6	CSTE 1207	Electronic Devices and Circuits	3	3
7	CSTE 1208	Electronic Devices and Circuits Lab	1	2
8	MATH 1203	Ordinary and Partial Differential equations	2	2
9	BMS 1201	History of the Emergence of Independent Bangladesh	3	3
10	CSTE 1226	Viva Voce	1	0
		Total	**21.5**	**24**

Year-2 Term-1

Sl.#	Course Code	Course Title	Credit	Credit Hours
1	CSTE 2101	Object Oriented Programming with C++	3	3
2	CSTE 2102	Object Oriented Programming with C++ Lab	1.5	3
3	CSTE 2103	Algorithm Design and Analysis	3	3
4	CSTE 2104	Algorithm Design and Analysis Lab	1.5	3
5	CSTE 2105	Digital Logic Design	3	3
6	CSTE 2106	Digital Logic Design Lab	1	2
7	CSTE 2107	Theory of Computation	3	3
8	HUM 1201	Industrial Management and Accountancy	3	3
9	MATH 2105	Matrices, Vector Analysis and Co-ordinate Geometry	3	3
		Total	**22**	**26**

Year-2 Term-2

Sl.#	Course Code	Course Title	Credit	Credit Hours
1	CSTE 2201	Object Oriented Programming with JAVA	3	3

Year-2 Term-1

Sl.#	Course Code	Course Title	Credit	Credit Hours
1	CSTE 2101	Object Oriented Programming with C++	3	3
2	CSTE 2102	Object Oriented Programming with C++ Lab	1.5	3
3	CSTE 2103	Algorithm Design and Analysis	3	3
4	CSTE 2104	Algorithm Design and Analysis Lab	1.5	3
5	CSTE 2105	Digital Logic Design	3	3
6	CSTE 2106	Digital Logic Design Lab	1	2
7	CSTE 2107	Theory of Computation	3	3
8	HUM 1201	Industrial Management and Accountancy	3	3
9	MATH 2105	Matrices, Vector Analysis and Co-ordinate Geometry	3	3
		Total	**22**	**26**

COURSE TITLE:OBJECT ORIENTED PROGRAMMING WITH C++

Course Code: CSTE 2101 **Credit Hours:** 03 **Exam Hours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

Course Objectives:

- Introduce the basic concept of Object-oriented Programming.
- Discuss how to design, develop, and program using C++.
- Make familiar with OOP tools and implement OOP solution to the real-life problem in C++.
- Make familiar with some advanced features of OOP.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials.

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	explain the basic principles of object-oriented programming i.e. data abstraction, encapsulation, inheritance, and polymorphism.
CLO2	apply the concept of an object and its relationships in modeling & building object-oriented solutions.
CLO3	analyze real-life scenarios for finding feasible object-oriented solutions.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2	√											
CLO3		√										

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	**Fundamentals of object-oriented Design:** Data Abstraction, Encapsulation, classes, Inheritance and Polymorphism, class Hierarchies. Designing and object-oriented system; Identifying the classes,	CLO1	Lecture and discussion with detailed information about the course, including the objectives, course outcomes, examinations. Topic wise lecture delivery.	Answer basic questions, quizzes, exams.

	Assigning Attributes and Behavior, finding relationship between classes, arranging classes into hierarchies: A design example.			
2	**A first look at C++:** Using streams for input and output, Standard Template Library (STL).	CLO1	Lecture on characteristics and basic operations. Some standard template libraries will be introduced.	Homework (stream concept and STL), exams.
3	**C++ enhancements to C:** Default Function Arguments, Placement of variable declarations, the scope resolution operation, the "Const" Qualifier, overloaded functions.	CLO1	Lecture and discussion with problems solution.	Answer basic questions, exams.
4	**References:** References as Aliases, references and pointers similarities and differences, references as function parameters, references as return values.	CLO1	Lecture and discussion with problems.	Homework (Reference), exams.
5	**Introduction to classes:** Declaring and using classes, class members, creation and destruction of objects, accessing data members, returning a reference.	CLO1, CLO2	Lecture and discussion on class and object. Accessing class members.	**Class Test 1** (topics of the week's 1-4)
6	"Const" objects and member function. Classes and dynamic memory allocation: New, delete operators.	CLO1, CLO2	Lecture and discussion on dynamic memory allocation of objects.	Answer basic questions, quizzes, Homework (Memory Allocation).
7	**'this' pointer, Static and Friend:** "this" pointer, Static members, friends, array of class objects.	CLO1, CLO2	Lecture on this pointer, static variable and static functions, friend function, and friend class. Explain their use and necessity.	Answer basic questions, examples.
8	**Inheritance and polymorphism:** Derived class and base class, derived class constructors, overriding member functions, public, protected and private inheritance.	CLO1, CLO2	Lecture on basic of inheritance. Explain inheritance with real life example.	Answer basic questions, quizzes, examples.
9	Virtual functions, abstract classes, polymorphism, classification of inheritance, classes within classes.	CLO2, CLO3	Lecture on the types of inheritance and how to override methods in inheritance using virtual function and application of nested classes.	**Class Test 2** (topics of the week's 5-8)
10	**Operator overloading:** Overloading unary operator, overloading a binary operator, data conversion.	CLO2	Lecture on operator overloading with problems solution.	Answer basic questions, examples.
11	**File processing:** File processing – formatted – unformatted and random files. Microsoft foundation classes: Strings, data structure.	CLO2	Lecture on file processing using IO stream. String processing and some basic data structure.	Homework, examples.
12	**Templates and Lists:** Generic actions & types, function templates, class templates, sequential	CLO2	Lecture on the characteristics of generic programming and	**Class Test 3** (topics of the week's 9-11)

	lists, virtual function nuances.		implement it by template with some problem's solution.	
13	**Interface and Exception Handling:** Interface and Exception Handling.	CLO2, CLO3	Lecture and discussion on the use of interface and how to handle exception using some problems solution.	Exercise the answering methods in final exam.

Recommended Books:

1. C++ program Design- An introduction to Programming and Object-Oriented Design by James P. Cohon/ Jack W. Davison.
2. Object Oriented Programming in Microsoft C++ by RoberLafore, Galgotia Book House.
3. Object Oriented Programming in Microsoft C++by E. Balagurusamy, TMH.
4. C++ How to Program. Introduction to Object Oriented Design with the UML by Deitel&Deitel, Pearson Education.
5. Programming with C++ by Schaum's Outline Series
6. C++- Unleashed The comprehensive Solutions by J. Liberty
7. C++- The Complete Reference by Herbert Schildt, TMH.

ASSESMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25)
(Average of best 2 out of 3 will be counted)

Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
Remember			
Understand	10	10	
Apply	10	10	15
Analyze	5	5	10
Evaluate			
Create			

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	
Understand	25
Apply	30
Analyze	20
Evaluate	
Create	

COURSE TITLE:OBJECT ORIENTED PROGRAMMING WITH C++ LAB

Course Code: CSTE 2102
Credit Hours: 1.5
Exam Hours: 03

Attendance: 10
Viva: 20
SEE Marks: 70

Course Objectives:

- Make familiar with OOP tools and implement OOP solution to the real-life problem in C++.
- Develop the students for designing object-oriented programs using C++.
- Perform experiments to verify practically the theories and concepts develop in CSTE 2101.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Code Blocks IDE.

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	explain object-oriented programs using OOP concepts.
CLO2	use object-oriented concepts in solving computational problems.
CLO3	analyze real-world problems using an object-oriented programming language.
CLO4	carry out tasks in a team environment.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2		√										
CLO3		√										
CLO4									√			

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1-2	**A first look at C++** Performing various C++, I/Operations; Different input and output technique using streams concept. String related problems. Standard Template Library (STL): vector, List, stack, queue, iterators.	CLO2	Discussion and practice	-Home task -Quiz
3-4	**Encapsulation** Problems related to creation of classes generating output. Writing member variable, member functions, constructor and destructor. Problems related to different access specifiers. Problems using array of objects, pointers and references;	CLO1, CLO2	Discussion, practice and case study	Answer basic questions, quizzes, Homework, exams.
5-6	**Inheritance** Experiments related to Introducing Inheritance and verification; Inheriting classes and sharing base classes functions;	CLO1, CLO2	Discussion, practice and case study	Quiz 1 (Topic of the 1-4 weeks)
7-8	**Polymorphism** Problems related to creation of Overloaded functions and constructor. Problems related to overloading relational and logical operators. Problems related to Method overriding. Test of achieving runtime polymorphism.	CLO1, CLO2, CLO3	Discussion, practice and case study	Homework, quizz
9-11	**Advance Topic** Problems related to: Static, Pure Virtual Function, Abstract Class, Interface, Exception Handling and Template function.	CLO1, CLO2, CLO3	Discussion, Practice with a real-life problem.	Quiz 2 (Topic of the 5-8 weeks)
2	**Problem Solving Activities** Using random access files for solving problems; Problems related to sharing common algorithms and procedures for different data type, Problems on ACM. To perform also other experiments relevant to this course, submit project.	CLO2, CLO3, CLO4	Practice with a real-life problem. .	Answer basic questions, Homework Quiz 3 (Topic of the 9-13 weeks)
	Final Lab Exam (Lab and Viva)			

ASSESMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	
Understand	10
Apply	40
Analyze	20
Evaluate	
Create	

COURSE TITLE: ALGORITHM DESIGN AND ANALYSIS

Course Code: CSTE 2103 **Credit Hours:** 03 **Exam Hours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

Course Objectives:

- Introduce various data structures and algorithms.
- Discuss the asymptotic performance of different searching, sorting, traversing, tree, and graph algorithms.
- Explain the performance of different algorithms with their feasibility for real-life scenarios.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, PDF books, Slides, e-Tutorials, PowerPoint.

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand the concepts of different algorithms.
CLO2	execute and implement different types of algorithms.
CLO3	monitor and compare the performance of different algorithms.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2	√											
CLO3		√										

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	**Introduction with algorithm:** The role of algorithm in computing: -What is algorithm? -Algorithm as a technology - Analyzing algorithm - Designing algorithm	CLO1	Lecture and discussion with some basic questions on complexity analysis time and space complexity.	Answer some basic question on complexity analysis and Solve some basic problems.
2	**Growth of functions** - Asymptotic notation - Standard notation and common function	CLO1, CLO3	Lecture and discussion on the complexity of the algorithm, analysis and finding the complexity.	Answer basic questions, quizzes.
3	**Review**: Basic data structure: stack, queue, BST, Heap, Priority queue, tree traversal, Union find, segment tree , interval tree.	CLO1	Lecture and discussion on the complexity of the data structures, usefulness, and the basic differences between them. Discussion should be followed by some interesting problems on different data structure.	a. Answer some interesting questions on data structures. b. Solving some real-life problems.

4-5	Sorting Paradigms: **a. Divide and conquer approach** - What is divide and conquer approach? - Analyzing the divide and conquer algorithm. **b. Heapsort** - Heaps - Maintaining the heap property - Building a heap - The heap sort algorithm **c. Quicksort** - Description of quicksort - Performance of quicksort - Analysis of quicksort	CLO1 , CLO3	a) Lecture and discussion with problems. b) Explain with example step by step. c) Show real life example.	Class Test 1 (topics of the week's 1-4)
6	Search Paradigms: **a. Linear Search** -Description of linear search -Performance of linear search -Analysis of linear search **b. Binary Search** -Description of binary search -Performance of binary search -Analysis of binary search	CLO1, CLO2, CLO3.	a) Lecture and discussion with problems. b) Explain with example step by step. c) Show real life example.	Discussion, give assignment, make problem one group and another group will find its solution, quizzes.
7-8	Dynamic Programming - What is dynamic programming? - How it works? - Elements of dynamic programming - Example Analysis (Rod cutting problem, Matrix chain multiplication, Longest Common Subsequence)	CLO1, CLO2, CLO3.	• General techniques will be taught in the lecture. • Exercises will be given in the tutorial and the lecturer (with the participation. • Assignments will be given to the students.	**Class Test 2** (topics of the week's 5-7)
9	Greedy Algorithm - How greedy algorithm differs from dynamic programming - Elements of the greedy strategy	CLO1, CLO2, CLO3.	Apply the algorithms and design techniques to solve problems. •Some algorithms will be given and the students will be asked to estimate the running time of the algorithms.	Answer basic questions, quizzes, Homework
10-11	Graph Algorithms: BFS, DFS, Advance dfs, Exhaustive bfs, MST, Shortest path algorithms, detecting negative cycles, DAG.	CLO1, CLO2, CLO3.	a. General techniques will be taught in the lecture. b. Exercises will be given in the tutorial and the lecturer. c. Assignments will be given to the students.	**Class Test 3** (topics of the week's 8-11)
12-13	a. Problem solving paradigms: greedy, divide and conquer, dynamic programming , recursive memorization, 2 pointer idea, complete search, using binary search and	CLO2, CLO3	a. Practice with UVA online. b. Can participate online programming contest.	Problem solving.

	ternary search b. How to formulate a solution using these			

Recommended Books:

1. Introduction to Algorithms - Cormen, Thomas, Charles Leiserson, Ronald Rivest, and Clifford Stein
2. Computer Algorithms, Henry F. Korth
3. Algorithm, Schaums Outline Series
4. Anny V. Levitin. Introduction to the design and analysis of Algorithms

ASSESMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25)
(Average of best 2 out of 3 will be counted)

Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
Remember			
Understand	10	10	5
Apply	10	10	10
Analyze	5	5	10
Evaluate			
Create			

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	
Understand	20
Apply	30
Analyze	20
Evaluate	
Create	

COURSE TITLE: ALGORITHM DESIGN AND ANALYSIS LAB

Course Code: CSTE 2104
Credit Hours: 1.5
Exam Hours: 03

Attendance: 10
Viva: 20
SEE Marks: 70

Course Objectives:

- Explain to design and develop a program to implement different algorithms.
- Debug and test the performance of these algorithms in different scenarios.
- Conduct experiments to get time and space complexity.

Resources Used: Multimedia, Whiteboard, Marker, e-Tutorials, Compiler, PowerPoint Slides.

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	implement the different algorithms in engineering problems.
CLO2	analyze the complexity of different algorithms.
CLO3	evaluate the performance of different algorithms in real-world problems.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2		√										
CLO3					√							

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1-2	**Introduce different types of Algorithm**	CLO1	• Statement of the problem. • Find a strategy to solve it. • Write program with	Assignment

			C++or JAVA	
3-4	**Sorting Algorithms** a. Bubble Sort b. Insertion Sort c. Selection Sort d. Quick Sort	CLO1, CLO2,CLO3	• Discussion about the problem. • Students will be given to do some problem to solve. • Analysis the complexity.	Solve problem from exercise book and online.
5-6	**Design Strategies** **Divide & Conquer** a. Merge sort b. Binary search	CLO1, CLO2,CLO3	• Statement of the problem. • Find a strategy to solve it. • Write program with C++or JAVA	Solve problem from exercise book and online.
7-8	**Search Paradigms:** a. Linear Search b. Binary Search	CLO1, CLO2, CLO3	• Statement of the problem. • Find a strategy to solve it. • Write program with C++or JAVA	Quiz 1(1 to 3 week)
9-10	**Dynamic Programming**	CLO1, CLO2, CLO3	• Statement of the problem. • Find a strategy to solve it. • Write program with C++or JAVA	Solve problem from exercise book and online.
11	**Greedy Algorithm**	CLO1, CLO2, CLO3	• Statement of the problem. • Find a strategy to solve it. Write program with C++or JAVA	Solve problem from exercise book and online.
12	**Graph Algorithms:** - Spanning Tree - Shortest path algorithms - DAG.	CLO1, CLO2, CLO3	• Discussion about the problem. • Students will be given to do some problem to solve. • Analysis the complexity.	Solve problem from exercise book and online.
13	**Final Lab Exam (Lab and Viva)**			

ASSESMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	
Understand	20
Apply	30
Analyze	20
Evaluate	
Create	

COURSE TITLE:DIGITAL LOGIC DESIGN

Course Code: CSTE 2105
Credit Hours: 03
Exam Hours: 04

Attendance: 05
CIE Marks: 25
SEE Marks: 70

Course Objectives:

- Introduce the basic understanding of digital and logic circuits with their different components.
- Provide knowledge of problem-solving in digital logic circuits & systems.
- Familiarize the students with building blocks of combinational and sequential circuits so that they will be able to develop circuit solutions.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Device manual, Question bank, Previous questions.

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand the basics of digital systems, and could differentiate between analog and digital systems.
CLO2	implement different types of digital circuits such as Flip-flops, Counter, Encoder, Decoder, Multiplexer, De-multiplexer, RAM, ROM, etc using different logic gates.
CLO3	design digital systems to solve real-life problems.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2	√											
CLO3		√	√									

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	**Introduction:** Digital and analog systems, The introductory concept of number systems and codes. Digital representation, Digital circuit, and Logic circuit. **Logic Gates, Boolean Algebra and Minimization**: Boolean constants and variables, truth tables. Basic Logic gates.	CLO1	Lecture and discussion on detailed information about the course, including the objectives, course outcomes, examinations. Lecture delivery on the basics of digital and analog systems, number systems and logic gates.	Answering basic questions, quizzes, Homework etc.
2	**Logic Gates, Boolean Algebra and Minimization**: Universality of NAND and NOR gates, Describing logic circuits algebraically, Evaluating logic circuit outputs, Boolean theorems, DeMorgan's	CLO1	Lecture and discussion on the universality of NAND and NOR gates and the implementation of logic circuits.	Answering basic questions, quizzes, Homework etc.

	theorems. Implementing logic circuits from boolean expressions, Alternate logic-gate representations.		Exercise sample problems on logic circuit implementation.	
3	**Combinational Logic Circuits Design**: Sum-of-product and product-of-sum forms, Simplifying logic circuits, algebraic simplification, Karnaugh map method.	CLO2, CLO3	Lecture and discussion on SOP and POS logical expression, logic simplification using algebraic and K-Map techniques. Exercise with various logical problems.	Answering basic questions, quizzes, Homework etc.
4	**Combinational Logic Circuits Design**: Designing combinational logic circuits, Exclusive OR and Exclusive NOR circuits, Logic circuits with multiple outputs, Designing logic circuits without a truth table, Parity generator and checker circuit, Enable/Disable circuits, Programmable logic devices (PLD), Hardware description languages- HDL, VHDL.	CLO2, CLO3	Lecture and discussion with examples on combinational logic circuits with single and multiple outputs, parity generator, and checker circuits. Lecture on the basics of hardware description language.	Answering basic questions, quizzes, Homework etc.
5	**Flip-Flops (FF)**: NAND gate latch, NOR gate latch, D latch, Clock signals and clocked Flip-Flops, Clocked S-C FF.	CLO2	Lecture on the basics on FF and latch with the introduction of S-C FF.	**CT-1** (topics of the week's 1-4)
6	**Flip-Flops (FF)**: Clocked J-K FF, Clocked D FF, Master-slave FF, FF applications, FF synchronization, Data storage and transfer, Frequency division, and counting. **Arithmetic circuits**: Adder circuits, Half adder (HA), Full adder (FA), Carry propagation, Parallel adder, carry look-ahead adder, The 2's complement addition, and subtraction system, The BCD adder circuit, Cascading BCD adder, Binary multiplier.	CLO2	Lecture and discussion on the design of J-K, D and Master-Slave FF. Lecture on the design of HA, FA, Parallel adder, Carry look-ahead adder and BCD adder.	Answering basic questions, quizzes, Homework etc.
7	**Counters and Registers**: Asynchronous counter: Ripple counters, Counters with mod numbers<2^n, IC asynchronous counters, Asynchronous down counter, Asynchronous up/down counter, Propagation delay in ripple counters.	CLO2	Lecture and discussion on the basics of a counter with the design and implementation of different types of an asynchronous counter. Exercise on related topics.	Answering basic questions, quizzes, Homework etc.
8	**Counters and Registers**: Synchronous counter, Synchronous down counter, Synchronous up/down counters, Decoding a counter, Decoding glitches, Cascading BCD counters, Shift-registers, Counter applications: frequency counter, digital clock.	CLO2	Lecture on the design and implementation of different types of synchronous counter and a digital clock circuit. Exercise on related topics.	Answering basic questions, quizzes, Homework etc.
9	**MSI Logic Circuits**: Decoders, BCD-to-	CLO2	Demonstrate the basics,	**CT-2** (topics of the

	decimal decoders, BCD-to-7-segment decoder/drivers.		design, and operations of the different decoder circuit.	week's 5-8)
10	**MSI Logic Circuits**: Encoders, Multiplexers and multiplexer applications, Demultiplexers. **Integrated-Circuit Logic Families**: Digital IC terminologies, TTL logic family, TTL series characteristics, open-collector TTL, Tristate TTL, ECL family, MOS digital ICs, MOSFET, CMOS characteristics, CMOS tri-state logic, TTL CMOS-TTL interfacing.	CLO2	Demonstrate the basics, design, and operations of different encoder, multiplexer and demultiplexer circuit. Lecture and discussion on the basics of TTL, ECL, and CMOS digital ICs logic families.	Answering basic questions, quizzes, Homework etc.
11	**Interfacing with the Analog World:** Digital to analog conversion (DAC), D/A conversion circuitry, Summing amplifier, Analog to digital conversion (ADC), A/D conversion circuitry, Digital ramp ADC.	CLO2, CLO3	Lecture and discussion on the design and operation of ADC and DAC circuit. Exercise on related topics.	Answering basic questions, quizzes, Homework etc.
12	**Memory Devices**: Memory terminology, general memory operation, semiconductor memory technologies, different types of ROMs, semiconductor RAMs, static and dynamic RAMs, ROM architecture, RAM architecture, **FPGA Concept**.	CLO2	Lecture and discussion on the design and operation of RAM and ROM architecture. Exercise on related topics.	**Assignment-1**
13	Review topics and Final exam preparation.	CLO1, CLO2, CLO3	Students will be asked to answer the questions orally on previous lectures and review the contents of the course. Discussion on the better answering methods for the final examinations.	Exercise the answering methods in final exam.

Recommended Books:

1. Digital Systems: Principles and Applications by Ronald J. Tocci, Prentice Hall.
2. Digital Logic and Computer Design by M. Morris Mano, Prentice Hall.
3. An Introduction to Switching Theory and Digital Electronics by V. K. Jain,Khanna Publishers.

ASSESMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25)
(Average of best 2 out of 3 will be counted)

Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
Remember	5		
Understand	10	10	5
Apply	10	15	10
Analyze			
Evaluate			
Create			10

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	5
Understand	20
Apply	30
Analyze	
Evaluate	
Create	15

COURSE TITLE:DIGITAL LOGIC DESIGN LAB

Course Code: CSTE 2106 **Credit Hours:** 01 **Exam Hours:** 03	**Attendance:** 10 **Viva:** 20 **SEE Marks:** 70

Course Objectives:

- Introduce the principles and methodology of digital logic design at the gate level.
- Design and analyze combinational and sequential logic circuits.
- Design and analyze digital circuits for real-life problem-solving.
- Explain the usages of the basic software tools for the design and implementation of digital circuits and systems.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Lab equipment and Manuals, Quartus software.

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand the different gates and IC's.
CLO2	implement and analyze different combinational and sequential logic circuits.
CLO3	design and analyze digital circuits for solving a real-life problems.
CLO4	use modern tools to implement and analyze digital circuits.
CLO5	gain teamwork skills for working effectively in groups.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2	√	√										
CLO3		√	√									
CLO4					√							
CLO5									√			

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	Verification of the truth tables of the logic gates (AND, OR, NOT, NOR, NAND, Ex-OR, Ex-NOR etc). Realization of the universality of NAND and NOR gate.	CLO1, CLO5	First lecture and then Practice.	Answer basic questions. Neatness, organization, completeness and individually written lab reports are due at the beginning of the lab period. Respected Teacher will be evaluated in lab period.
2	Design, construction and testing of a parity generator and checker circuit. Design, construction and testing of Half Adder & Full Adder circuits.	CLO2, CLO3	Discussion and practice.	
3-4	Verification of the truth tables of different Flip-Flops. Realization of D and T Flip-Flops by using J-K Flip-Flop.	CLO2	Lecture and discussion on Flip-Flop with tutorials and then practice.	
5-6	Design, construction and testing of different synchronous counters.	CLO2	Lecture and discussion on Counter and practice.	

	Design, construction and testing of different asynchronous counters.			
7-8	Design, construction and testing of a different Decoder circuit using logic gates and Decoder IC. Design, construction and testing of a different Encoder circuit using logic gates and Encoder IC.	CLO2	Lecture and discussion on Decoder and Encoder circuits with tutorials and then practice.	
9	Design, construction and testing of a multiplexer by using circuit using logic gate and MUX IC. Design, construction and testing of different de-multiplexer by using circuit using logic gate and MUX IC.	CLO2	Lecture and discussion on the concepts of Multiplexer and De-multiplexer circuits and practice.	
10-11	Solving some real life problems using a combination of different logic gates. Using software tools for the design and implementation of digital circuits and systems. Perform other experiments relevant to this course.	CLO3 CLO4	Lecture and discussion with real life problems. Demonstration on Quartus Software.	
12	Submit a mini project in a group			
13	**Final Lab Exam (Job, Quiz and Viva)**			

ASSESMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	10
Understand	30
Apply	10
Analyze	
Evaluate	20
Create	

COURSE TITLE:THEORY OF COMPUTATION

Course Code: CSTE 2107 **Credit Hours:** 03 **Exam Hours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

Course Objectives:

- Introduce the mathematical foundations of computation including automata theory; the theory of formal languages and grammars.
- Explain mathematical proofs for computation and algorithms.
- Discuss the notions of algorithm such as decidability, complexity, and computability.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Device manual, Question bank, Previous questions.

	CLOs	Description (At the end of the course, students will be able to)
Course Learning Outcomes	**CLO1**	understand the concepts of finite automata and the transform between equivalent deterministic and non-deterministic finite automata.

(CLO)	CLO2	explain the structural representations when designing software such as grammars and regular expressions.
	CLO3	analyze the limits of computation such as decidability and tractability; and time and space management for complex theories.

Mapping of CLO to PLO (Program Learning Outcome)

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	√											
CLO2	√											
CLO3		√										

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	**Automata:** Preliminary Concepts of Automata, computability, and complexity, introduction to formal proof, and types of proofs	CLO1	Lecture and discussion with detailed information about the course, including the objectives, course outcomes, examinations. Topic wise lecture delivery.	Answer basic questions, quizzes, Homework, exams.
2	**Finite Automata:** Types of finite automata, examples of finite automata, and designing finite automata.	CLO1	Lecture and discussion about finite automata and types of finite automata such as DFA and NFA.	Answer basic questions, quizzes, Homework, exams.
3	**Finite Automata:** Equivalence of NFA's and DFA's, finite automata with epsilon transitions. **Regular Expressions:** Concepts of regular expression, equivalence with finite automata, and applications of regular expression.	CLO1, CLO2	Lecture and problem solving on DFA, NFA and regular expression	Answer basic questions, quizzes, Homework, exams.
4	**Regular Languages:** Concepts of regular languages, closure properties of regular language, and equivalence and minimization of automata.	CLO1, CLO2	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
5	**Regular Languages:**Non-regular Languages - The pumping lemma for regular languages.	CLO2	Lecture and discussion with problems; pumping lemma	**Class Test 1**(topics of the Week 1-4)
6	**Context-Free Grammars and Languages:** Formal definition of a context-free grammar, examples of context-free grammar, constructing parse trees, and ambiguity in grammars and languages.	CLO2	Lecture and discussion about CFG.	Answer basic questions, quizzes, Homework, exams.
7	**Properties of Context-free Languages:** Context-free Grammar Simplification, and Chomsky normal form.	CLO2	Lecture and discussion on Grammar simplification.	Answer basic questions, quizzes, Homework, exams.
8	**Pushdown Automata:** Formal definition of pushdown automata, examples of pushdown automata, and equivalence with context-free grammars.	CLO1, CLO2	Lecture and discussion on pushdown automata and its relation with context-free grammars.	Answer basic questions, quizzes, Homework, exams.
9	**Computability Theory:** Formal	CLO1, CLO2	Lecture and discussion on	**Class Test 2**(topics

	definition of Turing machine, Nondeterministic Turing machines, and Hilbert's problems		Turing machine.	of the Week 5-8)
10	**Decidability:** Decidable languages, the halting problem – the diagonalization method.	CLO3	Lecture and discussion on language decidability.	Answer basic questions, quizzes, Homework, exams.
11	**Complexity Theory:** The Classes P and NP, examples of problems in these classes, the differences between P and NP, NP-Completeness, polynomial time reducibility, and the Cook-Levin Theorem.	CLO3	Lecture and discussion on complexity theory.	Answer basic questions, quizzes, Homework, exams.
12	**Examples of NP-Complete Problems:** The vertex cover problem – the Hamiltonian path problem, the subset sum problem, approximation algorithm, and probabilistic algorithms.	CLO3	Lecture and discussion on NP complete problems.	**Class Test 3** (topics of the Week 9-12)
13	**Applications:** Analysis and classification of Biochemical reactions and the complexity of evolved organisms.	CLO3	Lecture and discussion on the application of complexity theory.	Exercise the answering methods in the final exam.

Recommended Books:

1. Introduction to Automata Theory, Languages and Computation by Hopcroft and Ulman, Addison Wesley.
2. Elements of the Theory of Computation by Lewis and Papadimitriou, Prentice Hall.
3. Compiler design in C by A.J. Holub, Prentice-Hall.
4. Elements of Automata Theory by Jacques Sakarovitch, Cambridge University Press.
5. A Textbook on Automata Theory by P.K. Srimani and S.F.B Nasir, Cambridge University Press.

ASSESMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25)
(Average of best 2 out of 3 will be counted)

Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
Remember	5		
Understand	10	10	10
Apply	10	15	15
Analyze			
Evaluate			
Create			

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	10
Understand	25
Apply	35
Analyze	
Evaluate	
Create	

COURSE TITLE:INDUSTRIAL MANAGEMENT AND ACCOUNTANCY

Course Code: HUM 1201
Credit Hours: 03
Exam Hours: 04

Attendance: 05
CIE Marks: 25
SEE Marks: 70

Course Objectives:

- Make the students familiarize themselves with business concepts.
- Analyze and apply different strategies of marketing.
- Effective use of basic accounting in different application designs.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Device manual, Question

bank, Previous questions.

Course Learning Outcomes (CLO)	**CLOs**	**Description (At the end of the course, students will be able to)**
	CLO1	understand the concept of business, Accounting, management, and management strategy.
	CLO2	use basic or fundamental knowledge of management and accounting in different application designs.
	CLO3	gather knowledge about human resource management and industrial relation.

Mapping of CLO to PLO (Program Learning Outcome)	**PLO1**	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**	**PLO9**	**PLO10**	**PLO11**	**PLO12**
CLO1			√						√		√	
CLO2					√							
CLO3				√								

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	**Business concepts:** Business and Industry, Business and society, Business environment, Ethical issues of business	CLO1	Lecture and discussion with detailed information about the course, including the objectives, course outcomes, examinations, physical environment and methodology with the students. Brief discussion about business.	Answer basic questions, quizzes, Homework, exams.
2	**Management and Organizational concepts** Management principles and functions, Levels of management, Roles of management, Scientific management and core management skills, Corporate activities, Corporate Social responsibilities, Concept of business management, Organizational Structure of the industrial organization	CLO1, CLO2	Lecture and discussion with detailed information about management and its principles, functions, levels, roles, responsibilities and skills.	Answer basic questions, quizzes, Homework, exams.
3	**Management Strategy:** Strategy formulation in IT industry, technological development strategy and planning, SWOT analysis, PPM, Competitive superiority, Customer satisfaction, alliance, merger, acquisition and integration.	CLO1	Lecture and discussion about management strategies, SWOT analysis, planning and how it connects with IT industries.	Answer basic questions, quizzes, Homework, exams.
4	**Marketing Strategy:** Market and marketing, Market research, Sales/product planning, Sales promotion, Customer satisfaction survey, Business strategy and goal evaluation, Business management system.	CLO3	Lecture and discussion about marketing and customer's satisfaction survey.	Answer basic questions, quizzes, Homework, exams.

5	**Human Resource Management and Industrial Relations:** Concept of HRM, HRM functions and model, recruitment, selection Industrial relations and disputes, handling of grievances, labor welfare, Workers' participation, Motivation, leadership, collective bargaining, training and trade union, Payment, job satisfaction and job enrichment	CLO3	Lecture and discussion about HRM and its functions and models, workers payment recruitment and job enrichment.	**Class Test 1**(topics of the week's 1-4)
6	**Health, Safety and Industrial Environment:** Accidents, Safety consciousness, publicity, procedures, and measures. Environmental pollution, control acts for air, water, solid waste and noise.	CLO3	Lecture and discussion about safety, accidents and environment pollution.	Answer basic questions, quizzes, Homework, exams.
7	Project and project management, Project life cycle, scope management, Proposal, Project scheduling, budgeting and procurement, Project monitoring and evaluation.	CO1, CO2	Lecture and discussion about project management and its life cycle, scope, scheduling, budgeting.	Answer basic questions, quizzes, Homework, exams.
8	service and service management, Service management in IT industry, IT-IL system diagram, framework, Service support, delivery, facility management, System audit and internal control.	CLO1, CLO2	Lecture and discussion about service management and its impact on IT industry.	Answer basic questions, quizzes, Homework, exams.
9	**Materials Management:** Material in industry, inventory control model, ABC analysis, safety stock, reorder, level, economic ordering quantity, Stores equipment, Purchasing procedures, Bin card, cardex, material handling, Manual lifting, hoist, cranes, conveyors, trucks and fore trucks.	CLO1, CLO2	Lecture and discussion about materials management and its purchasing procedures, records and handling.	**Class Test 2**(topics of the week's5-8)
10	**Operations research and Industrial Engineering:** Operation research, charts, and diagram of understanding operations, job analysis, operational planning, decision-making, problem solving methods, Standardization organizations and specifications (ISO).	CLO2, CLO3	Lecture and discussion about operations research, methods of job analysis and decision making and concepts of standardization	Answer basic questions, quizzes, Homework, exams.
11	**Basics of Accounting:** Concepts of accounting, Accounting equation, classification of account, Double entry system, Accounting cycle journal, ledger and trial	CLO2	Lecture and discussion about accounting, its cycle journal, ledger, trial balance and financial statement analysis.	Quizzes, Homework, exams.

	balance, Preparation of financial statements, Financial statement analysis and interpretation: ratio analysis			
12	**Cost Accounting:** Cost concept, Contribution margin, ratio analysis, Break-even analysis, CVP relationship	CLO2	Lecture and discussion on Cost concepts, break-even analysis and CVP relationship	**Class Test 3** (topics of the week's9-12)
13	Miscellaneous and Final exam preparation	CLO1, CLO2, CLO3	Lecture and discussion on miscellaneous subjects	Exercise the answering methods in final exam.

Recommended Books:

1. Fundamental of Management by Dr. Mainul Islam
2. Human Resource Management by Dr. Abdul Awal Khan and Dr. Abu Taher.
3. Accounting Principles by JJ Weygandt, DE Kieso, PD Kimmel, Latest Edition, John Wiley.
4. Managerial Accounting by Garrison, R H and Noreen, EW, 10th Edition, McGraw-Hill.
5. Introduction to Management Accounting by Horngren, CT and Gary L Sundem, Prentice.
6. Advanced Management Accounting by Kaplan, RS & AA Atkinson, Prentice Hall.

ASSESMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25)
(Average of best 2 out of 3 will be counted)

Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
Remember	05		
Understand	10	10	05
Apply	5	10	10
Analyze	5	5	10
Evaluate			
Create			

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	10
Understand	15
Apply	15
Analyze	15
Evaluate	10
Create	05

COURSE TITLE:MATRICES, VECTOR ANALYSIS AND CO-ORDINATE GEOMETRY

Course Code: MATH 2105
Credit Hours: 03
Exam Hours: 04

Attendance: 05
CIE Marks: 25
SEE Marks: 70

Course Objectives:

- Introduce the basic matrix transformation and its operations.
- Provide knowledge about matrix decomposition using theorem and algorithm
- Explain vector differentiation, vector integration, and concepts of coordinate geometry to solve engineering problems.

Resources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Question bank, Previous questions.

	CLOs	Description (At the end of the course, students will be able to)
Course Learning Outcomes (CLO)	**CLO1**	understand different types of matrices and their operations.
	CLO2	explain the relation between matrix and vector.
	CLO3	perform matrix decomposition using different theorems and algorithm.
	CLO4	apply vector differentiation, integration, and coordinate geometry in solving a complex engineering problem.

Mapping of CLO to PLO (Program Learning Outcome)		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
	CLO1	√											
	CLO2	√											
	CLO3	√											
	CLO4	√											

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	**Matrix Terminology:** Vector presentation by matrix, different types of matrices, algebraic operations on matrices, Transpose of a Matrix, Adjoint and inverse of a matrix,	CLO1	Lecture and discussion on matrix	Answer basic questions, quizzes, Homework, exams.
2	**Matrix Terminology:** augmented matrix, row operation method, rank of Matrices, Mathematical Problems using Matrix, distinguish between determinant and matrix.	CLO1	Lecture and discussion about matrix operation.	Answer basic questions, quizzes, Homework, exams.
3	**Matrix Terminology:** Normal Vector, Orthonormal Vectors, Orthogonality, Gram-Schmidt Orthonormalization Process, co-variance matrix,	CLO2	Lecture and problem solving.	Answer basic questions, quizzes, Homework, exams.
4	**Matrix Decomposition:** Eigen Decomposition Theorem, Singular Value Decomposition (SVD).	CLO3.	Lecture and practice.	Exercise with various mathematical problems.
5	**Matrix Decomposition:** LU Decomposition, QR decomposition, Cholesky decomposition.	CLO3	Lecture and discussion about problems.	**Class Test 1**(topics of the week's 1-4)
6	**Matrix Decomposition:** Physical application of Matrix Decomposition Theorem, Mathematical Analysis of Matrices using MATLAB.	CLO3	Lecture and problem solving.	Answer basic questions, quizzes, Homework, exams.
7	**Vector differentiation:** Derivative of vector function-Velocity and acceleration-Scalar and vector fields-Gradient- It's geometrical interpretation	CLO4	Lecture and discussion on vector differentiation.	Answer basic questions, quizzes, Homework (word size expansion, memory location expansion), exams.
8	**Vector differentiation:** Directional derivative-Divergence and Curl-Their physical meaning-Relations involving-Solenoidal and irrotational fields-Scalar potentials (simple problems).	CLO4	Lecture and problem solving.	Answer basic questions, quizzes, Homework, exams.
9	**Vector Integration:** Line integral, the surface integral and volume integral-work done by a force-Statement and Verification of Green's theorem	CLO4	Lecture and discussion on vector integration.	**Class Test 2**(topics of the weeks5-8)
10	**Vector Integration:** Stoke's theorem and	CLO4	Lecture and practice.	Answer basic

	Gauss's Divergence theorem-their use in evaluating the Integrals.			questions, quizzes, Homework, exams.
11	**Coordinate geometry of two dimensions:** Change of axes, General equation of second degree.	CLO4	Lecture and discussion on coordinate geometry.	Quizzes, Homework, exams.
12	**Coordinate Geometry of three dimensions:** a system of coordinates, the distance between two points; Direction cosine and ratio; the angle between two straight lines;	CLO4	Lecture and discussion on problems.	**Class Test 3**(topics of the weeks9-12)
13	**Coordinate Geometry of three dimensions:** Equation of a plane; Plane through three given points; Angle between two planes; Equation of a straight line through two points.	CLO4	Problem solving and practice.	Exercise the answering methods in the final exam.

Recommended Books:

1. Vector Analysis and An Introduction to Tensor Analysis by M. R. Spiegel, S. Lipschutz, McGraw-Hill.
2. Analytical Geometry of Three Dimension by Vasistha and Agarwal, Krishna.
3. Advanced Engineering Mathematics by ErwinKreyszig, Wiley Eastern.

ASSESMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25)
(Average of best 2 out of 3 will be counted)

Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
Remember	5		
Understand	5	5	
Apply	15	20	25
Analyze			
Evaluate			
Create			

SEE-Semester End Examination (70 marks)

Bloom's Category	Test
Remember	10
Understand	10
Apply	50
Analyze	
Evaluate	
Create	