

Year-2 Term-2

Sl.#	Course Code	Course Title	Credit	Credit Hours
1	CSTE 2201	Object Oriented Programming with JAVA	3	3 → MKM MKM
2	CSTE 2202	Object Oriented Programming with JAVA Lab	1.5	3 → HK HK
3	CSTE 2203	Digital Electronics and Pulse Technique	3	3 → HK HK
4	CSTE 2204	Digital Electronics and Pulse Technique Lab	1.5	2 → HK HK
5	CSTE 2205	Signals and Systems	2	2 → HK HK
6	CSTE 2207	Data Communication	3	→ HK HK
7	CSTE 2208	Data Communication Lab	1	→ HK HK
8	CSTE 2209	Computer Architecture and Organization	3	3 → DJaw DJaw
9	CSTE 2210	Computer Architecture and Organization Lab	1	2 → M7ld M7ld
10	CSTE 2211	Electromagnetic Waves and Radiating Systems	2	2 → AN AN
11	MATH 2207	Complex Variables, Statistics and Probability	3	3 → AN AN
12	CSTE 2226	Viva Voce	1	0
		Total	25	27

COURSE TITLE:OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Code: CSTE 2201	Attendance: 05
Credit Hours: 03	CIE Marks: 25
Exam Hours: 04	SEE Marks: 70

Course Objectives:

- Introduce the basic concepts of Java.
- Discuss how to design, develop and program using Java.
- Implement event-driven graphical user interfaces (GUI) in Java.
- Expose problems and apply the object-oriented programming concept to solve real-world problems.

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 basic concepts of Java.											
	CLO2	design the programs using object-oriented modeling techniques.											
	CLO3	use Java for solving 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	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	History of Java, Java Class Libraries, Introduction to Java Programming	CLO1	Lecture and discuss detailed information about the course, including the objectives, course	Answer basic questions, quizzes, Homework, exams.

			outcomes, examinations, physical environment, and methodology with the students.	
2	Developing a Java application: Algorithms, Pseudo-code, Control structure, if/else selection structure, while repetition structure, assignment operators, increment, and decrement operators.	CLO1	Lecture and discuss the algorithms and pseudo-code. Using Java IDE to implement if/else, while, and different operators.	Answer basic questions, quizzes, Homework, exams.
3	Control structure: Primitive data types, Common Escape sequence, logical operator, For structure, switch, do/while, break and continue	CLO1, CLO2	Lecture and discussion about different primitive data types, common escape sequences. Using Java IDE to implement for, switch, do/while, break and continue.	Answer basic questions, quizzes, Homework, exams.
4	Methods: Program module in Java, Math class methods, Method definitions, Java API packages, Automatic variables, Recursion, Method overloading, Method of the Applet class	CLO1	Lecture and discuss methods and the way to implement them in java programs. Implement Java API package, recursion, and method overloading through Java IDE.	Answer basic questions, quizzes, Homework, exams.
5	Arrays: Arrays, Declaring and allocating arrays, passing arrays to methods, sorting arrays, searching arrays, multiple-subscripted arrays	CLO1, CLO2	Lecture and discuss arrays and implement array in Java IDE.	Class Test 1 (topics of the week's 1-4)
6	Object-based programming: Time abstract Data type, Class scope, controlling access to members, utility methods, constructors, using Overload constructor,	CLO1	Lecture and discussion about implementing a Time abstract Data type with a class, class scope, constructors, and constructor overloading.	Answer basic questions, quizzes, Homework, exams.
7	set and get method, software reusability, friendly members, finalize, static class members, Data abstraction, and information hiding	CLO1, CLO2, CLO3	Lecture and discuss set and get methods, software reusability, friend, finalize, and static class members. Using Java IDE to implement encapsulation.	Answer basic questions, quizzes, Homework, exams.
8	Superclass and subclass, protected members, constructor, finalize, composition, and inheritance.	CLO2, CLO3	Implement inheritance and the way to access inheritance through Java IDE.	Answer basic questions, quizzes, Homework, exams.
9	polymorphism, dynamic method building, final, abstract superclass, and concrete class	CLO2, CLO3	Lecture and discuss polymorphism and dynamic method building. Implement final and abstract keywords in the Java program.	Class Test 2 (topics of the weeks5-8)
10	String and Exception handling: String and characters, exception handling, files and stream.	CLO1, CLO2	Using Java IDE to show String, files, and exception handling related problems.	Answer basic questions, quizzes, Homework, exams.

11	Java API and GUI: Java API, Utility classes, 2D graphics, GUI, Swing	CLO2, CLO3	Implement Java API, utility classes, 2D graphics, and GUI using swing through Java IDE.	Quizzes, Homework, exams.
12	Multithreading and Interface: Events, Interface, Multithreading, Collection Framework	CLO1, CLO2	Implement multithreading, events, and interface through Java IDE.	Class Test 3/ Assignment(topics of the week's9-12)
13	Miscellaneous and Final exam preparation	CLO1	Lecture and discussion on miscellaneous subjects	Exercise the answering methods in final exam.

Recommended Books:

1. Java How to Program by Deitel&Deitel, Prentice Hall.
 2. Java: The Complete Reference by H. Schildt, McGraw-Hill.
 3. Beginning Java 2 by Ivor Horton: John Wiley & Sons.

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Test-3/ Assignment (25)	Bloom's Category	Test
Remember				Remember	10
Understand	15	10	10	Understand	30
Apply	10	15	15	Apply	30
Analyze				Analyze	
Evaluate				Evaluate	
Create				Create	

COURSE TITLE: OBJECT ORIENTED PROGRAMMING WITH JAVA LAB

Course Code: CSTE 2202 Credit Hours: 1.5 Exam Hours: 03	Attendance: 05 CIE Marks: 15 Project: 30 Viva: 20 SEE Marks: 30
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Course Objectives:

- Explain computing problems using Java concepts.
 - Provide knowledge about event-driven graphical user interfaces (GUI) in Java.
 - Develop Java API and GUI-based software.
 - Review experiments to verify the theories and concepts developed in CSTE 2201 practically.

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 OOP features using Java.
	CLO2	use the Java environment for creating, debugging, and run Java programs.
	CLO3	apply different concepts of Java in complex engineering problems.
	CLO4	construct a project with a team to solve problems using the knowledge of OOP with Java.

		CLO3		✓									
		CLO4						✓			✓		
Lesson Plan (as per week):													
Week	Course Contents				CLOs		Teaching Learning Strategy (activities directed to achieve outcomes)				Assessment Strategy (How they are developed)		
1	Developing Java application <ul style="list-style-type: none">• Algorithms• Data types• Operators				CLO1, CLO2		Discussion and practice				-Home task -Quiz		
2	Control structure <ul style="list-style-type: none">• If/else• While repetition• For• Switch• Do/while• Break and continue				CLO1, CLO2		Lecture and then Practice				Answer basic questions, quizzes, Homework, exams.		
3	Methods <ul style="list-style-type: none">• Method declaration• Java API packages• Recursion• Method overloading• Method of the applet class				CLO1, CLO2		Lecture and discussion with problems.				Quiz 1 (Topic of the 1-3 weeks)		
4	Arrays <ul style="list-style-type: none">• Array declaration• Memory allocation• Array as argument• Sorting arrays• Searching arrays				CLO1, CLO2		Lecture and discussion with problems.				Homework		
5-6	Object-based programming <ul style="list-style-type: none">• Time abstract data type• Utility methods• Constructors• Overload constructor• Get and set methods• Friendly class• Data abstraction• Information hiding				CLO2		Practice with a real-life problem.				Answer basic questions, quizzes, Homework, exams.		
7-8	Object-oriented programming <ul style="list-style-type: none">• Superclass and subclass• Finalize• Inheritance• Polymorphism• Dynamic method building• Final• Abstract superclass and concrete class				CLO2		Lecture and discussion with problems.				Quiz 2 (Topic of the 4-8 weeks)		
9	String and Exception handling <ul style="list-style-type: none">• String and characters• Exception handling				CLO2		Lecture and discussion with problems.				Homework		

	• Files and stream			
10	Java API and GUI • Java API • Utility classes • 2D graphics • GUI • Swing	CLO2	Practice with a real life problem.	Answer basic questions, Homework
11	Multithreading and Interface • Events • Interfaces • Multithreading	CLO2	Lecture and discussion with problems.	Answer basic questions, Homework Quiz 3 (Topic of the 9-11 weeks)
112	Project	CLO3, CLO4	Evaluate each project.	Presentation, Project showcasing.
13	Final Lab Exam (Lab and Viva)			

Recommended Books:

1. Java How to Program by Deitel&Deitel, Prentice Hall.
2. Java: The Complete Reference by H. Schildt, McGraw-Hill.
3. Beginning Java 2 by Ivor Horton: John Wiley & Sons.

ASSESSMENT PATTERN

Attendance- 05

Viva- 20

Project- 30

CIE-Continuous Interval Evolution (15) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (30 marks)	
Bloom's Category	Test-1 (15)	Test-2 (15)	Test-3 (15)	Bloom's Category	Test
Remember				Remember	
Understand	10	5		Understand	10
Apply	5	10	15	Apply	10
Analyze				Analyze	10
Evaluate				Evaluate	
Create				Create	

COURSE TITLE: DIGITAL ELECTRONICS AND PULSE TECHNIQUE

Course Code: CSTE 2203	Attendance: 05
Credit Hours: 03	CIE Marks: 25
Exam Hours: 04	SEE Marks: 70

Course Objectives:

- Make the students familiarize themselves with the internal structure of digital logic circuits
- Analyze and apply debugging and testing techniques to locate and resolve errors and to determine the effectiveness of a logic circuit.
- Effective use of fundamental logic elements including function generation, application, troubleshooting.

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 construction of digital circuits by using electronic devices.
	CLO2	apply electronic devices in the digital circuit as per digital principles.
	CLO3	analyze the working principle of electronic devices and digital ICs in real-world

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

Lesson Plan (as per week):

Week	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	Electronic switch (logic): Diode logic gates, Transistor switches, Transistor gates, MOS gates;	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	Logic applications: Logic Families: TTL, ECL, IIL and CMOS logic; Logic families and their sub-families	CLO2	Lecture and discussion with characteristics parameters of logic families individually. Data sheet will be introduced.	Questions about comparison, quizzes, Homework, exams.
3	Propagation delay, product and noise immunity; Open collector and high impedance gates; Electronic circuits for flip-flops, counters and register, memory systems, PLA's;	CLO1, CLO3	Lecture and discussion with problems.	Design, development, explanation, quizzes, Homework, exams.
4	Waveform generator, Oscillator: LED, LCD, and optically coupled oscillators; Non-linear applications of OP-AMPs; Analog switches	CLO2	Lecture and discussion with problems. Circuit design with op-amp.	Exercise with various mathematical problems.
5	A/D and D/A converter: Basics of A-D and D-A converters.	CLO3	Lecture and discussion on types of A/D, D/A converters.	Class Test 1 (topics of the week's 1-4)
6	A-D and D-A converters with applications; S-H circuits	CLO3	Lecture and discussion with problems, precision of A-D and D-A converters.	Design & construction, quizzes, Homework, exams.
7	Memory devices: Memory architecture, mask ROM design, NMOS and CMOS memories, dynamic registers.	CLO3	Lecture on design and applications of memory devices. Architecture, properties, word size expansion, memory location expansion.	Design, construction & explanation, quizzes, Homework (word size expansion, memory location expansion), exams.
8	Waveform shaper: Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits, comparator circuits	CLO2	Lecture on design and applications of the circuits.	Design, construction & explanation, quizzes, Homework, exams.
9	Transistor switch, Pulse transmission: Switching circuits; Pulse transformers, pulse transmission.	CLO1	Lecture on design and applications of the circuits.	Class Test 2 (topics of the week's 5-8)

10	Multivibrator: Monostable, Bistable and Astable multivibrators, Schmitt trigger by using npn transistors	CLO3	Lecture on design and applications of the circuits.	Design, construction & explanation, quizzes, Homework, exams.
11	Signal generator: Pulse generation, Blocking oscillators and time-base circuit	CLO3	Lecture on design and applications of the circuits.	Design, construction & explanation.
12	Timing circuits; Simple voltage sweeps, linear current sweeps	CLO2	Lecture on design and applications of the circuits.	Class Test 3 (topics of the week's 9-11)
13	Review topics and Final exam preparation.		Lecture and discussion on miscellaneous topics.	Exercise the answering methods in final exam.

Recommended Books:

- Suggested Books:**

 1. Digital and Pulse Technique by Gyanendra K Mithal, Khanna.
 2. High-Speed Pulse and Digital Techniques by Arpad Bama, John Wiley, and Sons.
 3. An Introduction to Switching Theory and Digital Electronics by V. K. Jain, Khanna Publishers.
 4. Digital Electronics Principles, Devices and Applications by Anil K. Maini.
 5. Millman's pulse, Digital & switching waveforms. By Jacob Millman, Herbert Taub.

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)	Bloom's Category	Test
Remember	10	5		Remember	10
Understand	15	10	10	Understand	40
Apply				Apply	
Analyze		10	15	Analyze	20
Evaluate				Evaluate	
Create				Create	

COURSE TITLE: DIGITAL ELECTRONICS AND PULSE TECHNIQUE LAB

Course Code: CSTE 2204	Attendance: 10
Credit Hours: 1.5	Viva: 20
Exam Hours: 03	SEE Marks: 70

Course Objectives:

- Course Objectives:**

 - Make the students familiarize themselves with the internal structure of digital logic circuits
 - Analyze and apply debugging and testing techniques to locate and resolve errors and to determine the effectiveness of a logic circuit.
 - Effective use of fundamental logic elements including function generation, application, troubleshooting.

➤ Effective use of fundamental logic elements including function generation, application of logic functions, truth tables, logic minimization, Karnaugh maps, and logic implementation using various logic families.

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

Course Learning Outcomes (CLO)	CLOs	Description (At the end of the course, students will be able to)
	CLO1	acquire significant knowledge with instruments and devices etc.
	CLO2	realize the characteristics of BJT, FET and MOSFET and to construct digital circuit by using these devices and digital ICs.
	CLO3	analyze digital circuits.
Mapping of CLO to PLO (Program	PLO1	✓
	PLO2	
Program	PLO3	
	PLO4	
Program	PLO5	
	PLO6	
Program	PLO7	
	PLO8	
Program	PLO9	
	PLO10	
Program	PLO11	
	PLO12	

Learning Outcome)	CLO3	✓																							
Lesson Plan (as per week):																									
Week	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)		Assessment Strategy (How they are developed)																				
1	Use a transistor as a switch, Construct and explain the characteristics of logic circuits by using BJT, MOSFETs	CLO2	Demonstration with appropriate devices		Answer basic questions, quizzes.																				
2	Logic Families: TTL, ECL, IIL and CMOS logic; Logic families and their sub-families	CLO1	Demonstration with appropriate devices and manual		Do.																				
3	Design and Construction of a Summing amplifier by using Op-amp. Integrator, differentiator, wave converter by using Op-amp. Design and Construction of a Voltage Controlled Oscillator (VCO) by using 555 IC.	CLO3	Demonstration with appropriate circuits		Circuit construction and interpretation.																				
4-5	D-A converter by using Op-amp.	CLO2, CLO3	Do.		Class Test 1 (topics of the week's 1-4)																				
6	Design and Construction of a Schmitt trigger by using NPN transistors/Op-amp.	CLO2, CLO3	Do.		Circuit construction and interpretation.																				
7	Design and Construction of Astable/Monostable/Bi-stable multivibrators by using NPN transistors.	CLO2, CLO3	Do.		Do.																				
8-9	Design and Construction of Astable/Monostable/Bi-stable multivibrators by using PNP transistors.	CLO2, CLO3	Do.		Class Test 2 (topics of the week's 5-8)																				
10	Design and Construction of Astable/Monostable multivibrators by using 555 IC.	CLO2, CLO3	Do.		Circuit construction and interpretation.																				
11-12	Design and Construction of a Relaxation oscillator by using Op-amp. /UJT.	CLO2, CLO3	Do.		Class Test 3 (topics of the week's 9-12)																				
13	Final Lab Exam (Lab and Viva)																								
ASSESSMENT PATTERN																									
Attendance- 10																									
Viva- 20																									
SEE-Semester End Examination (70 marks)																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Bloom's Category</th><th>Test</th></tr> </thead> <tbody> <tr> <td>Remember</td><td></td></tr> <tr> <td>Understand</td><td>20</td></tr> <tr> <td>Apply</td><td>30</td></tr> <tr> <td>Analyze</td><td>20</td></tr> <tr> <td>Evaluate</td><td></td></tr> <tr> <td>Create</td><td></td></tr> </tbody> </table>										Bloom's Category	Test	Remember		Understand	20	Apply	30	Analyze	20	Evaluate		Create			
Bloom's Category	Test																								
Remember																									
Understand	20																								
Apply	30																								
Analyze	20																								
Evaluate																									
Create																									

Course Code: CSTE 2205	Attendance: 05
Credit Hours: 02	CIE Marks: 25
Exam Hours: 03	SEE Marks: 70

Course Objectives:

- Introduce students to the concept and theory of signals and systems needed in computer science and telecommunication engineering fields.
- Provide students the basic idea of signal and system analysis and its characterization in the time and frequency domain.
- Explain the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

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

Course Learning Outcomes (CLO)	CLOs	Description (At the end of the course, students will be able to)											
	CLO1	interpret the signals in various forms.											
	CLO2	carry out Fourier/Laplace analysis of continuous-time signals.											
	CLO3	analyze various signals in time domain and frequency domain systems.											
Mapping of CLO to PLO(Program Learning Outcome)	PLO1	✓		PLO2		PLO3		PLO4		PLO5		PLO6	
	CLO1	✓		CLO2		CLO3							
	CLO2	✓											
	CLO3		✓										

Lesson Plan (as per week):

Week	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	Signal classifications: Continuous, discrete, stochastic, even-odd signals, mathematical models of ideal signals, Elementary/test signals, power and energy signal.	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	Signal classifications: Response of test signals to LTI systems, representation of signals using impulse function.	CLO1	Lecture and discussion on different types of signals.	Answer basic questions, quizzes, Homework, exams.
3	Systems: Classification, Properties of system- Linearity, causality, time invariance, memory, stability, and invariability.	CLO1	Lecture and discussion on different properties of systems.	Answer basic questions, quizzes, Homework, exams.
4	Time domain analysis of LTI systems: Differential equations- system representation, order of the system, solution techniques, zero state and zero input response, system properties;	CLO2	Lecture and discussion on differential equation of system response.	Exercise with various mathematical problems.
5	Time domain analysis of LTI systems: Impulse response- convolution integral, determination of system properties; state variable- basic concept, state equation and time domain solution.	CLO3	Lecture and discussion on impulse response of systems.	Class Test 1 (topics of the week's 1-4)
6	Frequency domain analysis of LTI systems: Fourier series- properties,	CLO2	Lecture and discussion on how to apply Fourier	Answer basic questions, quizzes,

	harmonic representation, system response, frequency response of LTI systems;		analysis to periodic and aperiodic signals	Homework, exams.
7-8	Frequency domain analysis of LTI systems: Fourier transformation-properties, system transfer function, system response and distortion-less systems.	CLO2	Lecture and discussion on how to apply Fourier transform techniques to signals and systems.	Answer basic questions, quizzes, Homework exams.
9-10	Applications of time and frequency domain analyses: Solution of analog electrical and mechanical systems.	CO2		Class Test 2 (topics of the week's 5-8)
11	Laplace transformation: Fourier to Laplace, Properties, inverse transform, solution of system equations, system transfer function.	CLO2	Lecture and discussion on how to analyze LTI systems by transform techniques	Answer basic questions, quizzes, Homework, exams.
12	Laplace transformation: System stability and frequency response and application, Convolution integral and its application, Superposition integral.	CLO2	Lecture and discussion on how to analyze LTI systems by transform techniques	Class Test 3 (topics of the week's 9-12)
13	Review topics and Final exam preparation.	CLO1, CLO3	Lecture and discussion on miscellaneous topics.	Exercise the answering methods in final exam.

Recommended Books:

1. Continuous and Discrete Signals and Systems- S. S. Soliman, M.D. Srinath
2. Signal Processing and Linear Systems- B.P. Lathi
3. Analysis of Linear Systems- David K. Cheng
4. Signals and Systems- Simon Haykin, Barry Van Veen
5. Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approaches-Raymond A. DeCarlo, Pen-Min Lin

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)	Bloom's Category	Test
Remember				Remember	
Understand	15	10		Understand	20
Apply	5	10	10	Apply	20
Analyze	5	5	15	Analyze	20
Evaluate				Evaluate	10
Create				Create	

COURSE TITLE:DATA COMMUNICATION

Course Code: CSTE 2207
Credit Hours: 03
Exam Hours: 04

Attendance: 05
CIE Marks: 25
SEE Marks: 70

Course Objectives:

- Introduce the essentials of data communication and networking including a study of the Open Systems Interconnection (OSI) and TCP/IP network models.
- Deliver the concepts of different types of digital and analog conversion techniques.

- Provide the concepts of multiplexing and switching techniques.
- Explain different error detection and correction techniques.

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 concepts of data communication with its different components.											
	CLO2	interpret different types of multiplexing and switching techniques.											
	CLO3	differentiate between different digital and analog conversion techniques.											
	CLO4	analyze different error detection and correction techniques.											
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	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1-2	Introduction: Data communication components, Data representations, Data flow types, Network topologies, Protocols, Standards, Network Model: Basics of OSI and TCP/IP model, Functions of different layers of OSI and TCP/IP model.	CLO1	Lecture and discussion with detailed information about the course, including the objectives, course outcomes, examinations, topic wise lecture delivery.	Answer basic questions, quizzes.
3	Data and Signals: Analog and digital data, Analog and digital signals, Nyquist theorem, Shannon capacity, Performance measurement of data network, Bandwidth-delay product.	CLO1	Lecture and discussion on the concepts of analog/digital data and signal.	Answer basic questions, quizzes, Exercise with various mathematical problems.
4-5	Digital Transmission: Digital to digital conversion: Line coding- NRZ, RZ, Manchester, Differential Manchester, AMI, Pseudoternary, 2B/1Q, 8B/6T, 4D-PAM5, MLT-3, Block coding- 4B/5B, 8B/10B, Scrambling, B8ZS, HDB-3.	CLO3	Lecture and discussion on the different types of digital to digital conversion techniques including line coding, block coding and scrambling with their performance analysis.	Answer basic questions, quizzes, Homework, Exercise with various mathematical problems.
6	Pulse modulation: PAM, PWM, PPM; Analog to digital conversion: PCM, DPCM, DM; Transmission modes.	CLO3	Lecture and discussion on the different types of analog to digital conversion techniques.	CT-1 (topics of the week's 1-5). Answer basic questions.
7	Analog Transmission: Digital to analog conversion: ASK, FSK, Various type of PSK such as BPSK, QPSK, 8-PSK, 16-PSK etc. Analog to analog conversion: AM, FM, PM; Various type of QAM such as 8-QAM, 16-QAM etc.	CLO3	Lecture and discussion on the different types of digital to analog and analog to analog conversion techniques.	Answer basic questions. Exercise with various mathematical problems.

8	Bandwidth Utilization-Multiplexing and Spreading: FDM, WDM, TDM-Synchronous TDM, Statistical TDM, Interleaving, Spread spectrum- FHSS, DSSS.	CLO2	Lecture and discussion on the types of multiplexing and spread spectrum technique.	Answer basic questions, quizzes, Homework, exams.
9	Switching: Circuit switched network, packet switched network, Datagram network, Virtual circuit network.	CLO2	Lecture and discussion on different types of switching technique.	Answer basic questions. CT-2 (topics of the week's 6-9)
10	Introduction to Coding Theory: Single bit error, Burst error, Huffman code, Error detecting and correcting Codes; Block coding- Hamming distance, Linear block codes.	CLO4	Lecture and discussion on the performance of different error control coding technique.	Answer basic questions, quizzes, Homework.
11	Introduction to Coding Theory: Simple parity check code, Hamming codes, Cyclic codes-Cyclic redundancy check (CRC), Checksum, Convolution codes.	CLO4	Lecture and discussion on the performance of different error control coding technique.	Answer basic questions, quizzes, Homework.
12	Multiple Access Technique: FDMA, TDMA, CDMA, SDMA, OFDM, OFDMA, SCFDMA.	CLO1	Lecture and discussion on the advantage, disadvantage and applications of different types of multiple access technique.	Answer basic questions. Assignment-1
13	Review topics and Final exam preparation.	CLO1, CLO2, CLO3, CLO4	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. Data Communications and Networking by Behrouz A. Forouzan, McGraw-Hill.
2. Principles of Communication Systems by Herbert Taub & Donald L. Schilling, McGraw-Hill
3. Modern Digital and Analog Communication Systems by B.P. Lathi and Zhi Ding, Oxford University Press.

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)	Bloom's Category	Test
Remember	5	5		Remember	10
Understand	10	10	10	Understand	30
Apply	10	5	5	Apply	10
Analyze		5	10	Analyze	20
Evaluate				Evaluate	
Create				Create	

Course Code: CSTE 2208
 Credit Hours: 01
 Exam Hours: 03

Attendance: 10
 Viva: 20
 SEE Marks: 70

Course Objectives:

- Provide hands-on experience to the students so that they can put theoretical concepts to practice.
- Discuss the concept of different analog and digital conversion techniques, error detection and correction methods, multiplexing techniques by different experiments.

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

Course Learning Outcomes (CLO)	CLOs	Description (At the end of the course, students will be able to)										
	CLO1	familiarize themselves with different data communication equipment.										
	CLO2	implement and analyze different data conversion and multiplexing experiments.										
	CLO3	implement and evaluate the effectiveness of error detection and correction techniques.										
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	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	To familiar with the operation of different data communication equipment.	CLO1	Lecture and discussion with detailed information about the lab course, including the objectives, course outcomes, lab examinations and evaluation methods.	Answer basic questions about different types of data communication equipment.
2-3	Digital to digital conversion: Using Board: Line Coding Unipolar-NRZ/ Bipolar-NRZ/ signal encode-decode Unipolar-RZ/ Bipolar-RZ signal encode-decode	CLO2	Lecture, discussion and practice.	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.
4	Manchester/Differential Manchester signal encode-decode. Alternate Mark Inversion/ signal encode-decode.	CLO2	Lecture, discussion and practice.	
5	Analog to Digital conversion: Using Board: PAM/PWM/PPM/PCM/DM modulator-demodulator	CLO2	Through lecture, discussion, practice, and out-of-class assignments.	
6	Digital to Analog conversion: Using Board: ASK/FSK/BPSK/QPSK modulator-demodulator	CLO2	Through lecture, laboratory, and out-of-class assignments.	
7-8	Analog to Analog conversion: AM/FM/PM/QAM	CLO2	Lecture, discussion and practice.	

	modulator-demodulator			
9	Multiplexing: FDM/WDM/TDM	CLO2	Lecture, discussion and practice.	
10	Error Detection and Correction: Simple parity check code, Hamming codes, Cyclic Redundancy Check (CRC).	CLO3	Through lecture, discussion, practice, and out-of-class assignments.	
11	Acquaint with Simulation program (MATLAB)	CLO2, CLO3	Through lecture, discussion, practice, and out-of-class assignments.	
12			Submit a mini project in a group	
13			Final Lab Exam (Job, Quiz and Viva)	

ASSESSMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE: COMPUTER ARCHITECTURE AND ORGANIZATION

Course Code: CSTE 2209 Credit Hours: 03 Exam Hours: 04		Attendance: 05 CIE Marks: 25 SEE Marks: 70										
Course Objectives:												
	<ul style="list-style-type: none"> ➤ Familiarize students about the basic structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. ➤ Explain different hardware components of computer systems including arithmetic unit, logic unit, shifter, and different types of the adder circuit. ➤ Analyze the performance of the processor and memory with an improved approach. 											
	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 computer systems and its organization.										
	CLO2	use the various components of computer systems with their working procedure.										
	CLO3	analyze the performance of computer systems using different performance improvement approaches like multiprocessing, instruction pipelining, and parallel processing, etc.										
Mapping of CLO to PLO (Program Learning Outcome)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
	✓											
	✓											
		✓										

Lesson Plan (as per week):

Week	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	Introduction: A brief history of computers, difference between computer architecture & organization, Limitations of computers- Unsolvable problem, Intractable problems, Speed limitations, Basics of computer organization: Top level structure of a computer, structure of digital computer-CPU, ALU, I/O devices.	CLO1	Lecture and discussion on detailed information about the course, including the objectives, course outcomes, examinations. Lecture delivery on the history of computers and the basics of computer architecture and organization.	Answering basic questions, quizzes, Homework etc.
2	Organization of the IAS computer, IBM System/360 and personal computer system, Factors that determine computer performance, Harvard & Von-Neumann architecture, Microcontroller Vs. Microprocessor.	CLO1	Lecture and discussion on computer structure, computer performance, Harvard & Von-Neumann architecture, Microcontroller & Microprocessor etc.	Answering basic questions, quizzes, Homework etc.
3	Micro-operations: Arithmetic micro-operation, Logic micro-operation, Shift micro-operation. Instruction Set: Instruction format, instruction types, CPI, IPS, MIPS & FLOPS, addressing modes of Instruction.	CLO2, CLO3	Lecture and discussion on micro-operations, computer instructions. Exercise on system performance calculation and addressing modes.	Answering basic questions, quizzes, Homework etc.
4	Arithmetic & logic circuits: Serial adder, Ripple carry adder, carry look-ahead adder, the design of floating point adder, Arithmetic circuit design, Logic circuit design, ALU design.	CLO2	Demonstration on arithmetic, logic and different types of the adder circuit.	Answering basic questions, quizzes, Homework etc.
5	Combinational circuit shifter design, Addition-subtraction logic network. Multiplier & divider: Unsigned binary multiplication, Booths multiplier, array multiplier, restoring & nonrestoring divider.		Lecture and discussion on addition-subtraction, multiplier, divider and shifter circuit	CT-1 (topics of the week's 1-4)
6	I/O devices & system organization: External devices (keyboards, monitors, CD-ROM drive, HDD, Mouse, light Pen etc.), I/O modules, programmed I/O, interrupt-driven I/O. DMA-I/O processors.	CLO2	Lecture and discussion on I/O device and I/O modules.	Answering basic questions, quizzes, Homework etc.
7	CPU organization: Fundamentals, Processor-memory communication with & without cache, an overview of CPU functions, Single accumulator based organization, General register organization, Stack organization.	CLO2	Lecture and discussion on cache memory and CPU organization. Exercise on instruction formats.	Answering basic questions, quizzes, Homework etc.
8	Control Unit Design: Hardwired control, microprogrammed control, nano-program control. Pipeline control Unit-throughput	CLO2	Lecture and discussion on control unit design and pipelining.	Answering basic questions, quizzes, Homework etc.

	& efficiency, instruction level pipelining different pipelined stages in CPU, pipeline hazards (data, control & structure). Tristate bus & Bus interconnection: Register transfer & RTL notation.			
9	RISC & CISC based architecture: Examples of RISC processor (SPARC & C490), introduction to superscalar & VLIW architectures.	CLO2	Lecture and discussion on different types of processor architecture.	CT-2 (topics of the week's 5-8)
10	Memory organization: Characteristics of memory systems, memory technology, types of memory-volatile & nonvolatile, ROM, PROM, EPROM, EEPROM, Flash memory, SRAM, DRAM, SDRAM, Content addressable memory.	CLO2	Lecture and discussion on memory characteristics with detail classification.	Answering basic questions, quizzes, Homework etc.
11	Cache & virtual memory: Direct, associative & set-associative, Cache hit, Cache miss & Hit ratio, Miss ratio, Miss penalty, instruction cache & data cache, virtual memory paging, Types of cache design- Logical cache, Physical cache. Memory hierarchy and goal in memory hierarchy design.	CLO2	Lecture and discussion on cache mapping and memory hierarchy with exercise.	Answering basic questions, quizzes, Homework etc.
12	Multiprocessors: types, performance, single bus multiprocessors, multiprocessors connected by network, clusters, parallel processing.	CLO2, CLO3	Lecture and discussion on multiprocessor and parallel processing system.	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. Computer Organization and Architecture by W. Stallings, Prentice Hall.
2. Computer Architecture and Organization by J.P. Hayes, McGraw Hill.
3. Computer System Architecture by- M. Morris Mano, Pearson Education.

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)	Bloom's Category	Test
Remember	10	5		Remember	10
Understand	15	10	10	Understand	40
Apply				Apply	
Analyze		10	15	Analyze	20
Evaluate				Evaluate	
Create				Create	

COURSE TITLE: COMPUTER ARCHITECTURE AND ORGANIZATION LAB

Course Code: CSTE 2210 Credit Hours: 01 Exam Hours: 03	Attendance: 10 Viva: 20 SEE Marks: 70
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Course Objectives:

- Introduce the basic operations of various functional modules of the computer.
- Provide knowledge about the implementation of the various functional modules of the computer.
- Acquire teamwork skills for working effectively in groups.

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

Course Learning Outcomes (CLO)	Mapping of CLO to PLO (Program Learning Outcome)	CLOs	Description (At the end of the course, students will be able to)											
		CLO1	understand the operation of various functional modules of the computer.											
		CLO2	implement various functional modules of the computer.											
		CLO3	gain teamwork skills for working effectively in groups.											
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	
	CLO1	√												
	CLO2	√												
	CLO3									√				

Lesson Plan (as per week):

Week	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1-2	Design, Construction and Testing of Arithmetic Unit (AU) Circuit. Design, Construction and Testing of Logic Unit (LU) Circuit using MUX IC.	CLO1- CLO3	Lecture and discussion on AU and LU circuit with practical implementation and testing.	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.
3-4	Design, Construction and Testing of Logic Unit (LU) Circuit using basic logic gates only. Design, Construction and Testing of Arithmetic Logic Unit (ALU) Circuit.	CLO1- CLO3	Discussion with practical implementation and testing.	
5-6	Design, Construction and Testing of different Adder circuit.	CLO1- CLO3	Discussion and practice.	
7	Design, Construction and Testing of Addition-Subtraction Logic Unit. Design, Construction and Testing of Shifter circuit.	CLO1- CLO3	Discussion and practice.	
8-9	Design, Construction and Testing of 2-bit,	CLO1- CLO3	Discussion with practical	

	4-bit magnitude comparator. Design, Construction and Testing of Registers.		implementation and testing. Demonstration with e-Tutorials.	
10-11	Design of a combinational multiplier. Design of Direct Mapped and Associative cache. Perform other experiments relevant to this course.	CLO1- CLO3	Demonstration with e-Tutorials.	
12		Submit a mini project in a group		
13		Final Lab Exam (Job, Quiz and Viva)		

ASSESSMENT PATTERN

Attendance- 05

Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:ELECTROMAGNETIC WAVE AND RADIATING SYSTEM

Course Code: CSTE 2211	Credit Hours: 02	Exam Hours: 03	Attendance: 05
			CIE Marks: 25
			SEE Marks: 70

Course Objectives:

- Introduce Maxwell equations and propagation of the wave in free space, dielectric, and conductin medium.
 - Explain electromagnetic plane-wave reflection and transmission properties at interfaces between differer media, characteristics of waves between parallel plane and waveguide.
 - Provide the knowledge of uniform transmission lines to predict and design specified characteristi impedances and propagation constants.
 - Calculate load impedance-admittance transformations analytically and with Smith charts.
 - Discuss electromagnetic radiation from antennas, its applications in communication.

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	derive Maxwell equation from basic laws and obtain solutions and characteristics for the one-dimensional wave equation in a different medium, wave in a parallel plane, and waveguide.
	CLO2	explain scalar and vector potential, plane wave reflection, transmission, and power flow of EM wave.
	CLO3	discuss and use different kinds of antenna.
	CLO4	analyze uniform transmission lines to predict and design specified characteristic impedances and propagation constants.

Learning Outcome)	CLO2	√									
	CLO3	√									
	CLO4		√								

Lesson Plan (as per week):

Week	Course Contents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1	Maxwell equations and plane wave propagation in isotropic medium.	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	Reflection, refraction, diffraction and polarization of EM waves: Pointing vector and power flow.	CLO2	Lecture and discussion of propagation of EM waves in different medium.	Answer basic questions, quizzes, Homework, exams.
3	Waves between parallel planes, TE, TM, TEM waves and their characteristics, Attenuation in parallel plane guides, wave impedances.	CLO1	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
4	Rectangularwave guides, TE waves in rectangular wave guides and their characteristics.	CLO1	Lecture and discussion with problems.	Exercise with various mathematical problems.
5	Wavevelocity, guide wavelength, wave impedances, field configurations.	CLO1	Lecture and discussions.	Class Test 1 (topics of the week's 1-4)
6	Transmission lines: Transmission line equation and their solution. Transmission line parameters, characteristics impedance, propagation constant, attenuation constant and phase constant.	CLO4	Lecture, discussions and power point presentation.	Answer basic questions, quizzes, Homework, exams.
7	Waveform distortion, distortion less transmission lines, loading of transmission lines, reflection coefficient and VSWR. Equivalent circuit of transmission lines, transmission lines at radio frequency, open and short circuit line, Smith chart, sub matching.	CLO4	Lecture, discussions and power point presentation.	Answer basic questions, quizzes, Homework (word size expansion, memory location expansion), exams.
8	Potential: Scalar and vector potentials, retarded potentials, field due to a current element, the power radiation and radiation resistance for field due to a dipole.	CLO2	Lecture, discussions and power point presentation.	Answer basic questions, quizzes, Homework, exams.
9	Antenna, Reciprocity theorem applied to an antenna gain and aperture of antenna, radiation intensity, directivity and antenna gain.	CLO3	Lecture, discussions and power point presentation.	Class Test 2 (topics of the week's 5-8)
10	Array: Two element arrays and their directional characteristics, linear array analysis, broad side and end-fire arrays, pattern mortification, binomial arrays, Design of broadcast array for a specific pattern.	CLO3	Lecture, discussions and power point presentation.	Answer basic questions, quizzes, Homework, exams.

11	Antenna: Basic principles of parabolic reflectors, analysis and power pattern, lens antennas, analysis and power pattern, lens antennas, folded dipole.	CLO3	Lecture, discussions and power point presentation.	Quizzes, Home exams.
12	Turnstile and Yagi antenna, log periodic antenna, horn antenna, travelling wave antennas.	CLO3	Lecture, discussions and power point presentation.	Class Test 3 (topics of the week's 9-12)
13	Review Classes	CLO1, CLO4	Lecture and discussion on miscellaneous topics.	Exercise the answering methods in final exam.

Recommended Books:

1. Electromagnetic waves and radiating systems by Edward C. Jordan & Keith G. Balmain, Pearson.
 2. Elements of Electromagnetics by Matthew N O Sadiku, Oxford University Press.
 3. Engineering Electromagnetics by W.H. Hayt & J.A. Buck, McGraw Hill

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				Attendance - 0.5	SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)		Bloom's Category	Test
Remember	5				Remember	10
Understand	10	5			Understand	25
Apply	10	15	15		Apply	25
Analyze		5	10		Analyze	10
Evaluate					Evaluate	
Create					Create	

COURSE TITLE:COMPLEX VARIABLES, STATISTICS AND PROBABILITY

Course Code: MATH 2207	Attendance: 05
Credit Hours: 03	CIE Marks: 25
Exam Hours: 04	SEE Marks: 70

Course Objectives:

- Begins with the exploration of the algebraic, geometric, and topological structures of the complex number field.
 - Equipped with the understanding of the fundamental concepts of the complex variable theory.
 - Discuss the complex function and its related problems.
 - Explain numerical data using different statistical tools.

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 algebraic, geometric, and topological structures of the complex number, Cauchy-Riemann equations, Harmonic function.
	CLO2	apply Cauchy's theorem and formula to solve the complex integration.
	CLO3	analyze the complex function and its related problems.
	CLO4	use random variables and their distribution.
	CLO5	analyze numerical data using different statistical tools.

Outcome)		CLO3	✓									
		CLO4	✓									
		CLO5		✓								
Week		Lesson Plan (as per week):										
Course Contents		CLOs		Teaching Learning Strategy (activities directed to achieve outcomes)				Assessment Strategy (How they are developed)				
1	Complex Analysis-Differentiation: Differentiation of functions of complex variable-Analytic functions-Cauchy-Riemann Equations (Cartesian only)-Harmonic Function-Orthogonal system-velocity potential.	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	Conformal mapping: Mapping by $w=1/z$, $w=1/z^2$, $w=e^z$, $w=z+1/z$, $w=\sin z$, $w=\cos z$, Bilinear transformation-fixed points-Problems to find the transformation when three points and their images are given.	CLO1		Lecture and discussion about mapping				Answer basic questions, quizzes, Homework, exams.				
3	Line integrals-simple problems-Statements of Cauchy's integral theorem, Cauchy's integral formula-Formula for higher order derivatives-Evolution of integrals using the above results. Taylor and Laurent series (no proof)-simple problems. Singularities-Residues-Cauchy's Residue theorem (no proof)-problems Evaluation of real definite integral.	CLO2, CLO3		Lecture and discussion with problems.				Answer basic questions, quizzes, Homework, exams.				
4	Variable and attributes, Collection and presentation of statistical data, Frequency distribution and Graphical representation. Analysis of statistical Data: Location, Dispersion and their measures. Skewness, Kurtosis, and their measures. Moments and Cumulants.	CLO5		Lecture and discussion with problems.				Exercise with various mathematical problems.				
5	Correlation theory: Linear Correlation, Measures of correlation and its significance. Regression and curve fitting: Linear and non-linear regression. Method of least squares. Curve fitting.	CLO5		Lecture and discussion with problems.				Class Test 1(topics of the week's 1-4)				
6	Concept of probability, Sample Space, Events. Union and intersection of Events. The probability of Events. Laws of probability. Conditional probabilities. Bose-Einstein Statistics. Bays Probability.	CLO5		Lecture and discussion with problems.				Answer basic questions, quizzes, Homework, exams.				
7	Discrete and continuous random variables. Density and distribution functions Mathematical expectation and variance. Conditional Expectation and conditional variance. Expected values and variances of the	CLO4		Lecture and discussion with problems.				Answer basic questions, quizzes, Homework (word size expansion, memory location				

	density distributions. Moments and cumulant generating functions. Characteristics functions.			expansion), exams
8	Study of Binomial, Poisson, Normal, Geometric, Negative, Binomial, Hypergeometric, exponential, lognormal, logarithmic, Beta and Gamma distributions.	CLO4		
9	Sampling Distribution: Fisher's Lemma, Study of χ^2 Distribution, T-distribution and F distribution properties, uses and Applications. Distribution of sample correlation coefficient in the null case. Sampling distribution of the medians and range.	CLO5	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
10	Basic Concepts Consistent estimates, Unbiased estimates. Mean and variance of estimates. Ideas of efficiency. The principle of Maximum likelihood. Illustration from Binomial, Poisson and Normal distributions.	CLO5	Lecture and discussion with problems.	Class Test 2(topics of the week's 5-8)
11	Statistical decisions; Statistical hypothesis; Critical region, Best critical region; Two types of error; the procedure of test of hypothesis; Most powerful test, standard Errors.	CLO5	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
12	Test of Significance: Test of single mean and single variance. Comparison of two sample Means, proportions, and Variances. Bartlett's test for homogeneity of variances. Test for correlation Regression coefficients.	CLO5	Lecture and discussion with problems.	Quizzes, Homework, exams.
13	An exact test for 2×2 tables. Test for $r \times c$ tables. Three-Way contingency tables. Large Sample Test of Significance. Nonparametric Test, One Sample, and two Sample Sign Test. Run Test and Rank Sum Test.	CLO5	Lecture and discussion with problems.	Class Test 3(topics of the week's 9-12)

Recommended Books:

1. Taylor, Michael. Introduction to Complex Analysis (PDF - 1.3MB)
2. Beck, Matthias, Gerald Marchesi, Dennis Pixton, and Lucas Sabalka. A First Course in Complex Analysis (PDF - 1MB)
3. Fundamental of statistics, S.C. Gupta and V.K. Kapoor.
4. ProbabilitywithStatisticalApplicationsbyMosteller,RourkeandThomas,Addison-Wesley
5. ProbabilitybyS.Lipschutz,McGraw-Hill,
6. ElementsofProbabilityandStatisticsbyF.L.Wolf,McGraw-Hill.

ASSESSMENT PATTERN

Attendance- 05

CIE-Continuous Interval Evolution (25) (Average of best 2 out of 3 will be counted)				SEE-Semester End Examination (70 marks)	
Bloom's Category	Test-1 (25)	Test-2 (25)	Assignment (25)	Bloom's Category	Test
Remember	5			Remember	10
Understand	5			Understand	10
Apply	10	15	15	Apply	25
Analyze	5	10	10	Analyze	25
Evaluate				Evaluate	
Create				Create	

COURSE TITLE: VIVA VOCE

Course Code: CSTE 2226 Credit Hours: 01	Total Marks: 100
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Course Objectives:

- Prepare the students to face interviews both in the academic and the industrial sector.

Course Learning Outcomes (CLO)	CLOs	Description (At the end of the course, students will be able to)											
	CLO1	analyze the various application of Computer Science & Telecommunication Engineering in real-life problem solving											
	CLO2	evaluate overall technical knowledge and industry readiness											
	CLO3	go under a virtual environment of technical interview.											

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

COURSE CONTENTS

OUTCOME (Student should be able to)

VIVA VOCE (Viva based on major/minor courses of Year-2)

CLO1, CLO2, CLO3

ASSESSMENT PATTERN

Category	Marks (100)
Eye contact	10
Body gesture	10
Communication skill	20
English pronunciation skill	10
Remember	10
Understand	10
Analyzing	20
Evaluating	10