RANI CHANNAMMA UNIVERSITY, BELAGAVI

PROGRAM /COURSE STRUCTURE AND SYLLABUS
as per the Choice Based Credit System (CBCS)
designed in accordance with
Learning Outcomes-Based Curriculum Framework (LOCF)
of National Education Policy (NEP) 2020
for

Bachelor of Science (Computer Science)

w.e.f.

Academic Year 2021-22 and onwards

Board of Studies (UG) Committee

Bachelor of Science (Computer Science)Programme 2021-22

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PREAMBLE

Computer Science (CS) has been evolving as an important branch of science and technology in last two decade and it has carved out a space for itself like engineering. Computer Science spans theory and more application and it requires thinking both in abstract terms and in concrete terms.

The ever -evolving discipline of computer science has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular domain. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data Science, Computational Science, and Software Engineering.

Universities and other HEIs introduced programmes of computer science. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavour has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge.InIndia, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries.Parallelly, BCA, BSc and MSc programmes with specialisation in Computer Science were introduced to train manpower in this highly demanding area.

BSc and BSc (Hons) are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS(M.Sc)or MCA leading to research as well as R&D, can be employable at IT industries, or can pursue a teaching profession or can adopt a business management career. BSc and BSc (Hons) aims at laying a strong foundation of computer science at an early stage of the career. There are several employment opportunities and after successful completion of BSc, graduating students can fetch employment directly in companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Program outcomes in BSc are aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in BSc courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Curriculum Framework for BSc degrees is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation
- To develop the ability to use this knowledge to analyse new situations in the application domain
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems

- To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments
- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate

PROGRAM OUTCOMES:

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
2. **Problem Solving**: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
3. **Programming a computer**: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
4. **Application Systems Knowledge:** Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
5. **Communication:** Must have a reasonably good communication knowledge both in oral and writing.
6. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
7. **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
8. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

By the end of the program the students will be able to:

The Bachelor of Computer Science (BSc (Hons)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:

1. Apply standard Software Engineering practices and strategies in real -time software project development
2. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
3. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
4. The ability to work independently on a substantial software project and as an effective team member.

RANI CHANNAMMA UNIVERSITY

VIdyaSangam, NH-4, Belagavi. -591156

Curricular and Credits Structure under Choice Based Credit System [CBCS] of Computer Science Major& One Minor Discipline Scheme for the Four Years Computer Science B.Sc. Undergraduate Honors Programmewith effect from 2021-22

SEMESTER-I

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
L1	21BSC1L1LK1	Kannada	40	60	100	4	-	-	3	2
	21BSC1L1LFK1	Functional Kannada								
L2	21BSC1L2LEN2	English	40	60	100	4	-	-	3	2
	21BSC1L2LHI2	Hindi								
	21BSC1L2LSN2	Sanskrit								
	21BSC1L2LTE2	Telugu								
	21BSC1L2LUR2	Urdu								
DSC1	21BSC1C1CS1L	Computer Fundamentals and Programming in C	40	60	100	4	-	-	4	2
	21BSC1C1CS1P	C Programming Lab	25	25	50	-	-	4	2	3
DSC1	Another Department Code	Another Department Course Title	40	60	100	4	-	-	4	2
			25	25	50	-	-	4	2	3
SEC1	21BSC1SE1CS1	Digital Fluency	25	25	50	1	-	2	2	2
VBC1	21BSC1V1PE1	Physical Education- Yoga	25	-	25	-	-	2	1	-
VBC2	21BSC1V2HW1	Health & Wellness	25	-	25	-	-	2	1	-
OEC1	21BSC1O1CS1	C Programming Concepts	40	60	100	3	-	-	3	2
				Total Marks	**700**	**Semester Credits**			**25**	

SEMESTER-II

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
L3	21BSC2L3LK2	Kannada	40	60	100	4	-	-	3	2
	21BSC2L3FKL2	Functional Kannada								
L4	21BSC2L4EN2	English	40	60	100	4	-	-	3	2
	21BSC2L4HI2	Hindi								
	21BSC2L4SN2	Sanskrit								
	21BSC2L4TE2	Telugu								
	21BSC2L4UR2	Urdu								
DSC2	21BSC2C2CS2L	Data Structures using C	40	60	100	4	-	-	4	2
	21BSC2C2CS2P	Data structures Lab	25	25	50	-	-	4	2	3
DSC2	Another Department Code	Another Department Course Title	40	60	100	4	-	-	4	2
			25	25	50	-	-	4	2	3
AECC1	21BSC2AE1ES2	Environmental Studies	20	30	50	3	-	-	2	2
VBC3	21BSC2V3PE2	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC4	21BSC2V4NC1	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
OEC2	21BSC2O2CS2	Web Designing	40	60	100	3	-	-	3	2
Total Marks					**700**	**Semester Credits**			**25**	
Exit option with Certificate (with the completion of courses equal to a minimum of 48 credits)					**1400**				**50**	

SEMESTER-III										
Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
L5	21BSC3L5LK3	Kannada	40	60	100	4	-	-	3	2
	21BSC3L5LFK3	Functional Kannada								
L6	21BSC3L6EN3	English	40	60	100	4	-	-	3	2
	21BSC3L6HI3	Hindi								
	21BSC3L6SN3	Sanskrit								
	21BSC3L6TE3	Telugu								
	21BSC3L6UR3	Urdu								
DSC3	21BSC3C3CS1L	Object Oriented Programming in JAVA	40	60	100	4	-	-	4	2
	21BSC3C3CS1P	JAVA Lab	25	25	50	-	-	4	2	3
DSC3	Another Department Code	Another Department Course Title	40	60	100	4	-	-	4	2
			25	25	50	-	-	4	2	3
SEC2	21BSC3SE2ES2	Artificial Intelligence	25	25	50	1	-	2	2	2
VBC5	21BSC3V5PE3	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC6	21BSC3V6NC2	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
OEC3	21BSC3O3CS5	R Programming	40	60	100	3	-	-	3	2
				Total Marks	**700**	**Semester Credits**			**25**	

SEMESTER-IV

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
L7	21BSC4L7LK4	Kannada	40	60	100	4	-	-	3	2
	21BSC4L7LFK4	Functional Kannada								
L8	21BSC4L8EN4	English	40	60	100	4	-	-	3	2
	21BSC4L8HI4	Hindi								
	21BSC4L8SN4	Sanskrit								
	21BSC4L8TE4	Telugu								
	21BSC4L8UR4	Urdu								
DSC4	21BSC4C2CS2L	Database Management Systems	40	60	100	4	-	-	4	2
	21BSC4C2CS2P	DBMS Lab	25	25	50	-	-	4	2	3
DSC4	Another Department Code	Another Department Course Title	40	60	100	4	-	-	4	2
			25	25	50	-	-	4	2	3
AECC2	21BSC4AE1CI2	Constitution of India	20	30	50	3	-	-	2	2
VBC7	21BSC4V5PE4	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC8	21BSC4V6NC3	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
OEC4	21BSC4O3CS7	Multimedia & Animation	40	60	100	3	-	-	3	2
Total Marks					**700**	**Semester Credits**			**25**	
Exit option with Diploma in Science (with the completion of courses equal to a minimum of 96 credits)OR continue studies with Major and Minor					**2800**				**100**	

SEMESTER-V

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
Computer Science as Major Discipline										
DSC5	21BSC5C5CSMJ1L	Programming in PYTHON	40	60	100	3	-	-	3	2
	21BSC5C5CSMJ1P	PYTHON Programming lab	25	25	50	-	-	4	2	3
DSC6	21BSC5C5CSMJ2L	Computer Networks	40	60	100	3	-	-	3	2
	21BSC5C5CSMJ2P	Computer Networks Lab	25	25	50	-	-	4	2	3
DSC5	Another Department Code as a Minor Subject	Another Department Course Title	40	60	100	3	-	-	3	2
			25	25	50	-	-	4	2	3
VC1	21BSC5VC1US	Unix & Shell Programming	40	60	100	3	-	-	3	2
	21BSC5VC1FD	Fundamentals of Data Science								
VBC9	21BSC5V5PE5	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC10	21BSC5V6NC4	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
SEC3	21BSC5SE3CS3	Cyber Security	25	25	50	1	-	2	2	2
				Total Marks	**650**	**Semester Credits**			**22**	

SEMESTER-VI

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
Computer Science as Major Discipline										
DSC7	21BSC6C6CSMJ1L	Internet Technologies	40	60	100	3	-	-	3	2
	21BSC6C6CSMJ1P	Internet Technology Lab	25	25	50	-	-	3	2	3
DSC8	21BSC6C6CSMJ2L	Operating System Concepts	40	60	100	3	-	-	3	2
	21BSC6C6CSMJ2P	C# Programming Lab	25	25	50	-	-	3	2	3
DSC6	Another Department Code as a Minor Subject	Another Department Course Title	40	60	100	3	-	-	3	2
			25	25	50	-	-	3	2	3
VC2	21BSC6VC2HT	Health Care Technologies	40	60	100	3	-	-	3	2
	21BSC6VC2DM	Digital Marketing								
INT1	21BSC6 INT1L	Internship*	25	50	75	-	-	-	2	2
VBC1	21BSC6V5PE5	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC2	21BSC6V6NC4	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
SEC4	21BSC6SE4CS4	Professional Communication	25	25	50	1	-	2	2	2
				Total Marks	**700**	**Semester Credits**			**24**	
Exit with Bachelor of Science Degree, B. Sc. (with the completion of courses equal to a minimum of 140 credits)or continue studies with the Major					**4175**	**Total Credits for BSC Program**			**146**	

*Internship between 5 th& 6th Semester with 3 to 4 weeks

Computer Science Subject as a Minor Discipline

SEMESTER-V										
Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
DSC5 As a Minor Subject	21BSC5C5CSMN1L	Programming in PYTHON	40	60	100	3	-	-	3	2
	21BSC5C5CSMN1P	PYTHON Programming lab	25	25	50	-	-	3	2	3

SEMESTER-VI										
Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
DSC6 As a Minor Subject	21BSC6C6CSMN1L	Internet Technologies	40	60	100	3	-	-	3	2
	21BSC6C6CSMN1P	Internet Technology Lab	25	25	50	-	-	3	2	3

Concept Note, Abbreviation Explanation and Coding:

Concept Note:

1. **CBCS** is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG/PG program.
2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following is mechanism be adopted in the University:
   One credit (01) = One Theory Lecture (L) period of one (1) hour.
   One credit (01) = One Tutorial (T) period of one (1) hour.
   One credit (01) = One practical (P) period of two (2) hours.
3. Course: paper/subject associated with AECC, DSC, DSEC, SEC, VBC, OEC, VC, IC and MIL
4. In case of **B.Sc**. **Once a candidate chose two courses/subjects of a particular two department in the beginning, he/she shall continue the same till the end of the degree, then there is no provision to change the course(s) and Department(s).**
5. A candidate shall choose **one of the Department's courses as major and other Department course as minor in fifth and sixth semester and major course will get continued in higher semester.**
6. Wherever there is a practical there will be no tutorial and vice-versa
7. A major subject is the subject that's the main focus of Core degree/concerned.
8. A minor is a secondary choice of subject that complements core major/ concerned.
9. Vocational course is a course that enables individual to acquire skills set that are required for a particular job.
10. Internship is a designated activity that carries some credits involving more than **25 days** of working in an organization (either in same organization or outside) under the guidance of an identified mentor. Internship shall be an integral part of the curriculum.
11. **OEC: For non- computer science students. Computer Science students have to opt for OEC from departments other than major and minor disciplines.**

Abbreviation Explanations:

1.	AECC:	Ability Enhancement Compulsory Course.
2.	DSC:	Discipline Specific Core Course.
3.	DSEC:	Discipline Specific Elective Course.
4.	SEC:	Skill Enhancement Course.
5.	VBC:	Value Based Course.
6.	OEC:	Open/Generic Elective Course
7.	VC:	Vocational Course.
8.	IC:	Internship Course
9.	L1:	Language One
10.	L2:	MIL
11.	L= Lecture; T= Tutorial; P=Practical.	
12.	MIL= Modern Indian Language; English or Hindi or Telugu or Sanskrit or Urdu	

Program Coding:

1. Code 21: Year of Implementation
2. Code BSC: BSC Program under the faculty of Applied Science of the University
3. Code 1: First Semester of the Program, (2 to 6 represent higher semesters)
4. Code AE: AECC, (C for DSC, S for SEC, V for VBC and O for OEC)
5. Code 1: First "AECC" Course in semester, similarly in remaining semester for such other courses
6. Code LK: Language Kannada, similarly Language English, Language Hindi, Language Telugu, Language Sanskrit, &Language Urdu
7. Code 1: Course in that semester.
8. CS: Computer Science

ASSESSMENT METHODS

Evaluation Scheme for Internal Assessment:

Theory:

Assessment Criteria	40 marks
1st Internal Assessment Test for30 marks 1 hr after 8 weeks and 2nd Internal Assessment Test for 30 marks 1 hr after 15 weeks . Average of two tests should be considered.	30
Assignment	10
Total	**40**

Assessment Criteria	25 marks
1st Internal Assessment Test for20 marks 1hr after 8 weeks and 2nd Internal Assessment Test for 20 marks 1hr after 15 weeks. Average of two tests should be considered.	20
Assignment	05
Total	**25**

Practical:

Assessment Criteria	25 marks
Semester End Internal Assessment Test for 20 marks 2 hrs	20
Journal (Practical Record)	05
Total	**25**

Question Paper Pattern:

RANI CHANNAMMA UNIVERSITY
Department of Computer Science

BSc(Computer Science)

Sub: Code: Maximum Marks: 60

a. Answer any Six Questions from Question 1 b. Answer any Three each Questions from Question 2,3,4 and 5

Q.No.1.	Answer any Six Questions (Atlest Two question from Each Unit) a. b. c. d, e. f. g. h.	2X6=12
Q.No.2.	(Should cover Entire Unit-I) a. b. c. d.	4X3=12
Q.No.3.	(Should cover Entire Unit-II) a. b. c. d.	4X3=12
Q.No.4.	(Should cover Entire Unit-III) a. b. c. d.	4X3=12
Q.No.5.	(Should cover Entire Unit-IV) a. b. c. d.	4X3=12

COURSE-WISE SYLLABUS

Semester I

Year	I	**Course Code:**21BSC1C1CS1L	**Credits**	04
Sem.	1	**Course Title:** Computer Fundamentals and Programming in C	**Hours**	52

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 40	Summative Assessment Marks: 60	Duration of ESA:.02 hrs.
Course Outcomes	After completing this course satisfactorily, a student will be able to: • Confidently operate Desktop Computers to carry out computational tasks • Understand working of Hardware and Software and the importance of operating systems • Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts • Read, understand and trace the execution of programs written in C language • Write the C code for a given problem • Perform input and output operations using programs in C • Write programs that perform operations on arrays	

Unit No.	**Course Content**	**Hours**
Unit I	**Fundamentals of Computers**: Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart andPseudo code with Examples. **Introduction to C Programming**: Over View of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.	13
Unit II	**C Programming Basic Concepts**: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants. **Input and output with C**: Formatted I/O functions - printf and scanf, control stings and escapesequences, output specifications with printf functions; Unformatted I/O functions to read and display single character and a string - getchar, putchar, gets and	13

	puts functions. **C Operators & Expressions**: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmeticexpressions; Type conversion.	
Unit III	**Control Structures**: Decision making Statements - Simple if, if_else, nested if_else, else_ifladder,Switch-case, goto, break & continue statements; Looping Statements - Entry controlled and Exit controlled statements, while, do-while, for loops, Nested loops. **Arrays**: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. **Strings**: Declaring & Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric*etc.	13
Unit IV	**Pointers in C:** Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers; **User Defined Functions:** Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type. **User defined data types:** Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.	13
Recommended Leaning Resources		
Print Resources	**Text Books** 1. Pradeep K. Sinha and PritiSinha: Computer Fundamentals (Sixth Edition), BPBPublication 2. E. Balgurusamy: Programming in ANSI C(TMH) **References** 1. Kamthane: Programming with ANSI and TURBO C (PearsonEducation) 2. V. Rajaraman: Programming in C (PHI –EEE) 3. S. ByronGottfried: Programming with C(TMH) 4. Kernighan &Ritche: The C Programming Language(PHI) 5. YashwantKanitkar: Let usC	

Year	I	**Course Code:** 21BSC1C1CS1P	**Credits**	02
Sem.	I	**Course Title:**C Programming Lab	**Hours**	45

Course Pre-requisites, if any:	Knowledge of Programming	
Formative Assessment Marks: 25	Summative Assessment Marks: 25	Duration of ESA: 03 hrs.

Practice Labs

1. The following activities be carried out/ discussed in the lab during the initial period of the semester.

1. Basic Computer Proficiency
    a. Familiarization of Computer Hardware Parts
    b. Basic Computer Operations and Maintenance.
    c. Do's and Don'ts, Safety Guidelines in Computer Lab
2. Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples.
3. 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 generate n primes
6. Write a C Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
7. Write a C Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
8. Write a C Program to read percentage of marks and to display appropriate message (Demonstration of else-ifladder)
9. Write a C Program to find the roots of quadratic equation (demonstration of switch-case statement)
10. Write a C program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array
11. Write a C Program to remove Duplicate Element in a single dimensionalArray
12. Program to perform addition and subtraction ofMatrices

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.
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 add two m x n matrices using functions

	7. Write a C Program to read, display and multiply two m x n matrices using functions 8. Write a C Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters. 9. Write a C Program to Reverse a String using Pointer 10. Write a C Program to Swap Two Numbers using Pointers 11. Write a C Program to demonstrate student structure to read & display records of n students. 12. Write a C Program to demonstrate the difference between structure &union.

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Activity – 1 from Part A	Write up on the activity/ task	3
	Demonstration of the activity/ task	07
Activity-2 from Part B	Write up on the activity/ task	3
	Demonstration of the activity/ task	07
Viva based on Lab Activities		05
Total		**25**

OPEN-ELECTIVE SYLLABUS :

Year	I	**Course Code:** 21BSC1O1CS1	**Credits**	03
Sem.	1	**Course Title:** C Programming Concepts	**Hours**	40

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 40	Summative Assessment Marks: 60	Duration of ESA:.02 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Read, understand and trace the execution of programs written in C language 2. Write the C code for a given problem 3. Perform input and output operations using programs in C 4. Write programs that perform operations on arrays 5. Write user defined functions to perform a task

Unit No.	Course Content	Hours
Unit I	**Introduction to C Programming:** Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. **C Programming Basic Concepts:** C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants.	10
Unit II	**Input and output with C:** Formatted I/O functions – *printf*and*scanf,* control stings and escape sequences, output specifications with *printf*functions; Unformatted I/O functions to read and display single character and a string - *getchar, putchar, gets* and *puts* functions **C Operators & Expressions:** Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion. **Control Structures:** Decision making Statements - *Simple if, if_else*, *nested if_else, else_if ladder, Switch Case*, *goto, break* &*continue* statements	10
Unit III	Looping Statements - Entry controlled and exit controlled statements, *while, do-while, for* loops, Nested loops. **Derived data types in C:** Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. **Strings:** Declaring & Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumericetc*	10

Unit IV	**User Defined Functions:** Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.	10
	Recommended Leaning Resources	
Print Resources	**Text Books:** 1. C: The Complete Reference, By HerbertSchildt. 2. C Programming Language, By Brain W.Kernighan 3. Kernighan & Ritchie: The C Programming Language(PHI) **References** 1. E. Balaguruswamy: Programming in ANSI C(TMH) 2. Kamthane: Programming with ANSI and TURBO C (PearsonEducation) 3. V. Rajaraman: Programming in C (PHI –EEE) 4. S. Byron Gottfried: Programming with C(TMH) 5. YashwantKanitkar: Let usC	

Semester: II

Year	I	**Course Code:** 21BSC2C2CS2L	**Credits**	04
Sem.	2	**Course Title:** Data Structures using C	**Hours**	52

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 40	Summative Assessment Marks: 60	Duration of ESA: 02 hrs.
Course Outcomes	After completing this course satisfactorily, a student will be able to: • Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used byalgorithms • Describe common applications for arrays, records, linked structures, stacks, queues, trees, andgraphs • Write programs that use arrays, records, linked structures, stacks, queues, trees, andgraphs • Demonstrate different methods for traversingtrees • Compare alternative implementations of data structures with respect toperformance • Describe the concept of recursion, give examples of itsuse • Discuss the computational efficiency of the principal algorithms for sorting andsearching	

Unit No.	**Course Content**	**Hours**
Unit I	Introduction to data structures: Definition; Types of data structures - Primitive & Non-primitive, Linear and Non-linear; Operations on data structures.Algorithm Specification, Performance Analysis, Performance Measurement 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.Arrays: Basic Concepts – Definition, Declaration, Initialization, Operations on arrays; Types of arrays; Arrays as abstract data types (ADT); Representation of Linear Arrays in memory;	13
Unit II	Traversinglineararrays;Insertinganddeletingelements;Sorting– Selectionsort,Bubblesort,Quick sort, Selection sort, Insertion sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching; Stacks:BasicConcepts– DefinitionandRepresentationofstacks;Operationsonstacks;Applications of stacks; Infix, postfix and prefix notations; Conversion from infix	13

	to postfix using stack; Evaluation of postfix expression using stack;	
Unit III	Queues: Basic Concepts – Definition and Representation of queues; Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;Dynamic memory allocation: Static & Dynamic memory allocation; Memory allocation and de- allocation functions - malloc, calloc, reallocandfree.Linked list: Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, Doubly liked list, Header liked list, Circular linked list; Representation of Linked list in Memory; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation; Garbage collection	13
UnitIV	Trees: Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth; Binary tree: Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; *preorder, inorder*and*Postorder*traversal; Reconstruction of a binary tree when any two of the traversals are given.	13
Recommended Leaning Resources		
Print Resources	**Reference Books:** 1. Ellis Horowitz and SartajSahni: Fundamentals of Data Structures 2. Tanenbaum: Data structures using C (Pearson Education) 3. Kamathane: Introduction to Data structures (Pearson Education) 4. Y. Kanitkar: Data Structures Using C(BPB) 5. Kottur: Data Structure Using C 6. Padma Reddy: Data Structure Using C 7. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education,2007)	

Year	I	**Course Code:** 21BSC2C2CS2P	**Credits**	02
Sem.	I	**Course Title:**Data Structure Lab	**Hours**	45
Course Pre-requisites, if any:	Knowledge of Programming			
Formative Assessment Marks: 25	Summative Assessment Marks: 25	Duration of ESA: 03 hrs.		

Part A:

1. Write a C Program to find GCD using recursive function
2. Write a C Program to display Pascal Triangle using binomial function
3. Write a C Program to generate n Fibonacci numbers using recursive function.
4. Write a C Program to implement Towers of Hanoi.
5. Write a C Program to implement dynamic array, find smallest and largest element of the array.
6. Write a C Program to create two files to store even and odd numbers.
7. Write a C Program to create a file to store student records.
8. Write a C Program to read the names of cities and arrange them alphabetically.
9. Write a C Program to sort the given list using selection sort technique.
10. Write a C Program to sort the given list using bubble sort technique.

PART B:

1. Write a C Program to sort the given list using insertion sort technique.
2. Write a C Program to sort the given list using quick sort technique.
3. Write a C Program to sort the given list using merge sort technique.
4. Write a C Program to search an element using linear search technique.
5. Write a C Program to search an element using recursive binary search technique.
6. Write a C Program to implement Stack.
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.

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Activity – 1 from Part A	Write up on the activity/ task	3
	Demonstration of the activity/ task	07
Activity-2 from Part B	Write up on the activity/ task	3
	Demonstration of the activity/ task	07
Viva based on Lab Activities		05
Total		**25**

OPEN-ELECTIVE SYLLABUS:

Year	I	**Course Code:** 21BSC2O2CS2		**Credits**	03
Sem.	II	**Course Title:** Web Designing		**Hours**	40
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 40		Summative Assessment Marks: 60		Duration of ESA:.02 hrs.	
Course Outcomes		At the end of the course the student should be able to: 1. Read, understand and trace the execution of programs 2. Write the code for a given problem 3. Perform input and output operations using programs 4. Write user defined functions to perform a task			
Unit No.		**Course Content**		**Hours**	
Unit I		History of Internet, The World Wide Web, Web Browser, Web Server, URL, Working of Web, Web Page, Types of Web Pages, Web Content, Websites, Home Pages, Building Website, Website building tools; Web graphics design, basic tips for graphics design, Web Designing tools: Gimp-image resize, crop, edit background, save with different file types. Introduction to web programming: what is web programming? , web programming languages.		10	
Unit II		Introduction to XHTML- Basic Syntax, Standard structure, Basic text markup, Images, Hypertext, Links, Lists, Tables, Forms- <form>,<input>,<label>,<select>,<textarea> tags and action buttons(submit and reset). CSS- Introduction, Levels of style sheets, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The <span> and <div>tags.		10	
Unit III		JavaScript: Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; Errorsin scripts; Examples.		10	
Unit IV		Introduction to XML, Syntax of XML , XML document structure, Displaying raw XML documents, Displaying XML documents with CSS,XSLT Stylesheets and Displaying XML documents with XSLT. Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation		10	

Recommended Leaning Resources	
Print Resources	**Text Books:** **1.** Robert W. Sebestra, “Programming the World Wide Web”, 7th Edition /4th edition Addison Wesley Publication,2013. **References:** 1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India 2. Web Technologies, Black Book, dreamtech Press 3. HTML 5, Black Book, dreamtech Press 4. Web Design, Joel Sklar, Cengage Learning 5. Developing Web Applications in PHP and AJAX, Harwani, McGrawHill 6. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel, Pearson