

Year-4 Term-1

| Sl.# | Course Code | Course Title | Credit | Credit Hours |
|------|-------------|--|-------------|--------------|
| 1 | CSTE 4101 | Computer Graphics | 3 | 3 |
| 2 | CSTE 4102 | Computer Graphics and Animation Lab | 1 | 2 |
| 3 | CSTE 4103 | Cryptography and Network Security | 3 | 3 |
| 4 | CSTE 4104 | Cryptography and Network Security Lab | 1 | 2 |
| 5 | CSTE 4105 | Wireless and Mobile Communication | 2 | |
| 6 | CSTE 4108 | Technical Writing and Presentation Lab | 1.5 | 2 |
| 7 | CSTE 4111 | Industrial Training | 2 | 0 |
| 8 | CSTE 4125 | Project and Thesis | 2 | 2 |
| | | Total | 15.5 | 22 |

COURSE TITLE: COMPUTER GRAPHICS

| | |
|---|---|
| Course Code: CSTE 4101 Credit Hours: 03 Exam Hours: 04 | Attendance: 05 CIE Marks: 25 SEE Marks: 70 |
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Course Objectives:

- Explain the tools and techniques of different computer graphics hardware and software.
- Discuss briefly different algorithms used in computer graphics, clipping, and splines technique.
- Explain the lighting models and shading techniques.

Resources Used:

| Course Learning Outcomes (CLO) | CLOs | Description (At the end of the course, students will be able to) | | | | | | | | | | | |
|--|------|---|---|--|--|--|--|--|--|--|--|--|-------|
| | CLO1 | understand the fundamental concepts of computer graphics. | | | | | | | | | | | |
| | CLO2 | use different drawing, clipping, filling, and light & shading algorithms. | | | | | | | | | | | |
| | CLO3 | differentiate between 2D and 3D rotation and translation matrix and differentiate among Flat, lambert, and Phong shading. | | | | | | | | | | | |
| Mapping of CLO to PLO (Program Learning Outcome) | PLO1 | √ | | | | | | | | | | | 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 | Computer Graphics Programming: OpenGL. Scan Conversion: scan converting a point, line, circle, ellipse, arc, and sectorized polygons. | CO1 | Lecture and discuss detailed information about the course, including the objectives, course outcomes, examinations, physical environment, and methodology with the students. Demonstrate problem-solving techniques | Answer basic questions, quizzes, Homework, exams. |
| 2 | Camera Analogy and Color Model: Viewing, Windowing, Clipping, RGB color model, CMYK color model, Lookup table, and direct coding | CO1 | Lecture and discussion about camera analogy and color model. | Answer basic questions, quizzes, Homework, exams. |

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| 3 | Projective Transformation: Types of projection, Parallel Projection, Perspective Projection | CO1 | Demonstrate examples of projective transformation using the internet. | Answer basic questions, quizzes, Homework, exams. |
| 4-5 | Vector and Matrix: Normal Vector, View Vector, 2D and 3D Rotation and Translation Matrix | CO1, CO3 | Lecture and discussion about vector and matrix. | Answer basic questions, quizzes, Homework, exams. |
| 6-7 | Raster Graphics & Hidden Surface Removal: Line Drawing, Anti-aliasing, Polygon Filling Algorithms, Z-buffer algorithm, Painter's algorithm | CO2 | Use different software tools to implement algorithms relate to raster graphics and hidden surface removal. | Class Test 1 (topics of the week's 1-5) |
| 8 | Lighting and Surface Property: Diffused Light, Ambient Light, Specular Light, Lighting Models for reflection, refraction and transparency | CO2, CO3 | Lecture and discussion about lighting and surface property. | Answer basic questions, quizzes, Homework, exams. |
| 9 | Shading and Texture Mapping: Flat shading, Lambert Shading, Phong Shading, Texture Fundamentals, Texture Blending | CO1, CO3 | Lecture and demonstrate shading and texture mapping. | Class Test 2 (topics of the week's 6-8) |
| 10-11 | Curves and Surfaces: Types of Curves, Cubic-Spline, Beta-Spline, NURBS | CO2 | Lecture and discuss about curves and surfaces. | Answer basic questions, quizzes, Homework, exams |
| 12 | Morphing View-morphing, Volume Metamorphosis | CO2 | Lecture and discussion about morphing. | Class Test 3 (topics of the week's 9-12) |
| 13 | Miscellaneous and Final exam preparation | CO1 | Lecture and discussion on miscellaneous subjects | Exercise the answering methods in final exam. |

Recommended Books:

1. **Computer Graphics: A Programming approach** by Steven Harrington, McGraw Hill.
2. **Computer Graphics** by Donald Hearn and M. Pauline Baker, Prentice Hall.
3. **OpenGL(r) 1.2 Programming Guide**, Third Edition: The Official Guide to Learning OpenGL, Version 1.2: by Mason Woo, Jackie Neider, Tom Davis, Dave Shriner, OpenGL Architecture, Review Board, Tom Davis, Dave Shreiner.
4. **Computer Graphics: Schaum's Outlines**, 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 | | | | Bloom's Category | Test |
| Remember | | | | Remember | |
| Understand | 15 | 5 | | Understand | 20 |
| Apply | 5 | 10 | 10 | Apply | 20 |
| Analyze | 5 | 10 | | Analyze | 15 |
| Evaluate | | | 10 | Evaluate | 10 |
| Create | | | 5 | Create | 5 |

COURSE TITLE: COMPUTER GRAPHICS LAB

| | |
|---|--|
| Course Code: CSTE 4102 Credit Hours: 01 Exam Hours: 03 | Attendance: 10 Viva: 20 SEE Marks: 70 |
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Course Objectives:

- Review experiments to verify the theories and concepts developed in CSTE 4101 practically.
- Explain different algorithms related to drawing shapes correctly.
- Develop 3D models using OpenGL API

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 | understand different algorithms related to drawing line, circle, ellipse, arc, and sector correctly. | | | | | | | | | | | |
| | CLO2 | apply different algorithms for drawing, scan conversion of various characters and designs, and transformation. | | | | | | | | | | | |
| | CLO3 | develop 3D models using the OpenGL API. | | | | | | | | | | | |
| 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) |
|------|--|----------|--|---|
| 1-2 | <ul style="list-style-type: none"> • Draw a Line using Polynomial Line Algorithm, DDA Line Algorithm, Bresenham's Line Algorithm • Draw a Circle using Midpoint Circle Algorithm, Polynomial circle algorithm, Trigonometric circle algorithm, Bresenham's circle algorithm | CO1, CO2 | Discussion and practice | -Home task -Quiz |
| 3-4 | <ul style="list-style-type: none"> • Draw an Ellipse using the Polynomial algorithm, Trigonometric algorithm. • Draw an Arc and a sector. | CO1, CO2 | Lecture and then Practice | Quiz 1 (Topic of the 1-4 weeks) |
| 5-6 | <ul style="list-style-type: none"> • Scan conversion of various characters: using Bitmap method and Outline method • Scan converting a character bangle ka using Bitmap method and Outline method • The scan converts Shahid Minar, SritiShoudo, a clock, and a flower. | CO2 | Lecture and discussion with problems. | Answer basic questions, quizzes, Homework, exams. |
| 7-8 | <ul style="list-style-type: none"> • Rotate a Line, Triangle, and Rectangle about a point. • Magnifying a circle, a triangle, and a rectangle about a point. • Create a flower by rotating an | CO2 | Lecture and discussion with problems. | Quiz 2 (Topic of the 5-8 weeks) |

| | | | | |
|-------|---|-----|---------------------------------------|---|
| | object | | | |
| 9-10 | <ul style="list-style-type: none"> Scan converts a three-dimensional “F” and cube, then rotates the object about the x-axis and magnifies it. Rotate a 3D cube and draw NSTU Shahid Minar using OpenGL. Projection of 3D cube. | CO2 | Practice with a real-life problem. | Answer basic questions, quizzes, Homework, exams. |
| 11-12 | <ul style="list-style-type: none"> Line & polygon clipping problems. To perform also other experiments relevant to this course. | CO2 | Lecture and discussion with problems. | Answer basic questions, Homework Quiz 3 (Topic of the 9-12 weeks) |
| 13 | Final Lab Exam (Assignment, Program setup, Viva) | | | |

Recommended Books:

1. DWL-2100AP Guide.
2. Data Communications and Networking by Behrouz Forouzan, 4th Edition, McGraw-Hill.
3. Fundamentals of Wireless LANs Lab Companion, Cisco Networking Academy Program, Cisco Press, 2004.

ASSESSMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE: CRYPTOGRAPHY AND NETWORK SECURITY

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|--|--|
| Course Code: CSTE 4103 Credit Hours: 03 Exam Hours: 04 | Attendance: 05 CIE Marks: 25 SEE Marks: 70 |
|--|--|

Course Objectives:

- Introduce the basic concepts of Cryptography and Network Security.
- Familiarize different symmetric and public-key encryption techniques used to provide security services of networks.
- Explain the various key distribution and management schemes for symmetric and public-key encryption.
- Provide the knowledge of various protocols for network security to protect against the threats in the networks.

Resources Used:

| Course Learning Outcomes (CLO) | CLOs | Description (At the end of the course, students will be able to) | | | | | | | | | | | |
|--------------------------------|------|---|------|------|------|------|------|------|------|-------|-------|-------|--|
| | CLO1 | understand the general concepts of cryptography and network security. | | | | | | | | | | | |
| | CLO2 | Explain the various key distribution and management schemes. | | | | | | | | | | | |
| | CLO3 | differentiate symmetric and public-key encryption techniques. | | | | | | | | | | | |
| | CLO4 | analyze various techniques/protocols for network security. | | | | | | | | | | | |
| Mapping of CLO to PLO(Program) | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 | PLO11 | PLO12 | |
| | CLO1 | ✓ | | | | | | | | | | | |

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|-------------------|------|---|---|---|--|--|--|--|--|--|--|
| 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 | Overview of Cryptography: Concept of Cryptography, Cryptanalysis, Brute-force Attack. OSI Security Architecture: Security Attacks, Security Services, Security Mechanisms; Network Security Model. | C01 | Discussion on detailed information about the course, including the objectives, course outcomes, examinations. Lecture and discussion on the basics of Cryptography and OSI security architecture. | Answering basic questions, quizzes, Homework etc. |
| 2 | Symmetric Cryptosystem: Symmetric Cipher Model, Substitution Technique: Caesar Cipher, Monoalphabetic Cipher, Polyalphabetic Cipher, Playfair Cipher, Hill Cipher; Transposition Technique: Rail Fence Technique, Columnar Transposition; Rotor Machines, Steganography. | CLO1, CLO3 | Lecture and discussion on basics of symmetric cryptosystem with a variety of substitution and transposition symmetric ciphers encryption-decryption technique. Exercise on substitution and transposition symmetric ciphers encryption-decryption technique. | Answering basic questions, quizzes, Homework etc. |
| 3 | Block Ciphers & DES: Block Cipher Principles, The Feistel Cipher, Data Encryption Standard (DES). DES Encryption, DES Decryption, The Strength of DES, Differential and Linear Cryptanalysis of DES, Diffusion, and Confusion. | CLO1, CLO3 | Detailed discussion on DES encryption-decryption technique with examples. | Answering basic questions, quizzes, Homework etc. |
| 4 | AES: Basic Structure, Primitive Operation, Inverse Cipher, Key Expansion, Rounds, Inverse Rounds, Simplified AES; Double DES, Triple DES. | CLO1, CLO3 | Detailed discussion on DES encryption-decryption technique with examples and introduce with DES extension techniques. | Answering basic questions, quizzes, Homework etc. |
| 5 | Block Cipher Modes of Operation: Electronic Codebook Mode (ECB), Cipher Block Chaining Mode (CBC), Cipher Feedback Mode (CFB), Output Feedback Mode (OFB), Counter Mode (CTR). | CLO1 | Lecture and discussion on different types of block cipher modes of operation. | CT-1 (topics of the week's 1-4) |
| 6 | Stream Cipher and RC4; Placement of Encryption Function: Link versus End-to-End Encryption, Traffic Confidentiality, Key Distribution Scenario, Automatic Key Distribution, Decentralized Key Distribution. | CLO2, CLO3 | Lecture and discussion on stream cipher technique, to identify potential locations where encryption function should deploy in networks and symmetric key management procedures. | Answering basic questions, quizzes, Homework etc. |
| 7 | Public Key Cryptosystems: | CLO1, CLO3 | Discussion on the basics of | Answering basic |

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|----|---|------------|---|---|
| | Requirements for Public Key Cryptography, Principles of Public Key Cryptosystems, RSA Algorithms, Security of RSA. | | public key cryptosystem and detailed discussion on RSA algorithm with examples. | questions, quizzes, Homework etc. |
| 8 | Key Management: Distribution of Public Keys, Diffie-Hellman Key Exchange; Authentication Requirements, Authentication Functions, Message Authentication Codes. | CLO2 | Lecture and discussion on public key management procedure with a detailed analysis of Diffie-Hellman key exchange technique and discussion on message authentication technique. | Answering basic questions, quizzes, Homework etc. |
| 9 | Hash Functions; Digital Signature Standards: RSA Approach, DSS Approach. | CLO1, CLO3 | Lecture on different approaches to digital signature. | CT-2 (topics of the week's 5-8) |
| 10 | Network Security: Electronic Mail Security: Pretty Good Privacy, S/MIME. IP Security: Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management. | CLO4 | Lecture and discussion on network security, E-mail security and IP security. | Answering basic questions, quizzes, Homework etc. |
| 11 | Web Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Electronic Translation. | CLO4 | Lecture and discussion on web security. | Answering basic questions, quizzes, Homework etc. |
| 12 | Firewalls: Firewall Design Principles, Packet-Filtering Router, Application-Level Gateway, Circuit-Level Gateway, Firewall Configurations, Trusted Systems. | CLO4 | Discussion on the security issues in Firewall, Router, and Gateway. | Assignment-1 |
| 13 | Review topics and Final exam preparation. | CLO1- 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. Cryptography and Network Security Principles and Practice by W. Stallings, Prentice Hall.
2. Cryptography and Network Security by BehrouzForouzan, McGraw-Hill.
3. Fundamentals of Computer Security Technology by Edward Amoroso, Prentice Hall.

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 | | | |
|------------------|----|----|----|
| Remember | 10 | | |
| Understand | 10 | 10 | |
| Apply | 5 | 15 | 10 |
| Analyze | | | 15 |
| Evaluate | | | |
| Create | | | |

| Bloom's Category | Test |
|------------------|------|
| Remember | 10 |
| Understand | 30 |
| Apply | 15 |
| Analyze | 15 |
| Evaluate | |
| Create | |

COURSE TITLE:CRYPTOGRAPHY AND NETWORK SECROTY LAB

| | |
|---|--|
| Course Code: CSTE 4104 Credit Hours: 01 Exam Hours: 03 | Attendance: 10 Viva: 20 SEE Marks: 70 |
|---|--|

Course Objectives:

- Expose different cipher techniques.
- Deliver different Substitution and Transposition techniques.
- Introduce the Digital Signature Standard.
- Familiarize with network security tools like GnuPG, KF sensor, Net Strumbler.
- Introduce intrusion detection system.

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 | understand and apply different Substitution and Transposition techniques. | | | | | | | | | | | |
| | CLO2 | use and analyze network security tools like GnuPG, KF sensor, Net Strumbler. | | | | | | | | | | | |
| | CLO3 | implement and analyze intrusion detection systems like snort. | | | | | | | | | | | |
| 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) |
|------|---|------|--|---|
| 1-2 | Find out the corresponding Caesar cipher, Monoalphabetic Cipher and Polyalphabetic Cipher of a plaintext. And then find the original text from the cipher text. | CO1 | Discussion and practical implementation of Caesar cipher, Monoalphabetic Cipher and Polyalphabetic Cipher. | Answer basic questions, quizzes, Homework, exams. |
| 3-4 | Find out the corresponding Playfair Cipher and Hill Cipher of a plaintext. And then find the original text from the cipher text. | CO1 | Discussion and practical implementation of Playfair cipher and Hill Cipher. | Answer basic questions, quizzes, Homework, exams. |
| 5-6 | Find out the corresponding Transposition Cipher of a given message. Then perform the reverse operation to get original plaintext. Find out the corresponding double Transposition Cipher of a given plaintext. Then perform the reverse operation to get original plaintext. | CO1 | Lecture and discussion with practical implementation of Transposition Cipher. | Answer basic questions, quizzes, Homework, exams. |
| 7 | Implement the encryption and decryption of 8-bit data using 'Simplified DES Algorithm' (created by Prof. Edward Schaefer) in 'C'. | CO1 | Discussion with practical implementation of DES encryption and decryption techniques. | Answer basic questions, quizzes, Homework, exams. |
| 8 | Implement 'Linear Congruential Algorithm' to generate 5 pseudo-random numbers in 'C'. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in 'C'. | CO1 | Discussion and practice | Answer basic questions, quizzes, Homework, exams. |
| 9 | Encrypt the plaintext message using RSA algorithm. Then perform the reverse operation to get original plaintext. | CO1 | Discussion with practical implementation of RSA encryption and decryption techniques. | Answer basic questions, quizzes, Homework, exams. |

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| 10 | Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG) | CO2 | Demonstration with e-Tutorials. | Answer basic questions, quizzes, Homework, exams. |
| 11 | Demonstrate intrusion detection system (ids) using any tool (snort or any other) Perform other experiments relevant to this course. | CO1, CO2, CO3 | Demonstration on intrusion detection with e-Tutorials. | Answer basic questions, quizzes, Homework, exams. |
| 12 | Submit a mini project in a group | | | |
| 13 | Final Lab Exam (Job, Quiz and Viva) | | | |

Recommended Books:

ASSESSMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE: WIRELESS AND MOBILE COMMUNICATION

| | |
|---|--|
| Course Code: CSTE 4105 Credit Hours: 2 Exam Hours: 03 | Attendance: 05 CIE Marks: 25 SEE Marks: 70 |
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Course Objectives:

- Introduce wireless and mobile cellular communication systems.
- Explain the concepts of FDD, TDD, FDMA, TDMA, CDMA, and different modulation techniques.
- Provide ideas on how to implement GSM, GPRS, and wireless network systems using diversity transmission and reception techniques.
- Deliver opinions on how to analyze and synthesis RTS/CTS mechanism, cellular services, radio propagation and path loss model, WLAN, special wireless network systems, and other ADHOC families.
- Show the significance of MANET, VANET, and other ADHOC families.

Resources Used:

| Course Learning Outcomes (CLO) | | CLOs | Description (At the end of the course, students will be able to) | | | | | | | | | | | |
|---------------------------------|------|------|--|------|------|------|------|------|------|------|-------|-------|-------|--|
| | | CLO1 | understand the wireless and mobile cellular communication systems, basic concepts on FDD, TDD, FDMA, TDMA, CDMA, and different modulation techniques in detail. | | | | | | | | | | | |
| | | CLO2 | implement GSM, GPRS, and wireless network systems using diversity transmission and reception techniques. | | | | | | | | | | | |
| | | CLO3 | analyze and synthesis RTS/CTS mechanism, cellular services, radio propagation and path loss model, WLAN, special wireless network systems, and other ADHOC families. | | | | | | | | | | | |
| | | CLO4 | evaluate the significance of MANET, VANET, and other ADHOC families. | | | | | | | | | | | |
| Mapping of CLO to PLO (Program) | | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 | PLO11 | PLO12 | |
| | | CLO1 | ✓ | | | | | | | | | | | |
| | CLO2 | ✓ | | | | | | | | | | | | |

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| Learning Outcome) | 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 | Introduction to wireless communication: Evolution of mobile radio communications, wireless communication system definitions, FDD and TDD, cordless and cellular mobile systems, different generations of wireless networks, modulation techniques for wireless communication. | CLO1 | Overall discussion about the course contents including the objectives, course examinations, physical environment and methodology. | Answer basic questions, group discussion, assignments. |
| 2 | FDMA, TDMA and CDMA: FDMA, TDMA and CDMA multiple access techniques for wireless communications. Setup encoding and decoding techniques by using CDMA. | CLO1, CLO2 | Delivering lecture and discussion on several techniques of multiple access. Showing the comparison among FDMA, TDMA and CDMA in classroom. | Draw the circuit diagrams to design the multiple accesses in classroom. Assignments, home works. |
| 3 | GSM and GPRS: GSM and GPRS: services and implementation of system architecture, radio interface, protocols, handover, security.services, | CLO1, CLO2 | Delivering lecture and discussion on GSM and GPRS systems. Demonstrate block diagrams and video tutorials GSM and GPRS systems in the classroom. | Answer basic questions and demonstrate presentation. |
| 4 | Special Wireless Network Systems: 2.5G systems, EDGE, TETRA, TDMA frame structure of TETRA, 3G systems, UMTS, Spreading and scrambling technique, UTRAN, 4G and beyond | CLO1, CLO2, CLO3 | Demonstrating various techniques to solve the design of all wireless networks. | Q & A session, demonstrate presentation and assignments. |
| 5 | CDMA Terminologies: IS-95 System architecture, Air interface, Physical and Logical channel, Handover and Security, and Introduction to CDMA 2000, W-CDMA. Draw the block diagrams of different categories of CDMA system. | CLO1, CLO3 | Delivering lecture and overall discussion on different categories CDMA system. | Class Test 1(topics of the weeks 1-4) |
| 6 | Cellular Mobile Concepts: Mobile telephone systems, Trunking efficiency, Basic cellular system, Performance criteria, Mobile radio environment, Operation of cellular systems, Planning a cellular systems, Analog and digital cellular systems. | CLO1 | Lecture and explanation on cellular Mobile Concepts. | Answer basic questions, group discussions, assignments. |
| 7 | Cellular Services: Frequency reuse, cell splitting, registration, terminal authentication, handoff. | CLO1, CLO2 | Lecture and discussion on different cellular services to expand cellular coverage and capacity. | Group discussion, presentation. |

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| 8 | Radio Propagation and Path Loss Model: Path loss modeling and signal coverage, Path loss model for outdoor communications- Free space propagation model, Two-Ray model, Okumura model, Hata model, Path loss model for indoor communications. | CLO2, CLO3 | Demonstrating on various path loss models for outdoor and indoor communications. | Q & A session and demonstrate presentation. |
| 9 | Fading: Small-scale fading- Flat fading, Frequency selective fading, Fast fading, slow fading, Large-scale fading, Rayleigh and Rician distributions. Statistical model for multipath fading channels. Narrowband fading model, Wideband fading model, Diversity, transmit diversity, receive diversity- selection combining (SC), maximal ratio combining, Coherence time and Coherence bandwidth, Path loss, shadowing and multipath, Effects of multipath channel, Doppler shift. | CLO1, CLO2 | Lecture and explanation on different fading problems. Solving the problems by applying diversity schemes. | Class Test 2(topics of the weeks 5-8) |
| 10 | Wireless Communication Technology: Frequency planning, noise and interference in wireless communication systems, antenna & radio wave propagation in the mobile environment fading. | CLO1, CLO2 | Delivering lecture and overall discussion on several topics of basic wireless communication system in classroom. | Answer basic questions, group discussion and presentation. |
| 11 | Wireless LAN: IEEE 802.11 standard, WLAN Family, WLAN modulation system, WLAN protocol architecture, Collision Sense Multiple Access with Collision Detection (CSMA/CD) and CSMA Collision avoidance (CSMA/CA). | CLO1, CLO2, CLO3 | Lecture and discussion on WLAN basics, family and modulation system, protocol architecture and CSMA/CD mechanism. | Q & A session, demonstrate presentation and assignments. |
| 12 | WLAN and ADHOC families: IEEE 802.11 Distributed Coordinate System (DCF) and Point Coordination Function (PCF), WLAN family (HAN, WPAN, and Wireless ATM). HIPERLAN: Requirements & Architecture. BLUETOOTH architecture & protocol stack. Brief introductions to 3G and 4G Cellular Mobile Communications Systems. Adhoc network (MANET, VANET) | CLO1, CLO2, CLO3, CLO4 | Lecture and explanation on the pros and cons of different WLAN and ADHOC network systems. | Class Test 3(topics of the weeks 9-12) |
| 13 | Review topics and Final exam preparation. | Learn about latest trends and the better answering methods in the final exam. | Lecture and discussion on miscellaneous topics. | Exercise the answering methods in final exam. |

Recommended Books:

1. Mobile Communications by Jochen Schiller, PEARSON Education Ltd.

2. Mobile Cellular Telecommunications by William C.Y. Lee, McGraw Hill.
3. Wireless Communications: Principles and Practice by Theodore S. Rappaport, Wiley.
4. Wireless Digital Communication by Kamil Feher, Prentice Hall.
5. Wireless Communications by Andrea Goldsmith, Cambridge 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 | 15 | 5 | | Remember | |
| Understand | 5 | 10 | 10 | Understand | 20 |
| Apply | 5 | 5 | 10 | Apply | 20 |
| Analyze | | 5 | 5 | Analyze | 20 |
| Evaluate | | | | Evaluate | 10 |
| Create | | | | Create | |

COURSE TITLE: TECHNICAL WRITING AND PRESENTATION LAB

| | |
|------------------------|----------------|
| Course Code: CSTE 4108 | Attendance: 10 |
| Credit Hours: 1.5 | Viva: 20 |
| Exam Hours: 03 | SEE Marks: 70 |

Course Objectives:

- Introduce how to write a research proposal
- Focus on structure of a scientific report
- Emphasize of writing abstract, introduction, methods, results and discussion.
- Focus on writing a journal paper or conference paper.

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 | comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions | | | | | | | | | | | |
| | | CLO2 | acquire individual and teamwork skills. | | | | | | | | | | | |
| | | CLO3 | adapt with any technical change. | | | | | | | | | | | |
| 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) |
|----------|---|----------------|--|--|
| 1-4 | Outlines of writing introduction | CLO1,CLO2,CLO3 | Lecture and discussion with the published paper. | Through lab report and viva. |
| 5-7 | Outlines how to write different techniques used in research | CLO1,CLO2,CLO3 | Lecture and discussion with the published paper | Through lab report and viva. |
| 7-9 | Explanation how to write result of research. | CLO1,CLO2,CLO3 | Lecture and discussion with the published paper | Through lab report and viva. |
| 10 11 | Explanation how to write discussion and conclusion. | CLO1,CLO2,CLO3 | Lecture and discussion with the published paper. | |

| | | | | |
|----|---------------------------------|----------------|--|------------------------------|
| 12 | Methods of writing abstract. | CLO1,CLO2,CLO3 | Lecture and discussion with the published paper. | |
| 13 | Methods of writing of reference | CLO1,CLO2,CLO3 | Lecture and discussion with the published paper. | Through lab report and viva. |

Recommended Books:

ASSESSMENT PATTERN

Attendance- 10

Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:INDUSTRIAL TRAINING

Course Code: CSTE 4111

Credit Hours: 2

Presentation: 20

Viva: 10

Report Evaluation: 70

Course Objectives:

- Develop career-oriented skills and techniques.
- Enhance good communication skills by working as a team member in industrial projects.
- Provide opportunities to build strength, teamwork spirit, and self-confidence.

Resources Used:

| Course Learning Outcomes (CLO) | CLOs | Description (At the end of the course, students will be able to) | | | | | | | | | | | |
|--------------------------------|------|--|--|--|--|--|--|--|--|--|--|--|--|
| | CLO1 | familiar with the working environment of the IT industries. | | | | | | | | | | | |
| | CLO2 | understand how to run an industrial project. | | | | | | | | | | | |
| | CLO3 | acquire individual and teamwork skills. | | | | | | | | | | | |
| | CLO4 | write a report on industrial training. | | | | | | | | | | | |

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

Lesson Plan (as per week):

| Course Contents | CLOs |
|--|------------------------|
| <ul style="list-style-type: none"> ➤ One-month industrial training in Software/IT/Networking industries. ➤ Engagement in various activities to get the practical experience of the knowledge that they have achieved throughout the program. ➤ Write a report after the completion of the training. | CLO1, CLO2, CLO3, CLO4 |

ASSESSMENT PATTERN

Viva-20

Presentation (20)

| Presentation (20) | | Report Evaluation (60 marks) | |
|-----------------------------|-------|------------------------------|------|
| Category | Marks | Bloom's Category | Test |
| Eye contact | 5 | Presentation | 20 |
| Body gesture | 5 | Field study and Analysis | 30 |
| Communication skill | 5 | Impact on the society | 5 |
| English pronunciation skill | 5 | Discussion and future plan | 5 |
| | | Bloom's Category | Test |

COURSE TITLE:PROJECT AND THESIS

| | |
|---|--|
| Course Code: CSTE 4125 Credit Hours: 2 | Presentation: 20 Viva: 10 Project/Thesis Evaluation: 70 |
|---|--|

Course Objectives:

- Focus a field of interest under a supervisor and find out a specific problem that can be solved for thesis or project work to be carried through the 4th year.
- Give a clear idea of the related work/project accomplished by the different authors.
- Discuss project/research methodologies that propel the students to do good project/research work.

Resources Used:

| Course Learning Outcomes (CLO) | CLOs | Description (At the end of the course, students will be able to) | | | | | | | | | | | |
|--|------|--|--|--|---|---|--|--|---|---|---|--|--|
| | CLO1 | review previous work/project. | | | | | | | | | | | |
| | CLO2 | select and apply modern tools in solving the problem | | | | | | | | | | | |
| | CLO3 | design a project or creative idea. | | | | | | | | | | | |
| | CLO4 | write an effective proposal. | | | | | | | | | | | |
| | CLO5 | acquire individual and teamwork skills. | | | | | | | | | | | |
| Mapping of CLO to PLO (Program Learning Outcome) | PLO1 | ✓ | | | | | | | | | | | |
| | CLO1 | | | | | | | | | | | | |
| | CLO2 | | | | ✓ | ✓ | | | | | | | |
| | CLO3 | | | | | ✓ | | | | | | | |
| | CLO4 | | | | | | | | ✓ | | ✓ | | |
| | CLO5 | | | | | | | | | ✓ | | | |

Lesson Plan (as per week):

| Course Contents | | CLOs |
|---|--|------------|
| Study the problems related to Computer Science and Telecommunication Engineering. | | CLO1 |
| Study different modern tools | | CLO2 |
| Design a project or create idea about contemporary issues. | | CLO3, CLO5 |
| Write effective reports | | CLO4, CLO5 |

ASSESSMENT PATTERN

Viva-10

Presentation (20)

| Category | Marks |
|-----------------------------|-------|
| Eye contact | 5 |
| Body gesture | 5 |
| Communication skill | 5 |
| English pronunciation skill | 5 |

Report Evaluation (60 marks)

| Bloom's Category | Test |
|---|------|
| Presentation | 10 |
| Choice of methods | 15 |
| Analyze the results | 15 |
| Scope of material and critical use of resources | 10 |
| The challenge and novelty of the topic for research | 20 |