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KUVEMPU UNIVERSITY

SEP – 2024

CURRICULUM STRUCTURE AND SYLLABUS

Bachelor of Science (B.Sc) Programme
In
Computer Science

[According to SEP (State Education Policy): 2024]

w.e.f Academic Year 2024-25

Under Graduate Board of Studies

In

Computer Science and B.C.A.

Kuvempu University, Shankaraghatta,

Shimoga, Karnataka.

Curriculum Design / Syllabus Framing Committee

Sl. No.	Name	Designation
1.	**Dr. Prabhakar C J** Professor, Department of P.G Studies and Research in Computer Science, Kuvempu University, Shankaraghatta – 577541, Shimoga(D).	**Chairman**
2.	**Dr. Shoieb Ahamed** Assistant Professor, Department of Computer Science, Government First Grade College, Sorab – 577429, Shimoga(D).	**Member**
3.	**Mr. Shashidhara B** Assistant Professor, Department of Computer Science, IDSG Government College, Chikkamagaluru(D) – 577101,	**Member**
4.	**Mr. Gopala B** Assistant Professor, Department of Computer Science, Government First Grade College Shikaripura - 577427, Shimoga(D).	**Member**
5.	**Mr. Krishnamurthy K** Assistant Professor, Department of Computer Science, Government First Grade College, Thirthahalli - 577432, Shimoga(D).	**Member**
6.	**Mr. Prajwal Kumar P** Assistant Professor, Department of Computer Science, Government First Grade College, Kadur – 577548, Chikkamagaluru(D).	**Member**

The objectives of the B.Sc (CS) Program

1. The primary objective of this program is to provide a foundation of computing principles for effectively using information systems and enterprise softwares.
2. It helps students analyze the requirements for system programming and exposes students for information systems
3. This Programme provides students with options to specialize in various software system.
4. To produce outstanding Computer Scientists who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the programming techniques and the problem- solving skills through programming
7. To prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

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. **Design and Development of Solutions:** Ability to design and development ofalgorithmic solutions to real world problems.
4. **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day scientific applications.
5. **Application Systems Knowledge**: Possessing a minimum knowledge to practice existing computer application software.
6. **Communication:** Must have a reasonably good communication knowledge both in oral and writing.
7. **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.
8. **Lifelong Learning:** Should become an independent learner. So, learn to learnability.
9. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

Bachelor of Science (B.Sc.) Computer Science - Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25 as per SEP-2024

Three Majors with a General degree in all 6 Semesters

(Course Structure, Scheme of Teaching and Evaluation - 2024-25)

Curriculum Framework for UG Programmes as suggested by KSHEC, Government of Karnataka

(As per G.O. No.: ED 166 UNE 2023, Bengaluru, dated: 08-05-2024)

Allocation of credits in Kuvempu University for UG-Science programmes
Class I: Three Major Subjects combination in all Six Semesters

Sl.No.	Subject Category	No. of Credits
1	Major Courses	90
2	Languages	24
3	Compulsory	12
4	Electives/Optional	04
Total		**130**

Semester-wise allocation of credits in Kuvempu University for UG-Science programmes
(Three Subjects combination)

Year	Semester	Total Credits
1	I	**46**
	II	
2	III	**50**
	IV	
3	V	**34**
	VI	
Total		**130**

Semester-wise allocation of credits in Kuvempu University for B.Sc (CS) Programme for framing syllabus of One Major Subject in Three Major Subjects combination (Class - I stream)

Year	Semester	Credits	Total Credits
1	I	05	**10**
	II	05	
2	III	07	**14**
	IV	07	
3	V	05	**10**
	VI	05	
Total		**34**	**34**

Bachelor of Science (B.Sc.) in Computer Science - Semester Scheme

Curriculum Structure for B.Sc. in Computer Science Programme for 2024-25

Sem.	Course/ Paper Code	Title of the Paper	Subject Category	Teaching Hour/ week	Semester End Exam.	Internal Assessme	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
Semester-I									
1	24MCS1	Computer Fundamentals and Programming in C	**MC-T**	03	80	20	**100**	03	3 Hrs.
	24MCS1P	Information Technology and C-Programming Lab	**MC-P**	04	40	10	**50**	02	3 Hrs.
	Total			**07**	**120**	**30**	**150**	**05**	---
Semester-II									
2	24MCS2	Data Structures Using C	**MC-T**	03	80	20	**100**	03	3 Hrs.
	24MCS2P	Data Structures Lab using C	**MC-P**	04	40	10	**50**	02	3 Hrs.
	Total			**07**	**120**	**30**	**150**	**05**	---
Semester-III									
3	24MCS3	Object Oriented Programming with Java	**MC-T**	03	80	20	**100**	03	3 Hrs.
	24MCS3P	JAVA Programming Lab	**MC-P**	04	40	10	**50**	02	3 Hrs.
	24MCSE1	Elective I	**EL/OP-I**	02	40	10	**50**	02	2 Hrs.
	Total			**09**	**160**	**40**	**200**	**07**	---
Semester-IV									
4	24MCS4	Data Base Management Systems	**MC-T**	03	80	20	**100**	03	3 Hrs.
	24MCS4P	PL/SQL Lab	**MC-P**	04	40	10	**50**	02	3 Hrs.
	24MCSE2	Elective II	**EL/OP-II**	02	40	10	**50**	02	2 Hrs.
	Total			**09**	**160**	**40**	**200**	**07**	---
Semester-V									
5	24MCS5	Web Technologies	**MC-T**	03	80	20	**100**	03	3 Hrs.
	24MCS5P	Web Technologies Lab	**MC-T**	04	40	10	**50**	02	3 Hrs.
	Total			**07**	**120**	**30**	**150**	**05**	---
Semester-VI									
6	24MCS6	Artificial Intelligence and Machine Learning	**MC-T**	03	80	20	**100**	03	3 Hrs.
	24MCS6P	Python Programming	**MC-P**	04	40	10	**50**	02	3 Hrs.
	Total			**07**	**120**	**30**	**150**	**05**	---
	Grand total			**48**	**800**	**200**	**1000**	**34**	**---**

Bachelor of Science (B.Sc.) in Computer Science - Semester Scheme

Curriculum Structure for Undergraduate Programme for 2024-25

Case 1 : Three Majors with a General degree in all Six Semesters –Number of courses and credit course-wise in all semesters

Semester	Major Course (Paper) Major 1	Elective/ Optional	AEDP
01 Theory paper and 01 Practical paper in each Major Subject (T+P)			
I	3+2 = **5**	**---**	
II	3+2 = **5**	**---**	
III	3+2 = **5**	Elective1- **2**	
IV	3+2 = **5**	Elective2- **2**	
V	3+2 = **5**	**---**	
VI	3+2 = **5**	**---**	Project/Internship/ Dissertation **2**
---	**---**	**---**	
Total	**30**	**04**	**02**
Grand Total		**36 Credits**	

1. Credit for the three major courses includes theory, practical (skill enhancement course), and tutorial/assignment/survey-based assignment/internship.
2. Practical paper(s) (Compulsory/Skill enhancement course) should provide practicalexperience which is complimentary to theory major paper(s).
3. Project Work/Dissertation/Internship/Apprenticeship Embedded Degree Programme (AEDP) should also be considered to be part of the curriculum.
4. **Project work/Dissertation/Internship during Semester-VI:** Students for Project work may be allotted as per following formula,

Project Allotment to Students

$$= \frac{\textit{Total number of students in a three subjects combination}}{\textit{Number of subjects in a combination (Three)}}$$

Practical Proper Examination I-VI semesters
Duration: 3Hrs

- Experimentation (Major & Minor/Spotters) - 30 Marks
- Viva Voice - 10 Marks

Total 40 Marks

Internal Assessment for Practical Paper I-VI semesters

- Attendance - 05 Marks
- Record/Journal - 05 Marks

Total 10 Marks

Project Work/Internship during VI semester

- Project work/Dissertation/Internship and preparation of Report - 40 Marks
- Viva Voice - 10 Marks

Total 50 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment

Major Courses

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5 = 10)	**10**
02	Assessment of Seminars/Assignment with proper record	**05**
03	Attendance with proper record	**05**
TOTAL MARKS		**20**

- **Attendance Marks-breakup**

< 75% - 00 Marks
75-80% - 01 Mark
80-85% - 02 Marks
85-90% - 03 Marks
90-95% - 04 Marks
> 95% - 05 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment

Elective/Optional Papers

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	**(2)**	**(3)**
01	Two Session Tests with proper record for assessment (2+2 = 4)	**04**
02	Assessment of Seminars/ Assignment with proper record	**03**
03	Attendance with proper record	**03**
TOTAL MARKS		**10**

- **Attendance Marks-breakup**

  <75% - 00 Marks

  75-80% - 01 Mark

  85-90% - 02 Marks

  90-100% - 03 Marks

Electives in Computer Science

Sl. No.	Semester	Elective	Electives Offered
01	THIRD SEMESTER	Elective I	Any one from the following • Office Automation • Computer Fundamentals
02	FOURTH SEMESTER	Elective II	Any one from the following • Internet Basics • Digital Fluency

B.Sc (CS) Semester: I

Course Code: 24MCS1	**Course Title: Computer Fundamentals and Programming in C**
Course Credits: 03	**Hour of Teaching/Week: 03**
Total Contact Hours: 48	**Formative Assessment Marks: 20**
Exam Duration: 03 Hours	**Summative Exam Marks: 80**

Course Outcomes (COs):

- Introduction to computers, classification of computers, anatomy of computer, constituents and architecture.
- 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

Content	Hours
Unit - 1	
Introduction to Computers - Computer Definition, Characteristics, History of Computers, Anatomy of Computer -Central Processing Unit, Storage units, Input and output Devices. Types of Computers, Types of Software - System Software and Utility Software; Operating System, Computer Languages – Machine Level, Assembly Level & High-Level Languages, Translators - Assembler, Interpreter and Compiler.	12
Unit - 2	
Number Systems - Binary, Octal, decimal hexadecimal, convert binary to decimal, Decimal to binary, Decimal to hexadecimal, hexadecimal to decimal. Binary 1's complement, binary 2's complement. Computer Codes-BCD, Gray Code, ASCII and Unicode; Basic logic gates and operations. **Overview of C:** History and Features of C, Structure of a C Program with Examples, C Character Set. Header files - stdio, conio, maths, string, ctype. C tokens - keywords, identifiers, constants, and variables; Data types-int, float, char, double, long. Declaration & initialization of variables; Symbolic constants.	12
Unit - 3	
Input and output with C-Formatted I/O functions - printf and scanf, control stings and escape sequences. Unformatted I/O functions - getchar, putchar, gets and puts. **C Operators & Expressions** - Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment & Decrement operators, Bitwise operators, Conditional operator, Operator Precedence and Associativity, Evaluation of arithmetic expressions.	12
Unit - 4	

	Control Structures - Simple if, if_else, nested if_else, Switch-case, goto, break & continue statements; Looping Statements - while, do-while, for loops. **Arrays** - Definition, Declaration, Initialization, Types of arrays, Representation of Linear Arrays in memory, Two-dimensional array, Operations on Array. **Pointers in C** - Understanding pointers - Declaring and initialising pointers, accessing address and value of variables using pointers, Advantages and disadvantages of using pointers.	12

Text Books

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition),BPB Publication
2. E. Balagurusamy: Programming in ANSI C (TMH)

References

1. Kamathane: Programming with ANSI and TURBO C (Pearson Education)
2. V. Rajaraman: Programming in C (PHI – EEE)
3. S. Byron Gottfried: Programming with C (TMH)
4. Kernighan & Ritche: The C Programming Language (PHI)
5. Yashwant Kanitkar: Let us C
6. P.B. Kottur: Programming in C (Sapna Book House)

Evaluation Scheme for Internal Assessment

Internal Assessment	
Test-1 & Test 2 (5+5)	10 Marks
Seminar/Assignment with Proper record	05 Marks
Attendance with proper record	05 Marks
Total	**20 Marks**

Course Code: 24MCS1P	**Course Title: Information Technology (IT) and C Programming LAB**
Course Credits: 02	**Hour of Teaching/Week: 04**
Total Contact Hours: 52	**Formative Assessment Marks: 10**
Exam Duration: 03	**Summative Exam Marks: 40**

Practice Lab

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.

Part A:

1. Create Bio-data in word
2. Create timetable in word with text formatting
3. Create Content page with header and footer, including page number, date, title
4. Create PowerPoint Presentation with content animation
5. Create PowerPoint Presentation with Slide transition
6. Create student marks card in Excel
7. Create Bar Chart and Pie Chart in Excel for Stock market data
8. Create inventory Bill in Excel with formulas

Part B:

1. Write a C Program to swap two numbers
2. Write a C Program to check given number is odd or even
3. Write a C Program to Find Factorial of given number
4. Write a C Program to display Day of week using a switch case.
5. Write a C Program to generate N fibonacci numbers using a for loop.
6. Write a C Program to read a number, find the sum of the digits
7. Write a C Program to read three numbers and find the biggest of three
8. Write a C Program to Reverse the given number using do-while loop
9. Write a C Program to read, store and display N numbers using Array

Evaluation Scheme for Internal Assessment

Attendance	5 Marks
Record	5 Marks
Total	10 Marks

Attendance Marks breakup

< 75 % - 00 Marks, 75- 80% - 01 Mark , 80-85% - 02 Marks
85-90% - 03 Marks, 90-95% - 04 Marks, > 95% - 05 Marks

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Program -1 from Part A	Write up and Execution	5+10 = 15
Program -2 from Part B	Write up and Execution	5+10 = 15
Viva Voce based on Lab Activities		10
Total		**40**

Semester: II

Course Code: 24MCS2	Course Title: Data Structures using C
Course Credits: 03	Hour of Teaching/Week: 03
Total Contact Hours: 48	Formative Assessment Marks: 20
Exam Duration: 03	Summative Exam Marks: 80

Course Outcomes (COs):

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 by algorithms
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
- Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
- Demonstrate different methods for traversing trees
- Compare alternative implementations of data structures with respect to performance
- Describe the concept of recursion, give examples of its use
- Discuss the computational efficiency of the principal algorithms for sorting and searching

Course Content

Content	Hours
Unit - 1	
Introduction to data structures: Definition; Types of data structures - Primitive & Non-primitive, Linear and Non-linear; Operations on data structures. User Defined Functions - Need, Syntax. Recursive function - Definition, Examples - Fibonacci number, factorial of number, GCD, Towers of Hanoi; Comparison between iterative and recursive functions. Sorting – Selection sort, Bubble sort, Quick sort, Insertion sort, merge sort. Searching - Sequential Search, Binary search.	12
Unit – 2	
Stacks: Basic Concepts – Definition and 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; Application of stack in function calls. **Queues**: Basic Concepts – Definition and Representation of queues; Types of queues – Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;	12
Unit – 3	
Dynamic memory allocation: Static & Dynamic memory allocation; Memory allocation and de- allocation functions - malloc, calloc, realloc and free. **Linked list**: Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, doubly liked list, Circular linked list; Representation of Linked list in Memory; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation.	12
Unit - 4	

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;	12

Text Books

1. Sartaj Sahani: Fundamentals of Data Structures

References

1. Tanenbaum: Data structures using C (Pearson Education)
2. Kamathane: Introduction to Data structures (Pearson Education)
3. Y. Kanitkar: Data Structures Using C (BPB)
4. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions(McGraw Hill Education, 2007))

Evaluation Scheme for Internal Assessment

Internal Assessment	
Test-1 & Test 2 (5+5)	10 Marks
Seminar/Assignment with Proper record	05 Marks
Attendance with Proper record	05 Marks
Total	**20 Marks**

Course Code: 24MCS2P	**Course Title: Data Structures Lab**
Course Credits: 02	**Hour of Teaching/Week: 04**
Total Contact Hours: 52	**Formative Assessment Marks: 10**
Exam Duration: 04	**Summative Exam Marks: 40**

Part A:

1.
2. write a C Program to read and transpose Matrix (two-dimensional array)
3. Write a C Program to Demonstrate Pointers Operations
4. Write a C Program to Demonstrate Dynamic memory allocation
5. Write a C Program to generate N Fibonacci numbers using a recursive function.
6. Write a C Program to find GCD using recursive function
7. Write a C Program to sort the given list using selection sort technique.
8. Write a C Program to sort the given list using Bubble sort technique

Part B:

1. Write a C Program to find element in Array using Binary search
2. Write a C Program to implement Stack.
3. Write a C Program to convert infix to postfix expression
4. Write a C Program to implement a simple queue.
5. Write a C Program to implement a Circular queue.
6. Write a C Program to implement a linear linked list.
7. Write a C Program to Create Binary search tree
8. Write a C Program to implement traversal of a binary tree.

Evaluation Scheme for Internal Assessment

Attendance	5 Marks
Record	5 Marks
Total	10 Marks
Attendance Marks breakup < 75 % - 00 Marks, 75- 80% - 01 Mark , 80-85% - 02 Marks 85-90% - 03 Marks, 90-95% - 04 Marks, > 95% - 05 Marks	

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Program -1 from Part A	Write up and Execution	5+10 = 15
Program -2 from Part B	Write up and Execution	5+10 = 15
Viva Voce based on Lab Activities		10
Total		**40**

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR SUBJECTS (Semesters I –VI)

B.Sc. (CS) Semester-I Degree Examination; 2024-25
(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: COMPUTER SCIENCE

Paper –_____: _____
Paper Code: _____

Time: 3 Hours **Max. Marks: 80**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

1. Answer **all** the following questions: **(2×10=20)**

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)

SECTION-B

Answer any **SIX** of the following: **(Two Questions From each Unit)** **(5×6=30)**

2.
3.
4.
5.
6.
7.
8.
9.

SECTION -C

Answer **Any Three** of the following: **(10×3=30)**

10. **From Unit-I**

11. **From Unit-II**

12. **From Unit-III**

13. **From Unit-IV**

THEORY EXAMINATION QUESTION PAPER PATTERN FOR ELECTIVE/OPTIONAL PAPERS

(Semesters III & IV)

B.Sc. Semester-I/II/III/IV/V Degree Examination; 2024-25

(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: COMPUTER SCIENCE

Paper – ELECTIVE/OPTIONAL III & IV ____: _____

Paper Code: _____

Time: 2 Hours **Max. Marks: 40**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

Answer **all** the following questions: **(2×5=10)**

1.
2.
3.
4.
5.

SECTION-B

Answer any **SIX** of the following: **(5×6=30)**

6.
7.
8.
9.
10.
11.
12.
13.

Syllabus Distribution for Question Paper Setting		
Section-A	Ten Questions of each carrying 02 marks	Two questions each from unit-1 and Unit-2. And Three questions each from Unit-3 and unit-4.
Section -B	Eight Questions carrying 06 marks each.	Two questions from each unit.
Section -C	Four Questions carrying 10 marks each	One question from each unit. (There shall be sub-Questions.)