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2020-21



**Dr G R DAMODARAN COLLEGE OF SCIENCE(Autonomous), COIMBATORE – 641 014**  
(Autonomous and affiliated to the Bharathiar University and recognized by the UGC)  
Re-accredited at the 'A' Grade level by the NAAC and ISO 9001:2015 Certified

## **REGULATIONS FOR THE BACHELOR OF SCIENCE IN COMPUTER TECHNOLOGY DEGREE COURSE**

(EFFECTIVE FROM THE ACADEMIC YEAR 2020 - 2021 ONWARDS)

### **1. DURATION AND COURSE / PROGRAMME OF STUDY:**

The course leading to the degree of Bachelor of Science in Computer Technology of the Bharathiar University shall consist of six semesters in three academic years. The duration of each semester shall not be less than 90 working days. The course / programme of study will comprise subjects of study (theory and practical) and curricular components with credits and syllabuses / descriptions as set out in *Section 9* below.

### **2. ELIGIBILITY FOR ADMISSION:**

Candidates for admission to the first year of the course leading to the Degree of Bachelor of Science in Computer Technology of the Bharathiar University shall be required to have passed the Higher Secondary Examination, with Mathematics or Computer Science as the subjects, conducted by the Government of Tamil Nadu or an examination accepted as equivalent there to.

### **3. ATTENDANCE AND PROGRESS:**

Students shall be required to have secured at least *75% of attendance* in a semester to be deemed to have completed the course work and permitted to take the Term End Examination (TEE). Shortfall in attendance, up to 10% may be condoned, upon application citing proper and genuine grounds for the shortfall, at the discretion of the Principal. Students who fail to meet the 75% attendance requirement including the period of condonation will not be allowed to write the Term End Examinations (TEE) of the semester but may be permitted to proceed to the next semester course of study if they have attended 55% or more of the working days. Upon thus proceeding to the next semester they shall be required to put up additional attendance to make up for the previous semester's shortage of attendance as a condition for being allowed to appear at the ensuing Term End Examinations, failing which they shall *redo* the course

*G. Reddy*

beginning from the semester of first default. Those who put in less than 55% of actual attendance in a semester shall have no option but to redo the course of the semester of default afresh when it is offered next. Lack of satisfactory progress (participation and performance in sessional work) may also entail stoppage from terminal examinations and compliance with such conditions as the Principal may lay down to enable continuation with the course.

The provision for proceeding to the next semester despite attendance shortfall for those with 55% or more of attendance shall be available to a student *only once* during the entire course of study.

#### 4. ASSESSMENT:

The assessment shall comprise continuous sessional assessment in the subjects of study and other curricular components as well as terminal examinations carrying credit as shown in the curricular scheme in *section 9* below. The break-up and modes of assessment for continuous assessment, the pattern of question papers for term end examination (TEE) and the method of terminal assessment in case of curricular components other than conventional subjects of study, shall be framed by the Standing Committee of the Academic Council, and informed in advance to the students.

Continuous assessment marks once earned by a student in a subject shall remain unchanged, unless he / she repeats the course of study in the subject, in a subsequent semester when it is offered for a succeeding regular batch.

The Choice Based Credit System (CBCS) as recommended by the Tamil Nadu State Council for Higher Education (TANSHE), Government of Tamilnadu and as directed by the Bharathiar University, Coimbatore will be suitably adopted for the overall assessment scheme. The marks scored by the candidates at the TEE shall be converted to Grade Points / Grade Letter as detailed below:

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<i>Range of Marks</i>	<i>Grade Points</i>	<i>Grade Letter</i>	<i>Description</i>
90 - 100	9.0 - 10	O	Outstanding
80 - 89	8.0 - 8.9	D+	Excellent
75 - 79	7.5 - 7.9	D	Distinction
70 - 74	7.0 - 7.4	A+	Very Good
60 - 69	6.0 - 6.9	A	Good
50 - 59	5.0 - 5.9	B	Average
45 - 49	4.5 - 4.9	C	Satisfactory
00 - 44	0.0	U	To Re-appear
Absent	0.0	AAA	Absent

NA – Not Applicable

Students shall register for their regular subjects at the end-of-semester examination and for such of their arrear subjects as may be scheduled at that examination. Candidates failing at the end-of-semester examination shall register for *all* the failed subjects at the next Term End Examination opportunity. A score that is less than the minimum mark required to pass in a subject or absence at an examination opportunity shall lead to a 'RA' (*To Re-appear*) result and shown as such in the mark sheet.

Candidates passing in the regular appearance, but desirous of improving their TEE marks in any subject/s of any semester shall be allowed to do so *only once* (for a subject) by appearing for the same in the *immediate next terminal examination* opportunity.

The students who are present and awarded 'RA' in any of their final semester subjects shall be eligible to appear at the special supplementary examinations that will be conducted soon after the regular April / May Term End Examinations. In addition, the final year outgoing students who have arrear in *only one* subject in any one of the previous semesters (semesters I through V) and the failed out gone students with arrears to clear in *only one subject* in any of the semesters (semesters I through VI) shall also be given the special supplementary examination opportunity.

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## 5. PASSING MINIMUM:

A candidate shall be declared to have successfully completed a subject or component if he / she secures not less than 45% of the total marks specified for the subject / component, i.e. in the continuous assessment and terminal examination marks put together, subject to scoring a minimum of 40% of the TEE marks in the subject.

## 6. CLASSIFICATION:

The Choice Based Credit System (CBCS) as recommended by the Tamil Nadu State Council for Higher Education (TANSHE), Government of Tamil Nadu and as directed by the Bharathiar University, Coimbatore shall be suitably adopted for the over all classification of successful candidates.

Based on the Cumulative Grade Point Average (CGPA) secured by them in the subjects counting for classification of all semesters, successful candidates will be graded / classified as below:

CGPA	GRADE	CLASSIFICATION
9.5 to 10.0	O+	First Class with Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C	Third Class
0.0 and above but below 4.5	U	To Re-appear

\* Candidates who have passed in the first appearance and within the prescribed number of semesters of the UG programme (Part III subjects only) only are eligible to be considered (i.e. a candidate who is 'Absent' for an examination in his regular first opportunity and clears it in any of the subsequent semester examinations is not eligible for the award of distinction).

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**7. PROCEDURE FOR COMPLETING THE COURSE:**

Candidates who complete the course fulfilling the requirements of attendance and progress of all semesters and satisfying the passing requirements of all the subjects within  $n + 2$  years of their admission (where  $n$  is the normal course duration in years) shall be declared to have qualified for the degree.

A student who fails to clear any arrear subject/s within this  $n+2$  years period will be required to take the examinations thereafter only on the current syllabuses of the new regulations that may be in force. If such current scheme / syllabus does not contain the subject of the same title as the one in which he / she has to appear, a paper may be set for him / her on the old syllabus or he / she may be required to take the examination in an equivalent current subject as may be decided by the Equivalence Committee / the Academic Council.

**8. AWARD OF DEGREE:**

Students who successfully complete the course will be awarded the Bachelor of Science in Computer Technology degree by the Bharathiar University on the recommendation of the college.

**9. SCHEME OF SUBJECTS / CURRICULAR COMPONENTS, CONTENT DESCRIPTIONS AND CREDITS:**

**Enclosure I**



**Dr G R DAMODARAN COLLEGE OF SCIENCE (AUTONOMOUS)  
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**B.Sc(COMPUTER TECHNOLOGY)**  
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**EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021**

Programme Outcome	
PO1	To develop problem solving abilities using Computer Technologies
PO2	Ability to use appropriate techniques, skills and tools necessary for computing practice
PO3	An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computational systems
PO4	To have an understanding in the concepts, principles and theories of the computer oriented domains
PO5	Open up the avenues of contemporary computing methods and apply in their professional practices.
PO6	Enhancing the programming skills for practicing the digitization in activities
PO7	Implement the optimum methods in technology updates for the career development
PO8	Improve their computer literacy, their basic understanding of operative systems and a working knowledge of software commonly used in academic and professional environments.
PO9	Identify the best practices in the Industry and collaborate with industry experts to equip themselves
PO10	Engaged in lifelong learning to equip them to the changing environment and be prepared to take-up mastering programmes

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<b>Programme Specific Outcome</b>	
<b>PSO1</b>	Apply concepts and methods to solve problems in real-world contexts.
<b>PSO2</b>	Acquire and excel in cross-disciplinary skills and knowledge to nurture them in the field of Computer Technology
<b>PSO3</b>	Build the necessary skill set and analytical abilities for developing computer based solutions for real life problems
<b>PSO4</b>	Design and develop computer programs/computer-based systems in the latest cutting edge technologies
<b>PSO5</b>	Build expertise in various hardware and software related technologies

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**SCHEME OF EXAMINATIONS**

Sem.	Part	Course Code	Course Name	Credits	MARKS			Hrs./ Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
I	I	20100T	TAMIL I	3	25	75	100	5	3	THEORY
I	I	20100H	HINDI I							
I	I	20100F	FRENCH I							
I	I	20100M	MALAYALAM I	3	25	75	100	5	3	THEORY
I	II	20100E	ENGLISH I							
I	III	20195A	CORE: PROGRAMMING FUNDAMENTALS	4	25	75	100	4	3	THEORY
I	III	20195B	CORE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE	3	25	75	100	4	3	THEORY
I	III	20195C	ALLIED: MATHEMATICS FOR COMPUTER TECHNOLOGY	4	25	75	100	5	3	THEORY
I	III	20195P	CORE: PROGRAMMING LAB	3	40	60	100	5	3	PRACTICAL
I	IV	20100G	SKILL BASED SUBJECT: GENERAL AWARENESS	2	25	75	100	2	3	THEORY
II	I	20200T	TAMIL II	3	25	75	100	5	3	THEORY
II	I	20200H	HINDI II							
II	I	20200F	FRENCH II							
II	I	20200M	MALAYALAM II	3	25	75	100	5	3	THEORY
II	II	20200E	ENGLISH II							
II	III	20295K	ONLINE COURSE: SWAYAM/NPTEL COURSE	4				4		

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II	III	20295A	CORE: DATA STRUCTURES AND ALGORITHMS	3	25	75	100	5	3	THEORY
II	III	20295B	ALLIED: DISCRETE MATHEMATICS	4	25	75	100	4	3	THEORY
II	III	20295P	SKILL BASED SUBJECT: JAVA AND DATA STRUCTURES LAB	3	40	60	100	5	3	PRACTICAL
II	IV	20200G	ENVIRONMENTAL STUDIES: ENVIRONMENTAL AWARENESS	2	25	75	100	2	3	THEORY

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MAPPING OF COURSES WITH PROGRAMME OUTCOME LEVELS

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
20195A	CORE: PROGRAMMING FUNDAMENTALS	3	2	1	3	1	3	1	2	3	3
20195B	CORE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE	3	2	3	2	2	1	3	2	2	2
20195C	ALLIED: MATHEMATICS FOR COMPUTER TECHNOLOGY		1	3				1			1
20295A	CORE: DATA STRUCTURES AND ALGORITHMS	3	2	3	3	2	3	2	3		1
20295B	ALLIED: DISCRETE MATHEMATICS			3				1			1

Indicators: 1. Reasonable 2. Significant 3. Strong

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20195A	CORE: PROGRAMMING FUNDAMENTALS	4	Theory	-	100

**Objective of the Course:** This subject provides the knowledge on the concepts of the programming in general with respect to any language and their programming environments. The fundamental concepts in both the structured programming and the Object Oriented programming are discussed.

**UNIT I: PROGRAMMING FUNDAMENTALS** **(Teaching hours: 08)**

Programming Concept Fundamentals: Concepts of programming languages – Programming Domains – Language Evaluation Criteria - Influences of Language Design – Language Categories – Language Design Trade-offs – Implementation Methods – Programming Environments.

**UNIT II: BASICS OF C PROGRAMMING** **(Teaching hours: 10)**

Structured Programming: C Fundamentals: The C Character Set – Identifiers and Keywords – Data Types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic Constants – Operators.

Data Input and Output: Getchar and Puchar Function – scanf function- printf function- Gets and Puts Functions.

Control Statements: The If-else, The While, Do-while, For, Nested control structures, Switch, break, The Continue statement- The Comma Operator-The Goto Statement - Storage Classes

**UNIT III: C PROGRAMMING FUNCTIONS** **(Teaching hours: 10)**

Functions: A Brief Overview - Defining a Function– Accessing a Function – Function Prototype- Passing Arguments to a Function – Recursion. Arrays: Defining an Array – Processing an Array- Passing Arrays to Functions – Multidimensional Arrays – Strings: Defining a string-Reading and writing a string- String Handling Functions. Pointers-- Pointer Declarations – Passing Pointers to Function – Pointers and One-Dimensional Arrays – Operations on Pointers – Pointers and Multidimensional Arrays. Structures: Defining a Structure – Processing a Structure.

**UNIT IV: OOPS CONCEPTS** **(Teaching hours: 11)**

Object Oriented Programming with C++: Objects and Classes- A Simple class – C++ Objects as Physical Objects – C++ Objects as Data types – Constructors – Objects as Function arguments – The default Copy constructor – Returning objects from functions – Static class Data – const and classes.

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Operator Overloading: Overloading unary operators – Overloading binary operators. Inheritance: Derived class and Base class – Derived class constructors – Overriding member functions – Scope resolution with overridden functions – Class Hierarchies – Types of Inheritance.

**UNIT V: VIRTUAL FUNCTIONS**

**(Teaching hours: 11)**

Virtual Functions: Virtual Functions – Normal member functions accessed with pointers – Virtual member functions accessed with pointers – Late binding – Abstract classes and Pure virtual functions – Virtual destructors – Virtual base class-Friend Functions.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understanding Programming Fundamentals & Categories of Programming Languages	K2
CO2	Applying & Analysing basic concepts in C Programming	K3 & K4
CO3	Analysing, Creating & Evaluating Functions, Arrays, Pointers in C Programming	K4 & K5
CO4	Creating & Evaluating OOPS concepts.	K5
CO5	Understanding Virtual Functions	K2

**Note: K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.**

**Course Outcome mapping with Programme outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	1	2		2	1		1	
CO2	3	2		3		3		2	3	3
CO3	2		1			3	2		3	3
CO4	2			2	1	3		2		
CO5	1	1		2		3		2	2	2

**Indicators: 1. Reasonable 2. Significant 3.Strong**

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<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Concepts of Programming Languages	Robert W. Sebesta	Pearson Publication	Eleventh Edition, 2016
2	Programming with C	Byron S. Gottfried	Tata McGraw Hill	Third Edition, 2012
3	Let Us C	Yashawant Kanetkar	BPB Publications	14 <sup>th</sup> Edition, 2016
4	Object Oriented Programming in C++	Robert Lafore	Pearson Education, Sams Publishing	Fourth Edition Sixth Impression, 2011
5	Professional C++	Marc Gregoire, Nicholas A. Solter, Scott J. Kleper		Wrox, 2011

**Pedagogy:** Lecture, PPT, Assignment



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20195B	CORE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE	3	Theory	-	100

**Objective of the Course:**

This subject imparts knowledge on the various number systems, basics of digital computer combinational circuits, integrated circuits, organization of input-output and memory units in digital computer.

**UNIT I: NUMBER SYSTEMS**

**(Teaching hours: 10)**

Number Systems: Decimal, Binary, Octal and Hexadecimal – Conversion from one to another – Binary Addition, Subtraction, Multiplication and Division – Complements in binary and other number systems – ASCII codes – BCD weighted – Excess three – Gray codes.

**UNIT II: LOGIC GATES & K MAPS**

**(Teaching hours: 10)**

Digital Computers - Logic gates : AND, OR, NOT, XOR, NAND, NOR and XNOR gates – Truth tables– Laws of Boolean Algebra – DeMorgan's Theorem – Simplification of Boolean expressions – Karnaugh Maps – Two and Three variable maps – Four variable Map – Product of Sums and Sum of Products simplification – Don't care conditions.

**UNIT III: COMBINATIONAL CIRCUITS**

**(Teaching hours: 10)**

Combinational Circuits: Introduction –Half adder – Full adder –Half Subtractor – Full Subtractor - Flip Flops. Integrated Circuits: Introduction – Decoders – Encoders – Multiplexers – Demultiplexers - Registers – Shift Registers – Binary counters.

**UNIT IV: INPUT-OUTPUT ORGANIZATION**

**(Teaching hours: 10)**

Input-Output organization: Input-output Interface - I/O Bus and Interface Modules- Asynchronous data transfer (strobe control and handshaking) - Modes of transfer: Programmed I/O - Interrupt Initiated I/O - Software Considerations. Input-output processor: CPU-IOP Communication.

**UNIT V: MEMORY ORGANIZATION**

**(Teaching hours: 10)**

Memory organization: Memory hierarchy. Main memory: RAM and ROM Chips - Cache memory: Associative Mapping- Direct Mapping. Virtual memory: Address Space & Memory Space- Address Mapping Using Pages-Associative memory Page Table-Page Replacement.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Apply and Evaluate on the number systems	K3 & K5
CO2	Create, Apply & Evaluate Logic Gates, Boolean Expression and Karnaugh Maps	K3 & K5
CO3	Remember & Understand the basics of digital computer combinational circuits, integrated circuits	K1 & K2
CO4	Understand the organization of input-output organization in a digital computer	K2
CO5	Understand the concepts of various memory organization	K2

**Note:**

**K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.**

**Course Outcome mapping with Programme outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	1	1		3	2	2	2
CO2	3	1	3	1	1	2	3	2	2	2
CO3	3	2	1	3	2	1	2	2	2	2
CO4	1	2	1	2	1	1	1	1	1	1
CO5	2	1	2	2			2	2	2	2

**Indicators: 1. Reasonable 2. Significant 3.Strong**

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Computer System Architecture	M. Morris Mano	Prentice Hall of India Publications	3 <sup>rd</sup> Edition, 8 <sup>th</sup> Impression, 2011
2	Digital Logic and Computer Design	M.Morris Mano	Prentice Hall	14 <sup>th</sup> Impression 2012
3	Digital Computer Fundamentals	Thomas C.Bartee	Tata McGraw Hill	Sixth Edition, 23 <sup>rd</sup> Reprint, 2011

**Pedagogy:** Lecture, PPT, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20195C	ALLIED: MATHEMATICS FOR COMPUTER TECHNOLOGY	4	Theory	95%	5%

**Objective of the subject:** This paper enables the students to gain knowledge on the Mathematical structures for Computer Technology and the applications of Statistical and Numerical methods.

**UNIT I: MATRICES**

**(Teaching hours: 10)**

Matrices: Introduction - Types of matrices - Determinant and its properties – Inverse of a matrix – Eigen Values and Eigen vectors – Cayley’s Hamilton theorem.

**UNIT II: NUMERICAL METHODS**

**(Teaching hours: 10)**

Numerical Methods: System of simultaneous Linear Algebraic equations – Gauss elimination method - Gauss Jordan method - Inversion of a matrix using Gauss Elimination method - Gauss Jacobi Method - Gauss Seidel Method.

**UNIT III: NUMERICAL INTERPOLATION, INTEGRATION**

**(Teaching hours: 10)**

Numerical Interpolation: Newton’s Forward and Backward interpolation – Lagrange’s interpolation.

Numerical integration: Trapezoidal rule, Simpson’s 1/3 rule and Simpson’s 3/8 rule.

**UNIT IV: MEASURES OF CENTRAL VALUE, DISPERSIONS**

**(Teaching hours: 10)**

Measures of central value: Mean – Median - Mode – Relationship among mean, median and mode.

Measures of Dispersions: Range- Standard Deviation - Variance.

**UNIT V: CORRELATION, REGRESSION**

**(Teaching hours: 10)**

Correlation: Correlation – Types of correlation – Methods of correlation –Correlation coefficient and its properties - Karl Pearson’s co-efficient of correlation – Spearman’s Rank Correlation.

Regression – Introduction –Difference between Correlation and regression – Regression lines - Regression equations of X on Y and Y on X.

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**Course Outcome mapping with Knowledge level**

Course outcome	CO Statement	Knowledge level
CO1	Basic definition of matrix, determinants and perform various operations on it.	K1, K2, K3
CO2	Derive numerical methods for approximating the solution of the problems of algebraic and transcendental equations such as Gauss elimination, Jacobi and Seidel methods.	K1, K3, K4
CO3	Derive numerical interpolation and integration methods for approximating the solution of trapezoidal, Simpson's rule, Newton's forward and backward interpolations.	K1, K3, K4
CO4	To find out appropriate statistical methods such as Mean, median, mode and apply them in various data analysis problems.	K2, K4, K5
CO5	To find out appropriate statistical methods like correlation, regression and apply them in various data analysis problems.	K2, K4, K5

**Note: K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Creating & Evaluating.**

**Course Outcome mapping with Programme outcome:**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		1	3							1
CO2		1	3				1			1
CO3		1	3				1			1
CO4		1	3				1			1
CO5		1	3				1			1

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Numerical Methods In Science & Engineering	M. K. Venkataraman	National Publishing Company	2007, 5th Edition
2	Statistical Methods	S.P. Gupta	Sultan chand and sons	2014, Revised edition.
3	Discrete Mathematics for Computer Science & Applications	P.Radha, T. Santha	Kalaikathir Achchagam	2002, 2nd edition.

Pedagogy: Lecture, Assignment.

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S.No.	Title	Author	Publishers	Publication Year & Edition
1	Numerical Methods In Science & Engineering	M. K. Venkataraman	National Publishing Company	2007, 5th Edition
2	Statistical Methods	S.P. Gupta	Sultan chand and sons	2014, Revised edition.
3	Discrete Mathematics for Computer Science & Applications	P.Radha, T. Santha	Kalaikathir Achchagam	2002, 2nd edition.

Pedagogy: Lecture, Assignment.



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**Dr G R DAMODARAN COLLEGE OF SCIENCE (AUTONOMOUS)**  
**COIMBATORE - 641014**  
**B.Sc(COMPUTER TECHNOLOGY)**  
**(Under Choice Based Credit System)**  
**EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021**

Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20195P	CORE: PROGRAMMING LAB	3	PRACTICAL	-	-

**Objective of the subject:** The purpose of this subject is to introduce structured and object oriented programming where the students will be able to enhance their analyzing and problem solving skills.

**Structured Programming (C)**

1. Operators and expressions
2. Control statements
3. Functions
4. Arrays
5. Strings
6. Pointers
7. Structures

**Object Oriented Programming (C++)**

8. Class and Objects
9. Functions (Friend, Inline, Recursive, Virtual)
10. Overloading concepts (Function, Operator)
11. Inheritance
12. Exceptions

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO	To understand the structured and objected oriented programming. The course includes creating programs using functions, pointers, structures in C and classes, overloading, inheritance and exception handling in C++	K2,K3,K4,K5

**K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.**

**Course Outcome Mapping with Programme Outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	3	1	1	2		3	2	3		1

**Indicators: 1. Reasonable 2. Significant 3.Strong**

**Pedagogy:** Demonstration, Experiments

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20295A	CORE: DATA STRUCTURES AND ALGORITHMS	3	Theory	-	100

**Objective of the subject:** This subject highlights on Introduction to Data Structures, Stack and Queue algorithms, algorithms for Searching, Sorting, Trees and Manipulation of data structures.

**UNIT I: Introduction, Arrays** (Teaching Hours: 8)

Introduction: Basic Terminologies-Data Structures-Data Structure Operations-Algorithms: Clomplexity, Time Space Trade-off. Arrays, Records and Pointers: Linear arrays – representation of linear arrays – Traversing linear array – Inserting and deleting – Multidimensional arrays – Pointers – Records – Matrices - Sparse Matrices.

**UNIT II: Linked List** (Teaching Hours: 9)

Linked list: Linked lists – Representation in memory – Traversing linked list – Garbage collection – Insertion and deletion in linked list – Header linked lists – Two-way lists.

**UNIT III: Stack, Queue** (Teaching Hours: 11)

Stacks, Queues and Recursion: Stacks – Array representation of stacks – Linked representation of stack – Arithmetic expressions – Recursion – Tower of Hanoi – Implementation of recursive procedure by stacks – Queue – Linked representation of Queues – Deques – Priority Queues.

**UNIT IV: Trees** (Teaching Hours: 12)

Trees: Introduction – Binary trees – Representing binary trees in memory – Traversing binary trees – Traversing algorithm using stack – Threads - Binary search trees – Searching, Inserting and Deleting in a binary search tree.

**UNIT V: Searching, Sorting** (Teaching Hours: 10)

Searching: Sequential – Binary – Fibonacci Search. Sorting - Bubble sort – Quick sort – Insertion sort – Selection sort – Merging – Merge sort – Radix sort – Heap sort.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the basic concepts, terminologies in data structure. A detailed study on arrays and records.	K1,K2,K3
CO2	Understand various sorting techniques. Introducing linked list, its types and the operation on linked list.	K2,K3,K4
CO3	A detailed study on stacks and queues, representation in memory and its operations. Application of stack such as recursion, infix to postfix, Tower of Hanoi.	K2,K3,K5
CO4	To give an insight on trees, their representation and the operations on trees. Apply different tree traversal techniques and operations on binary search tree.	K2,K3,K4,K5
CO5	To understand the various searching and sorting techniques.	K2,K3,K4,K5

**Note:**

**K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.**

**Course Outcome mapping with Programme outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1	3		2	2		3		1
CO2	3	2	3	3	2	2		3		1
CO3	3	2	3	3	2	3		3		2
CO4	3	2	3	3	2	3		3		1
CO5	1	2	3		2	3	2	2		1

**Indicators: 1. Reasonable 2. Significant 3.Strong**

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Data Structures Schaum's Outlines	Seymour Lipschutz, G.A Vijayalakshmi Pai	Tata McGraw-Hill Companies	2006, Indian Adapted Edition

**Pedagogy: Lecture, PPT presentation, Assignment**

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SECOND	20295B	ALLIED: DISCRETE MATHEMATICS	4	Theory	95%	5%

**Objective of the subject:** This paper enables the students to understand the concepts of discrete mathematics and learning its applications in Computer Science.

**UNIT I: MATHEMATICAL LOGIC** (Teaching hours: 10)

Mathematical Logic: Connective, well-formed formula, tautology, equivalence of formulas, tautological implications, duality law. Normal Forms- Theory of inference for statement calculus.

**UNIT II: RELATION, FUNCTIONS** (Teaching hours: 10)

Relation and functions: Binary Relations – types of relations – Matrix and Graph of relation - composition of relations - equivalence of relations – Functions – types of functions - composition of functions.

**UNIT III: FORMAL LANGUAGES, AUTOMATA** (Teaching hours: 10)

Formal Languages and Automata: Grammars, phrase-structure grammar, context-sensitive grammar, context-free grammar, regular grammar. Finite state automata – conversion of non-deterministic finite automata to deterministic finite automata.

**UNIT IV: LATTICE, BOOLEAN ALGEBRA** (Teaching hours: 10)

Lattice and Boolean Functions: Introduction – Lattices as Partially ordered sets-Properties of lattices – Special lattices – Complete, Complement and distributive lattices.  
Boolean Functions – Introduction – Values of Boolean expressions -Minimization of Boolean function using K-map.

**UNIT V: GRAPH THEORY, TREES** (Teaching hours: 10)

**(Proving the theorems are exempted for Graphs and Tree)**

Graph Theory: Directed and undirected graphs, connected graphs, path, reachability, circuits, Hamiltonian paths, and Euler graphs – Matrix representation of directed and undirected graphs.  
Trees: binary tree –spanning tree- Traversals of binary trees.

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**Course Outcome mapping with Knowledge level**

Course outcome	CO Statement	Knowledge level
CO1	To Keep in mind about the fundamental ideas and notations of discrete mathematics such as Tautology, contradiction and normal forms.	K1, K2
CO2	To understand the concepts of sets, relation, function.	K1, K2, K3
CO3	Analyze the formal languages and automata.	K2, K4, K5
CO4	Understand algebra concepts, posets, lattices, Boolean algebra and their applications in the field of computer science.	K2, K3, K5
CO5	Basic definitions of Tree, Graph theory and knowledge about types of graphs including Eulerian and Hamiltonian graphs.	K1, K2, K3, K4

**Note: K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Creating & Evaluating.**

**Course Outcome mapping with Programme outcome:**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			3							1
CO2			3				1			1
CO3			3				1			1
CO4			3				1			1
CO5			3				1			1

**Indicators: 1. Reasonable 2. Significant 3.Strong**

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Discrete Mathematical Structures with Applications to Computer Science.	J.P Tremblay, R.P. Manohar	McGraw Hill	2010, 38th reprint

Pedagogy: Lecture, PPT, Assignment

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Pedagogy: Lecture, PPT, Assignment



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SECOND	20295P	<b>SKILL BASED SUBJECT: JAVA AND DATA STRUCTURES LAB</b>	3	PRACTICAL	-	-

**Objective of the subject:** This subject gives a hands-on experience on implementing the OOPS concepts like inheritance, applets, packages, exception handling and data structure concepts like stacks, queues using Java.

Write Programs using the following concepts.

1. Inheritance.
2. String manipulation.
3. Overloading
4. Interface.
5. Packages.
6. Exception handling.
7. Multithreading.
8. Applet.
9. Stack
10. Queue
11. Searching
12. Sorting

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO	To impart knowledge in using string functions, packages, interfaces handling exception handling and multithreading. Various sorting and searching methods, the data structures stack and queues are implemented using Java language.	K1,K2,K3

**K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Creating & Evaluating.**

**Course Outcome Mapping with Programme Outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	3	1	1	2		3	2	3		1

**Indicators: 1. Reasonable 2. Significant 3.Strong**

**Pedagogy:** Demonstration, Experiments