Year-3 Term-1

Sl.#	Course Code	Course Title	Credit	Credit Hours
1	CSTE 3101	Communication Engineering	3	3
2	CSTE 3102	Communication Engineering Lab	1	2
3	CSTE 3103	Digital Signal Processing	3	3
4	CSTE 3104	Digital Signal Processing Lab	1	2
5	CSTE 3105	Database Management System	3	3
6	CSTE 3106	Database Management System Lab	1.5	3
7	CSTE 3107	Operating Systems and System Programming	3	3
8	CSTE 3108	Operating Systems and System Programming Lab	1.5	3
9	CSTE 3109	Microprocessor, Microcontroller and Interfacing	3	3
10	CSTE 3110	Microprocessor, Microcontroller and Interfacing Lab	1	2
11	CSTE 3111	Compiler Construction	3	3
12	CSTE 3112	Compiler Construction Lab	1	2
		Total	**25**	**27**

COURSE TITLE:COMMUNICATION ENGINEERING

Course Code: CSTE 3101 **Credit Hours:** 03 **Exam Hours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

Course Objectives:

- Introduce the concepts of communication system, information theory, and different types of noise.
- Discuss the different types of analog modulation and demodulation techniques, sidebands, frequency domain expressions, Super Heterodyne Receiver, etc.
- Familiarize with sampling, aliasing and quantization.
- Discuss digital communication and different communication techniques.
- Give outlines about communication system design and traffic analysis.

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

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	Understand the evolution of communication systems, basic information theory, different analog modulation schemes details with demodulation techniques and sampling.
CLO2	Apply information theory, modulation and demodulation technique in signal transmission.
CLO3	Design communication system and analyze traffic.

Mapping of CLO to PLO Program Learning

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

Outcome)	CLO3		√										

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How th are developed)
1	**Overview of communication systems**: Introduction to communication systems: Basic principles, Fundamental elements, message source, bandwidth requirements, transmission media types	CLO1	Lecture and discussion on basic communication system.	Answer basic questions, quizzes Homework, exam
2	**Information theory**: Measurement of information, error free communication over noisy channel, channel capacity.	CLO1, CLO2	Lecture and discussion with mathematical concepts on information theory.	Answer basic questions, quizzes Homework, exam
3	**Noise:** External and internal noise, characteristics of various types of noise, noise calculation, signal to noise ratio and noise figure	CLO1	Discussion on different types of noise.	Answer basic questions, quizzes, Homework, exams
4	**Analog modulation and demodulation:** Amplitude modulation (AM)— introduction, DSB-FC, DSB-SC, SSB, and VSB: spectral analysis of each type, envelope and synchronous detection;.	CLO1,	Lecture and discussion on analog modulation and demodulation.	Answer basic questions, quizzes, Homework, exams
5	**Angle modulation:** Frequency modulation (FM) and phase modulation (PM), spectral analysis, demodulation of FM and PM; Transmitter & Receiver: AM and FM transmitters, super heterodyne radio receiver, performance parameters of a radio receiver	CLO1, CLO2	Lecture and discussion on angle modulation.	**Class Test 1**(topics of the week's 1-4)
6	**Sampling:** Sampling theorem, signal reconstruction, aliasing, natural and flat-top sampling, quantization, quantization noise, non-uniform quantization, signal to quantization error ratio;	CLO1	Lecture and discussion on sampling, aliasing and quantization.	Answer basic questions, quizzes, Homework, exams
7	**Pulse modulation:** Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), and Pulse Position Modulation (PPM); Pulse Code Modulation (PCM), differential PCM, delta modulation (DM), and Adaptive DM; -law and A-law companding. Binary Modulated Bandpass.	CLO1, CLO2	Lecture and discussion on pulse modulation.	Answer basic questions, quizzes, Homework, exams
8	**Signaling:** Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), differential PSK (DPSK), Frequency Shift Keying (FSK), Minimum Shift Keying (MSK) principle, bandwidth requirements, detection, noise performance;.	CLO1, CLO2	Lecture and discussion on signal transmission.	Answer bas questions, quizze exercise, Homewor exams.
9	**Principles of digital data transmission:** Simple digital communication system,	CLO1, CLO2	Lecture and discussion on digital data transmission	Answer basic questions, quizzes,

line coding, pulse shaping, scrambling, Error detection and correction schemes		system.	Homework, exams.
Multiplexing: Frequency Division Multiplexing (FDM), FDM hierarchy, Time Division Multiplexing (TDM) and TDM digital hierarchy (T1 & E1 carrier system), Space division multiplexing, Code Division Multiplexing, Wavelength Division Multiplexing (WDM).	CLO1, CLO2	Lecture and discussion on different types of multiplexing.	**Class Test 2**(topics of the week's 5-8)
Communication system design: design parameters, channel selection criteria and performance simulation.	CLO1, CLO3	Lecture and discussion on communication system design.	Answer basic questions, quizzes, Homework, exams.
Traffic analysis: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing.	CLO1, CLO3	Lecture and discussion on Traffic System.	Answer basic questions, quizzes, Homework, exams.
Review topics and Final exam preparation.	CLO1, CLO2,CLO3	Lecture and discussion on miscellaneous topics.	**Class Test 3**(topics of the week's 9-12)

mended Books:

Data Communications and Networking by Behrouz A. Forouzan, McGraw-Hill.
Principles of Communication Systems by Herbert Taub & Donald L. Schilling, McGraw-Hill
Communication System by Simon Haykin,
Telecommunications Switching, Traffic and Networks by Flood, John Edward, Prentice Hall, 1995.

ASSESMENT PATTERN

Attendance- 05

ontinuous Interval Evolution (25)
ge of best 2 out of 3 will be counted)

n's Category	Test-1 (25)	Test-2 (25)	Assignment (25)
mber			
rstand	20	15	
y	5	10	10
rze			15
ate			
e			

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:COMMUNICATION ENGINEERING LAB

e Code: CSTE 3102	Attendance: 10
Hours: 01	Viva: 20
Hours: 03	SEE Marks: 70

Objectives:

Provide hands-on experience to the students so that they can put theoretical concepts to practice.

Explain the concept of analog modulation, demodulation and different electronic communication experiments in a practical environment.

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

CLOs	Description (At the end of the course, students will be able to)
CLO1	gain significant experience with communication equipment.

Outcomes (CLO)	CLO2	apply the techniques of different modulation and demodulation to laborat measurements.
	CLO3	explain sampling and reconstruction of analog signal.
	CLO4	analyze the analog modulator and demodulator input-output response with the help the MATLAB simulation program.
	CLO5	acquire teamwork skills for working effectively in groups.

Mapping of CLO to PLO (Program Learning Outcome)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PL
CLO1	√											
CLO2	√											
CLO3	√											
CLO4		√										
CLO5										√		

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How t are developed)
1	To familiar with the operation of different communication equipment.	CLO1	Lecture and discussion with detailed information about the lab course, including the objectives, course outcomes, lab examinations and evaluation method.	Answer basic questions about different types of communication equipment.
2-6	**Modulation and demodulation:** AM/FM/PM/DSB-SC/SSB-SC ,PAM,PCM, TDM multiplexer and demultiplexer.	CLO2, CLO5	Through lecture, laboratory, and out-of-class assignments.	Neatness, organization, completeness and individually writt lab reports are du the beginning of t lab period. Respected Teache will be evaluated lab period.
7-8	**Sampling:** Sampling and reconstruction of analog signal.	CLO3, CLO5	Through lecture, laboratory, and out-of-class assignments.	
9-11	Acquaint with Simulation program (MATLAB)	CLO4, CLO5	Through lecture and discussion.	
12	Visit different communication related company.			
13	Final Lab Exam (Job, Quiz and Viva)			

ASSESMENT PATTERN

Attendance- 10

Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:DIGITAL SIGNAL PROCESSING

rse Code: CSTE 3103 **dit Hours:** 03 **m Hours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

rse Objectives:

- Introduce signals, systems, time and frequency domain concepts, and the associated mathematical tools that are fundamental to all DSP techniques.
- Discuss the concepts of z-transform and discrete-time Fourier transform.
- Discuss various sampling techniques.
- Explain the functionalities of different types of the digital filter.

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

'se ning omes))

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand the fundamentals of digital signal processing.
CLO2	analyze the digital systems using z-Transform, Discrete-Time Fourier Transform, and Fast Fourier Transform.
CLO3	Design FIR and IIR filters using a variety of techniques.

ping of to PLO gram ning ome)

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

Lesson Plan (as per week):

CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
Discrete time signals & systems: Discrete time signals, Discrete time systems, Linearity, causality, stability, static/dynamic, Time Invariance/Time variance, classification of discrete time system.	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.
Discrete time signals & systems: Linear convolution, Circular convolution Cross Correlation, Autocorrelation. Linear constant coefficient difference equations	CLO1	Lecture and discussion and analyze the accuracy.	Answer basic questions, quizzes, Homework, exams.
Discrete time signals & systems:	CLO1, CLO2	Lecture and computation of	Answer basic

	sampling theorem & sampling process. Reconstruction of sampling data, convolution.		linear equation solution methods.	questions, quizzes, Homework.
4	**Discrete time signals & systems:** Frequency domain representation of discrete time signals and systems, Fourier transform of discrete time signals, properties of discrete time, Fourier transform.	CLO1, CLO2	Lecture and decomposition of linear systems	Answer basic questions, quizzes, Homework, exams
5	**The Z-transform:** Definition, properties of the region of convergence for the Z-transform, Z-transform properties.	CLO2	Lecture and discussion on non-linear equations solution.	**Class Test 1** (topics of the week's 1-4)
6	**The Z-transform:** Inverse Z-transform using contour integration, complex convolution theorem, Parseval's, unilateral Z-transform, stability interpretation using Jury's array.	CLO2	Lecture and discussion on non-linear equations solution.	Answer basic questions, quizzes, Homework, exams
7	**Discrete Fourier Transform:** Discrete Fourier series, properties of discrete Fourier series, Discrete Fourier transform, properties of DFT, circular convolution using discrete Fourier transform.	CLO1, CLO2	Lecture and problem solving on interpolation.	Answer basic questions, quizzes, Homework, exams
8	**Discrete Fourier Transform:** Decimation in time FFT algorithm, decimation in frequency FFT, FFT of long sequences using overlap add and overlap save method.	CLO2	Lecture and discussion on divided difference and problem solving.	Exercise with various mathematical problems.
9	**Transform analysis of LTI system & structures for discrete-time system:** Frequency response of LTI system, relationship between magnitude & phase, all pass systems, minimum phase system. Linear system with generalized linear phase.	CLO1	Lecture and analysis on numerical differentiation with problems.	**Class Test 2** (topics of the week's 5-8)
10	**Transform analysis of LTI system & structures for discrete-time system:** Block diagram representation & signal flow graph representation of Linear constant. Coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures.	CLO2	Lecture and discussion on numerical integration methods with problems.	Answer basic questions, quizzes, Homework, exams.
11	**Filter design Techniques:** Design of discrete time IIR filters from continuous time filters.	CLO3	Lecture and analysis of Differential equations.	Quizzes, Homework, exams.
12	**Filter design Techniques:** frequency transformations of low pass IIR filters.Design of FIR filters by windowing.	CLO3	Lecture and discussion on Differential equations.	**Class Test 3**(topics of the weeks9-11)
13	**Filter design Techniques:** FIR filter design by Kaiser window method. Frequency sampling method.	CLO3	Lecture and discussion on concrete mathematics.	Exercise the answering methods in the final exam.

l Books:
l Signal Processing by J.G. Proakis, Prentice-Hall.
standing Digital Signal Processing by R. G. Lyon, Orling Kindersley.
l Signal Processing by Defatta, Wiley.

ASSESMENT PATTERN

Attendance- 05

us Interval Evolution (25)
st 2 out of 3 will be counted)

gory	Test-1 (25)	Test-2 (25)	Assignment (25)
	5		
	20	5	10
		10	5
		5	
		10	10

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:DIGITAL SIGNAL PROCESSING LAB

: CSTE 3104
s: 01
: 03

Attendance: 10
Viva: 20
SEE Marks: 70

tives:
op the knowledge on signals used in digital signal processing.
luce signals, systems, time and frequency domain concepts, and the associated mathematical tools re fundamental to all DSP techniques.
de a thorough understanding and working knowledge of design, implementation, analysis, and parison of digital filters for processing of discrete-time signals.
duce various sampling techniques and different types of filters and will also understand basic iples of Estimation Theory.

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

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand signal and system, errors estimation and analysis, number theory, and recurrence solution of different problems.
CLO2	analyze the digital systems using z-Transform and Discrete-Time Fourier Transform.
CLO3	analyze the discrete-time signals and systems in the frequency domain using Discrete Fourier Transform and Fast Fourier Transform.
CLO4	Design FIR and IIR filters using a variety of techniques.

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

Lesson Plan (as per week):

CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
e a program in MATLAB to generate	CLO1	Lecture and discussion on	-Home task

	the following waveforms (DT and CT signal)- i) Unit Impulse sequence/signal ii) Unit step sequence/signal iii) Unit Ramp sequence/signal iv) Sinusoidal sequence/signal v) Exponential sequence/signal vi) Random sequence/signal Write a program in MATLAB to study the basic operations on the Discrete – time signals. (Operation on dependent variable (amplitude manipulation) and Operation on independent variable (time manipulation)).		digital signals	-Quiz
3	Write a program in MATLAB to check for linearity, Causality and stability of various systems. Write a MATLAB Script to perform discrete convolution (Linear and Circular) for the given two sequences and also prove by manual calculation.	CLO1	Lecture and problem discussion about linear convolution and digital systems	-Home task -Quiz
4-6	Write a MATLAB program to (a) find Z and inverse Z transform and pole zero plot of Z-transfer function. (b) Solve the difference equation and find the system response using Z transform. Write a MATLAB Script to perform sampling rate conversion for any given arbitrary sequence (D.T) or signal (C.T) by interpolation, decimation, up-sampling, down-sampling and resampling (i.e. fractional value).	CLO1, CLO3	Lecture and problem solving on z-transform and sampling.	Quiz 1 (Topic of th 1-3 weeks)
7-8	Write a MATLAB program to perform the Discrete Fourier Transform (DFT) & inverse Discrete Fourier Transform for the given sequences. ite a MATLAB Script to compute te Fourier Transform and Inverse ourier Transform of the given g FFT algorithms (DIT-FFT	CLO1, CLO3	Lecture and problem solving.	Homework
	ript to design a low ndow Method for ign	CLO2	Lecture and problem solving on Filter designing.	Quiz 2 (Topic of th 4-8 weeks)
11	**Fi** dis time			
12	**Filter** transfo filters.D windowin	CLO2	Practice.	Homework.
13	**Filter desig** design by Ka Frequency san	CLO1, CLO3	Discussion and application of GSP processor.	Quiz 3 (Topic of t 4-11 weeks)

CO12

Assessment
egy (How they
e developed)
ome task

ii) Low pass filter an audio signal input to DSK with FIR filter. iii) Low pass filter an audio signal input to DSK with IIR filter. iv) To generate sine wave using lookup table with table values generated within the program.			

ASSESMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:DATABASE MANAGEMENT SYSTEM

rse Code: CSTE 3105 **dit Hours:** 03 **m Hours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

rse Objectives:

- Explain the fundamental concepts of a relational database system.
- Introduce the physical and logical database designs and database modeling.
- Impart data manipulation using SQL and relational algebra.
- Demonstrate normalization theory.
- Understanding the essential DBMS Concepts such as Integrity, security, authentication, transaction, concurrency, Recovery, distributed database, data mining, and warehousing.

ources Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Previous questions.

	CLOs	Description (At the end of the course, students will be able to)
rse rning comes O)	CLO1	explain the concepts of Database Management System
	CLO2	design and apply different techniques of the database to real-world problems.
	CLO3	analyze the end-user requirements to design a detailed database system.

		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
pping of) to PLO gram rning come)	CLO1	√											
	CLO2	√	√										
	CLO3		√										

Lesson Plan (as per week):

	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
	Basic of Database Management System Drawback of general file processing system, Basic concepts of the database	CLO1	Lecture and discussion with detailed information about the course, including the	Answer basic questions, quizzes, Homework, exams.

	system, Architecture of a Database System, Data structures and Corresponding Operators. The Hierarchical Approach to DBMS, Relational Data bases, Data Models, Database Internals, Database Users and Administrators Architecture to IMS, IMS data structure, External Level to IMS, IMS, Data manipulation, defining PCB, DL/1, Operations		objectives, course outcomes, examinations. Topic wise lecture delivery.	
2	**Entity- Relationship Model** Entities and Entity Sets, Relationships and Relationship Sets, attributes, mapping constraints, keys, entity relationship diagrams, Reducing E-R diagrams to Tables.	CLO2, CLO3	Lecture and discussion with some practical scenario.	Exercise with various problems.
3	Generalization, Aggregation, Design of an E-R Database Scheme.	CLO2, CLO3	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
4	**Relational Model** Structure of Relational Databases, the relational Algebra, The Tuple Relational Calculus, the domain Relational Calculus, Modifying the database, Views.	CLO2	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
5	**Relational Commercial Languages** SQL, Query-by Example	CLO2	Lecture and discussion with problems.	**Class Test 1**(topics of the week's 1-4)
6	**Integrity Constraints:** Domain Constraints, Referential Integrity, Functional Dependencies, Assertions, and Triggers. Relational Database Design: Pitfalls in Relational Database Design,	CLO2	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
7	Normalization using Functional Dependencies. Normalization using Multi-valued Dependencies, Normalization using Join Dependencies, Domain – Key Normal Form, Alternative Approaches to Database design.	CLO2	Lecture and discussion with some practical scenario.	Answer basic questions, quizzes, Homework, exams.
8	**Indexing and Hashing** Basic Concepts, Indexing, B+ Tree Index Files, B- Index Files, Static Hash Functions, Comparison of Indexing and Hashing Index Definition in SQL, Multiple-Key Access.	CLO2	Lecture and discussion with problems.	Answer basic questions, quizzes, Homework, exams.
9	**Query Processing:** Query Interpretation, Equivalence of Expressions, Estimation of Query Processing Cost, Estimation of Cost of Access using Indices, Join Strategies, Join Strategies for Parallel Processors, Structure of a Query Optimizer.	CLO2	Lecture and discussion with problems.	**Class Test 2**(topics of the weeks5-8)
0	**Crash Recovery:** Failure Classification, the storage	CLO2	Lecture and discussion with problems.	Answer basic questions, quizzes,

Hierarchy, Transaction Model, Log Based Recovery, Buffer Management, Checkpoints, Shadow Paging, failure With Loss of non-volatile Storage, Stable Storage Implementation.			Homework, exams.
Concurrency Control: Schedules, Testing of Serialization, Lock – based Protocols, Time Stamp Based Protocols, Validation Techniques, Multiple Granularity, Multi-version Schemes, Insert and Delete Operations.	CLO2	Lecture and discussion with problems.	Quizzes, Homework, exams.
Database System Architectures and Distributed Databases: Centralized Systems, Client/Server Systems, Parallel systems, Distributed data storage, Network transparency, Distributed query processing, Distributed transaction model, Commit Protocols, Concurrency controls, Deadlock handling, Multidatabase Systems.	CLO1, CLO2	Lecture on design and applications of the circuits.	**Class Test 3**(topics of the weeks9-12)
Data Warehousing and Mining Decision-Support Systems, Data Warehousing, Data Mining, Classification, Association Rules, Other Types of Associations, Clustering and Other Forms of Data Mining.	CLO2	Lecture and discussion on miscellaneous topics.	Exercise the answering methods in final exam.

ommended Books:

1. Data base system Concepts, A. Silberschatz, H.F. Korth, 4th Edition, Mcgraw-Hill
2. Principles of Database Systems, Jeffrey D. Ullman, 2nd Edition, Galgotia Publishing.
3. An Introduction To Database Systems, C.J.Date, 7th Edition, Pearson Education.
4. Database Systems –Design, Implementation & Management 4th Edition, By Rob. Coronel, Thomson Course Technology

ASSESMENT PATTERN

Attendance- 05

Continuous Interval Evolution (25)
age of best 2 out of 3 will be counted)

m's Category	**Test-1 (25)**	**Test-2 (25)**	**Assignment (25)**
ember			
erstand	15	10	
ly	10	10	15
lyze		5	10
uate			
te			

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:DATABASE MANAGEMENT SYSTEM LAB

se Code: CSTE 3106	**Attendance:** 10
t Hours: 1.5	**Viva:** 20
Hours: 03	**SEE Marks:** 70

e Objectives:

Explain database requirements and determine the entities involved in the system and their relationship to

one another.
- Familiarize the data manipulation using SQL.
- Demonstrate data Integrity, security, authentication, transaction, concurrency, Recovery.

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

Course Learning Outcomes (CLO)

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand database concepts, structures, and query language.
CLO2	execute SQL queries and perform PL/SQL programming.
CLO3	analyze and implement database schema that meets desired needs and also manipulat data to modify and summarize results for reporting.
CLO4	coordinate with team members and work effectively in groups.

Mapping of CLO to PLO (Program Learning Outcome)

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

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How th are developed)
1-2	**Relational Commercial Languages:** Introduction to SQL, Relational Database Management System. Writing Basic SQL statements, Capabilities of SQL SELECT Statements, Restricting and sorting data. Single-Row-Functions, Displaying Data from multiple tables, aggregating data using group functions.	CLO1, CLO2	Discussion and practice	Answer basic questions, quizzes, Homework, exam
3-4	Sub queries, Multiple Column Sub queries, Producing Readable output with SQL *Plus. Manipulating Data, Creating and Managing Tables including constraints.	CLO3	Discussion and practice.	Answer basic questions, quizzes, Homework, exam Quiz 1 (Topic of t 1-2 weeks)
5-6	Other Database Objects, Controlling User Access. SQL Workshop.	CLO2	Lecture and discussion with problems.	Exercise with problems.
7-8	**Oracle PL/SQL** Oracle: Object Relational Database Management System, SQL statements, about PL/SQL and its environments. Declaring Variables, writing Executable Statements.	CLO2	Discussion and practice	Answer basic questions, quizzes, Homework, exam
9-11	Interacting with the Oracle Server, Writing Control Structures. Working with Composite Data types. ·ting Explicit Cursors, Advanced ·t Cursors Concepts, Create view, - and functions. ·ptions.	CLO2	Lecture, discussion with problems and practice.	Answer basic questions, quizzes Homework, exam Quiz 2 (Topic of t 3-8 weeks)

mit project work.	CLO4		

Final Lab Exam (Job and Viva)

ASSESMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:OPERATING SYSTEM AND SYSTEM PROGRAMMING

Code: CSTE 3107 Hours: 03 Hours: 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

Objectives:
Provide the fundamental knowledge of the operating system concept.
Make the students understand the services provided by and the design of an operating system.
Discuss the synchronizing and scheduling processes of the CPU.
Explain different approaches to memory management.

es Used: Multimedia, Whiteboard, Marker, Handouts, Slides, PDF books, e-Tutorials, Question bank, questions.

	CLOs	Description (At the end of the course, students will be able to)
g es	CLO1	identify and describe functions and facilities of the operating system.
	CLO2	apply algorithms to improve operating system performances.
	CLO3	coordinate the design and performance of major components of operating systems.
	CLO4	design and develop a system program to implement operating system functions using system service calls.

g of PLO am g ne)

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

Lesson Plan (as per week):

CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
ntroduction to operating system, perating system structures, services, user nterface, and system calls.	CLO1	Lecture and discussion with some basic questions on the role of operating system in computer system. Demonstrate various OS structures with real life examples.	Answer basic questions using practical examples on operating systems from the user viewpoint.

2	Process scheduling, operations on processes, IPC, Threading, Scheduling criteria, scheduling algorithms.	CLO1, CLO2, CLO3	Lecture and discussion. Provide sample problems and engage students while making solutions. Provide exercise problems as assignment. Arrange quizzes. Conduct lab class session on processes.	1) Solve given exercise problems and submit assignment. 2) Participate in the quiz 3) Implementing process scheduling algorithms by writing computer programs
3	Process coordination, synchronization, critical section problem, semaphores.	CLO2, CLO3	Lecture and discussion with examples on the topic. Provide exercise problems as assignment. Conduct lab class session on processes.	Solve given exercise problems and submit assignment.
4	Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, avoidance and detection.	CLO2, CLO3	Lecture and discussion with examples on the topic Provide exercise problems	Answer basic questions on the topic Solve exercise Do lab tasks and submit lab report on the topic
5	Memory management strategy, swapping, paging, segmentation.	CLO2, CLO3	Lecture and discussion with examples on the topic Arrange pop-up quizzes.	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz
6	Virtual memory management, demand paging and page replacement.	CLO2, CLO3	Lecture and discussion with examples on the topic Arrange pop-up quizzes.	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz
7	File systems, access methods, file system mounting.	CLO2, CLO3	Lecture and discussion with examples on the topic Conduct lab session on the topic	Answer basic questions on the topic Discuss among them on the topic Submit lab report on the topic
8	Disk structure, Disk scheduling, RAID structure.	CLO2, CLO3	Lecture and discussion with examples on the topic Arrange pop-up quizzes.	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz

System, I/O hardware, application I/O terface, Transforming I/O requests to rdware Operations.	CLO2, CLO3	Lecture and discussion with examples on the topic Arrange pop-up quizzes.	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz
stem Security, System and Network reats, Cryptography as a security tool, er authentication.	CLO2,CLO4	Lecture and discussion with examples on the topic Arrange pop-up quizzes.	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz
stem Security, System and Network reats, Cryptography as a security tool, er authentication.	CLO2,CLO4	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz	Answer basic questions on the topic Discuss among them on the topic Participate in the quiz

nended Books:
Operating System Concepts, 9th edition by Silberschatz, Galvin, Gagne.
Modern Operating Systems (3rd Edition): Andrew S. Tanenbaum

ASSESMENT PATTERN

Attendance- 05

tinuous Interval Evolution (25)
of best 2 out of 3 will be counted)

Category	Test-1 (25)	Test-2 (25)	Assignment (25)
ber			
and	15	10	
	10	10	15
		5	10

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:OPERATING SYSTEM AND SYSTEM PROGRAMMING LAB

lode: CSTE 3108
ours: 1.5
urs: 03

Attendance: 10
Viva: 20
SEE Marks: 70

bjectives:
scribe functions and facilities of operating systems and fundamental operating system abstractions.
ovide hands-on experiences with OS in both user and system/kernel modes.
plain operating system administrative functions based on a commonly available operating system.
miliarize the various features of distributed OS like UNIX, Linux, windows etc.
sign and develop system programs to implement operating system functions using system service ls.

Used: Computer with Linux/Unix environment, Multimedia, Whiteboard, Marker, Handouts, Slides,

Course Learning Outcomes (CLO)	CLOs	Description (At the end of the course, students will be able to)
	CLO1	understand and explain the functions and facilities of the operating system.
	CLO2	apply algorithms to improve operating system performances.
	CLO3	evaluate the design and performance of major components of operating systems.
	CLO4	construct a system program to implement operating system functions using system service calls.

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

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
1-2	Introduction to Linux- Linux Installation, Introduction to Shell, Creating user account- 1.5hrs.	CLO1	Lecture in the lab class with demonstration	a. Install Linux b. Use Shell commands c. Solve Exercise
3-4	Course Project discussion and group formation – list of projects, team formation, project plan and deliverables withpresentation – 1.5hrs	CLO1	Project discussion with demonstration of sample project	a. Form a project team b. Select a project and prepare a plan
5-6	Introduction to Linux tools- Linux files, Directories, Root, File Permissions, Working with files and directories, Disk related commands- 1.5hrs.	CLO1, CLO2	a. Lecture in the lab class with demonstration b. Providing simple lab tasks based on the demonstration	a. Use Linux tools with commands b. Work with file and directory operations c. Do lab task d. Solve Exercise
7-8	Essential Linux commands and Working with editors- 2.5hrs. Present the concept of the project in a team – 30mins	CLO1, CLO2	Lecture in the lab class with demonstration of customizing and editing session. Providing simple lab tasks based on the demonstration. Arrange team presentation.	Do lab task. Solve Exercise Present the concept of the project (Presentation 1)
9	Processes in Linux, Process Scheduler, Deadlock avoidance– 3hrs	CLO2, CLO3	Lecture in the class with demonstration of process related commands and algorithms	Implement Process Scheduling Algorithms
10	Introduction to Shell Scripts- Shell programming, Shell Variables, Shell Keywords, Write simple Shell program- 1.5hrs.	CLO2, CLO3	Demonstration of Shell Scripting b. Providing simple lab tasks based on the demonstration	Do lab task Solve Exercise
11	Decision making and Loop control structure- 1.5hrs.	CLO2, CLO3	Demonstration of Shell Scripting Providing simple lab tasks based on the	Do lab task Solve Exercise

		demonstration	
hell Administration- Adding and moving users, aily administrative works, File anagement. Disk management, Monitoring system and Ensuring system ecurity	CLO2, CLO3, CLO4	a. Demonstration of administrative commands b. Providing simple lab tasks based on the demonstration	a. Do lab task Solve Exercise

ASSESMENT PATTERN

Attendance- 10
Viva- 20

SEE-Semester End Examination (70 marks)

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

COURSE TITLE: MICROPROCESSOR, MICROCONTROLLER AND INTERFACING

Code: CSTE 3109 **Hours:** 03 **lours:** 04	**Attendance:** 05 **CIE Marks:** 25 **SEE Marks:** 70

Objectives:
Familiarize with Intel 8085, 8086, 80286, 80386, 80486, and 80586 microprocessors.
Discuss the architecture, instruction sets, and addressing modes of an Intel 8086 microprocessor.
To give ideas about Assembly Language Programming as well as the design of various types of digital and analog interfaces.
Focus on the interface of various devices to the microprocessor.
Illustrate the microcontroller architecture, addressing mode, instruction sets, and various programmable interfacing devices.
Show the performances among various programmable interfacing devices using assembly language programming.

es Used: Multimedia, Whiteboard, Marker, Handouts, pdf books, e-Tutorials, Device manual, Question evious questions.

CLOs	Description (At the end of the course, students will be able to)
CLO1	Understand the Intel 8085, 8086, 80286, 80386, 80486, and 80586 microprocessors and also the architecture, instruction sets, and addressing modes of an Intel 8086 microprocessor in details.
CLO2	Implement the interface of various devices with the microprocessor using Assembly Language Programming.
CLO3	Classify certain classes of problems in various interfacing devices with the microprocessor.
CLO4	Evaluate the performances among various programmable interfacing devices.

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

	CLO4		√											

Lesson Plan (as per week):

Week	CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How the are developed)
1	**Microprocessor Fundamentals and Architecture:** Evolution of microprocessor, architecture of a microprocessor, Data bus, address bus, control bus, I/O units, and memory, architecture of Intel 8086 Microprocessor, its execution unit, and bus-interface unit, its registers and flags.	CLO1	Overall discussion with the course contents including the objectives, course outcomes, examinations, physical environment and methodology and demonstrating the microprocessor architecture and its related functional parts.	Answer basic questions, group discussion, assignments.
2	**Programming Model:** Programming model of 8086 processor, segment-offset address and physical address calculations, even and odd addressing, and the introduction of different addressing modes, Operating systems and BIOS, Memory organization of PC.	CLO1, CLO2	Delivering lecture and overall discussion on several topics of programming model of 8086 processor interactively and solving several examples of addressing modes.	Solving problems in classroom. Submitted Home works and assignments regularly.
3	**Assembly Language:** Introduction to IBM PC Assembly Language, Assembly Language syntax, Program Data, Variables, named constants, program structure, memory models, Input/output instruction, Running program, Program Segment Prefix.	CLO1	Lecture and overall explanation about several topics of assembly language programming and demonstrating various solving techniques to run a program.	Exercise with various programming problems.
4	**Status Register and Flow Control:** The processor status and the Flag register, overflow condition, debugging a program, flow control instructions, conditional jumps, signed versus unsigned jumps, high-level language structures, branching and looping structures.	CLO1, CLO3	Demonstrating various techniques to solve the design of a program and run a program correctly using flowcharts.	Exercise with various programming problems.
5	**Logic Operation:** Logic, Shift and Rotate Instruction, some common applications of Shift and Rotate operations and related examples.	CLO1, CLO2	Demonstrating several problem-solving techniques to solve several problems on logical, shift and rotate instructions.	**Class Test 1** (topics of the week's 1-4)
6	**Data Structure:** The Stack and Introduction to Procedures, Basic stack operations, Procedures Declaration, Communication between procedures, calling a procedures.	CLO1, CLO2	Lecture and discussion on stack operations, procedures declaration, communication between procedures, calling a procedure and also to solve sample programs using stack operations.	Exercise with various programming problems, group discussion.
	Operation: d Division Instructions,	CLO1, CLO2	Lecture and explanation on arithmetic terminologies to	Exercise with various

versus unsigned multiplications, overflow, Signed Extension of		run related programs.	programming problems, home works.
s and String Manipulation: and related addressing modes, operator, register indirect modes, and Indexed addressing modes. ing instructions, director flag, g a string, storing a string, loading a scanning a string, comparing substring operation. Classification classes of problems in various ing devices to the microprocessor.	CLO1, CLO2, CLO3	Lecture and discussion on arrays and String to solve related programs.	Answer basic questions, exercises, home works.
ontroller: ction to microcontroller, ontroller architecture, addressing and instruction sets, introduction to family architecture, pin diagram, ion, ports, addressing modes, al & external memory, SFR, flags, ization, counters and timers, serial unication.	CLO1, CLO2	Lecture and explanation on different microcontroller terminologies.	**Class Test 2** (topics of the week's 5-8)
8255, Keyboard and Display rfaces: c description on Programmable heral Interface (8255), block ram, ports and operating modes, ramming 8255, control word, I/O addressing, BSR mode, Interface to from I/P DIPs and Display at O/P s in mode 0, all interface circuit and rams, basics of Keyboard and lay Interface, 8086 Keyboard face.	CLO1, CLO4	Lecture and discussion on PPI 8255, Keyboard and Display Interfaces.	Q & A session, group discussion, assignments.
, 8259, 8295: A controller (8237), data transfer A mode, block diagram, step in DMA ation, DMA registers and modes, rammable Interrupt Controller 9), block diagram, priority modes, rol word initialization, masking and ritization, programming OCWs, C7040 Printer Interface to a rocomputer using the 8295-printer roller chip.	CLO1, CLO4	Lecture and explanation on DMA, Interrupt and Printer controller interface devices.	Answer basic questions, presentations, home works.
4, AVR, M Microcontroller: grammable Interval Timer (8254), ck diagram, control register, status ister, modes of counters with examples interface programs, Advanced Virtual C (AVR) Microcontroller, ARM crocontroller.	CLO1, CLO4	Lecture and discussion on the pros and cons of 8254, AVR, ARM Microcontrollers.	**Class Test 3** (topics of the week's 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. Assembly Language Programming and Organization of the IBMPC by Ytha Yu and Charles Marut, McGraw-Hill
2. Microprocessor and Microcomputer based System Design by Rafiquzzaman, CRC Press
3. Microcomputer Systems: 8086/8088 Family by Y. Liu and G. A. Gibson, Prentice-Hall.
4. Microprocessor and Interfacing by Douglas V. Hall, Tata McGraw Hill.

ASSESMENT PATTERN

Attendance- 05

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

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

SEE-Semester End Examination (70 marks)

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

COURSE TITLE:MICROPROCESSOR, MICROCONTROLLER AND INTERFACING LAB

Course Code: CSTE 3110
Credit Hours: 01
Exam Hours: 03

Attendance: 10
Viva: 20
SEE Marks: 70

Course Objectives:

- Provide ideas on how to operate the microprocessor MDE-8086 kit.
- Provide concepts on how to execute a typical machine code program using the MDE-8086 kit.
- Develop various Interface, Interrupt, and Serial monitor-based experiments by using 8255A I/O controller and MDE-8086 kit.
- Show various Assembly Language Programs by using MASM translator in PC.
- Illustrate techniques how to design various interfacing systems based on microprocessors and microcontrollers.

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	operate microprocessor MDE-8086 kit and execute a typical machine code program using the MDE-8086 kit.
CLO2	develop and analyze various Interface, Interrupt, and Serial monitor based experiments by using 8255A I/O controller and MDE-8086 kit.
CLO3	develop and analyze various Assembly Language Programs by using MASM translator in PC.
CLO4	design various interfacing systems based on microprocessors and microcontrollers.
CLO5	acquire teamwork skills for working effectively in groups.

Mapping of CLO to PLO

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO
CLO1	√											

CLO2		√										
CLO3		√										
CLO4		√										
CLO5									√			

Lesson Plan (as per week):

CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
-8086 kit: duction on Microprocessor MDE- kit. Operation of microprocessor -8086 kit successfully.	CLO1	Demonstrating of different key functions, addressing, instructions and related functional parts of MDE-8086 kit in classroom.	Answer basic questions, group discussion.
riments on 8255A Interface: segment display interface to display exadecimal character. ED interface.	CLO1, CLO2	Delivering lecture and discussion on 7-segment display interface and LED interface using 8255A module into MDE-8086 kit and several machine code programs.	Home works and assignments.
eriments on Interface: rfacing a speaker with microprocessor to operate on by the program	CLO1, CLO2	Demonstrating various solving techniques to interface speaker by MDE-8086 kit.	Exercise with various instruction code programs.
eriments on Interface: matrix LED displays.	CLO1, CLO2	Demonstrating various solving techniques to display dot matrix LED by MDE-8086 kit.	Exercise with various instruction code programs.
eriments on Interface: pper Motor Interface to control speed. ign analog/digital control systems g Stepper Motor.	CLO1, CLO2, CLO4, CLO5	Demonstrating various solving techniques to control the speed of stepper motor by MDE-8086 kit.	Design analog/digital control systems using Stepper Motor.
eriments on Interrupt: nterrupt due to division by zero nterrupt due to overflow nterrupt due to user defined software.	CLO1, CLO2	Demonstrating various techniques to solve various Interrupt based experiments.	**Lab Test 1**(topics of the weeks1-5)
eriments with serial monitor: xecution of different serial monitor mands oading and executing assembly guage program.	CLO1, CLO2	Delivering lecture and overall discussion to solve various Serial monitor based experiments with various instructions and assembly programming in the classroom.	Assignments.
t of Assembly Language based grams: Write an assembly language program ead a character from the keyboard. A program to display a single racter.	CLO3	Lecture and discussion on related sample programs.	Exercise with various programming problems, group discussion.

13	Review to preparatio		
		CLO3	Lecture and explanation on program terminologies to run related programs.

Recommended Boo

1. Assembly La
   McGraw-Hill
2. Microprocessc
3. Microcomputer
4. Microprocessor

Assessment Strategy (How they are developed)

Answer basic questions, group discussion.

Home works and assignments.

onstrating various ques to solve various ic operations and ed programs.

Answer basic questions, home works.

CIE-Continuous Interval E
(Average of best 2 out of 3 went

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

LED
A
3086 kit
e code

Exercise with various instruction code programs.

Exercise with various instruction code programs.

on **Lab Test 2** (topics of the weeks 8-10)

COURSE TITLE:MICROP

various
ques to
atrix LED by
kit.

ing various
hniques to
e speed of stepper
MDE-8086 kit.

Design analog/digital control systems using Stepper Motor.

Course Code: CSTE 3110
Credit Hours: 01
Exam Hours: 03

Lab Test 1(topics of the weeks1-5)

Course Objectives:

- Provide ideas on how to operate t
- Provide concepts on how to execut
- Develop various Interface, Interr controller and MDE-8086 kit.
- Show various Assembly Language P
- Illustrate techniques how to desig microcontrollers.

strating various ques to solve various ipt based iments.

Assignments.

A session, iscussion, exam ion.

Resources Used: Multimedia, Whiteboard, Ma

Course Learning Outcomes (CLO)	**CLOs**	**Description (At the e**
	CLO1	operate microprocessor using the MDE-8086 kit
	CLO2	develop and analyze experiments by using 825
	CLO3	develop and analyze va translator in PC.
	CLO4	design various interfacing s
	CLO5	acquire teamwork skills for

vering lecture and all discussion to solve ous Serial monitor sed experiments with rious instructions and ssembly programming in he classroom.

Lecture and discussion on related sample programs.

Exercise with various programming problems, group discussion.

Mapping of CLO to PLO		PLO1	PLO2	PLO3	PLO4	P
	CLO1	√				

	Management, Lexical Analyzer.			
3	**Syntax Analysis:** The role of Parser, Top-down parsing, predictive Parsers.	CLO2	Lecture and discussion on parsing technique.	Answer basic questions, quizzes, Homework, exams.
4	**Syntax Analysis:** Bottom-up parsing. L.R. Parsers (SLR, CLR & LALR), Implementation of LR Parsers.	CLO2, CLO3	Lecture and discussion on bottom-up parsing technique: (SLR)	Exercise with various mathematical problems.
5	**Syntax Analysis:** Bottom-up parsing. L.R. Parsers (SLR, CLR & LALR), Implementation of LR Parsers.	CLO2, CLO3	Lecture and problem solving on bottom-up parsing technique:(CLR and LALR)	**Class Test 1**(topics of the week's 1-4)
6	**Syntax Directed Translation:** Intermediate Code, Postfix notation, Parse tree and Syntax Trees.	CLO2	Lecture and discussion with problems about different syntax directed translation notations.	Answer basic questions, quizzes, Homework, exams.
7	**Syntax Directed Translation:** Translation of Assignment statements. Boolean expressions, statements that alter the flow of control. Array references in arithmetic expressions, Procedure Calls, Declarations, and Case Statements.	CLO2	Lecture and discussion about semantic rules	Answer basic questions, quizzes, Homework (word size expansion, memory location expansion), exams.
8	**Symbol Tables:** Contents, Data structures for symbol tables, representing scope information.	CLO1	Lecture and discussion on scope management.	Answer basic questions, quizzes, Homework, exams.
9	**Symbol Tables:** Error detection and Recovery: Error handling. Lexical-phase, Syntactic phase and semantic phase.	CLO1, CLO3	Lecture and discussion on error detection.	**Class Test 2**(topics of the weeks5-8)
10	**Code Generation:** Issues in Code Generation, Target Machine, Runtime storage management.	CLO1	Lecture and discussion on code generation.	Answer basic questions, quizzes, Homework, exams.
11	**Code Generation:** Basic block and flow graphs, Simple code generator, register allocation and assignment.	CLO1	Lecture and discussion and code generation from flow graph.	Quizzes, Homework, exams.
12	**Code Generation:** DAG, Peephole Optimization, Generation Code from DAG's. Three address codes, quadruples, triples.	CLO1, CLO3	Lecture and discussion on DAG.	**Class Test 3**(topics of the weeks9-12)
13	**Code optimization:**Principle source of optimization, optimization of basic books, blocks, loops in Flow graphs, Data-Flow analysis, code improving transformations, alias, Data flow algorithms	CLO3	Lecture and discussion on code optimization.	Exercise the answering methods in final exam.

mended Books:

of Compiler Design by Alfred V. Aho and Jeffrey D. Ullman, Addison-Wesley.
ign in C by A.J. Holub, Prentice-Hall .
ices of Compiler Writing by Trembly and Sorensen, McGraw-Hill
on by Niklaus wirth, Addision-Wesley.

ASSESMENT PATTERN

Map CLO	Attendance- 5	
	tion (25)	**SEE-Semester End Examination (70 marks)**

est 2 out of 3 will be counted)

Test-1 (25)	Test-2 (25)	Assignment (25)
10	10	5
10	10	10
5	5	5
		5

Bloom's Category	Test
Remember	10
Understand	10
Apply	20
Analyze	15
Evaluate	5
Create	10

COURSE TITLE:COMPILER CONSTRUCTION LAB

STE 3112 1 5	**Attendance:** 10 **Viva:** 20 **SEE Marks:** 70

es:
e the fundamental base of a different phase of the compiler by implementing simple programs.
ize the application of regular expression and grammar in language recognition.
he use of Lex, flex, and other lexical analyzer generation tools.
n the implementation of parser and code generator in the compiler.

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

CLOs	Description (At the end of the course, students will be able to)
CLO1	understand the architecture of a compiler and the function of its components.
CLO2	apply appropriate formal notations to define a programming language.
CLO3	use appropriate code generation and optimization techniques.
CLO4	design and implement lexical and syntax analyzers by using various algorithms.

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

Lesson Plan (as per week):

CourseContents	CLOs	Teaching Learning Strategy (activities directed to achieve outcomes)	Assessment Strategy (How they are developed)
c program to find number of ers, number of alphabets, number s, number of white spaces and of new lines from a file. c program to find comments in a ile or text. a program that shows whether a e is valid or not	CLO1, CLO2	Discussion and practice.	-Home task -Quiz
c program to find keywords in a	CLO1, CLO2	Lecture and Discussion	Answer basic

	program. Write a c program to find different types of variables. Write a c program to find numbers in .c file. Write a C program to simulate lexical analyzer for validating operators. Write a c program to find operator precedence parsing for an expression like ((x+y*z) +p/q) +z		with problems.	questions, quizzes, Homework, exams
5	Write a c program to validate string by a given regular expression like a*b$^+$, (a|b)*abb, (ab)*aba. Write a C program to check whether a string belong to a grammar or not	CLO1	Lecture and discussion about regular expression and grammars.	Quiz 1 (Topic of the 1-5 weeks)
6	Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.	CLO2, CLO4	Lecture and discussion on Lex & YACC tools	Homework
7-8	Write a c program to eliminate left recursion in a production. Write a c program to identify first and follow of a grammar.	CLO4	Lecture and discussion with problems	Quiz 2 (Topic of the 6-7 weeks)
9-10	Write a c program to construct parsing table for a predictive parser. Write a c program to LL(1) parsing for a given input expression.	CLO4	Lecture and discussion on parsing	Homework
11	Write a C program to implement Program semantic rules to Calculate the expression that takes an expression with digits, + and * and computes the value.	CLO3, CLO4	Lecture and discussion about semantic rules	Homework
	...e a C program to generate machine ...m abstract syntax tree generated ...			
	...m to generate machine ...yntax tree generated	CLO3	Lecture and discussion code generation.	Answer basi questions, Homework Quiz 3 (Topic of th 8-12 weeks)

Rec
1. Princ
2. Comp
3. Theory
4. Compile

CIE-Continuous nswer basic

Exam (Assignment, Program setup, Viva)

ASSESMENT PATTERN

Attendance- 10

Viva- 20

SEE-Semester End Examination (70 marks)

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