Yashavantrao Chavan Institute of Science, Satara(Autonomous)
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 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

7. **MEDIUM OF INSTRUCTION :** ENGLISH

8. **STRUCTURE OF COURSE:**
   1. **FIRST SEMESTER—**

Sem-I

Level	Semester	Course	Course Title	Course Category	No. of Lectures Per Week	Credits
5	I	Computer Science	BCST101:C Programming I	Theory Paper -I	05	04
			BCST102: Database Management Systems	Theory Paper -II		
			C Programming I and Database Management Systems lab	Practical Paper - I	04	02
		Electronics	BET101:Fundamental of Electronics and Network Analysis	Theory Paper -I	05	04
			BET102:Semiconductor Devices	Theory Paper -II		
			Fundamental of Electronics and Network Analysis and Semiconductor Devices lab	Practical Paper - I	04	02

		Mathematics	BMT101:Differential Calculus I	Theory Paper -I	05	04
			BMT102:Differential Equations I	Theory Paper -II		
			Differential Calculus I and Differential Equations I lab	Practical Paper -I	04	02
		Statistics	BST101:Descriptive Statistics-I	Theory Paper -I	05	04
			BST102:Elementary Probability Theory	Theory Paper -II		
			Descriptive Statistics-I and Elementary Probability Theory lab	Practical Paper -I	04	02
		AECC- I	English for communication	Theory Paper -I	05	04
		SEC- I	Database Analyst	-	02	01
		VBC	Yoga and Health	TH	02	01
Total Credits of Semester - I						**30**

2. SECOND SEMESTER—

Sem-II

Level	Semester	Course	Course Title	Course Category	No. of Lectures Per Week	Credits
5	II	Computer Science	BCST201:C Programming II	Theory Paper –III	05	04
			BCST202:Relational Database Management Systems	Theory Paper –IV		
			C Programming II and Relational Database Management Systems lab	Practical Paper –II	04	02
		Electronics	BET201:Digital Electronics	Theory Paper –III	05	04
			BET202:Electronic Circuits	Theory Paper –IV		
			Digital Electronics and Electronic Circuits lab	Practical Paper –II	04	02
		Mathematics	BMT201: Differential Calculus II	Theory Paper –III	05	04
			BMT202:Differential Equations II	Theory Paper –IV		
			Differential Calculus II and Differential Equations II Lab	Practical Paper –III	04	02
		Statistics	BST201:Descriptive Statistics-II	Theory Paper –III	05	04
			BST202:Probability and Probability Distribution	Theory Paper –IV		
			Descriptive Statistics-II and Probability and Probability Distribution lab	Practical Paper –II	04	02
		AECC- II	English for Communication	Theory Paper -II	05	04
		SEC- II	Database Analyst		02	02
Total Credits of Semester - II						**30**

Evaluation Pattern:

Sem-I

Level	Semester	Course	Course Title	Course Category	Internal Evaluation			ESE	Total Marks	Credits
					ISE-I	Mid Semester	ISE-II			
5	I	C1	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		C2	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		C3	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		C4	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		AECC-I	English	Theory Paper -I	10	20	10	60	100	04
		SEC- I	Database Analyst		--	05	--	20	25	01
		VBC			--	05	--	20	25	01
								Total	**650**	**30**

Sem-II

Level	Semester	Course	Course Title	Course Category	Internal Evaluation			ESE	Total Marks	Credits
					ISE-I	Mid Semester	ISE-II			
5	II	C1	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		C2	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		C3	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		C4	DSC-1	Theory Paper -I	05	10	05	30	100	04
			DSC-2	Theory Paper -II	05	10	05	30		
			Practical-1	Practical Paper -I	--	--	--	25	25	02
		AECC-I	English	Theory Paper -I	10	20	10	60	100	04
		SEC- I	Database Analyst		--	10	--	40	50	02
								Total	**650**	**30**

Syllabus

B.Sc.I- Semester-I

Theory :BCST101: Paper I: C Programming-I

Course Objectives: Students will be able to…
1. impart adequate knowledge on the need of programming languages.
2. evaluate the need of problem-solving techniques.
3. develop 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=4	SEMESTER-I BCST101: Paper I: C Programming-I	No. of hours per unit/ credits
Credit –I UNIT I	**Unit I : Introduction to 'C' language**	(12)
	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.	
Credit –I UNIT II	**Unit II : Branching and Looping**	(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.	
Credit –I UNIT III	**Unit III : Functions**	(8)
	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.	
Credit –I UNIT IV	**Unit IV: Arrays**	(8)
	Array definition and declaration, initialization of arrays, types of arrays, String handling functions, Arrays and functions.	

Course Outcomes:

At the end of this course, students should be able to:
1. Learn algorithm writing and flowchart drawing.
2. Understand the compilation process and execution of any C Program.
3. Analyse the use of Functions and Arrays to solve in real life applications.
4. Understand the use of Arrays to solve in real life applications.

Reference Books: (Unit wise)

1. Let Us C – Yashwant Kanetkar ,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)

B.Sc.I- Semester-I
Theory :BCST102 :Paper II: Database Management Systems

Course Objectives: Students will be able to-
1. learn fundamental concepts of data.
2. evaluate principles of databases.
3. create database management operation.
4. adapt the concept of procedure oriented, object-oriented programming languages, Database Management.

Credits=4	SEMESTER-I **BCST102: Paper II: Database Management Systems**	No. of hours per unit/ credits
Credit –I UNIT I	**Unit I: Introduction to Database Management Systems**	(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.	
Credit –I UNIT II	**Unit II: Entity Relationship Modeling and Relational Data Model**	(9)
	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	
Credit –I UNIT III	**Unit III: Relational Algebra and (Relational) Calculus**	(8)
	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	
Credit –I UNIT IV	**Unit IV: Basics of Structured Query Language**	(11)
	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: -At the end of this course, students should able to:
1. Learn the basics of data, information, system and Database.
2. Understand basics of different database models for software development.
3. Design the basics of Relational algebra operations and Relational Calculus.
4. Remember SQL basics and write queries to perform different operations on real world data and identify the purpose of query processing and optimization and also demonstrate the basic of query evaluation.

Reference 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))

Practical-I

BCSP103:Lab Course I (C Programming I and Database Management Systems)

Course Objectives: students will be able to:
1. understand computer programming and its roles in problem solving.
2. remember and develop well-structured programs using C language.
3. develop 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 BCSP103:Lab Course I	No. of hours per unit/ credits(30)
Part A :	**C Programming I**	
	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 :	**Database Management Systems**
	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)

Course Outcomes:-

At the end of this course, students should be able to:

1. learn which software's are available for C Programming and how to use the Editor for writing Program and how to execute it.
2. write algorithms, flowcharts and programs on operators, Conditional Branching, Looping, Functions and Arrays.
3. learn which software's are available for RDBMS and how to use the Editor for writing query and how to execute it.
4. Understand and formulate query, using SQL, solutions to a broad range of query and data update problems.

Reference Books:

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 .

Course Objectives:- Students will be able to-

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

Credits=4	SEMESTER-II BCST201 Paper III: C Programming-II	No. of hours per unit/ credits
Credit –I UNIT I	**Unit I: Pointers**	(12)
	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.	
Credit –I UNIT II	**Unit II: Structure and Union**	(10)
	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.	
Credit –I UNIT III	**Unit III: C Preprocessor**	(4)
	Preprocessor directives – file inclusion, macro substitution – simple, nested, argumented.	
Credit –I UNIT IV	**Unit IV: File Handling**	(10)
	Defining and opening a file, File opening modes- read, write, append, Closing afile, Input/Output Operations on file, Random access to files, command line arguments.	

Course Outcomes:- At the end of this course, students should be able to:

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

Reference 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))

B.Sc.I- Semester-II
Theory: BCST202 Paper IV: Relational Database Management Systems

Course Objectives: students will be able to:

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

Credits=4	SEMESTER-II BCST202 Paper IV: Relational Database Management Systems	No. of hours per unit/ credits
Credit –I UNIT I	**Unit I: Database design**	(6)
	Database Schema, Data Dictionary, ER and EER to relational mapping, functional dependencies-properties and types, Normalization (Upto BCNF)	
Credit –I UNIT II	**Unit II: File Structure and Indexing**	(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.	
Credit –I UNIT III	**Unit III: Structured Query Language**	(10)
	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.	
Credit –I UNIT IV	**Unit IV: Transaction management and Concurrency control**	(12)
	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 ,security mechanisms – mandatory and discretionary.	

Course Outcomes:-

At the end of this course, students are able to:

1. Understand the E R model and relational model.
2. Understand database concepts and file structures and query language.
3. Use a data definition language and utilities to implement the schema using a DBMS.
4. Use an SQL interface of relational DBMS package to create, maintain and query a database.

Reference 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))

Practical-II

BCSP203:Lab Course II(C Programming – II and Relational Database Management Systems)

Course Objectives: students will be able to:

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

Credits=2	SEMESTER-II BCSP203:Lab Course II	No. of hours per unit/ credits(30)
Part A :	**C Programming II**	

	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 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.
	
	Exercise No.5 Programs on File Handling (Sample Programs)
	  1. Write a program to read a file and count number of lines, number of characters 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.	

Part B :	Relational Database Management Systems	

	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 and 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.	

Course Outcomes:-

At the end of this course, students should be able to:

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

Reference Books:

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 .