

**Rayat Shikshan Sanstha's**  
**Sadguru Gadage Maharaj College, Karad**  
**Department of Computer Science**  
**Syllabus for Bachelor of 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 2022 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.
- The duration of course shall be of Three years.

**6. PATTERN :** Semester (CBCS)

**7. MEDIUM OF INSTRUCTION :** ENGLISH

**8. STRUCTURE OF COURSE :**

**1. FIRST SEMESTER—(NO.OF PAPERS2)**

**Sem-I**

		Theory		
Sr. No.	Subject Name	PAPER NO and Subject Code	No. of lectures per week	Credits
1	Computer Science	Paper-I: BCST22- 101	5	4
		Paper-II: BCST22- 102		

**2. SECOND SEMESTER—(NO.OF PAPERS2)**

**Sem-II**

Sr. No.	SUBJECT Name	Theory				Practical	
		PAPER NO and Subject Code	No. of lectures Per week	Credits		No. of lectures Per week	Credits
1	Computer Science	Paper-III: BCST22-201	5	4	Practical Paper – I : BCSP22-203	4	2
		Paper-IV: BCST22-202					

**3. STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:**

**B.Sc. I Semester I**

**Paper I :** Problem Solving using Computers

**Paper II :** Database Management System

**B.Sc. I Semester II**

**Paper III :** Programming Skills Using ‘C’

**Paper IV :** Relational Database Management System

**Practical Paper-I Based on :**

**BCST22-101, BCST22-102, BCST22-201, BCST22-202**

**Semester -I**

**Theory:BCST22-101: Paper I: Problem Solving using Computers**

**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 – 1 Problem Solving Using Computers**

**(15 hrs.)**

(A) Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

(B) Logical Continuum of Program of Programming : Linux Operating System and C Language, Introduction to GCC Compiler, Components of Compilation Process, Getting Used to the Data Types , Built-In Standard Library, Nitty-Gritty of Programming, structures, Algorithm, Pseudocode, Procedure, Program, C Program Structure, Vi Editor, Whittling the First 'C' Program, Checking Whether the Compiler Is Working, Execution of Make file, Variable Declaration , Input / Output Statement, Format Specifiers, Escape Sequences.

**Unit – 2 Control Structures and Arrays**

**(15 hrs.)**

(A) Decision Making and Looping Constructs: Introduction, The if Statement, The if-else Statement, Nested if-else, The Switch Case Statement, The while Loop, The odd Loop (do while), the for Loop, Loop Control Statements, Infinite Loop.

(B) Arrays: Features, Definition, Types of Arrays, Single-Dimensional Array, TwoDimensional Array, Multi-Dimensional Array.

**Recommended Books: (Unit wise)**

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

**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:**

Students should write basic programs on variables, Control Statements and looping.

**Unit 3:**

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.

## Theory :BCST22-102 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 – 1 Introduction to Database Management Systems (15 hrs.)

Characteristics of database approach. Data models: Hierarchical, Network, Relational, Schema and Instances, DBMS architecture: Three Schema Architecture, Internal, Conceptual, External, Data independence: Logical, Physical.

### Unit – 2 Entity Relationship and Enhanced ER Modeling (15 hrs.)

Entity: Entities: Domain, Attributes, Tuples, Relations, Entity Relationships: one-one, one-many, many-one, many-many, and SQL-99: Schema Definition, Constraints: Domain Integrity, Entity, Referential, And Concept of Object modeling.

### Recommended Books: (Unit wise)

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

### 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 :

Students should understand the Key concepts of Database and importance and use of DFD and ERD.

#### Unit 3 :

Students should understand the basics of Relational algebra operations and Relational Calculus & learn how to implement it in real data.

#### Unit 4 :

Students should understand basics of SQL Language and write SQL queries to perform different operations on real world data.

## Semester -II

### Theory:BCST22-201 Paper III: Programming Skills Using 'C'.

#### 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 – 1 Pointers and Functions:

(15 hrs.)

(A)Pointers: Pointer Data Type, Pointer Declaration, Pointer Initialization, Arrays and Pointers, Pointers and One-Dimensional Arrays, Pointers and Two-Dimensional Arrays

(B)Programming for Functional Functions: Introduction, Function Declaration, Function Definition, Function Call, Nested Functions Recursion.

#### Unit – 2 Structures and File Handling:

(15 hrs.)

(A)Structure and Dynamic Memory Allocation: User-Defined Data Types, Defining Structure, Nesting of Structure, Dynamic Memory Allocation,.

(B)File Handling: Defining and opening a file, File opening modes- read, write, append, closing a file, Input/Output Operations on file: getc(), putc(), getw(), putw(), fprintf(), fscanf(), ftell(), fseek(), rewind().

#### Recommended Books: (Unit wise)

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

#### 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.

## Theory: BCST22-202 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 – 1 Relational Data Model

(15 hrs.)

Basic concept, Relational constraint: not null, unique, primary, foreign, check, Relational algebra: Select, Project, Union, Intersection, Difference, SQL queries: DDL : create, alter, drop, DML : insert, update, delete, DQL : select. SQL operator: Logical, relational, in, between, like, not, is null. SQL Clauses: Where, Order by, Group by, Having, Aggregate Functions :SUM, MAX, MIN, COUNT, AVG.

### Unit – 2 Database design

(15 hrs.)

Entity Relationship (ER) : Basic Structures of Entity Relationship (ER), Symbols, Construction of ER Diagram, Example: Library Management System, EER to relational mapping: Concept of Extended Entity Relationship Diagram (EER), Specialization, Generalization, Aggregation. Functional dependencies: Key, Primary, Super Key, Candidate Key, Functional Decomposition. Normal forms : First NF (1NF), Second NF (2NF), Boyce-Codd NF (BCNF) Third NF (3NF).

### Recommended Books: (Unit wise)

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

### 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

## **BCSP22-203 PRACTICAL PAPER – I (Maximum Marks: 50) (Credits 02)**

### **Computer Science Practical Paper**

#### **Based on BCST22-101 and BCST22-102, BCST22-201 and BCST22-202.**

Practical: Four lectures of 48 minutes (3.2 hrs) per week per batch.

#### **Practical Experiments:**

##### **Based on Based on BCST22-101 and BCST22-102.**

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
  - Grade A: Percentage  $\geq 80$
  - Grade B: Percentage  $\geq 70$  and  $< 80$
  - Grade C: Percentage  $\geq 60$  and  $< 70$
  - Grade D: Percentage  $\geq 40$  and  $< 60$
  - Grade E: Percentage  $< 40$
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci sequence.
5. WAP to print palindrome numbers between given range.
6. WAP to find sum of the following series for n terms:  $1 - 2/2! + 3/3! - \dots - n/n!$
7. WAP to sort given array in ascending as well as descending order.
8. WAP to calculate the sum and product of two compatible matrices.
9. WAP to check whether a given number is prime or not using nested function by introducing factorial function. "P is prime number if and only if  $(P-1)! + 1$  is divisible by P".
10. WAP to calculate factorial of given number using recursive function.
11. WAP to dynamically allocate memory of n items to an integer pointer, display their sum and average.
12. WAP to swap two numbers using function (call by reference).
13. WAP to dynamically allocate memory of n items to a character array, end it with '\0' and count number of vowels, consonants and spaces in it.
14. WAP to using user defined data type structure to store information of a student rollno, name, and percentage. Create array of 10 students and display students having percentage  $> 70$ .
15. WAP to copy content of text file into another text file.
16. WAP to count number of lines and characters of given text file.



**Based on Based on BCST22-201 and BCST22-202**

**Note: MySQL may be used.**

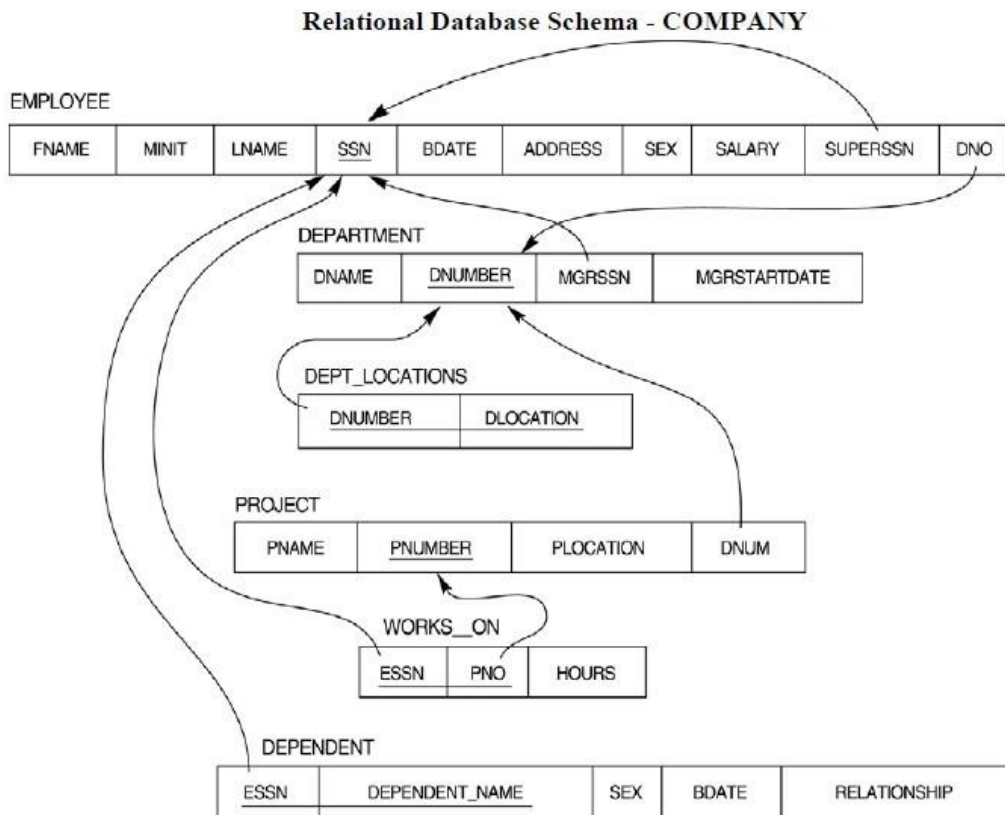
The following concepts must be introduced to the students:

**DDL Commands**

- Create table, alter table, drop table

**DML Commands**

- Select , update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or,not,=,<>,>,<,>=,<=)
- Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by..... having
- Arranging using order by



**Questions to be performed on above schema**

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
4. Display all the details of all employees working in the company.
5. Display ssn, lname, fname, address of employees who work in department no 7.
6. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'
7. Retrieve the name and salary of every employee
8. Retrieve all distinct salary values
9. Retrieve all employee names whose address is in 'Bellaire'
10. Retrieve all employees who were born during the 1950s
11. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000 (inclusive)
12. Retrieve the names of all employees who do not have supervisors
13. Retrieve SSN and department name for all employees
14. Retrieve the name and address of all employees who work for the 'Research' department
15. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.
16. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
17. Retrieve all combinations of Employee Name and Department Name
18. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
19. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
20. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
21. Select the names of employees whose salary does not match with salary of any employee in department 10.

22. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
23. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
24. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
25. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
26. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
27. For each department, retrieve the department number, the number of employees in the department, and their average salary.
28. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
29. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
30. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
31. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
32. Delete all dependents of employee whose ssn is '123456789'.
33. Delete an employee from Employee table with ssn = '12345' ( make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL.
34. Perform a query using alter command to drop/add field and a constraint in Employee table.

## 7.EXAMINATION SCHEME

**Theory:** Theory examination will be conducted at the end of each semester. Paper: Duration: 2 Hrs. Maximum Marks: 50. Minimum for passing: 40%.

**Practical:** Practical Examination will be conducted annually towards the end of Second Term of every Academic year. Duration: 4 hours, Maximum Marks: 50. Minimum for passing: 40%.

### End Semester Examination (ESE) :

#### Nature of Theory Question Paper :

(Maximum Marks 40)

- |   |                         |
|---|-------------------------|
| 1. Choose correct alternatives                | 8 Marks (Each 1 mark)   |
| 2. Attempt any two out of three sub questions | 16 Marks (Each 8 marks) |
| 3. Attempt any four out of six sub questions  | 16 Marks (Each 4 marks) |

#### Nature of Practical Examination: (Maximum Marks 50) (Credits 02)

The Practical Examination in Computer Science is conducted at end of each Academic year (Annually) which will be based on Paper **BCST22-101 and BCST22-102, BCST22-201 and BCST22-202** of 4 hours duration and of 50 maximum marks. There will be four questions, out of these student has to attempt Any Two questions. The marks distribution for the practical paper is given below:

#### Practical Paper - I

- |                                 |                                |
|---------------------------------|--------------------------------|
| Each question carries           | : 20 marks (20 x 2 = 40 marks) |
| Certified Journal carries       | : 5                            |
| Viva based on practical carries | : 5                            |

#### Comprehensive Continuous Evaluation:

CCE 10 Marks - Descriptive short questions (2 X 5)

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

**Chairman**  
**BOS, Computer Science**

**Principal**  
**S.G.M. College, Karad**

## Syllabus for Bachelor of Science Part-II

### STRUCTURE OF COURSE :

#### THIRD SEMESTER— (NO.OF PAPERS2)

##### Sem-III

Sr. No.	Subject Name	Theory		
		PAPER NO and Subject Code	No. of lectures per week	Credits
1	Computer Science	Paper-V: BCST22-301	6	4
		Paper-VI: BCST22-302		

#### 1. FOURTH SEMESTER—(NO.OF PAPERS- 2)

##### Sem-IV

Sr. No.	SUBJECT Name	Theory				Practical	
		PAPER NO and Subject Code	No. of lectures Per week	Credits		No. of lectures Per week	Credits
1	Computer Science	Paper-VII: BCST22-401	6	4	Practical Paper – III : BCSP22-403	8	2
		Paper-VIII: BCST22-402					

#### 2. STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:

##### B.Sc. II Semester III

**Paper V : BCST22-301 :** PHP and MySQL

**Paper VI : BCST22-302:** Object Oriented Programming Using C++

##### B.Sc. II Semester IV

**Paper VII : BCST22-401:** Cyber Security Essentials-I

**Paper VIII : BCST22-402:** Data Structure Using C++

**Practical Paper-II : BCSP22-403 based on:**

**BCST22-301, BCST22-302, BCST22-401, BCST22-402**

## Syllabus for Bachelor of Science Part-III

### STRUCTURE OF COURSE :

#### 1. FIFTH SEMESTER—(NO.OF PAPERS – 4)

#### Sem-V

		Theory		
Sr. No.	SUBJECT TITLE	PAPER NO and Paper Code	No. of lectures per week	Credits
1	Computer Science	Paper-IX: BCST501	12	8
		Paper-X: BCST502		
		Paper-XI: BCST503		
		Paper-XII: BCST50X (Elective:BCST504/505/506)		
		SECCCST507	01	01
		AECCCST	03	02

### STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:

#### B.Sc. III Semester V

**Paper IX : BCST22-501:** Core Java

**Paper X: BCST22-502:** C# Programming

**Paper XI : BCST22-503:** Linux part- I

**Paper XII : BCST22-504:** Python Part -I

**SECCCST507: Numerical Skill:** Programming with SCILAB

**SECCCSP510:** Programming with SCILAB LAB

**AECCCST :** English

**2. SIXTH SEMESTER—(NO.OF PAPERS - 4)**

**Sem-VI**

Sr. No.	SUBJECT TITLE	Theory				Practical	
		PAPER NO and Paper Code	No. of lectures per week	Credits		No. of lectures Per week	Credits
1	Computer Science	Paper-XIII: BCST22-601	12	8	Practical Paper III	20	4
		Paper-XIV: BCST22-602					
		Paper-XV: BCST22-603					
		Paper-XVI: BCST22-60X (Elective:BCST22-604/605/606)					
		SECCCST22-607	01	01	SECCCSP610	02	01
		AECCCST	03	02	-	-	-

**STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:**

**B.Sc. III Semester VI**

**Paper XIII : BCST22-601:** Advance Java

**Paper XIV: BCST22-602:** ASP .NET

**Paper XV : BCST22-603:** Linux Part- II

**Paper XVI : BCST22-604:** Python Part -II

**Practical Paper-IV: BCSP22-608:** Based on BCST22-501, BCST22-502,BCST22-601,BCST22-602

**Practical Paper-V: BCSP22-609:** Based on BCST22-503,BCST22-504,BCST22-603,BCST22-604

**Practical Paper-VI: BCSP22-610:** Industrial Project

**SECCCST607:** Entrepreneurship Development Program

**AECCCST:**English

**BCST/Pxyz:**

B: B.Sc.

CS: Computer Science

T: Theory

P: Practical

x: Semester I to VI

yz: 01 to 10

**SECC:** Skill Enhancement Compulsory Course

**AECC:** Ability Enhancement Compulsory Course

**Chairman**

**BOS Computer Science**