Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad
Department of Computer Science
BSc-I Computer Science (Optional)
Syllabus

1. **TITLE :** COMPUTER SCIENCE

2. **YEAR OF IMPLEMENTATION:** New Syllabi for the B.Sc. I Computer Science will be implemented from June 2019 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 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 OBJEVTIVES 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.
    - The duration of course shall be of Three years.
6. **PATTERN :** Semester (CBCS)

7. **MEDIUM OF INSTRUCTION :** ENGLISH

8. **STRUCTURE OF COURSE :**

SEMESTER - I

		Theory				Practical	
Sr. No.	SUBJECT TITLE	PAPER NO and Paper Code	No. of lectures per week	Credits		No. of lectures Per week	Credits
1	Computer Science	Paper-I: BCST101	5	4	Practical Paper – I : BCSP103	4	2
		Paper-II: BCST102					

Paper I : C Programming - I
Paper II : Database Management System
Practical Paper-I : C Programming – I and Database Management System

SEMESTER - II

| Sr. No. | SUBJECT TITLE | PAPER NOandPaper Code | Theory | | | | Practical | |
			No. of lectures Per week	Credits		No. of lectures Per week	Credits
1	Computer Science	Paper-III: BCST201	5	4	Practical Paper – II : BCSP203	4	2
		Paper-IV: BCST202					

Paper III : C Programming - II
Paper IV : RelationalDatabase Management System
Practical Paper-II : C Programming – II and Relational Database Management System

Semester -I

BCST101: Paper I: C Programming-I

Learning Objectives:

1. To impart adequate knowledge on the need of programming languages.
2. To teach the need of problem solving techniques.
3. To develop programming skills using the fundamentals and basics of C Language.
4. To teach the student to write algorithms and flowchart of programs in C and to solve the problems.

Unit I :Introduction to 'C' language (12L)

Step involving in problem solving, Problem definition, 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 :Branching and Looping (8L)

Conditional branching, if, if else, switch, Nested statements. Looping – for, while, do-while statements. Unconditional control statements, break and continue.

Unit III :Functions (8L)

Definition, declaration, Local and global variable, Library functions and User defined functions, recursion, Scope and lifetime of variables, Storage classes-Auto, Extern, Register, Static.

Unit IV: Arrays (8L)

Array definition and declaration, initialization of arrays, One, Two and multidimensional array, String handling functions, Arrays and functions.

Recommended Books: (Unit wise)

1. Let Us C – YashwantKanetkar ,BPB Publications, Edition 15 (Unit I – (Pg. 1-18), Unit III –(Pg. 135-151),Unit IV – (Pg. 239-257))

2. Programming in ANSI C , E. Balagurusamy McGraw Hill Education Edition 6 (Unit I (Pg. 1-97,213-254) Unit II (Pg. 99-155),Unit III (Pg. 32 & 213-254), Unit IV – (Pg.159-187))

3. Programming in C – Schuam outline Series (Unit I (Pg. 2.1-4.40), Unit II (Pg. 6.1-6.65) ,Unit III (Pg.7.1-7.41),Unit IV (Pg.9.1- 9.47))

4. The C Programming Language – Brian Kernighan and Dennis Ritchie , Pearson Education India , Edition 2 (Unit II,III) Series (Unit II (Pg. 6.1-6.65) ,Unit III (Pg.7.1-7.41)

Learning Outcomes:

Unit 1 :
   1. Students should understand importance and use of algorithm and flowchart drawing.
   2. Students should learn algorithm writing and flowchart drawing.
   3. Student should understand the compilation process and execution of any C Program.

Unit 2:
   1. Students should write basic programs on variables, Control Statements and looping.

Unit 3:
   1. Students should understand the use of Functions and Arrays to solve in real life applications.

Unit 4:
   1. Students should understand the use of Arrays to solve in real life applications.
   2. Students should write simple programs using C language and will help them to develop programming logic.

BCST102 Paper II: Database Management System

Learning Objectives:
   1. To teach fundamental concepts of data.
   2. To teach principles of databases.
   3. To teach database management operation.
   4. To adapt the concept of procedure oriented, object oriented programming languages, Database Management.

Unit I: Introduction to Database Management Systems   (8L)

Characteristics of database approach, data models – ER Model, Relational Model, Network Model, Hierarchical Model, Object Oriented Model, DBMS architecture and data independence.

Unit II:Entity Relationship Modeling and   Relational Data Model   (9L)

Entities, Attributes and Entity Sets, Relation and Relationships sets, Features of E-R Model Relational Model - Basic concepts, relational constraints, DFD and its Types, ERD and types of relationship

Unit III:Relational Algebra and Relational Calculus   (8L)

Operations on Relational Algebra Select, Project, Union, Set different, Cartesian product, Rename, Operations on Relational Calculus:- Tuple Relational Calculus, Domain Relational Calculus

Unit IV:Basics of Structured Query Language   (11L)

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.

Recommended Books: (Unit wise)

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010 (Unit I (Pg. 29-85), Unit II (Pg.199-284))
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002. (Unit I (Pg. 3-45), Unit II (Pg.40-94),Unit III (Pg.100-126),Unit IV(Pg.130-167))
3. .Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010. (Unit I (Pg. 1-30), Unit II (Pg.27-81),Unit III (Pg.87-133),Unit IV(Pg.141-177))
4. SQL,PL/SQL The Programming Language of ORACLE – Ivan Bayross. BPB publication 4thEdition . (Unit IV (Pg. 114-199))

Learning Outcomes:-
Unit 1 :
1. Students should learn the basics of data, information, system and Database.
2. Students should understand basics of different database models for software development.
Unit 2 :
1. Students should understand the Key concepts of Database and importance and use of DFD and ERD.
Unit 3 :
1. Students should understand the basics of Relational algebra operations and Relational Calculus & learn how to implement it in real data.
Unit 4 :
1. Students should understand basics of SQL Language and write SQL queries to perform different operations on real world data.

Practical-I
BCSP103: Lab Course I (C Programming-I and Database Management System)

Learning Objectives:

1. To understand computer programming and its roles in problem solving
2. To understand and develop well-structured programs using C language
3. To develop programming skills using the fundamentals and basics of C Language.
4. To teach the student to write algorithms and flowchart of programs in C and to solve the problems.
5. To teach principles of databases.
6. To teach database management operation.

Part A :

Exercise No. 1. Simple C Programs on Operators

(Sample Programs)

1. Write a program to accept 5 subject marks and calculate total marks, percentage and grade of student.
2. Write program to perform arithmetic operations.

Exercise No.2. Programs on Conditional Branching (If Else Statement , Nested If)

(Sample Programs)

1. Write a program to input n numbers and find the Odd and Even numbers.
2. Write a program to check number is positive and negative.

3. Write a program to find an age of a person (Input birth date and today date).

Exercise No.3. Programs on Looping(For , While , Do While).

(Sample Programs)

1. Write a program to find the sum of first n natural numbers.
2. Write a program to accept the range and generate Fibonacci Series.
3. Write a program to find prime numbers between given range.

Exercise No.4.Programs on Functions.

(Sample Programs)

1. Write a program to calculate sum of numbers using simple function.
2. Write a program to find prime number using function.
3. Write a program to calculate factorial of number using Recursion.

Exercise No.5. Programs on Arrays.

(Sample Programs)

1. Write a program to enter array elements and perform arithmetic operations
2. Write a program to sort the numbers in ascending and descending order using array.
3. Write a program to find the product of given two matrices.
4. Write a program to create a function to find the given number is Armstrong or not.

Part B :

ExerciseNo.1 Programs on DDL and DML Commands

(Sample Programs)

1. Create table Student, Teacher, Book_dtls ,Product and perform all DDL and DML Commands.

ExerciseNo.2 Programs on Operators

(Sample Programs)

1. Perform calculations on above created tables Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)

Exercise No.3 Programs on Functions

(Sample Programs)

Aggregate functions, String handling functions.

Exercise No.4 Programs on Constraints.

(Sample Programs)

1. Create table and apply all constraints.
2. Create tables with relevant foreign key constraints
3. Populate the tables with data

Exercise No.5 Perform the following queries on the database :

(Sample Programs)

1. Display all the details of all employees working in the company.
2. Display ssn, lname, fname, address of employees who work in department no 7.
3. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'
4. Retrieve the name and salary of every employee
5. Retrieve all distinct salary values
6. Retrieve all employee names whose address is in 'Bellaire'
7. Retrieve all employees who were born during the 1950s

8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)

Books Recommended:
1. Let Us C – Yashwant Kanetkar ,BPB Publications, Edition 15
2. Programming in ANSI C , E. Balagurusamy McGraw Hill Education Edition 6
3. Programming in C – Schuam outline Series
4. The C Programming Language – Brian Kernighan and Dennis Ritchie , Pearson Education India , Edition 2
5. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010
6. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002
7. .Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
8. SQL,PL/SQL The Programming Language of ORACLE – Ivan Bayross. BPB publication 4thEdition .

Learning Outcomes:-
1. Student should learn which software's are available for C Programming and how to use the Editor for writing Program and how to execute it.
2. Student should understand how to simple C programs.
3. Student should write algorithms, flowcharts and programs on operators, ConditionalBranching, Looping, Functions and Arrays.
4. Student should learn how to solve any mathematical problem using C Programs.
5. Programming in C should increase the programming logic of Students.
6. Student should learn which softwares are available for RDBMS and how to use the Editor for writing query and how to execute it.
7. Student should understand how to implement theoretical knowledge of SQL into SQL queries.
8. Student should write queries based on, DDL and DMLcommands, operators, Functions and Constraints.
9. Student should learn how to implement Database models.

Semester -II

BCST201 Paper III: C Programming – II

Learning Objectives:

1. To develop a programming logic.
2. To teach advanced concepts of c language.
3. To develop skills for writing complex programs using 'C'.
4. To understand and develop well-structured programs using C language

Unit I: Pointers   (12L)

Definition and declaration, Operations on pointer, Pointer initialization, Pointer and function, Pointer and array, Call by value and Call by reference. Dynamic memory allocation and deallocation, command line arguments

Unit II:Structure and Union   (10L)

Definition and declaration, Difference between structure and union, Array of structures, structure and function, Nested structure, Pointer to structure, self-referential structure.

Unit III:C Preprocessor   (4L)

Preprocessor directives – file inclusion, macros – simple, nested, argumented.

Unit IV:File Handling   (10L)

Defining and opening a file, File opening modes- read, write, append, Closing afile, Input/Output Operations on file, Random access to files.

Recommended Books: (Unit wise)

1. Let Us C – YashwantKanetkar ,BPB Publications, Edition 15 (Unit I (Pg. 157-168), Unit II (Pg.211-235),Unit III (Pg.323-326))
2. Programming in ANSI C , E. Balagurusamy McGraw Hill Education Edition 6 (Unit I (Pg. 280-307), Unit II (Pg.363-372),Unit III (Pg.257-276),Unit IV(Pg.309-327))
3. Programming in C – Schuam outline Series (Unit I (Pg. 10.1-10.71), Unit III (Pg.11.1-11.78),Unit IV(Pg.12.1-12.37))
4. The C Programming Language – Brian Kernighan and Dennis Ritchie , Pearson Education India , Edition 2 (Unit I (Pg. 93-122), Unit II (Pg.88-93) ,Unit IV (Pg.127-149))

Learning Outcomes:-
Unit 1:
   1. Students should understand basics of Memory allocation for variables and Pointers.
Unit 2:
   1. Students should understand Basics of preprocessor directives and its use.
Unit 3:
   1. Students should understand the basics of Structure and Union and its use.
Unit 4:
   1. Students should understand File handling mechanism, functions and create files at runtime.
Unit 1,2,3,4:
   1. Students should write simple programs to complex programs.
   2. Students should develop simple applications of real life using structures and files, Arrays, Pointers etc.

BCST202 Paper IV: Relational Database Management System

Learning Objectives:
   1. To teach concept of normalization.
   2. To teach Transaction Processing.
   3. To teach File Structure and Indexing.
   4. To teach the knowledge of RDBMS into real life data.
   5. To teach the different types of SQL queries performed on data.

Unit I: Database design   (6L)

Database Schema, Data Dictionary, ER and EER to relational mapping, functional dependencies, Normalization (Up to BCNF)

Unit II:File Structure and Indexing   (8L)

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.

Unit III:Structured Query Language   (10L)

SQL Clauses (Order By, Group By, Having, Where) Subquery, Join (Inner, Outer, Cross),View and types ,Indexing and types, PLSQL,Cursor and its types, Trigger and its types

Unit IV:Transaction management and Concurrency control   (12L)

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 – role of DBA, security mechanisms – mandatory and discretionary.

Recommended Books: (Unit wise)

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010. (Unit I (Pg.29-36,286-294), Unit II (Pg.583-668) ,Unit III(Pg.87-137),Unit IV (Pg.743-827)
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002. (Unit I (Pg.605-639), Unit II (Pg.271-299) ,Unit IV (Pg.517-573)
3. A.Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010. (Unit II (Pg.393-493) ,Unit IV (Pg.563-637)
4. SQL,PL/SQL The Programming Language of ORACLE – Ivan Bayross. BPB publication 4thEdition. (Unit I (Pg. 1-7))

Learning Outcomes:-

Unit 1: Students should understand concepts of database Schema, Normalization and relational mapping and how to implement it in real data.

Unit 2: Data. Students should learn the file structure and indexing mechanism of data.
Unit 3: Student should write the sql queries for joining tables, sub query, PL/SQL Programs, Cursor Triggers etc.
Unit 4: Student should learn the concept of Transaction management, deadlocks and concurrency control.
BCSP203: Lab Course II (C Programming – II and Relational Database Management System)

Learning Objectives:

1. To teach advanced concepts of c language.
2. To develop skills for writing complex programs using 'C'.
3. To understand and develop well-structured programs using C language
4. To teach concept of normalization, Transaction Processing.
5. To teach File Structure and Indexing.
6. To teach the knowledge of RDBMS into real life data.
7. To teach the different types of SQL queries performed on data.

Part A:

Exercise No.1 Programs on Pointers
(Sample Programs)
1. Write a program to create, initialize and access a pointer variable.
2. Write a program to swap two numbers using pointers.
3. Write a program to calculate Fibonacci series using pointers.

Exercise No.2 Programs on Structure and Union

(Sample Programs)
1. Create a structure program to input employee info(empno, name, salary) and display it on the screen.
2. Create a structure which stores item information and Calculate the amount using formula amount = price * quantity.
3. Write a program to create a structure of marks of 3 subjects and total for three students. Find the total of each student.
4. Write a program to create union to input student info and display it.

Exercise No.3 Programs on Union
(Sample Programs)
1. Write a program to create union to input student info and display it.
2. Write a program to create union to input Employee info and display it.

Exercise No.4 Programs on File Handling
(Sample Programs)
1. Write a program to read a file and count number of lines, number ofcharacters and number of words in a given file.
2. Write a program which writes book information into disk file and display book information on the screen.

Exercise No.5 Programs on C Preprocessor
(Sample Programs)
1. Write a C program to find current time using predefined macros
2. Write a C program to Calculate area of circle using #define preprocessor.

Part B:
Exercise No.1. Programs on SQL Clauses
(Sample Programs)
1. Create a table Employee, Department and apply order by , Group by, where ,having clause.

Exercise No.2 Programs on Sub query.
(Sample Programs)
1. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
2. For each department, retrieve the department number, the number of employees in the department, and their average salary.
3. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
4. Change the location and controlling department number for all projects having more Than 5 employees to 'Bellaire' and 6 respectively.
5. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.

Exercise No.3 Programs on Join
(Sample Programs)
1. Create a table student and subject and course and apply cross, equi/inner, outer (left, right) Join.
2. Create a table Employee, Product and perform join operation.

Exercise No.4 Programs on View
(Sample Programs)
1. Create a table student, Book and Create view (Read Only View and Updatable View)

Exercise No.5 Programs on Index, PLSQL, Cursor Trigger

(Sample Programs on Index)
   1. Create a table student, Book and Create all types of Indexes (Simple,
      Composite, Duplicate, Unique)
(Sample Programs on PL SQL)
   1. Program to write PL SQL code to perform DML operation on table Area.
   2. Program to write PLSQL code to calculate even odd number.
   3. Program to write PLSQL code to calculate factorial of number.
(Sample Programs on cursor and trigger)
   1. Create table Student and create cursor (implicit and explicit) on it.
   2. Create trigger on table Employee.

Learning Outcomes:-
   1. Student should solve programs on basics of pointer, Structure and Union, File Handling, C
      Preprocessor.
   2. Student should write simple applications to solve any real life problem.
   3. Due to program writing student will acquire the program writing skill, technical skill.
   4. Programming in C should increase the file programming logic of Students.
   5. Student should understand how to implement theoretical knowledge of SQL into SQL
      queries.
   6. Student should write queries for any application software and able to handle database.
   7. Due to query writing student will acquire the Relational Database Management skill,
      Concurrency Control mechanism.
   8. Student should learn which software's are available for RDBMS and how to use the Editor
      for writing query and how to execute it.
   9. Student should write queries based on SQL Clauses, sub query, Join,
      View,Index,PL/SQL,and Cursor, Trigger.

Books Recommended :

   1. 1. Let Us C – YashwantKanetkar ,BPB Publications, Edition 15
   2. 2. Programming in ANSI C , E. Balagurusamy McGraw Hill Education Edition 6
   3. Programming in C – Schuam outline Series
   4. 4. The C Programming Language – Brian Kernighan and Dennis Ritchie , Pearson Education
      India ,   Edition 2.
   5. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson
      Education, 2010
   6. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill,
      2002.
   7. A.Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw
      Hill, 2010.
   8. SQL,PL/SQL The Programming Language of ORACLE – Ivan Bayross. BPB publication
      4th Edition .

Nature of Question Paper:

   3. CCE-I : Marks =10: Unit 1 : Descriptive short questions (2X5)
   4. CCE-II: Marks =10: Unit 2 and3: Multiple Choice questions : Online Examination: (1X10)
   5. ESE: Marks =50: Unit 1 to 4:
      Multiple Choice questions (1 X10)
      Attempt any two out of three (2X10=20)
      Attempt any four out of six(4X5=20)

      (ACCE- Comprehensive Continuous Evaluation, ESE – End Semester Examination)