pointer initialization, Pointer and function, Pointer and array, Call by value and Call by reference, Pointer and Character Strings, Dynamic memory allocation and deallocation.	
<b>UNIT II</b>	<b>Structure and Union</b>	(8)
	Definition and declaration, Structure initialization, Difference between structure and union, Array of structures, Arrays within Structures, structure and function, Nested structure, Pointer to structure, self-referential structure.	
<b>UNIT III</b>	<b>C Preprocessor</b>	(6)
	Preprocessor directives – file inclusion, macro substitution – simple, nested, argumented.	
<b>UNIT IV</b>	<b>File Handling</b>	(8)
	Defining and opening a file, File opening modes- read, write, append, Closing a file, Input/Output Operations on file, Random access to files, command line arguments.	

**Course Outcomes:** - Students will be able to...

1. interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.
2. evaluate union and enumeration user defined data types.
3. apply functional hierarchical code organization.
4. analyze File handling mechanism, functions and create files at runtime.

**Reference Books:**

1. Yashwant Kanetkar (2018) Let Us C, BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Jeri R. Hanly and Elliot B. Koffman (2009) Problem Solving and Program Design in C (6th Edition)
4. E. Balagurusamy (2008) Programming in ANSI C, McGraw Hill Education Edition 6
5. Peter van der Linden (1994) Expert C Programming: Deep C Secrets

## B.Sc.I- Semester-II

### Theory: Course IV: BCST122: Relational Database Management Systems

**Course Objectives:** - Students should be able to...

1. remember the concept of normalization.
2. learn the transaction processing.
3. understand File Structure and Indexing.
4. identify the knowledge of RDBMS into real life data and to learn the different types of SQL queries performed on data.

<b>Credits=2</b>	<b>SEMESTER-II</b> <b>Course IV: BCST122: Relational Database Management Systems</b>	<b>No. of hours per unit/ credits</b>
<b>UNIT I</b>	<b>Database design</b>	(8)
	Database Schema, Data Dictionary, ER and EER to relational mapping, functional dependencies-properties and types, Normalization (Upto BCNF)	
<b>UNIT II</b>	<b>File Structure and Indexing</b>	(8)
	Definition of file, Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files ( Primary index, secondary index, clustering index),Multilevel indexing using B and B+ trees.	
<b>UNIT III</b>	<b>Structured Query Language</b>	(6)
	SQL Clauses (Order By, Group By, Having, Where), Concept of Subquery - rules, Subquery with select,insert ,update and delete statements),Join (Inner, Outer,Cross),View and types ,Indexing and types, PLSQL,Cursor and its types, Trigger and its types.	
<b>UNIT IV</b>	<b>Transaction management and Concurrency control</b>	(8)
	Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management. Recovery manager component – concept of log, recovery algorithms (deferred and immediate, shadow paging) Security	

**Course Outcomes:** - Students will be able to...

1. explain concepts of database Schema, Normalization and relational mapping.
2. evaluate database concepts and file structures and query language.
3. write the SQL queries for joining tables, sub query, PL/SQL Programs, Cursor Triggers etc.
4. evaluate the concept of Transaction management, deadlocks and concurrency control.

#### Reference Books:

1. R. Elmasri, S.B. Navathe, (2010), Fundamentals of Database Systems 6th Edition, Pearson Education.
2. R. Ramakrishanan, J. Gehrke,( 2002),Database Management Systems 3rd Edition, McGraw-Hill.
3. Silberschatz, H.F. Korth, S. Sudarshan, (2010), Database System Concepts 6th Edition, McGraw Hill SQL,PL/SQL
4. The Programming Language of ORACLE – Ivan Bayross. BPB publication 4thEdition

**Lab Course II: BCSP123: (based on Lab BCST121 And BCST122)**

**Course Objectives:** - Students should be able to...

1. learn advanced concepts of c language.
2. identify skills for writing complex programs using 'C'.
3. understand well-structured programs using C language
4. learn concept of normalization, Transaction Processing and to learn File Structure and Indexing.

Credits=2	SEMESTER-I BCSP113: Lab (based on BCST111 and BCST112)	No. of hours per unit/ Credits (60)
<b>Part A:</b>	<b>C Programming- II</b>	
	<ol style="list-style-type: none"> <li>1. Write a program to create, initialize and access a pointer variable.</li> <li>2. Write a program to swap two numbers using pointers.</li> <li>3. Write a program to calculate Fibonacci series using pointers.</li> <li>4. Create a structure program to input employee info(empno, name, salary) and display it on the screen.</li> <li>5. Create a structure which stores item information and Calculate the amount using formula amount = price * quantity.</li> <li>6. Write a program to create a structure of marks of 3 subjects and total for three students. Find the total of each student.</li> <li>7. Write a program to create union to input student info and display it.</li> <li>8. Write a program to create union to input student info and display it.</li> <li>9. Write a program to create union to input Employee info and display it.</li> <li>10. Write a C program to find current time using predefined Macros.</li> <li>11. Write a C program to Calculate area of circle using #define preprocessor.</li> <li>12. Write a program to read a file and count number of lines, number of characters and number of words in a given file.</li> <li>13. Write a program which writes book information into disk file and display book information on the screen.</li> </ol>	

Part B:	Relational Database Management Systems	
	<p>14. Programs on SQL Clauses  Create a table Employee, Department and apply order by, Group by, where, having clause.</p> <p>15. Programs on Sub query</p> <ol style="list-style-type: none"> <li>a. Select the names of employees whose salary is greater than the average salary of all employees in department 10.</li> <li>b. For each department, retrieve the department number, the number of employees in the department, and their average salary.</li> <li>c. For each project, retrieve the project number, the project name, and the number of employees who work on that project.</li> <li>d. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.</li> <li>e. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.</li> </ol> <p>16. Programs on Join –</p> <ol style="list-style-type: none"> <li>a. Create a table student and subject and course and apply cross, equi/inner, outer (left, right) Join.</li> <li>b. Create a table Employee, Product and perform join operation.</li> </ol> <p>17. Programs on View  Create a table student, Book and Create view (Read Only View and Updatable View)</p> <p>18. Programs on Index  Create a table student, Book and Create all types of Indexes (Simple,Composite,Duplicate,Unique)</p> <p>19. PLSQL</p> <ol style="list-style-type: none"> <li>a. Program to write PL SQL code to perform DML operation on table Area.</li> <li>b. Program to write PLSQL code to calculate even odd number.</li> <li>c. Program to write PLSQL code to calculate factorial of number.</li> </ol> <p>20. Cursor and Trigger  Create table Student and create cursor (implicit and explicit) on it.Create trigger on table Employee.</p>	

**Course Outcomes:** - Students will be able to...

1. Solve programs on basics of pointer, Structure and Union, File Handling, C Preprocessor.
2. Write student will acquire the program writing skill, technical skill.
3. demonstrate the PLSQL programming logic.
4. implement practical knowledge of SQL queries.

**Reference Books:**

1. Yashwant Kanetkar (2018) Let Us C, BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Ivan Bayross,(2012)SQL,PL/SQL The Programming Language of ORACLE BPB publication 4<sup>th</sup>Edition .
4. R. Elmasri, S.B. Navathe, (2010), Fundamentals of Database Systems 6th Edition, Pearson Education
5. A.Silberschatz, H.F. Korth, S. Sudarshan, (2010),Database System Concepts 6th Edition, McGraw Hill.
6. Jeri R. Hanly and Elliot B. Koffman (2009)Problem Solving and Program Design in C(6th Edition)
7. R. Ramakrishanan, J. Gehrke,(2002), Database Management Systems 3rd Edition, McGraw-Hill.

## Minor Syllabus

### Course Structure for B.Sc. I (Semester- I)

Theory				Practical				
Course Title	Course Code	Lecture per week	Credits	Course	Course Title	Course Code	Lecture per week	Credits
Fundamentals of Computer	BCST- 114	5	2	Practical -1	Fundamentals of Computer and Computer Programming-I Lab-I	BCSP - 116	4	2
Computer Programming-I	BCST- 115		2					

### Course Structure for B.Sc. I. (Semester- II)

Theory				Practical				
Paper Title	Paper Code	Lecture per week	Credits	Course	Paper Title	Paper Code	Lecture per week	Credits
Computer Programming-II	BCST- 124	5	2	Practical - 2	Computer Programming-II and SQL Programming Language Lab- II	BCSP - 126	4	2
SQL Programming Language	BCST- 125		2					

**Note:** B: B. Sc. T=Theory and P= Practical

**Structure and Title of Courses of B. Sc. Course:**

**\* B. Sc. I Semester I \***

<b>Course Number</b>	<b>Course Code</b>	<b>Course Name</b>
I	BCST- 114	Fundamentals of Computer
II	BCST- 115	Computer Programming-I
Lab-I	BCSP- 116	Fundamentals of Computer and Computer Programming-I Lab-I

**\* B. Sc. I Semester II\***

<b>Course Number</b>	<b>Course Code</b>	<b>Course Name</b>
III	BCST- 124	Computer Programming-II
IV	BCST- 125	SQL Programming Language
Lab-II	BCSP- 126	Computer Programming-II and SQL Programming Language Lab-II



## Syllabus

### B.Sc. I- Semester-I

#### Theory: Course I: BCST114: Fundamentals of Computer

**Course Objectives:** Students should be able to...

1. define basic concepts and terminology of computers.
2. understand operate desktop computers to carry out computational tasks.
3. learn working of Hardware and Software and the importance of operating systems.
4. identify programming languages, number systems, peripheral devices, networking, multimedia and internet concepts.

<b>Credits=2</b>	<b>SEMESTER-I</b> <b>Course I: BCST114: Fundamentals of Computer</b>	<b>No. of hours per unit/ credits</b>
<b>UNIT I</b>	<b>Introduction to Computers</b>	(8)
	Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer	
<b>UNIT II</b>	<b>Basic Computer Organization</b>	(8)
	Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	
<b>UNIT III</b>	<b>Software's and Operating System</b>	(7)
	Software and its needs, types of S/W. System Software: Operating System, utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi-tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux	
<b>UNIT IV</b>	<b>Computer Arithmetic and Data Communication</b>	(7)
	Binary, Binary Arithmetic, Number System: Positional & Non Positional, Binary, Octal, Decimal, Hexadecimal, Converting from one number system to another , Converting from one number system to another , Converting from one number system to another, Communication Process, Data Transmission speed, Communication Types (modes), Data Transmission Medias, Modem and its working, characteristics, Types of Networks, LAN Topologies, Computer Protocols, Concepts relating to networking	

**Course Outcomes:** Students will be able to...

1. describe basic concepts and terminology of information technology.
2. evaluate the fundamentals of personal computers and their operations.
3. maintain their small account using the computers and enjoy in the world of Information Technology
4. use the computer for basic purposes of preparing his personnel/business letters, viewing information on internet (the web), sending mails, preparing his business presentations, playing games etc.

**Reference Books:**

1. Guy Hart-Davis(2023) "The ABCs of Microsoft Office 97 Professional edition", BPB Publications.
2. Karl Schwartz(1998), "Microsoft Windows 98 Training Guide" BPB Publications.
3. C.S. French(1998) "Data Processing and Information Technology", BPB Publications
4. P.K Sinha (1992)`Computer Fundamentals`, BPB Publications

## B.Sc. I- Semester-I

### Theory: Course II: BCST115: Computer Programming-I

**Course Objectives:** Students should be able to...

1. define adequate knowledge on the need of programming languages.
2. study the need of problem-solving techniques.
3. understand programming skills using the fundamentals and basics of C Language.
4. learn to write algorithms and flowchart of programs in C and to solve the problems.

Credits=2	SEMESTER-I Course II: BCST115: Computer Programming-I	No. of hours per unit/ credits
UNIT I	<b>Introduction to 'C' language</b>	(8)
	Problem Solving definition, Step involving in problem solving, Algorithm, Characteristics, Flowcharts, Definition, Symbol, features. History of 'C' language, Structure of 'C' programs, 'C' Tokens, Character set and keywords, Constant and its type, Variable and its type Data types, Operators and its types, Precedence rules, Input/output using standard functions.	
UNIT II	<b>Branching and Looping</b>	(8)
	Conditional branching, if, if else, else if ladder, switch, Nested statements. Looping – for, while, do-while statements. Unconditional control statements- goto, break and continue.	
UNIT III	<b>Functions in C</b>	(7)
	Definition, types & parts of functions, Local and global variable, Library functions and User defined functions, Passing arguments to a function, return statement, recursion, Scope and lifetime of variables, Storage classes-Auto, Extern, Register, Static.	
UNIT IV	<b>Arrays in C</b>	(7)
	Array definition and declaration, initialization of arrays, types of arrays, String handling functions, Arrays and functions.	

**Course Outcomes:** students will be able to...

1. develop algorithm writing and flowchart drawing.
2. evaluate the compilation process and execution of any C Program.
3. analyse the use of Functions and Arrays to solve in real life applications.
4. apply the use of Arrays to solve in real life applications.

#### Reference Books:

1. Yashwant Kanetkar (2018)Let Us C,BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Jeri R. Hanly and Elliot B. Koffman (2009)Problem Solving and Program Design in C (6th Edition)
4. E. Balagurusamy (2008)Programming in ANSI C , McGraw Hill Education Edition 6
5. Peter van der Linden (1994)Expert C Programming: Deep C Secrets
6. Brian Kernighan and Dennis Ritchie (1988)The C Programming Language –, Pearson Education India , Edition 2

## Practical-I

### Lab Course I: BCSP116: based on (BCST114 and BCST115)

**Course Objectives:** students should be able to...

1. understand the basic concepts of computer system.
2. study the uses of computers in various fields
3. identify programming skills using the fundamentals and basics of C Language.
4. learn the student to write algorithms and flowchart of programs in C and to solve the problems.

Credits=2	SEMESTER-I BCSP116: Lab Course I	No. of hours per unit/ credits (60)
<b>Part A :</b>	<b>Fundamentals of Computer</b>	
	<ol style="list-style-type: none"> <li>1. Identification of the peripherals of a computer, components in a CPU and their functions.</li> <li>2. Assembling and disassembling the system hardware components of personal computer.</li> <li>3. Basic Computer Hardware Trouble shooting.</li> <li>4. Study of LAN and WiFi Basics.</li> <li>5. Basic Computer Proficiency-               <ol style="list-style-type: none"> <li>1. Familiarization of Computer Hardware Parts</li> <li>2. Basic Computer Operations and Maintenance.</li> <li>3. Do's and Don'ts, Safety Guidelines in Computer Lab</li> </ol> </li> <li>6. Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples.</li> <li>7. Verify the components of a typical computer system.</li> <li>8. Explore, maintain files, and customize the Window operating system.</li> <li>9. Integrate Word, Excel and PowerPoint to prepare business documents</li> <li>10. Study of basics of computer networks</li> </ol>	
<b>Part B :</b>	<b>Computer Programming- I</b>	
	<ol style="list-style-type: none"> <li>11. Write a program to accept 5 subject marks and calculate total marks, percentage and grade of student.</li> <li>12. Write program to perform arithmetic operations.</li> <li>13. Write a program to input n numbers and find the Odd and Even numbers.</li> <li>14. Write a program to find an age of a person (Input birth date and today date).</li> <li>15. Write a program to find the sum of first n natural numbers.</li> <li>16. Write a program to accept the range and generate Fibonacci Series.</li> </ol>	

	<p>17. Write a program to calculate sum of numbers using simple function.</p> <p>18. Write a program to calculate factorial of number using Recursion.</p> <p>19. Write a program to enter array elements and perform arithmetic operations</p> <p>20. Write a program to sort the numbers in ascending and descending order using array.</p>	
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**Course Outcomes:** - Students will be able to...

1. evaluate the fundamentals of personal computers and their operations.
2. maintain their small account using the computers and enjoy in the world of information technology
3. apply software's are available for C Programming and how to use the Editor for writing Program and how to execute it.
4. improve to write algorithms, flowcharts and programs on operators, Conditional Branching, Looping, Functions and Arrays.

**Reference Books:**

1. Guy Hart-Davis(1998), "The ABCs of Microsoft Office 97 Professional edition", BPB Publications,
2. Karl Schwartz(1998), "Microsoft Windows 98 Training Guide"
- 3.C.S. French(1998), "Data Processing and Information Technology", BPB Publications
- 4.P.K Sinha (1992), `Computer Fundamentals`, BPB Publications
5. Yashwant Kanetkar (2018), Let Us C,BPB Publications, Edition 18
6. Peter Prinz and Tony Crawford (2016), C in a Nutshell (2nd Ed.)
7. Jeri R. Hanly and Elliot B. Koffman (2009), Problem Solving and Program Design in C (6th Edition)
8. E. Balagurusamy (2008), Programming in ANSI C , McGraw Hill Education Edition 6

**B.Sc. I- Semester-II**  
**Theory: BCST124: Course III: Computer Programming-II**

**Course Objectives:** - Students should be able to...

1. understand a programming logic.
2. learn advanced concepts of c language.
3. identify skills for writing complex programs using ‘C’.
4. study and develop well-structured programs using C language

Credits=2	SEMESTER-II BCST124: Course III: Computer Programming-II	No. of hours per unit/ credits
<b>UNIT I</b>	<b>Pointers</b>	(8)
	Understanding the pointers, Definition and declaration, Operations on pointer, Pointer initialization, Pointer and function, Pointer and array, Call by value and Call by reference, Pointer and Character Strings, Dynamic memory allocation and deallocation.	
<b>UNIT II</b>	<b>Structure and Union</b>	(8)
	Definition and declaration, Structure initialization, Difference between structure and union, Array of structures, Arrays within Structures, structure and function, Nested structure, Pointer to structure, self-referential structure.	
<b>UNIT III</b>	<b>C Preprocessor</b>	(6)
	Preprocessor directives – file inclusion, macro substitution – simple, nested, argumented	
<b>UNIT IV</b>	<b>File Handling</b>	(8)
	Defining and opening a file, File opening modes- read, write, append, Closing a file, Input/Output Operations on file, Random access to files, command line arguments.	

**Course Outcomes:** - Students will be able to...

1. interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.
2. define union and enumeration user defined data types.
3. explore functional hierarchical code organization.
4. evaluate file handling mechanism, functions and create files at runtime.

**Reference Books:**

1. Yashwant Kanetkar (2018), Let Us C, BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016), C in a Nutshell (2nd Ed.)
3. Jeri R. Hanly and Elliot B. Koffman (2009), Problem Solving and Program Design in C (6th Edition)
4. E. Balagurusamy (2008), Programming in ANSI C, McGraw Hill Education Edition 6
5. Peter van der Linden (1994) Expert C Programming: Deep C Secrets

**B.Sc. I- Semester-II**  
**Theory: Course IV: BCST125: SQL Programming Language**

**Course Objectives:** Students should be able to...

1. learn fundamental concepts of data.
2. understand principles of databases.
3. identify the database management operation.
4. discuss the concept of procedure oriented, object-oriented programming languages, Database Management.

Credits=2	SEMESTER-II Course IV: BCST125: SQL Programming Language	No. of hours per unit/ credits
UNIT I	<b>Introduction to Database Management Systems</b>	(8)
	Definition of Database, Characteristics of database approach, data models, Importance of data models, ER Model, Relational Model, Network Model, Hierarchical Model, Object Oriented Model, Concept of DBMS, DBMS architecture and data independence.	
UNIT II	<b>Entity Relationship Modeling and Relational Data Model</b>	(7)
	Entities, Attributes and Entity Sets, Relation and Relationships sets, Features of E-R Model Relational Model - Basic concepts, Types of constraints (relational constraints), DFD and its Types, ERD and types of relationship	
UNIT III	<b>Relational Algebra and (Relational) Calculus</b>	(7)
	Preliminaries, Relational algebra operators, Operations on Relational Algebra Select, Project, Union, Set different, Cartesian product, Rename, Operations on Relational Calculus:- Tuple Relational Calculus, Domain Relational Calculus	
UNIT IV	<b>Basics of Structured Query Language</b>	(8)
	Basic SQL Queries – DDL (Create, Alter, Drop) Commands and DML (Insert, Update, Delete) Commands, Select Statement, Constraints (Primary Key, Foreign Key, Unique Key, Null, Check, Default, Super Key, Candidate Key), Datatypes, Operators, Functions.	

**Course Outcomes:** - students will able to...

1. apply the basics of data, information, system and Database.
2. evaluate basics of different database models for software development.
3. design the basics of Relational algebra operations and Relational Calculus.
4. demonstrate SQL basics and write queries to perform different operations on real world data.

**Reference Books:**

1. R. Elmasri, S.B. Navathe, (2010), Fundamentals of Database Systems 6th Edition, Pearson Education
2. R. Ramakrishanan, J. Gehrke,( 2002),Database Management Systems 3rd Edition, McGraw-Hill,
3. Silberschatz, H.F. Korth, S. Sudarshan, (2010), Database System Concepts 6th Edition, McGraw Hill
4. SQL,PL/SQL The Programming Language of ORACLE – Ivan Bayross. BPB publication 4<sup>th</sup>Edition

## Practical-II

### Lab Course II :BCSP126: Lab (based on BCST124 and BCST125)

**Course Objectives:** students should be able to...

1. learn advanced concepts of C language.
2. understand skills for writing complex programs using 'C'.
3. study of concept of normalization, Transaction Processing and to learn File Structure and Indexing.
4. identify the different types of SQL queries performed on data.

Credits=2	SEMESTER-II BCSP126:Lab Course II	No. of hours per unit/ credits(60)
<b>Part A :</b>	<b>Computer Programming II</b>	
	<ol style="list-style-type: none"><li>1. Write a program to create, initialize and access a pointer variable.</li><li>2. Write a program to swap two numbers using pointers.</li><li>3. Write a program to calculate Fibonacci series using pointers.</li><li>4. Create a structure program to input employee info(empno, name, salary) and display it on the screen.</li><li>5. Create a structure which stores item information and Calculate the amount using formula amount = price * quantity.</li><li>6. Write a program to create a structure of marks of 3 subjects and total for three students. Find the total of each student.</li><li>7. Write a program to create union to input student info and display it.</li><li>8. Write a program to create union to input student info and display it.</li><li>9. Write a program to create union to input Employee info and display it.</li><li>10. Write a C program to find current time using predefined macros</li><li>11. Write a C program to Calculate area of circle using #define pre-processor.</li><li>12. Write a program to read a file and count number of lines, number of characters and number of words in a given file.</li><li>13. Write a program which writes book information into disk file and display book information on the screen.</li></ol>	



<b>Part B :</b>	<b>SQL Programming Language</b>
	<ol style="list-style-type: none"> <li>14. Create table Student, Teacher, Book_dtls ,Product andperform all DDL and DML Commands.</li> <li>15. Perform calculations on above created tables Conditionspecification using Boolean and comparison operators (and, or, not,=,&lt;&gt;,&gt;,&lt;,&gt;=,&lt;=)</li> <li>16. Use Aggregate functions</li> <li>17. Use String handling functions.</li> <li>18. Create table and apply all constraints. <ol style="list-style-type: none"> <li>a. Create tables with relevant foreign key constraints</li> <li>b. Populate the tables with data</li> </ol> </li> <li>19. Display all the details of all employees working in thecompany and solve the following queries. <ol style="list-style-type: none"> <li>a. Display ssn, lname, fname, address of employees who workin department no 7.</li> <li>b. Retrieve the birthdate and address of the employee whosename is 'Franklin T. Wong'</li> <li>c. Retrieve the name and salary of every employee</li> <li>d. Retrieve all distinct salary values</li> <li>e. Retrieve all employee names whose address is in 'Bellaire'</li> <li>f. Retrieve all employees who were born during the 1950s</li> </ol> </li> <li>20. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)</li> </ol>

**Course Outcomes:-** Students will be able to...

1. apply basics of pointer, Structure and Union, File Handling, C Preprocessor.
2. evaluate how to implement theoretical knowledge of SQL into SQL queries.
3. create and write queries for any application software and able to handle database.
4. acquire the Relational Database Management skill, Concurrency Control mechanism.

**Reference Books:**

1. Yashwant Kanetkar (2018)Let Us C,BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Ivan Bayross,(2012)SQL,PL/SQL The Programming Language of ORACLE BPB publication 4thEdition .
4. R. Elmasri, S.B. Navathe, (2010),Fundamentals of Database Systems 6th Edition, Pearson Education
5. A.Silberschatz, H.F. Korth, S. Sudarshan, (2010),Database System Concepts 6th Edition, McGraw Hill.
6. Jeri R. Hanly and Elliot B. Koffman (2009)Problem Solving and Program Design in C (6th Edition)
7. R. Ramakrishanan, J. Gehrke,(2002), Database Management Systems 3rd Edition, McGraw-Hill.

**Open Elective (OE) Course Name: Digital Literacy**

**Semester – I**

**OE Course - I: BCST117: Digital Literacy- I**

**Course Objectives:** Students should be able to...

1. understand and identify basic computer operating skills.
2. study of basic system maintenance operations for hardware and software.
3. identify and use concepts, terminology of windows operating system.
4. Learn the basics of internet.

<b>Credits (Total Credits 2)</b>	<b>SEMESTER – I OE Course – I BCST117: Digital Literacy -I</b>	<b>No. of hours per unit</b>
<b>Unit - I</b>	<b>Introduction to computers</b> Introduction, definition of computer, parts of a computer, data processing cycle, hardware versus software, operating system.	<b>(08)</b>
<b>Unit – II</b>	<b>Windows interface</b> Introduction, windows series interface, windows properties, working with multiple windows, control panels.	<b>(08)</b>
<b>Unit – III</b>	<b>Windows explorer and applications</b> Introduction, explorer and my computer, windows applications, notepad, paint, character map, calculator, WordPad systems tools.	<b>(08)</b>
<b>Unit - IV</b>	<b>Introduction to Internet</b> Introduction, internet architecture, internet tools, browser configuration, accessing through Inter Explorer, MS Outlook-Mail Window, Customizing Outlook Express.	<b>(06)</b>

**Course Outcomes:** Students will be able to...

1. explore computer operating skills and techniques.
2. describe hardware and software component.
3. use applications of windows operating system and integrates software package.
4. evaluate basics of internet tools and browser configuration.

**Reference Books:-**

1. Dodge Mark, Swinford Echo, Couch Andrew, Schorr Ben M., MeltonBeth, Rusen Ciprian Adrian, Legault Eric. (2014),Microsoft Office Professional 2013 Step by Step.PHI Learning
2. Tanenbaum Andrew S.( 2002),Computer Networks. Pearson Professional Education
3. Jane Margolis and Allan Fisher, (2002),Unlocking The Clubhouse: Women in Computing,, MIT press
4. P.K. Sinha, (2004),Computer Fundamentals, BPB Fundamentals Digital Literacies: Concepts, Policies and Practices (New Literacies and DigitalEpistemologies)

## OE Course - II: BCST118: Digital Literacy -II

**Course Objectives:** Students should be able to...

1. understand the names and functions of the Word interface components.
2. learn how to construct formulas, including the use of built-in functions, and relative and absolute references.
3. identify the names and functions of the PowerPoint interface.
4. study the fundamentals of Internet, and the principles of web design.

Credits (Total Credits 2)	SEMESTER – I OE Course – II BCST118: Digital Literacy- II	No. of hours per unit
<b>Unit - I</b>	<b>MS-Word</b> Starting MS-Word, Document Window, Components of Document Windows, Create Documents, Open Documents, Locating Documents, Protecting Documents, Manipulating Text, Getting Help with MS-Word, Introduction, Viewing Documents, Formatting Text, Formatting Paragraphs, Formatting Pages, Desktop Publishing Features, Introduction, Mail Merger, Creating Main Document, Specifying the Data Source.	<b>(08)</b>
<b>Unit – II</b>	<b>Microsoft Excel</b> Introduction, Starting Excel, Excel Worksheet, navigating Worksheet Entering Data, Text, Numbers, entering data and time, Entering Formulas, Excel Functions - Selecting Cell Ranges, Creating Text Number and data Series, creating Text Series, using the Autofill features, Worksheet Formatting - Numbering Formatting, Custom Formats, Data & Time format, Changing Column width and Row width, Advanced features of Microsoft Excel - Using Formulas, Function & Macros-Entering Formulas, Entering Date and time formulas, Inserting Range Names in formulas, Entering Functions- Entering Function manually.	<b>(08)</b>
<b>Unit – III</b>	<b>PowerPoint</b> PowerPoint presentation screen, Rulers and Guides, creating a presentation using a Template, creating a blank presentation, opening and closing an existing presentation, inserting and deleting slides in a presentation, viewing a presentation, entering and editing text, enhancing text presentation, working with color and Line Style, adding headers and Footers, Modify and Refine a Presentation - Create and edit Tables, Create and modify Graphic Objects, Create Text Boxes, Work with Themes, Work with Slide Masters, Advanced features of Microsoft PowerPoint - Import an outline from Word and insert slides from another presentation, create a Chart Slide.	<b>(08)</b>

<b>Unit - IV</b>	<b>Networking and communication</b> Communication using the Internet: Basic of Computer networks; LAN, WAN; Concept of Internet; Applications of Internet; connecting to internet; What is ISP; Knowing the Internet; Basics of internet connectivity related troubleshooting, WWW and Web Browsers: World Wide Web; Web Browsing software, Search Engines, Understanding URL; Domain name; IP Address; Using e-governance website, Communications and collaboration: Basics of electronic mail; Getting an email account, Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.	<b>(06)</b>
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**Course Outcomes:** Students will be able to...

1. evaluate applications with the window elements of the Word Program.
2. demonstrate and export data from the Internet and merge the data in to Excel worksheets.
3. use design layouts and templates for presentations.
4. explore the fundamentals of Internet, and the principles of web design.

**Reference Books:-**

1. Albert Chipman, Aug 4 (2021), Microsoft Office 365 User Guide-A Complete User Manual for Beginners and Pro with Useful Tips & Tricks to Master the Microsoft Office 365 New Features for Easy Navigation.
2. Tech Demystified,( June 16, 2021),MICROSOFT ACCESS, EXCEL & POWER BI FOR BEGINNERS & POWER USERS: The Concise Microsoft Access, Excel & Power BI A-Z Mastery Guide for All Users
3. MICROSOFT WORD & POWERPOINT FOR BEGINNERS & POWER USERS 2021: The Concise Microsoft Word & PowerPoint A-Z Mastery Guide for All Users Paperback – May 11, 2021 by Tech Demystified
4. Behrouz A. Forouzan,(2007)DATA COMMUNICATIONS AND NETWORKING (SIE) | 4th Edition.

## OE Practical Course - I: BCSP119: Lab course (based on BCSP117 and BCST118)

**Course Objectives:** Students should be able to...

1. understand the concept of input and output devices of computers
2. study the architecture in terms of functions performed by different types of operating systems.
3. learn employment opportunities by proving skills in Microsoft Office and knowledge of working with Internet.
4. identify different advanced network technologies that can be used to connect different networks.

Credits (Total Credits 2)	SEMESTER – I OE Practical Course - I BCSP119: Lab based on BCSP117 and BCST118 List of Practical (15)	No. of hours per Practical (60)
1	Identify and use the following hardware parts and peripherals a. Printer, Scanner and Web Cam. b. Different Ports used in computer.	2
2	Booting the system and customize the desk top.	2
3	Do the following operations. a. Create a new folder and a file. b. Copy the created file to a new folder.	2
4	Identify and use the following hardware parts and peripherals. a. DVD Drive and USB Devices.	2
5	Search a specified content using internet, download it.	
6	Show different components of File Explorer.	2
7	Show the difference between Navigation pan, details pan and the address bar.	2
8	Create an application and prepare a neat curriculum Vitae for applying a job in a company. Apply Page format and Paragraph format to the above document and take the hard copy.	2
9	Prepare a mark list and find out Grade of each subject using functions and take the hard copy (Apply cell insertion deletion and merge).	2
10	Prepare a presentation with five slides including animation, insertion of scanned images.	2
11	Create an email id and send, receive and forward mails with attachments.	2
12	Create a file (document / worksheet/ presentation) and upload it in the pdf format.	2
13	Study of Difference between Hub, Switch, and Router	2
14	Study of Proxy Server and how do they protect the computer network	2
15	Study of different types of networks	2

**Course Outcomes:** Students will be able to...

1. explore basic word processing, Spreadsheet and Presentation Graphics Software skills.
2. explain different resource managements performed by operating system.
3. create error free documents like lecture scripts, notes, assignment, applications, projects, letters, question papers, books, e-books, and various educational materials.
4. interpret different network technologies and their application.

**Reference Books:**

1. P K Sinha (2004), Computer Fundamentals, BPB publication.
2. E Balagurusamy (2009), FUNDAMENTALS OF COMPUTERS, Mc Graw hill publisher.
3. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersey.
4. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

## Semester – II

### OE Course - III: BCSP127: Digital Literacy -III

**Course Objectives:** Students should be able to...

1. learn basic concepts of computer architecture and organization,
2. understand key skills of constructing cost-effective computer systems.
3. identify and familiarize the basic CPU organization.
4. study various memory devices and IO communication.

<b>Credits (Total Credits 2)</b>	<b>SEMESTER – II OE Course – III BCSP127: Digital Literacy -III</b>	<b>No. of hours per unit/credits</b>
<b>Unit - I</b>	<b>Structure of Computers</b> Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes. COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.	<b>(08)</b>
<b>Unit – II</b>	<b>Basic Computer Organization and Design</b> Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC	<b>(08)</b>
<b>Unit – III</b>	<b>Register Transfer and Micro-Operations</b> Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.	<b>(08)</b>
<b>Unit - IV</b>	<b>Memory System</b> Memory Hierarchy, Semiconductor Memories, RAM (Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID, Input Output: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.	<b>(06)</b>

**Course Outcomes:** Students will be able to...

1. evaluate various components of computer and their interconnection.
2. apply basic components and design of the CPU: the ALU and control unit.
3. compare and select various Memory devices as per requirement.
4. design various types of IO mapping techniques.

**Reference Books:**

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersey.
3. Andrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,
4. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill
5. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.



## OE Course - IV: BCSP128: Digital Literacy -IV

**Course Objectives:** Students should be able to...

1. understand Functions, Services and structure of Operating Systems.
2. identify the problem at the view level & ability to understand the physical structure of the database to handle data.
3. study of the solutions to the security needs of a business through risk compliance.
4. learn Project Management using IT tools & related applications.

Credits (Total Credits 2)	SEMESTER – II OE Course – IV BCSP128: Digital Literacy -IV	No. of hours per unit/credits
<b>Unit - I</b>	<p><b>Operating System:</b>  Basics of Operating System: Operating system, Basics of popular operating system (LINUX, WINDOWS);  The User Interface: Task Bar, Icons, Start Menu, Running an Application- notepad, paint etc, Operating System Simple Setting: Changing System Date And Time, Changing Display Properties, To Add Or Remove A Windows Component, Changing Mouse Properties, Adding and removing Printers;</p>	<b>(08)</b>
<b>Unit – II</b>	<p><b>Database Management Systems:</b>  Introduction to the concepts of database management system;  Creating a database;  Creating a Table: concepts of field, field types; entering data in a table, preview and print a table, changing row and column height; closing and opening of table, sorting of table, finding and replacing texts; using queries wizard; creating report from tables / queries from report wizard, modifying a report, printing of report; creating a form using wizard, entry in the forms; basic of formatting of forms and reports.</p>	<b>(08)</b>
<b>Unit – III</b>	<p><b>Cyber Security:</b>  Cyber Security: Basic concepts of threats, vulnerabilities, controls; risk; confidentiality, integrity, availability; security policies; security mechanisms; Data Security and protection: concept, creating strong passwords; how to stay safe when surfing on internet: “In private Browsing”, identifying secure website, clear cookies; Know about security threats from web sites like: viruses, worms, Trojan horses, spyware.  Understand the term malware; Netiquettes, DOS, DDOS; Netiquettes; Security Considerations: Be aware of the possibility of receiving fraudulent and unsolicited e-mail; phishing, Recognize attempted phishing;</p>	<b>(08)</b>
<b>Unit - IV</b>	<p><b>Applications of IECT: e-governance, Multimedia and Entertainment;</b>  Project Management using IT tools &amp; related applications  Introduction to Cloud Computing: What is cloud computing, Properties &amp; Characteristics, Service models, Deployment</p>	<b>(06)</b>

	models; Concepts of: IaaS (Infrastructure as a Service), PaaS (Platform as a Service), SaaS (Software as a service), DaaS (Desktop as a Service). e-Governance: Definition of e-Governance, Pillars of e-Governance, Infrastructure for e-Governance, Processing engineering and Governance, e-Governance project life cycle, electronically delivery of services, messaging system and case	
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**Course Outcomes:** Students will be able to...

1. explore GUI Based operating systems and its components, file management.
2. acquire skills in creating and developing forms, queries and reports.
3. evaluate security features & vulnerabilities and will be able to secure its network from attacks.
4. describe the concepts of cloud computing and mobile computing and explore the IT Act 2000 on the nature and operation of digital signatures.

**Reference Books:**

1. Sivarama P Dandamudi(2013)Fundamental of Computer Organization and Design, Springer, New York.
2. Ramez Elmasri, Shamkant B.Navathe, (2011), Database systems, 6th edition, Pearson Education.
3. P K Sinha (2004), Computer Fundamentals, BPB publication.
4. E Balagurusamy(2009), FUNDAMENTALS OF COMPUTERS, Mc Graw hill publisher.
5. Elmasri Navrate(2008), Fundamentals of Database Systems, Pearson Education.
6. Kevin Mitnick (Author), Robert Vamosi (Contributor), Mikko Hypponen(14 February 2017), The Art of Invisibility, Little, Brown and Company.

## OE Practical Course - II: BCSP129: Lab Course(based on BCST127 and BCST128)

**Course Objectives:** Students should be able to...

1. identify principles of computer organization and the basic architectural concepts.
2. understand the basic concepts and the applications of database systems
3. study the models, tools, and techniques for enforcement of security with some emphasis on the use of cryptography.
4. learn Project Management using IT tools & related applications.

<b>Credits (Total Credits 2)</b>	<b>SEMESTER – II OE Practical Course - II BCSP129: Lab based on BCST127 and BCST128 List of Practical (15)</b>	<b>No. of hours per Practical(60)</b>
<b>1</b>	Study of Computer Architecture characteristics	<b>2</b>
<b>2</b>	Mention important steps for computer design	<b>2</b>
<b>3</b>	Study of large number of registers are included in the CPU, and what is the most efficient way to connect them?	<b>2</b>
<b>4</b>	Mention what are the basic components of a Microprocessor	<b>2</b>
<b>5</b>	Study of the binary representation of instructions?	
<b>6</b>	understand Linux and its basic components	<b>2</b>
<b>7</b>	Study of the different operating systems	<b>2</b>
<b>8</b>	Data Definition Languages (DDL) Commands Of Base Tables and Views	<b>2</b>
<b>9</b>	Data Manipulation Language (DML) And DCL Command Of Base Tables And Views	<b>2</b>
<b>10</b>	Study of the features of firewall. Write the steps in providing network security and to set Firewall Security in windows.	<b>2</b>
<b>11</b>	What computers did you find running on the local network?	<b>2</b>
<b>12</b>	Search for unauthorized servers or network service on your network	<b>2</b>
<b>13</b>	Study of IECT Technology	<b>2</b>
<b>14</b>	Study of Digital Locker is a mobile application that allows citizens to store and access their personal documents and certificates in secure digital format using their mobile device.	<b>2</b>
<b>15</b>	Write the steps to make Microsoft Chrome as a default browser, Add Active-X Controls and Add-on to the Browser.	<b>2</b>

**Course Outcomes:** Students will be able to...

1. design a simple CPU with applying the theory concepts.
2. demonstrate the basic elements of a relational database management system.
3. develop basic understanding of security, cryptography, system attacks and defences against them.
4. evaluate the concepts of cloud computing and mobile computing and get an idea about e-Governance & its benefits.

### **Reference Books:**

1. Kevin Mitnick (Author), Robert Vamosi (Contributor), Mikko Hypponen(14 February 2017), The Art of Invisibility, Little, Brown and Company.
2. Sivarama P Dandamudi(2013)Fundamental of Computer Organization and Design,Springer,New York.
3. Ramez Elmasri, Shamkant B.Navathe, (2011),Database systems, 6th edition, Pearson Education.
4. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersey.
5. E Balagurusamy(2009),FUNDAMENTALS OF COMPUTERS,Mc Graw hill publisher.
6. ElmasriNavrate(2008), Fundamentals of Database Systems, Pearson Education.
7. P K Sinha (2004),Computer Fundamentals,BPB publication.
8. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

**Semester-I**  
**Indian Knowledge System (IKS)**  
**IKS101: History of Computers in India**

**Course Objectives: Student should be able to...**

- 1) understand design for a steam-powered, mechanical computer.
- 2) learn digital computing replaced analog methods.
- 3) study the evolution of indian programming languages
- 4) identify the story behind the modern computing

Credits=2	<b>SEMESTER-I</b> <b>History of Computers in India</b>	<b>No. of hours per unit/ credits</b>
<b>Unit I</b>	<b>Pre-Independence Era of Computers</b> Introduction: Computing in the Pre-industrial World, Establishment of the Tata Institute of Fundamental Research, Analog Computing in the 19th and early 20th, Introduction of electronic computers in India, Information Technology before 1945	7
<b>Unit II</b>	<b>Early Computing Initiatives</b> Development of the first indigenous electronic computer: HEC-2M, Role of F.C. Kohli in setting up the first computer manufacturing company in India, Computers and Culture in the 1960s, Early Computer Languages and Software	7
<b>Unit III</b>	<b>Era of Mainframes and Minicomputers</b> Introduction of mainframe and minicomputer technologies in India, Role of the Department of Electronics (DoE) in promoting computerization, Evolution of Indian programming languages (FORTRAN, COBOL)	8
<b>Unit IV</b>	<b>Modern Computing</b> Emergence of Indian IT companies and software exports, Role of NRIs in the growth of the Indian IT industry, Internet and Digital Revolution, Mobile computing and smartphone revolution in India, Artificial Intelligence (AI) and Machine Learning (ML) in Indian industries	8

**Course Outcomes: - Student will be able to ...**

- 1) design for a steam-powered, mechanical computer.
- 2) evaluate digital computing replaced analog methods.
- 3) gain the knowledge about evolution of Indian programming languages.
- 4) elaborate the story behind the modern computing.

**Reference Books:**

1. Martin Campbell-Kelly and William Aspray(2004),Computer: A History of theInformation Machine
2. Fred Turner(2006), Counterculture to Cyberculture (University of Chicago Press)
3. Martin Campbell-Kelly(2003),Airline Reservations to Sonic the Hedgehog: A Historyof the Software Industry (MIT Press)
4. Janet Abbate(1999), Inventing the Internet, (MIT Press)

## Skill Enhancement Course (SEC103)

### Photoshop Designer

#### Course Objectives: Student should be able to...

1. learn and demonstrate their understanding and skillful use of the elements and principles of visual design
2. understand skill to use the digital tools as a powerful means of communication for creation, modification & presentation.
3. identify aesthetic sensibilities into their works and explore ways to balance between formal theories with practical applications.
4. understand equipment functions and library resources related to the study of photoshop.

Credits (Total Credits 2)	SEMESTER-II Skill Enhancement Course (SEC): Photoshop Designer	No. of hours per unit/credits (15)
<b>UNIT-I</b>	<b>Introduction Variations in Photoshop applications</b>	<b>8</b>
	A) Introduction of graphics design. B) Types of graphics, Uses of graphics C) History of Photoshop D) software used for graphics designing: Adobe Photoshop cs2 Adobe Photoshop cs3, Adobe Photoshop cs4, Adobe Photoshop cs5, Adobe Photoshop cs6, Adobe Photoshop cc.	
<b>UNIT-II</b>	<b>Art and Visual Perception</b>	<b>7</b>
	A) Introduction of photoshop: Photoshop Workspace and Interface, Photoshop Tools, raster graphics and vector graphics, image formats, operations on image B) Photoshop Features: advertisement creation, wallpapers, websites, jewelry creation, fashion designing, animations and 3d effects software development and designs, photo modification purpose	

#### Course Outcomes: Students will be able to...

1. improve their design skills and techniques using a variety of tools.
2. illustrate the importance of designing and color theory.
3. demonstrate a thorough understanding of the elements of photoshop design.
4. evaluate visual forms and their aesthetic functions and basic design principles.

#### Reference Books:

1. Routledge (6 October 2008), Art and Design in Photoshop, 1st edition
2. Bittu Kumar (29 January 2013), Adobe Photoshop, V&S Publishers; Latest Revised Edition
3. Kogent Learning Solutions Inc. (1 January 2012), Photoshop CS6 in Simple SteDream tech Press

## Lab Course: Skill Enhancement Course (SEC103):Photoshop Designer

### Course Objectives: Student should be able to...

1. learn and applying Principals for photoshop.
2. study the ways to balance between formal theories with practical applications.
3. identify deep knowledge of Adobe photoshop cs2.
4. understand the fundamental concepts of photo editing.

Credits (1)	List of Practical's	No. of Hours (15)
1	Study of the graphics design software's, its types and uses	
2	Understand the menus of softwares	
3	Draw the elements of design: (line, shape, Forms, space, colors etc.)	
4	Study of the photoshop softwares	
5	Browse the image and resize the image in Adobe Photoshop.	
6	Perform the properties of image in photoshop.	
7	Design the logo.	
8	Design the images.	
9	Redesign an existing image.	
10	Drawing and sketching the image and logo.	
11	Sketching of natural and manmade objects and environment.	
12	Sketching of representational Drawing.	
13	Draw the image and use color Correction property in it.	
14	Add the Text property in Adobe photoshop.	
15	Understand the features and 3D effects	

### Course Outcomes: students will be able to...

1. demonstrate in between drawing and execution with squash and stretch, staging, arc, principle.
2. create organize content and sequences for photo editing.
3. evaluate a thorough understanding of the elements of photoshop design.
4. create advanced editing techniques for documentary.

### Reference Books:

1. Routledge (6 October 2008), Art and Design in Photoshop, 1st edition
2. Bittu Kumar (29 January 2013), Adobe Photoshop, V&S Publishers; Latest Revised Edition
3. Kogent Learning Solutions Inc. (1 January 2012), Photoshop CS6 in Simple Steps, Dreamtech Press

**Semester-II**  
**Value Education Course**  
**VEC104: Course Title: Environmental Sociology**

**Course objectives: Students should be able to...**

1. have a sound conceptual, theoretical and empirical background to the issues of environment.
2. learn environmental issues in the indian context.
3. understand the concept of sustainable development and resource management.
4. identify opportunities for preparation of further research in the area.

Credits (2)	Theory Paper (VEC104)	No. of hours per unit
<b>Credit – Unit I:</b>	<b>Environment and Sociology</b>	<b>(6)</b>
	1.1 Introduction to Sociology and Environment 1.2 Environment in Classical Sociological Tradition 1.3 Sociology’s response to environmental issues	
<b>Credit – Unit II</b>	<b>Environmental Sociology in India</b>	<b>(8)</b>
	2.1 Environmental Sociology in India. 2.2 Environmentalism and Environmental Movement in India 2.3 Ideological Trends in Indian Environmentalism 2.4 Environmental movements in local perspective	
<b>Credit – Unit III</b>	<b>Environmental Sociology around the world</b>	<b>(8)</b>
	3.1 Environmentalism around the world: Past and Present 3.2 Contemporary Environmental Movements 3.3 Environmental Movements in Global Perspectives	
<b>Credit – Unit IV</b>	<b>Sustainable Development and Sociology</b>	<b>(8)</b>
	4.1 The Concept of Sustainability 4.2 Environment and Sustainable Development 4.3 Resource, Property and Resource Governance Regimes 4.4 Environmental Democracy and Climate Change	

**Course Outcomes: Students will be able to...**

1. explain the main concepts, theories, debates and empirical practices on the interaction between environment and society.
2. describe current theoretical and empirical debate on environmental movements and sustainable resource management practices.
3. evaluate policies and practices concerning environmental governance and sustainable development.
4. apply different theories and methodologies of research in different contexts relevant to environment and sustainable development.



## Reference Books:

1. Gould, Kenneth Alan and Tammy L Lewis(2009), Twenty Lessons in Environmental Sociology. New York: Oxford University Press.
2. Hanningan, John(2006), Environmental Sociology: A Social Constructionist Perspective. Oxan: Routledge.
3. Bell, Michael Mayerfeld(2004), An Invitation to Environmental Sociology. Thousand Oaks, California: Pine Forge Press.
4. Dunlap, R.; Frederick H. Buttel, Peter Dickens and August Gijswijt. (Ed.)(2002), Sociological Theory and the Environment: Classical Foundations, Contemporary Insights. Boston: Rowman & Littlefield.
5. Hanningan, John(1996), Environmental Sociology. Oxan: Routledge.
6. Barry, John(1999), Environment and Social Theory. Oxan: Routledge.