



RANI CHANNAMMA UNIVERSITY

BELAGAVI

**REVISED CURRICULUM FRAMEWORK FOR
UNDER GRADUATE COURSE**

STRUCTURE & SYLLABUS OF BACHELOR OF SCIENCE

COMPUTER SCIENCE

1ST TO 2ND Semesters

w.e.f.

Academic Year 2024-25 and Onwards

Submitted by

Chairman,
Board of Studies (UG),
Bachelor of Computer Science
Rani Channamma University, Belagavi.

Curriculum Structure for B.Sc. Computer Science of RCUB w.e.f 2024-25

Category	Course Code	Title of the Paper	Marks			Hours / Week	Credits	Duration of Exams (Hrs.)
			IA	SEE	Total			
SEMESTER I								
DSC 1	SEPBSCCST01	Fundamentals of Computer with Programming in C	20	80	100	04	3	03
	SEPBSCCSP01	C Programming Lab	10	40	50	04	2	03
TOTAL: HOURS / CREDIT					150	08	5	
SEMESTER II								
DSC 2	SEPBSCCST02	Data Structures using C	20	80	100	04	3	03
	SEPBSCCSP02	Data Structures using C Lab	10	40	50	04	2	03
TOTAL: HOURS / CREDIT					150	08	5	

Year	I	Course Code: SEPBSCCST01	Credits	03
Semester	I	Course Title: Fundamentals of Computer with Programming in C	Hours	48
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Outcomes	<p><i>After completing this course satisfactorily, a student will be able to:</i></p> <ul style="list-style-type: none"> ○ Confidently operate Laptop/Desktop Computers to carry out computational tasks. ○ Understand working of Hardware and Software and the importance of operating systems. ○ Understanding the concept of programming languages. ○ Read, understand and trace the execution of programs written in C language. ○ Write the C code for any complex and real-time problems. ○ Write programs that perform operations matrices using Arrays & Strings. ○ Write programs using pointer concepts for efficient memory usage. ○ Create user defined functions to strengthen the C Library. 			
Unit No.	Course Content			Hours
UNIT I	<p>Fundamentals of Computers: Introduction, Definition, History of Computers, Generations of Computers, Classification of Computers, Characteristics of Computers, Basic Organization of a Computer, Software, Types of Software, Overview of Operating System. Number Systems – different types, conversion from one number system to another;</p> <p>Introduction to C Programming: History of C, Features of C; Programming Languages and its Classification; Compiler, Interpreter, Linker, and Loader; Problem Solving Techniques; Flowcharts; Algorithms; Basic Structure of a C Program; Executing a C Program; Examples of flow charts and algorithms - Largest of three numbers, Reversing the digits of an integer, GCD of two integers, generating prime numbers, computing nth Fibonacci numbers.</p>			10
UNIT II	<p>Overview of C: C Character set; C Tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Declaration of Storage Class; Assigning Values to Variables, Symbolic constant, Declaring a Variable as Constant</p> <p>Operators & Expression: Introduction; Arithmetic Operators; Relational Operators; Logical Operators; Assignment Operators; Increment & Decrement Operators; Conditional Operator; Bitwise Operators; Special Operators; Arithmetic Expressions; Evaluation of Expressions; Type Conversion; Operator Precedence and Associativity; Standard Mathematical functions.</p>			10

UNIT III	<p>Input/output Functions: Formatted I/O Functions - printf and scanf; Unformatted I/O Functions – getch(), putch(), getche(), getchar(), putchar(), gets(), puts().</p> <p>Control Structures:</p> <p>Decision Making & Branching: Introduction; Decision making with Simple if; if-else; Nesting of if-else; else-if ladder, switch; and goto statement</p> <p>Decision Making & Looping: Introduction; while loop; do-while loop; for loop, Nested loops; jumps in loops - break, continue, return, exit.</p>	10
-----------------	--	----

UNIT IV	<p>Arrays: Introduction; One-dimensional Arrays; Declaration of One-dimensional Arrays; Initialization of One-dimensional Arrays; Two-dimensional Arrays; Initializing Two-dimensional Arrays; Multi-dimensional Arrays; Dynamic Arrays; Passing Arrays to Functions.</p> <p>Strings: Introduction; Declaring & Initializing String Variables; Reading Strings from Terminal; Writing Strings to Screen; String Handling Functions - strlen, strcmp, strcpy, strrev and strcat; Character handling functions - toascii, toupper, tolower, isalpha, isnumeric etc.</p>	08
----------------	---	----

UNIT V	<p>Pointers in C: Introduction; Understanding Pointers; Accessing the Address of a Variable; Declaring Pointer Variables; Initialization of Pointer Variables; Accessing a Variable through its Pointer; Chain of Pointers; Pointers and Arrays.</p> <p>User defined functions: Introduction; Need for user defined functions; Elements of User-Defined Functions; Definition, Categories of Functions - No Arguments and No Return Values, Arguments but No Return Values, Arguments with Return Values, No Arguments but Returns a Value; Nesting of Functions; Recursion; The Scope, Visibility and Lifetime of Variables.</p> <p>User defined data types: Defining a Structure; Declaring Structure Variables; Accessing Structure Members; Structure Initialization; Arrays of Structures; Unions; Difference between Structure & Union; Bit Fields.</p>	10
---------------	--	----

Recommended Learning Resources

Text Books:

1. Computer Concepts and Programming in C (UPTU): E. Balaguruswamy.
2. Computer Fundamentals and Programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.
3. Brian W. Kernighan and Dennis M. Ritchie - The ‘C’ Programming Language, Prentice Hall of India.

Reference Books:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (SixthEdition), BPB Publication
2. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
3. Kernighan & Ritche: The C Programming Language(PHI)
4. Yashwant Kanitkar: Let us C

Year	1	Course Code: SEPBSCCSP01	Credits	02
Semester	1	Course Title: C Programming Lab	Hours	48
Course Pre-requisites, if any		Knowledge of C Programming Language		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 03hrs.	

PRACTICE LABS

- The following activities be carried out/ discussed in the lab during the initial period of the semester.
 - Basic Computer Proficiency
 - Familiarization of Computer Hardware and Software.
 - Basic Computer Operations and Maintenance.
 - Do's and Don'ts, Safety Guidelines in Computer Lab
- Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples.
- Type Program Code, Debug and Compile basic programs covering C Programming fundamentals discussed during theory classes.

PART A:

1. Write a C Program to read radius of a circle and to find area and circumference
2. Write a C Program to read three numbers and find the biggest of three.
3. Write a C Program to demonstrate library functions in *math.h*
4. Write a C Program to check for prime.
5. Write a C Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
6. Write a C Program to display the following by reading the number of rows as input,


```

1
  1 2 1
    1 2 3 2 1
      1 2 3 4 3 2 1
      
```
7. An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs.100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
8. Write a C Program to find the roots of quadratic equation (demonstration of switch-case statement)
9. Write a C program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
10. Write a C Program to remove Duplicate Element in a single dimensional Array
11. Program to perform addition and subtraction of Matrices

PART B:

1. Write a C Program to find the length of a string without using built in function
2. Write a C Program to demonstrate string functions - strlen, strcmp, strcpy, strev and strcat.
3. Write a C Program to demonstrate pointers in C
4. Write a C Program to check a number for prime by defining isprime()function
5. Write a C Program to read, display and to find the trace of a square matrix
6. Write a C Program to read, display and multiply two m x n matrices using functions.
7. Write a C Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
8. Write a C Program to Reverse a String using Pointer
9. Write a C Program to Swap Two Numbers using Pointers
10. Write a C Program to demonstrate student structure to read & display records of n students.
11. Write a C Program to demonstrate the difference between structure &union.

Instructions:

1. Certified Journal is mandatory for every student to appear the practical examination.
2. Student has to execute a minimum of 8 programs from each part to complete the Lab course.
3. Based on practical internal test of 10 marks shall be awarded.

Year	II	Course Code: SEPBSCCST02	Credits	03
Semester	II	Course Title: Data Structure Using C	Hours	48
Course Pre-requisites, if any		Knowledge of C Programming.		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Objectives	<p>After completing this course satisfactorily, a student will be able to:</p> <ul style="list-style-type: none"> ○ To explain Fundamentals of Data Structures and their Applications. ○ To illustrate representation of Different Data Structures such as Arrays, Stack, Queues, Linked Lists, Trees and Graphs. ○ To Design and Develop Solutions to problems using Linear Data Structures ○ To discuss applications of Nonlinear Data Structures in problem solving. ○ Problem solving using Dynamic memory allocation concepts. ○ To introduce advanced Data structure concepts such as Binary Search Trees 			
Unit No.	Course Content			Hours
UNIT I	<p>Introduction to Data Structures: Definition; Classification of Data Structures - Primitive & Non-primitive, Linear and Non-linear; Operations on Data Structures; Abstract Data Type; Different Approaches to Designing an Algorithm; Control Structures Used in Algorithms; Time and Space Complexity.</p> <p>Arrays: Introduction; Declaration; Initialization; Accessing the Elements of an Array; Storing Values in Arrays; Operations on arrays; Types of arrays; Arrays as Abstract Data Types (ADT);</p>			10
UNIT II	<p>Representation of Linear Arrays in memory; Traversing Linear Arrays; Inserting and Deleting elements; Sorting – Bubble sort, Selection sort, Merge Sort, Insertion sort, Quick sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching;</p> <p>Stacks: Introduction; Definition and Array Representation of Stacks; Operations on Stacks; Applications of Stacks; Infix, Postfix and Prefix notations; Conversion from infix to postfix using stack; Evaluation of postfix expression using stack;</p>			9
UNIT III	<p>Queues: Introduction; Definition and Array Representation of queues; Types of Queues – Simple Queues, Circular Queues, Double ended Queues, Priority Queues; Operations on Ordinary queue;</p> <p>Recursion: Definition; Types of recursions; Recursion Technique Examples - Fibonacci numbers, GCD, Binomial coefficient ${}^n C_r$, Towers of Hanoi; Comparison between Iterative and Recursive functions.</p>			9

UNIT IV	<p>Dynamic Memory Allocation: Static & Dynamic Memory Allocation; Memory allocation and De-allocation functions - malloc, calloc, realloc and free.</p> <p>Linked List: Introduction - Basic Terminologies, Linked Lists versus Arrays, Memory Allocation and De-allocation for a Linked List; Representation of Linked List, Types of Linked Lists - Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked List and Header Linked List; Representation of Linked list in Memory; Operations on Singly Linked Lists – Traversing, Searching, Inserting, Deleting;</p>	10
UNIT V	<p>Trees: Definition; Tree Terminologies – Node, Root Node, Leaf Node, Path, Ancestors of a Node, Siblings, Descendant node, Terminal & Non-Terminal Nodes, Degree of a Node, Level Number, In-degree, Out-degree; Types of Trees;</p> <p>Binary tree: Terminology; Types of Binary Trees - Strict Binary Tree, Complete Binary Tree, Binary Search Tree and Heap Tree; Representation of Binary Tree in Memory. Traversal Of Binary Tree – Pre-order, In-order and Post-order Traversal;</p>	10

Recommended Learning Resources

Text Book:

1. Data Structures Using C - Reema Thareja, 2nd Edition, Published in India by Oxford University Press.
2. Data Structures Using C - Samir Kumar Bandyopadhyay, Kashi Nath Dey, Pearson Education.
3. Data Structures with C – Seymour Lipschutz, Tata McGraw-Hill Education Private Limited.
4. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014

Reference Books:

1. Padma Reddy: Data Structure Using C, 2019, CENGAGE INDIA
2. Tanenbaum: Data structures using C (Pearson Education)
3. Ellis Horowitz and SartajSahni: Fundamentals of Data Structures
4. Kamathane: Introduction to Data structures (Pearson Education)
5. Y. Kanitkar: Data Structures Using C(BPB)
6. Kottur: Data Structure Using C
7. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGrawHill Education,2007)

Year	II	Course Code: SEPBSCCSP02	Credits	02
Semester	II	Course Title: Data Structures Using C Lab	Hours	48
Course Pre-requisites, if any		Knowledge of C Programming		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	

PART A:

1. Write a C program to read one dimensional array, and print sum of all elements along with inputted array elements using Dynamic Memory Allocation.
2. Write a C Program to Display Pascal Triangle using Binomial function.
3. Write a C Program to find GCD using recursive function.
4. Write a C Program to generate n Fibonacci numbers using recursive function.
5. Write a C Program to implement Towers of Hanoi.
6. Write a C Program to read the names of cities and arrange them alphabetically.
7. Write a C Program to implement dynamic array, find smallest and largest element of the array.
8. Write a C Program to search an element using linear search technique.
9. Write a C Program to search an element using recursive binary search technique.
10. Write a C Program to sort the given list using selection sort technique.

PART B:

1. Write a C Program to sort the given list using bubble sort technique.
2. Write a C Program to sort the given list using insertion sort technique.
3. Write a C Program to sort the given list using quick sort technique.
4. Write a C Program to sort the given list using merge sort technique.
5. Write a C Program to implement Stack.
6. Write a C Program to implement Queue
7. Write a C Program to convert an infix expression to postfix.
8. Write a C Program to implement simple queue.
9. Write a C Program to implement linear linked list.
10. Write a C Program to display traversal of a tree.

Instructions:

1. Certified Journal is mandatory for every student to appear for the examination.
2. Student has to execute a minimum of 8 programs in each part to complete the Lab course.
3. Based on practical test 10 marks of practical shall be awarded.

Semester End Exam Question Paper Pattern

Duration of the examination: 3hour

Max. Marks: 80

Section A

Answer any TEN Questions from the following, each carries 2 marks:

[10X2=20]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----
11. -----
12. -----

Section B

Answer any FOUR from the following questions each carries 5 marks.

[4X5=20]

13. -----
14. -----
15. -----
16. -----
17. -----

Section C

Answer any FOUR from the following questions each carries 10 marks.

(The Question may consist two sub-questions)

[4X10=40]

18. -----
19. -----
20. -----
21. -----
22. -----

CIA for Practical	
Assessment Type	Marks
Test1	10
Total	10 Marks

Instructions:

1. Based on Two practical Tests 10 marks of practical shall be awarded.

Note: Guidelines given by the university from time-to-time shall be followed for IA.

SEE Scheme of Evaluation for Lab Examination

Assessment Criteria	Marks
Writing of 2 Programs (Each from Part A & Part B)	15
Execution (Includes program code modification and execution result)	15
Journal	05
Viva Voice	05
Total	40 Marks

Instructions:

1. Certified Journal is mandatory for appearing the examination.
2. Students shall be given two programming assignments taking into consideration of duration of the time allotted to students for writing, typing and executing the programs.

CIA for Theory	
Assessment Type	Marks
Test 1 / Seminar / Activity	10
Test 2 / Seminar / Activity	10
Total	20 Marks

RANI CHANNAMMA UNIVERSITY BELAGAVI



BACHELOR OF SCIENCE IN COMPUTER SCIENCE SYLLABUS FOR UNDER GRADUATE STATE EDUCATION POLICY-2024

WITH EFFECT FROM THE ACADEMIC YEAR
2025-26

Submitted by
Prof. Shivanand Gornale
Chairman
Board of Studies (UG)
Rani Channamma University
Belagavi

Curriculum Structure for B.Sc. Computer Science of RCUB w.e.f 2025-26

Category	Course Code	Title of the Paper	Marks			Hours / Week	Credits	Duration of Exams (Hrs.)
			IA	SEE	Total			
SEMESTER III								
DSC 3	SEPBSCCST03	JAVA Programming	20	80	100	04	03	03
	SEPBSCCSP03	Java Programming - Lab	10	40	50	04	02	03
Elective	SEPBSCCSOEC01	Computer Fundamentals	10	40	50	03	02	02
TOTAL: HOURS / CREDIT					200	11	07	
SEMESTER IV								
Category	Course Code	Title of the Paper	Marks			Hours / Week	Credits	Duration of Exams (Hrs.)
DSC 4	SEPBSCCST04	Data Base Management System	20	80	100	04	03	03
	SEPBSCCSP04	Data Base Management System - Lab	10	40	50	04	02	03
Elective	SEPBSCCSOEC02	Digital Marketing	10	40	50	03	02	02
SEC	SEPBSCCSSEC01	Office Automation	10	40	50	04	02	02
TOTAL: HOURS / CREDIT					250	15	09	

Year	II	Course Code: SEPBSCCST03	Credits	03
Semester	III	Course Title: Java Programming	Hours	48
Course Pre-requisites, if any		Knowledge of C Programming.		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Objectives	After completing this course satisfactorily, a student will be able to: <ul style="list-style-type: none"> • Explain the object-oriented concepts and JAVA. • Write JAVA programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism. • Implement Classes and multithreading using JAVA. • Demonstrate the basic principles of creating Java applications with GUI. 			
Unit No.	Course Content			Hours
UNIT I	Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.			08
UNIT II	Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.			10
UNIT III	Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.			10
UNIT IV	Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.			10
UNIT V	I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming			10
Recommended Learning Resources				
Text Book:				
1. Programming with Java, By E Balagurusamy – A Primer, 6th Edition, McGraw Hill Publication. 2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.				

Reference Books:

1. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.
2. Java 2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication, 2017.
3. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017.

Year	II	Course Code: SEPBSCCSP03	Credits	02
Semester	III	Course Title: Java Programming Lab	Hours	40
Course Pre-requisites, if any		Knowledge of Java Programming		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 03hrs.	

Practice Labs

1. Program to print the following triangle of numbers

```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

```

2. Program to simple java application, to print the message, "Welcome to java"
3. Program to display the month of a year. Months of the year should be held in an array.
4. Program to find the area of rectangle.
5. program to demonstrate a division by zero exception
6. Program to create a user defined exception say Pay Out of Bounds.

PART A: Java Programming Lab

1. Program to assign two integer values to X and Y. Using the "if()" statement the output of the program should display a message whether X is greater than Y.
2. Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint: Fact of 4 = 4*3*2*1)
3. Program to find the area and circumference of the circle by accepting the radius from the user.
4. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
5. Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.
6. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.
7. Program to create a student class with following attributes; Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The passing mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.
8. Write a program to demonstrate multiple inheritance and use of Implementing Interfaces
9. Illustrate creation of thread by
 - a) Extending Thread class.
 - b) Implementing Runnable Interfaces
10. Write a program to demonstrate multiple inheritance and use of implementing Interfaces.

PART B: Exception Handling & GUI Programming

1. Program to catch Negative Array Size Exception. This exception is caused when the array size is initialized to negative values.
2. Program to demonstrate exception handling with try, catch and finally.
3. Program which create and displays a message on the window
4. Program to draw several shapes in the created window
5. Program to create a 4×4 grid and fills it in with 15 buttons, each labeled with its index.
6. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother button similar details of mother also appear.
7. Create a frame which displays your personal details with respect to a button click
8. Program to create a window with Text Fields and Buttons. The "ADD" button adds the two integers and display the result. The "CLEAR" button shall clear all the text fields.
9. Program to create a window, when we press M or m, the window displays “Good morning”, A or a, the window display’s Good Afternoon”, E or e, the window displays “Good Evening”, N or n, the window displays “Hello”.
10. Demonstrate the various mouse handling events using suitable example.

Instructions:

1. Certified Journal is mandatory for every student to appear for the examination.
2. Student has to execute all programs in each part to complete the Lab course.
3. Based on practical test 10 marks of practical shall be awarded.

Year	II	Course Code: SEPBSCCSOEC01	Credits	02
Semester	III	Course Title: Computer Fundamentals [OEC]	Hours	48
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 02 hrs.	
Course Objectives	<p><i>After completing this course satisfactorily, a student will be able to:</i></p> <ul style="list-style-type: none"> • Describing the components of a typical computer and explain the characteristics of each of them. • Explain the components, functions, and types of computer systems • Understand the working of operating system and the services it provides. • Understand the importance of computers in business and society. • Describe various types of networks, network standards and communication software. 			
Unit No.	Course Content			Hours
UNIT I	Introduction to computers: Definition, Characteristics of computers, Evolution of computer, Generation of Computer, Types of Computers - Microcomputers, Minicomputers, Mainframes, Super computers, Basic organization of computer – Input unit, CPU, CU, ALU, Memory unit & Output unit, Input and output Devices, Types of storage devices.			12
UNIT II	Number System: Introduction to Number System, Types of Number System – Binary, Octal, Decimal & Hexadecimal, Conversion from one number system to another number system for whole numbers, Computer Codes – BCD, Gray code, ASCII code & Unicode			12
UNIT III	Software Fundamentals: Software - Definition, Types of Software, Operating System – Definition, Introduction, Functions, Classification, Computer Languages – Machine Level Language, Assembly Level Language & High Level Language. Computer Translators – Compiler, Interpreter & Assembler			12
UNIT IV	Computer Network Basics: Computer Network – Definition, Types – LAN, WAN, MAN & PAN, Applications, Devices – Client, Server, Hub, Switch, Router, Topology – Bus, Ring, Star, Mesh & Hybrid, Internet: Definition, Services & Service providers, Logical & Physical Address, WWW, Web browser, DNS, HTTP/HTTPS, URL.			12
Recommended Learning Resources				
Text Book:				
<ol style="list-style-type: none"> 1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication, 2010. 2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC, March 2014, ISBN: 9781466587793 				
Reference Books:				
<ol style="list-style-type: none"> 1. J. Glenn Brooks hear, "Computer Science: An Overview", Addison-Wesley, Twelfth Edition, June 2017. 2. R.G. Dromey, "How to solve it by Computer", Prentice-Hall International Series in computer science, C.A.R.HOARE Series Editor, PHI, ISBN:0-13-433995-9. 				

Year	II	Course Code: SEPBSCCST04	Credits	03
Semester	IV	Course Title: Database Management Systems	Hours	48
Course Pre-requisites, if any		Knowledge of C Programming.		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Objectives	<p>After completing this course satisfactorily, a student will be able to:</p> <ul style="list-style-type: none"> • Explain the various database concepts and the need for database systems. • Identify and define database objects, enforce integrity constraints on a database using DBMS. • Demonstrate a Data model and Schemas in RDBMS. • Identify entities and relationships and draw ER diagram for a given real-world problem. • Convert an ER diagram to a database schema and deduce it to the desired normal form. • Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation. • Explain the transaction processing and concurrency control techniques. 			
Unit No.	Course Content			Hours
UNIT I	Introduction to Databases: Introduction to Database Management System, File based system, Advantages of DBMS over file based system, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach, Database Applications, Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems			10
UNIT II	Entity-Relationship (ER) Model: Using High-Level Conceptual Data Models for Database Design, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher than Two, Conversion of E-R Diagram to Relational Database.			10
UNIT III	Basics of Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Decomposition, Functional Dependencies, Normalization, Rules of Data Normalization, The First Normal Form(1NF), The Second Normal Form(2NF), The Third Normal Form(3NF), Boyce Codd Normal Form(BCNF).			10
UNIT IV	Relational Query Language & SQL (Structured Query Language): Relational Operations: SELECT, PROJECT, RENAME and JOIN, Relational Algebra Operations from Set Theory, SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL Data Definition Language(DDL), Data Manipulation Language (DML), Data Control Language(DCL), Transaction Control Language(TCL) Statements in SQL, Aggregate Functions, Queries using Order by, Group by & Having, Nested Queries, Joins, Views			10

UNIT V	Transaction Processing & PL/SQL: Introduction to Transaction Processing, Transaction and System Concepts, Desirable properties (ACID properties) of Transactions, Transactions: read & write operations, Introduction to PL/SQL, Variables, Constants, Control Statements, PL/SQL Procedure, Example Programs.	08
---------------	---	----

Recommended Learning Resources

Text Book:

1. Ramez Elmasri, Navathe, Fundamentals of Database Systems – 6th Edition, Published by Pearson Edition.

Reference Books:

1. Modern Database Management: Fred R. McFadden.
2. Database Systems: Design, Implementation, and Management: C Coronel, S Morris, Peter Rob.
3. SQL, PL/SQL: The Programming Language of Oracle: Ivan Bayross.

Year	II	Course Code: SEPBSCCSP04	Credits	02
Semester	IV	Course Title: Database Management Systems - Lab	Hours	40
Course Pre-requisites, if any		Knowledge of C Programming		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 03 hrs.	

PART A:

1. Retrieving records from the table – Consider the EMPLOYEES table with the following details.

Employee_Id, First_Name, Last_Name, Email, Phone_Number, Hire_Date, Job_Id, Salary, Commission_Pct, Manager_Id, Department_Id

- Create an employee's table with the above given details
- Insert five records into the table employees.
- Display the table Employees.
- Find out the employee id, names, and salaries of all the employees.
- List out the employees who works under manager 100.
- Find the names of the employees who have a salary greater than or equal to 4800.
- List out the employees whose last name is 'AUSTIN'.
- Find the names of the employees who works in departments 60, 70 and 80.
- Display the unique Manager_Id from employees table

2. Exercise on updating records in table - Create Client_master with the following fields.

ClientNo, Name, Address, City, State, Bal_due

- Create a client master table with the above given details
- Insert five records into the Client_Master.
- Display Client Master Table.
- Find the name of Clients whose balance_due >5000.
- Change the bal_due of ClientNO "C123" to Rs. 5100.
- Change the name of the table Client_master to Client12.
- Display the bal_due heading as "BALANCE" Client master table.

3. Rollback and Commit Commands Create Teacher table with the following fields.

Name, DeptNo, Date of joining, DeptName, Location, Salary

- Create a teacher table with the above given details
- Insert five records.
- Give Increment of 25% salary for Mathematics Department.
- Perform Rollback command.
- Give Increment of 15% salary for Commerce Department.
- Perform commit command

4. Company Database an Enterprise wishes to maintain a database to automate its operations. Enterprise is divided into certain departments and each department consists of employees.

The following two tables describes the automation schemas

Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)

Dept (deptno, dname, loc)

- a) Create a Emp & Dept table with the above given details.
 - b) Insert five records.
 - c) Update the employee salary by 15%, whose experience is greater than 10 years.
 - d) Delete the employees, who completed 30 years of service.
 - e) Display the manager who is having maximum number of employees working under him?
 - f) Create a view, which contain employee names and their manager
 - g) Determine the names of employee, who earn more than their managers.
 - h) Determine the employees, who are located at the same place.
5. Consider the Insurance database given below. The primary keys are underlined and the data types are specified.

PERSON (driver – id #: String, name: string, address:

strong) CAR (Regno: string, model: string, year: int)

ACCIDENT (report-number: int, accd-date: date, location:

string) OWNS (driver-id #: string, Regno: string)

- a) Create the above tables by properly specifying the primary keys and the foreign keys.
- b) Enter at least five tuples for each relation.
- c) Demonstrate how you add a new accident to the database.
- d) Find the total number of people who owned cars that were involved in accidents in 2008 were involved.

PART B:

1. Write PL/SQL procedure for Largest of three numbers.
2. Write PL/SQL procedure for Factorial of a number.
3. Write PL/SQL procedure for Fibonacci series.
4. Write PL/SQL procedure for given number is Prime or not.
5. Write PL/SQL procedure for given year is leap year or not.

Instructions:

1. Certified Journal is mandatory for every student to appear for the examination.
2. Student has to execute all programs in each part to complete the Lab course.
3. Based on practical test 10 marks of practical shall be awarded.

Year	II	Course Code: SEPBSCCSOEC02	Credits	02
Semester	IV	Course Title: Digital Marketing [OEC]	Hours	48
Course Pre-requisites, if any		<ul style="list-style-type: none"> Basic Knowledge of internet and internet browsing. Experimental and Analytical mindset. 		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 02 hrs.	
Course Objectives	<p><i>After completing this course satisfactorily, a student will be able to:</i></p> <ul style="list-style-type: none"> Understand the fundamental concepts and principles of digital marketing. Develop practical skills to implement various digital marketing strategies and techniques. Analyze and evaluate the effectiveness of digital marketing campaigns. Apply critical thinking and problem-solving skills to real-world digital marketing scenarios. Create comprehensive digital marketing plans and strategies. 			
Unit No.	Course Content			Hours
UNIT I	Introduction to Digital Marketing: Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms. Digital Marketing Strategy: Developing a digital marketing strategy, Setting goals and objectives.			12
UNIT II	Digital Marketing Planning: Budgeting and resource allocation Campaign planning and execution, Monitoring and adjusting digital marketing campaigns. Search Engine Optimization (SEO): Introduction to SEO, Keyword research and analysis, On-page optimization techniques, Off-page optimization techniques, SEO measurement and analytics.			12
UNIT III	Social Media Marketing: Overview of social media marketing, Social media platforms and their features, Creating and optimizing social media profiles, Social media content strategy, Social media advertising and analytics Email Marketing: Introduction to email marketing, Building an email list Creating effective email campaigns, Email automation and segmentation Email marketing metrics and analytics.			12
UNIT IV	Content Marketing: Understanding content marketing, Content strategy and planning, Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics.			12
Recommended Learning Resources				
Text Book:				
<ol style="list-style-type: none"> "Search Engine Optimization All-in-One For Dummies" by Bruce Clay "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by ChadS. White "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles 				
Reference Books:				
<ol style="list-style-type: none"> "Web Design with HTML, CSS, JavaScript and jQuery Set" by Jon Duckett "Advanced Google AdWords" by Brad Geddes "Social Media Marketing Workbook: How to Use Social Media for Business" by Jason McDonald 				

Year	II	Course Code: SEPBSCCSSEC01	Credits	02
Semester	III	Course Title: Office Automation [SEC]	Hours	48

Course Pre-requisites, if any	<ul style="list-style-type: none"> Basic Knowledge of Computer, internet and internet browsing. Experimental and Analytical mindset.
-------------------------------	--

Formative Assessment Marks: 10	Summative Assessment Marks: 40	Duration of ESA: 02 hrs.
--------------------------------	--------------------------------	--------------------------

Course Objectives	<p><i>After completing this course satisfactorily, a student will be able to:</i></p> <ul style="list-style-type: none"> Understand the fundamental concepts and principles of Computer. Develop practical skills to implement various applications strategies and techniques. Analyze and evaluate the effectiveness of Office tools. Apply critical thinking and problem-solving skills
-------------------	---

Unit No.	Course Content	Hours
UNIT I	MS-Word: Creating, Editing, Saving and printing text documents - Font and Paragraph formatting - Simple character formatting - Inserting tables, Smart art, Page breaks - Using lists and styles - Working with images - Using Spelling and Grammar check - Understanding document properties - Mail merge.	12
UNIT II	MS- Excel: Spreadsheet Basics - Creating, editing, saving and printing spreadsheet - Working with functions & formulas - Modifying worksheets with color & auto formats - Graphically representing data: Charts & Graphs - Speeding data entry: Using Data Forms - Analyzing Data: Data Menu, Subtotal, Filtering Data - Formatting work-sheets - Securing & Protecting Spreadsheets.	12
UNIT III	MS-PowerPoint: Opening, Viewing, Creating and Printing slides - Applying auto layouts - Adding custom animation - Using slide transitions - Graphically representing data: Charts & Graphs - Creating Professional Slide for Presentation.	12
UNIT IV	Collaborative Tools: Email: Compose and send emails- organize their inbox - manage attachments and use email filters and rules. Forms: Create a Form-Validate a Form; Share a Form-Managing Response. Online Data Management: Online Quiz-Online Forms-Online Assignment-Google sheets-Google docs-Google slides-shared calendars and document sharing services. online meeting platforms-Video-Conferencing / online Meet-social media tools and platforms to communicate and collaborate with others.	12

Recommended Learning Resources

Text Book:

1. Dinesh Maidasani, Learning computer Fundamentals, MS Office and Internet & Web Technology, Firewall Media, Third Edition 2016.
2. <https://wiki.openoffice.org/wiki/Documentation>.
3. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>.

Semester End Exam Question Paper Pattern

Duration of the examination: 3hour

Max. Marks: 80

Section A

Answer any TEN Questions from the following, each carries 2 marks:

[10 X 2= 20]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----
11. -----
12. -----

Section B

Answer any FOUR from the following questions each carries 5 marks.

[4 X 5=20]

13. -----
14. -----
15. -----
16. -----
17. -----

Section C

Answer any FOUR from the following questions each carries 10 marks.

(The Question may consist two sub-questions)

18. -----
19. -----
20. -----
21. -----
22. -----

[4 X 10=40]

Semester End Exam Question Paper Pattern (OEC / SEC)

Duration of the examination: 2hour

Max. Marks: 40

Section A

Answer any FIVE Questions from the following, each carries 2 marks: [05 X 2= 10]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----

Section B

Answer any FOUR from the following questions each carries 5 marks. [04 X 5= 20]

9. -----
10. -----
11. -----
12. -----
13. -----
14. -----

Section C

Answer any ONE from the following questions each carries 10 marks. [01 X 10= 10]

(The Question may consists two sub-questions)

15. -----
16. -----
17. -----

CIA for Practical	
Assessment Type	Marks
Test1	10
Total	10 Marks

Instructions:

1. Based on Two practical Tests 10 marks of practical shall be awarded.

Note: Guidelines given by the university from time-to-time shall be followed for IA.

SEE Scheme of Evaluation for Lab Examination

Assessment Criteria	Marks
Writing of 2 Programs (Each from Part A & Part B)	15
Execution (Includes program code modification and execution result)	15
Journal	05
Viva Voice	05
Total	40 Marks

Instructions:

1. Certified Journal is mandatory for appearing the examination.
2. Students shall be given two programming assignments taking into consideration of duration of the time allotted to students for writing, typing and executing the programs.

CIA for Theory	
Assessment Type	Marks
Test 1 / Seminar / Activity	10
Test 2 / Seminar / Activity	10
Total	20 Marks

RANI CHANNAMMA UNIVERSITY BELAGAVI



BACHELOR OF SCIENCE IN COMPUTER SCIENCE SYLLABUS FOR UNDER GRADUATE STATE EDUCATION POLICY-2024

WITH EFFECT FROM THE ACADEMIC YEAR
2026-27

Submitted by
Prof. Parashuram Bannigidad
Chairman
Board of Studies (UG)
Rani Channamma University
Belagavi

Curriculum Structure for B.Sc. Computer Science of RCUB w.e.f 2026-27

Category	Course Code	Title of the Paper	Marks			Hours /Week	Credit	Duration of Exams (Hrs.)
			IA	SEE	Total			
SEMESTER V								
DSC 5	SEPBSCCST05	Python Programming	20	80	100	04	03	03
DSC 6	SEPBSCCST06	Computer Networks	20	80	100	04	03	03
DSC-Lab	SEPBSCCSP	Python Programming and Computer Networks – Lab	10	40	50	04	02	03
SEC 2	SEPBSCCSSEC02	Open Source Tools	10	40	50	04	02	02
TOTAL: HOURS / CREDIT					300	16	10	
SEMESTER VI								
DSC 7	SEPBSCCST07	WEB Technology	20	80	100	04	03	03
DSC 8	SEPBSCCST08	PHP	20	80	100	04	03	03
DSC-Lab	SEPBSCCSP	WEB Technology and PHP – Lab	10	40	50	04	02	03
SEC 3	SEPBSCCSSEC03	Fundamentals of Cyber Security	10	40	50	04	02	02
TOTAL: HOURS / CREDIT					300	16	10	

DSC : Discipline Specific Courses, SEC : Skill Enhancement Courses.

Note : For the SEC1, SEC2, & SEC3 (SEPBSCCSSEC-01, SEPBSCCSSEC-02, SEPBSCCSSEC-03) the semester-end examination will consist of multiple-choice questions.

Prof. Parashuram Bannigidad
Chairman BOS(UG),
Department of Computer Science,
RCUB, Belagavi

Prof. Vishwanath B. Awati
Dean,
Faculty of Science & Technology
RCUB, Belagavi

Year	III	Course Code: SEPBSCCST05	Credits	03
Semester	V	Course Title: Python Programming	Hours	48
Course Pre-requisites, if any		Basic understanding of programming concepts. Familiarity with any programming language is beneficial but not required.		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Outcomes	<p>After completing this course satisfactorily, a student will be able to:</p> <ul style="list-style-type: none"> • Setup Python to develop simple applications • Understand the basic concepts in Python Programming CO3 Learn how to write, debug and execute Python programs • Understand and demonstrate the use of advanced data types such as tuples, dictionaries and lists, Tuples and Sets • Design solutions for problems using object-oriented concepts in Python • Use and apply the different Python Libraries for GUI Interface, Data Analysis and Data Visualisation. • Extend the knowledge of python programming to build successful career in software development. 			
Unit No.	Course Content			Hours
UNIT I	<p>Introduction: Introduction, Overview, Features and Applications of Python; Python Versions; Getting Started With Python; Python Command Line mode and Python IDEs; Indentation; Comments:</p> <p>Python Basics: Identifiers; Keywords; Variables; Data Types; Operators; Precedence and Association; Statements and Expressions;</p> <p>Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions.</p>			8
UNIT II	<p>Functions: Introduction; Types of Functions; Built- in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. User Defined Functions-Parameters, arguments, function calls, return statement, Scope and Lifetime of Variables in Functions, Writing Python Scripts using functions.</p> <p>Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods.</p>			10
UNIT III	<p>Lists: Creating Lists; Built-in Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists.</p> <p>Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.</p> <p>Tuples and Sets: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.</p>			10
UNIT IV	<p>Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally.</p> <p>File Handling: File Types; Operations on Files– Create, Open, Read, Append and Write, Close Files; File Names and Paths; Format Operator.</p> <p>Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism- Definition, Operator Overloading.</p>			10

UNIT V	<p>GU Interface: The Tkinter Module-; Widgets-Button, Canvas, Check button, entry, frame, label, List Box, Menu Button, Radio Button, Message, Scale, Scrollbar, Text, Spin Box, Message Box, Label Frame, Paned Window ; Layout Management- pack, grid and place.</p> <p>Python SQLite: The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on Tables- Insert, Select, Update. Delete and Drop Records.</p>	10
Recommended Learning Resources		
Text Book:		
<ol style="list-style-type: none"> 1. Introduction to Computing and Problem Solving Using Python, E Balaguruswamy, McGrawHill, First Edition 2. Advance Core Python Programming, Meenu Kohli, 2021, BPB Publications 		
Reference Books:		
<ol style="list-style-type: none"> 1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, 2015, Green Tea Press. Freely available online @ https://www.greenteapress.com/thinkpython/thinkCSpy.pdf 2. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python 3. Programming Language, Fabio Nelli, 2015, Apress® 4. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, 2012, Prentice Hall 5. Automate the Boring Stuff, Al Sweigart, 2015, No Starch Press, Inc. 6. Data Structures and Program Design Using Python, D Malhotra et al., 2021, Mercury 7. Learning and Information LLC 8. http://www.ibiblio.org/g2swap/byteofpython/read/ 9. https://docs.python.org/3/tutorial/index.html 		

Year	III	Course Code: SEPBSCCST06		Credits	03
Semester	V	Course Title: Computer Networks		Hours	48
Course Pre-requisites, if any		Basic understanding of programming concepts. Familiarity with any programming language is beneficial but not required.			
Formative Assessment Marks: 20		Summative Assessment Marks: 80		Duration of ESA: 03hrs.	
Course Outcomes	<p>After completing this course satisfactorily, a student will be able to:</p> <ol style="list-style-type: none"> 1. Define various data communication components in networking. 2. Describe networking with reference to different types of models and topologies. 3. Understand the need for Network and various layers of OSI and TCP/IP reference model. Explain various Data Communications media. 4. Describe the physical layer functions and components 5. Identify the different types of network topologies and Switching methods. 6. Describe various Data link Layer Protocols. 7. Identify the different types of network devices and their functions within a network. 8. Analyze and interpret various Data Link Layer and Transport Layer protocols. 9. Explain different application layer protocols. 				
Unit No.	Course Content				Hours
UNIT I	Introduction: Computer Network: Definition, Goals, Structure; Broadcast and Point-To-Point Networks; Network Topology and their various Types; Types of Network, Network software, Design issues for the layers, Connection-oriented vs. Connectionless service, Applications of Computer network, Protocols and Standards, The OSI Reference Model, The TCP/IP Protocol suite, Comparison between OSI and TCP/IP Reference model.				8
UNIT II	Physical Layer: Functions of Physical Layer, Analog signals, Digital signals, Transmission Impairment, Data Rate Limits, and Performance. Data Transmission Media: Guided Transmission Media, Magnetic Media, Twisted Pairs, Coaxial Cable, Power Lines, Fiber Optics, Wireless Transmission, Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Light Transmission, Digital Modulation and Multiplexing, Public Switched Telephone Networks. Switching: Circuit switching, Message switching & Packet switching				10
UNIT III	Data Link Layer: Functions of Data Link Layer, Data Link Control: Framing, Flow and Error Control, Error Detection and Correction, High-Level Data Link Control (HDLC) & point — to — Point protocol (PPP), Channel Allocation Problem, Multiple Access: Radom Access (ALOHA, CSMA, CSMA/CD, CSMA/CA), Controlled Access(Reservation, Polling, Token Passing), Channelization(FDMA, TDMA, CDMA),				10
UNIT IV	Wired LAN: Ethernet Standards and FDDI, Wireless LAN: IEEE 802.11x and Bluetooth Standards. Transport Layer: Functions of Transport Layer, Elements of Transport Protocols: Addressing, Establishing and Releasing Connection, Flow Control & Buffering, Error Control, Multiplexing & Demultiplexing, Crash Recovery,				10

<p>UNIT V</p>	<p>User Datagram Protocol (UDP): User Datagram, UDP Operations, Uses of UDP, RPC, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocol, Go Back-N(GBN), Selective Repeat (SR). Application layer : Functions of Application layer, Application Layer Protocols: DNS, DHCP, WWW, HTTP, HTTPS, TELNET, FTP, SMTP, POP, IIMAP</p>	<p>10</p>
<p align="center">Recommended Learning Resources</p>		
<p>Text Book:</p>		
<ol style="list-style-type: none"> 1. Andrew S Tanenbaum, David. J. Wetherall, —Computer NetworksII, Pearson Education, 5th Edition Advance Core Python Programming, Meenu Kohli, 2021, BPB Publications 2. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth Edition 		
<p>Reference Books:</p>		
<ol style="list-style-type: none"> 1. Kurose and Ross, Computer Networking- A Top-Down approach, Pearson, 5th edition 2. William Stallings, Data and Computer Communications, 7th Edition,PHI 3. http://highered.mheducation.com/sites/0072967757/index.html 4. Larry L. Peterson, Bruce S. Davie, —Computer Networks: A Systems Approach, Morgan Kaufmann Publishers, Fifth Edition, 2011. 6. Brijendrasingh, Data Communication and Computer Networks,PHI 		

Year	III	Course Code: SEPBSCCSP	Credits	02
Semester	V	Course Title: Python Programming and Computer Networks Lab	Hours	40
Course Pre-requisites, if any		Knowledge of C Programming		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 03hrs.	

Part-A –Python Programming Lab

1. Write a Python function to calculate the factorial of a number
2. Write a Python to generate Fibonacci Sequence
3. Write a Python program to get the sum of digits of a non-negative integer.
4. Write a Python program to create a module Calculation.py that contains functions to perform basic arithmetic operations.
5. Write a python program to reverse a string without using built-in functions.
6. Write a python program to generate random numbers.
7. Write a python program to display Multiplication Tables
8. Demonstrate importing the math module and perform any five math functions.
9. Write a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle.
10. Write a Python class named Rectangle constructed by a length and width and a method which will compute the area and perimeter of rectangle.

Part-B – Computer Networks Lab

1. Prepare hardware and software specification for basic computer system and Networking.
2. Identifying the networking devices on a network.
3. Configure the IP address of the computer.
4. Implement connecting two nodes using network simulator.
5. Implement connecting three nodes considering one node as a central node using network simulator. Implement a network to connect three nodes considering one node as a central node using network simulator
6. Implement bus topology using network simulator.
7. Implement star topology using network simulator.
8. Implement ring topology using network simulator.
9. Demonstrate the use of wireless LAN using network simulator.
10. Implement FTP using TCP bulk transfer using network simulator

Instructions:

1. Certified Journal is mandatory for every student to appear for the examination.
2. Student has to execute all programs in each part to complete the Lab course.
3. Based on practical test 10 marks of practical shall be awarded.

Year	II	Course Code: SEPBSCCSSEC02	Credits	02
Semester	IV	Course Title: Open Source Tools	Hours	48
Course Pre-requisites, if any		Basic knowledge of OS, SDLC, DBMS		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 2 hrs.	
Course Outcomes	<p>After completing this course satisfactorily, a student will be able to:</p> <ul style="list-style-type: none"> • Recognize the benefits and features of Open Source Technology and to interpret, contrast and compare open source products among themselves. • Use appropriate open source tools based on the nature of the problem. • Write code and compile different open-source software. • Differentiate between Open-Source Software (OSS) and Free Open-Source Software (FOSS). • Compare and analyze open-source operating systems. • Understand the role of open source software's in content management and knowledge sharing. • Evaluate the benefits and challenges of adopting open-source technologies in different domains. 			
Unit No.	Course Content			Hours
UNIT I	Open Source Software's: Introduction to Open sources, Need of Open Sources, Open Source Principles and Standard Requirements, Advantages of Open Sources,			12
UNIT II	Free Software: FOSS, Licenses – GPL, LGPL, Copyrights, Patents, Contracts & Licenses and Related Issues, Application of Open Sources. Open Source Operating Systems : FEDORA, UBUNTU			12
UNIT III	Programming Tools And Techniques: Usage of design Tools like Argo UML or equivalent, Version Control Systems - Git, GitHub, GitLab or equivalent, Bug Tracking Systems - Trac, BugZilla, Front-end Frameworks - BootStrap			12
UNIT IV	Open Source Software & Applications: Apache, Berkeley Software Distribution(BSD), Mozilla (Firefox), Wikipedia, Joomla, GNU Compiler Collection, Libre Office			12
Recommended Learning Resources				
Text Books:				
<ol style="list-style-type: none"> 1. KailashVadera, Bhavyesh Gandhi, "Open Source Technology", Laxmi Publications Pvt. Ltd 2012, 1st Edition. 2. "Open Source Software" – Sandeep Sehgal, University Science Press. 				
Reference Books:				
<ol style="list-style-type: none"> 1. Fadi P. Deek and James A. M. McHugh, "Open Source: Technology and Policy", Cambridge Universities Press 2007. 2. "Understanding Open Source and Free Software Licensing" – Andrew M. St. Laurent, O'Reilly Media 				

Year	III	Course Code: SEPBSCCST07	Credits	03
Semester	VI	Course Title: WEB Technology	Hours	48
Course Pre-requisites, if any		Basic Knowledge of Programming, Internet & Web Browsing		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Outcomes	<p>After completing this course satisfactorily, a student will be able to:</p> <ul style="list-style-type: none"> ○ Understand basics of Internet technology ○ Use of HTML in designing static web pages. ○ Use of CSS in designing attractive web pages ○ Use of Java Script in designing dynamic web pages. ○ Students are able design an own website at the end of the course. 			
Unit No.	Course Content			Hours
UNIT I	<p>Fundamentals of Web: Internet, WWW, Web Browsers, Web Protocols and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.</p> <p>HTML5 and XHTML: Origins and evolution of HTML5 and XHTML, Basic syntax, Standard XHTML document structure, Basic Text Markup, HTML5 Page Layout and Navigation, Hypertext Links, Lists, Tables.</p>			10
UNIT II	<p>HTML5 and XHTML: Forms, Frames in HTML5 and XHTML, Syntactic differences between HTML5 and XHTML, Images, audio and video.</p> <p>Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and <div> tags.</p>			10
UNIT III	<p>Introduction to XML: Introduction; Syntax; Document structure; Document Type Definitions (DTD); XSLT style sheets; XML Processors; Web services.</p> <p>Introduction to Java Script: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, Operations, and expressions; Screen output and keyboard input;</p>			10
UNIT IV	<p>Introduction to Java Script: Control statements; Object creation and Modification; Arrays; Functions; Constructor; Pattern matching using expressions; Errors in scripts; Examples.</p> <p>Java Script and HTML Documents: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling;</p>			10
UNIT V	<p>Java Script and HTML Documents: Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification. Dynamic Documents with JavaScript</p>			08
Recommended Learning Resources				
Text Book:				
1. Robert W Sebesta, "Programming the World Wide Web", 4th Edition, Pearson Education, 2008.				
Reference Books:				
1. M.Deitel, P.J.Deitel, A.B.Goldberg, "Internet & World Wide Web How to program", 3rd Edition, Pearson Education / PHI, 2004.				
2. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.				

3. Xue Bai et al, "The Web Warrior Guide to Web Programming", Thomson, 2003
4. Sklar, "The Web Warrior Guide to Web Design Technologies", 1st Edition, Cengage Learning India.
5. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

Year	III	Course Code: SEPBSCCST8	Credits	03
Semester	VI	Course Title: PHP	Hours	48
Course Pre-requisites, if any		Basic Knowledge About Programming and Web Browsers		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	
Course Outcomes	After completing this course satisfactorily, a student will be able to: <ul style="list-style-type: none"> ○ Explore fundamentals of Web applications. ○ Working with OOPs ○ Database connectivity ○ Application development 			
Unit No.	Course Content			Hours
UNIT I	Introducing PHP –Basic development Concepts –Creating first PHP Scripts –Using Variable and Operators –Storing Data in variable – Understanding Data types –Setting and Checking variables– Data types – Using Constants –Manipulating Variables with Operators.			10
UNIT II	Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements –Repeating Action with Loops –Working with String and Numeric Functions.			10
UNIT III	Working with Arrays: Storing Data in Arrays –Processing Arrays with Loops and Iterations –Using Arrays with Forms -Working with Array Functions –Working with Dates and Times.			10
UNIT IV	Using Functions and Classes: Creating User-Defined Functions -Creating Classes –Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing Files-Processing Directories.			10
UNIT V	Working with Database and SQL: Introducing Database and SQL-Using MySQL-Adding and modifying Data-Handling Errors –Using SQLite Extension and PDO Extension. Introduction XML— Simple XML and DOM Extension.			08
Recommended Learning Resources				
Text Book: <ol style="list-style-type: none"> 1. PHP A Beginner’s Guide, VIKRAM VASWANI, Tata McGraw-Hill, 2008. 2. Spring into PHP5, Steven Holzer, Tata McCraw Hill Edition, 2005 				
Reference Books: <ol style="list-style-type: none"> 3. The PHP Complete Reference, Steven Holzner –Tata McGraw-Hill Edition, 2010 				

Year	III	Course Code: SEPBSCCSP	Credits	02
Semester	VI	Course Title: Web Technology and PHP - Lab	Hours	48
Course Pre-requisites, if any		Basic knowledge of programming concepts, HTML, Java Script, Python, or Java, is recommended.		
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.	

PART A: Web Technology Lab

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form
2. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
3. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
4. JavaScript Program to perform Basic Arithmetic operations.
5. JavaScript Program to implement all string operations.
6. JavaScript Program to Check Prime Number.
7. JavaScript program to sort list of element in ascending and descending order and show the exception handling.
8. JavaScript program to find area of geometrical figures using method overloading.
9. JavaScript Program to Create Array and inserting Data into Array
10. JavaScript Program to Validate an Email Address.

PART B: PHP Lab

1. Develop a PHP program to display prime numbers between the given ranges and display the total number of prime numbers.
2. Develop a PHP program and check message passing mechanism between pages.
3. Develop a PHP program to demonstrate inheritance.
4. Develop a PHP program to demonstrate constructors and destructors.
5. Write a PHP program that writes contents of one file to another.
6. Develop a PHP code to read the values entered into the form and test them against the values in the Mysql database. Perform necessary exception handling.
7. Write a PHP program to sort the student records which are stored in the database using selection sort.
8. Develop a PHP program to design a college admission form using MYSQL database.
9. Develop a PHP program using session.
10. Develop a PHP program using cookie and session.

Year	III	Course Code: SEPBSCCSSEC03	Credits	02
Semester	VI	Course Title: Fundamentals of Cyber Security	Hours	48
Course Pre-requisites, if any		Basic knowledge of internet, cyber security		
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 2 hrs.	
Course Outcomes	<p>After completing this course satisfactorily, a student will be able to:</p> <ul style="list-style-type: none"> Understand the concept of Cyber security and issues and challenges associated with it. Understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures. Appreciate various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms. 			
Unit No.	Course Content			Hours
UNIT I	Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.			12
UNIT II	Cyber-crime and Cyber law: Classification of cybercrimes, Common cyber-crimes- cyber-crime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks,			12
UNIT III	Cybercriminals modus-operandi, Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cyber-crime and offences, Organisations dealing with Cyber-crime and Cyber security in India. Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy,			12
UNIT IV	Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media.			12
Recommended Learning Resources				
Text Books: <ol style="list-style-type: none"> Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010 Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011) 				
Reference Books: <ol style="list-style-type: none"> Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001) Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers. 				

Semester End Exam Question Paper Pattern

Duration of the examination: 3hour

Max. Marks: 80

Section A

Answer any TEN Questions from the following, each carries 2 marks:

[10X2=20]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----
11. -----
12. -----

Section B

Answer any FOUR from the following questions each carries 5 marks.

[4X5=20]

13. -----
14. -----
15. -----
16. -----
17. -----

Section C

Answer any FOUR from the following questions each carries 10 marks.

(The Question may consist two sub-questions)

[4X10=40]

18. -----
19. -----
20. -----
21. -----
22. -----

Semester End Exam Question Paper Pattern (SEC)

Duration of the examination: 2hour

Max. Marks: 40

Section A

Answer any FIVE Questions from the following, each carries 2 marks:

[05X2=10]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----

Section B

Answer any FOUR from the following questions each carries 5 marks.

[04X5=20]

9. -----
10. -----
11. -----
12. -----
13. -----
14. -----

Section C

Answer any ONE from the following questions each carries 10 marks.

[01X10=10]

(The Question may consists two sub-questions)

15. -----
16. -----
17. -----

CIA for Practical	
Assessment Type	Marks
Test1	10
Total	10 Marks

Instructions:

1. Based on Two practical Tests 10 marks of practical shall be awarded.

Note: Guidelines given by the university from time-to-time shall be followed for IA.

SEE Scheme of Evaluation for Lab Examination

Assessment Criteria	Marks
Writing of 2 Programs (Each from Part A & Part B)	15
Execution (Includes program code modification and execution result)	15
Journal	05
Viva Voice	05
Total	40 Marks

Instructions:

1. Certified Journal is mandatory for appearing the examination.
2. Students shall be given two programming assignments taking into consideration of duration of the time allotted to students for writing, typing and executing the programs.

CIA for Theory		
Assessment Type	Test Conduct for	Marks Reduced to
Test 1	20	04
Test 2	20	10
Assignment	-	03
Attendance	-	03
Total		20 Marks

Prof. Parashuram Bannigidad
Chairman BOS(UG),
Department of Computer Science,
RCUB, Belagavi

Prof. Vishwanath B. Awati
Dean,
Faculty of Science & Technology
RCUB, Belagavi