

Semester-V						
S. No.	Code	Course Name	L	T	P	C
1	CSL 501	Compiler Design	3	1	0	4
2	CSL 502	Software Engineering	3	0	0	3
3	CSL 503	Microprocessor and Interfacing	3	1	0	4
4	XXXXXX	Elective-I	3	0	0	3
5	CSL 506	Professional Communication and Soft Skills	2	0	0	2
6	CSL 507	Project-I	0	0	8	4
7	CSL 508	Compiler Design Lab	0	0	2	1
8	CSL 509	Software Engineering Lab	0	0	2	1
9	CSL 510	Microprocessor and Interfacing Lab	0	0	2	1
10	CSL 511	Summer Internship	0	0	0	0
Total credits			14	02	14	23
Total hours			30			

Course Code	CSL 501
Course Name	Compiler Design
Number of Credits	3-1-0-4
Course Type	GIR

Course Objectives

- To understand the various phases of compiler and its use.

Course content

Unit I Introduction To Compiler

Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

Unit II Parsing Technique

Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing. Bottom up parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar.

Unit III Syntax-Directed Translation

Semantic analysis : Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker. **Symbol Tables**: Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non-block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays.

Unit IV Symbol Tables

Code optimization: Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Unit V Code Generation

Object code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation

Course Outcomes

- Ability to apply the knowledge of lex tool & yacc tool to develop a scanner & parser
- Ability to design and develop software system for backend of the compiler

Text Books

1. Aho, Alfred V., Lam, Monica S., Sethi, Ravi and Ullman, Jeffrey D. "*Compilers Principles, Techniques and Tools*". Pearson Education Limited Boston, 2014.
2. Hollub, Allen I. "*Compiler Design in C*". Prentice-Hall Inc. New Jersey, 1990.

Reference Books

1. Louden, Kenneth C. "*Compiler Construction: Principles and Practice*". Course Technology, 1997.
2. Bennet, J.P. "*Introduction to Compiler Techniques*". Tata McGraw-Hill, 1990.

Course Code	CSL 508
Course Name	Compiler Design Lab
Number of Credits	0-0-2-1
Course Type	GIR

Lab Objectives

- The lab course provides the complete description about inner working of a compiler.
- The main focus is to understand working of compiler in detailed manner

List of Experiments

- Conversion of infix notation to postfix notation.
 - To Recognize declarative statements
 - Program to recognize arithmetic expression
 - Program to Check valid If statements in C program and report errors to users
 - Program to Check for un terminated, multi line comment statements in C program
 - To Create an assembler that will display warning/errors when symbols are used but not defined and vice versa
 - Write a program that will create and display content of Symbol table
 - Implementation for lexical analyzer
 - Write a C program to implement type checking
 - Implement Predictive parser using C.
- Note** The Instructor may add /tune experiments, wherever he/she feels in a justified manner

Course Outcomes

To understand different phases of compiler design

Course Code	CSL 502
Course Name	Software Engineering
Number of Credits	3-0-0-3
Course Type	GIR

Course Objective:

- To understand the Software Engineering Practices and Process Models.
- Assessment in each module gives the overall Software engineering practice.
- Ability to enhance the software project management skills.

Unit-I Introduction to Software Engineering: Role of Software Engineering, Software Evolution, Software Development Life Cycle. Software Process Models: Software process models, Software Specification, Software design and implementation, Software validation, Automated process support, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized process models, Agile Methodology.

Unit-II Software Requirement: Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Software Models, Data Flow Diagrams, Entity Relationship Diagrams, Designing the architecture.

Unit-III Quality: Quality concepts, Review techniques, Software Quality Assurance (SQA): Verification and Validation, SQA Plans, issues.

Unit-IV Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing, Software Testing Strategies - Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Testing- applications, verification, Software configuration management, Product metrics.

Unit-V Project management: Project Management Concepts, Process and Project Metrics, Estimation for Software projects, Project Scheduling, Risk Management, Maintenance. Assessment: Preparation of Risk mitigation plan.

Course Outcomes

- Assessment in each module gives the overall Software engineering practice.
- Ability to enhance the software project management skills.
- Ability to comprehend the systematic methodologies involved in SE.

Text Books:

1. Sommerville Ian, “*Software Engineering*”, Addison-Wesley, Ninth Edition, 2011.
2. Pressman R. S., “*Software Engineering: A Practitioners Approach*”, McGraw Hill, Seventh Edition, 2010.
3. Nartin Robert C. and Martin Micah, “*Agile Principles, Patterns, and Practices in C#*”, Prentice Hall, 2007

Reference Books:

1. Jalote Pankaj, “*Software Project Management in practice*”, Pearson Education, New Delhi, 2002.
2. Mall Rajib, “*Fundamentals of Software Engineering*”, PHI Publication, Third Edition, 2009.

Course Code	CSL 509
Course Name	Software Engineering Lab
Number of Credits	0-0-2-1
Course Type	GIR

Lab Objectives:

- To understand the software engineering methodologies involved in the phases for project development.
- Open Source Tools: StarUML/ UMLGraph/ Top cased

Prepare the following documents and develop the software project startup, prototype model, using software engineering methodology for at least two real time scenarios or for the sample experiments:

- Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope, Objectives and Infrastructure.
- Software Requirement Analysis – Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements.
- Data Modeling – Use work products
- Software Designing – Develop use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams.
- Prototype model – Develop the prototype of the product

The SRS and prototype model should be submitted for end semester examination.

List of Sample Experiments:

Course management system (CMS): A course management system (CMS) is a collection of software tools providing an online environment for course interactions.

Easy Leave: This project is aimed at developing a web based Leave Management Tool, which is of importance to either an organization or a college.

E-Bidding: Auctions are among the latest economic institutions in place. In this project, explore the efficiency of common auctions when values are interdependent.

Electronic Cash counter: This project is mainly developed for the Account Division of a Banking sector to provide better interface of the entire banking transactions.

Lab Outcomes:

- Ability to develop software projects and software project process
- Ability to design and develop project modules and assign resources
- Ability to comprehend, assess, and calculate the cost of risk involved in a project management.

Course Code	CSL 503
Course Name	Microprocessors and Interfacing
Number of Credits	3-1-0-4
Course Type	GIR

Course Objectives

- To understand interfacing of 16-bit microprocessor with memory and peripheral chips involving system design.
- To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors.

Course Content

Unit-I Introduction to Microprocessor: History and Evolution, types of microprocessors, Block diagram of 8085, Pin Diagram of 8085, Addressing modes, Types of Instructions.

Unit-II Assembly Language Programming and Timing Diagram: Assembly language programming in 8085, Macros, Labels and Directives, Microprocessor timings, Instruction cycle, Machine cycles, T states, Timing diagram for different machine cycles.

Unit-III Serial I/O and Interrupts: Serial I/O using SID, SOD. Interrupts in 8085, Issues in implementing interrupts, multiple interrupts and priorities, Daisy chaining, Interrupt handling, Enabling, disabling and masking of interrupts.

Unit-IV Data transfer techniques: Programmed data transfer, Parallel data transfer using 8155. Programmable parallel ports and handshake input/output, Programmable interrupt controller 8259A. DMA transfer, cycle stealing and burst mode of DMA, 8257 DMA controller.

Unit-V Microprocessor Interfacing Techniques Interfacing memory and I/O devices: Addressing memory, interfacing static RAMs, Interfacing and refreshing dynamic RAMs, interfacing a keyboard, interfacing a printer, Interfacing A/D converters, D/A converters. Architecture of 8086: Pin diagram of 8086, addressing modes, Comparison of 8086 and 8088, minimum mode maximum mode, system timing, introduction to Pentium and further series of microprocessors

Course Outcomes

- Identify various addressing modes Perform various microprocessor based programs.
- Interpret & Solve various automation based problems using microprocessor.

Text Books

1. Gaonkar, Ramesh S, "*Microprocessor architecture, Programming and applications with 8085*", 6th Edition, Prentice Hall, 2013.
2. Brey, Barry B., "*The Intel Microprocessor, 8086/8088, 8018/80188, 80286, 80386, 80486, Pentium and Pentium pro-processors – architecture, Programming and interfacing*", 8th Edition, Prentice Hall 2012.

Reference Book

1. Ufferbeck John, "*The 8080/85 Family: Design, Programming & Interfacing*", PHI India.

Course Code	CSL 510
Course Name	Microprocessors and Interfacing Lab
Number of Credits	0-0-2-1
Course Type	GIR

Lab Objectives

- To become familiar with the architecture and Instruction set of Intel 8085 microprocessor.
- To provide practical hands on experience with Assembly Language Programming.
- To familiarize the students with interfacing of various peripheral devices with 8085 microprocessor.

List of Experiments

- Introduction of microprocessor 8085 trainer kit – 85AD
- The addition of two 8-bit numbers.
- The subtraction of two 8-bit numbers.
- The addition with carry of two 8-bit numbers.
- The subtraction with borrow of two 8-bit numbers.
- The addition of two BCD numbers.
- The subtraction of two BCD numbers.
- The multiplication of two 8-bit numbers by repeated addition method.
- The multiplication of two 8-bit numbers by bit Rotation method.
- The division of two 8-bit numbers by repeated addition method.
- The division of two 8-bit numbers by bit rotation method.
- The square of given numbers in array.
- To find largest number in an array.
- Study of 8086 microprocessor kit
- The addition of two 16-bit numbers.

Course Outcomes

- Explain the architecture, pin configuration of various microprocessors.
- Identify various addressing modes.
- Perform various microprocessor-based programs.

Course Code	CSL 506
Course Name	Professional Communication and Soft Skills
Number of Credits	2-0-0-2
Course Type	GIR

Course Objective

- To enhance the holistic development of students and improve their employability skills.

Course

Content

Unit-I Introduction to Soft Skills & Professional ethics: Aspects of Soft Skills, Effective Communication Skills, Personality Development, Importance of Professional Ethics.

Unit-II Team Building: To know the nature of the team, To understand personal as well as professional goals of the members of the group, To work effectively in a team through building relation and interpersonal communication.

Unit-III Art of Negotiation: What is negotiation, Ways of negotiating, To understand the power of language and non-verbal communication.

Unit-IV Organizing Meetings: How to call the meeting, How to organize a meeting, How to design the agenda and prepare minutes of the meeting.

Unit-V Presentation Skills: Reading, structure of presentation, verbs often required, language focus, importance of body language in presentation, preparing an outline of a presentation, ending the presentation.

Unit-VI Stress Management & Time Management: Kinds of stress, Identify the right reason/s of stress, How to handle the pressure, Techniques to cope with the stressful situation at a workplace. Goal setting, Understand the importance of time and How to prepare the time line.

Unit-VII Group Discussion & Public Speaking: Nature of discussion, Ways to form and present the arguments. To learn the skills of appearing in an interview and being successful in it.

Course outcomes

- Understand and recognize the importance of interpersonal skills.
- Understand the realistic perspective of work and work expectations.

Text books

1. Rizvi, Ashraf., *“Effective Technical Communication”*, Tata McGraw Hill ,2008.
2. Mohan, Krishan., *“Developing Communication Skills”*, Mac Millan India Limited, 2009.

Reference Books

1. Dale, Carnegie., *“How to win Friends and Influence People”*, New York: Simon & Schuster, 1998.
2. Coleman, Daniel. *“Emotional Intelligence”*. Bantam Book, 2006.

Course Code	CSL507
Course Name	Project-I
Number of Credits	0-0-8-4
Course Type:	GIR

The project work will involve detailed literature survey, implementation, and experimentation plan. At the end of the 5th semester, the project work should have been demonstrated and work done will be evaluated.

Course Code	CSL 511
Course Name	Summer Internship
Number of Credits	0-0-0-0
Course Type	Non-Credit

The students will carry out summer internship of minimum 4 weeks in Industry* after 4th semester. A Project report based on training and corresponding proofs of training will be submitted by the student at the start of 5th semester. In this course, the credits will not be counted for the calculation of the final CGPA. Only the grades will appear in the Grade card and transcript.

List of program Electives

Course Code	CSL 504
Course Name	Information Security
Number of Credits	3-0-0-3
Type of Course	PE

Course Objective:

- To provide understanding of principal concepts, issues, and approaches of security.

Unit -I Overview: Computer Security Concepts, Security Functional Requirements, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, Computer Security Strategy.

Unit -II Access Control: Access Control Principles, Subjects-Objects and Access Rights, Discretionary Access Control, UNIX File Access Control, Role- Based Access Control, Attribute-Based Access Control, Trust Frameworks. Case Study: RBAC System for a Bank.

Unit -III Database Security: The need for Database Security, RDBMS and SQL Injection attacks, Database Access Control, Inference, Database Encryption.

Unit -IV Authentication and Authorization: Introduction, Authentication Methods, Passwords, Biometrics, Two-Factor Authentication, Single Sign-On and Web Cookies. Steganography, Authorization: A Brief History, Access control Matrix, Multilevel Security Models, Covert Channels, Inference Control, CAPTCHA.

Unit -V Firewalls and Intrusion Detection and Prevention Systems: Firewall Characteristics and Access Policy, Types of Firewall, Firewall Biasing, Firewall Location and Configuration, Intrusion Detection Systems, Intrusion Prevention Systems, Unified Threat Management Products.

Course Outcomes:

- Acquire a practical overview of the issues involved in the field of information security and assurance.

Textbooks:

1. Stallings William and Brown Lowrie, “*Computer Security: Principles and Practice*”, Pearson, Fourth Edition, 2018.
2. Stamp Mark, “*Information Security: Principles and Practices*”, Wiley Publication, Second Edition, 2011.

Reference Book:

1. Stallings William, “*Cryptography and Network Security: Principles and Practice*”, Pearson, Seventh Edition, 2017.

Course Code	CSL 505
Course Name	Natural Language Processing
Number of Credits	3-0-0-3
Course Type	PE

Course Objectives

- To understand the application of computational methods in linguists.
- To apply statistical and probabilistic methods for parameter estimation and inference.
- To know how the computational methods, give insight into observed human language phenomena.

Course Content

Unit-I Sound: Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

Unit-II Words and Word Forms: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.

Unit-III Structures: Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

Unit-IV Meaning: Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Coreferences.

Unit-V Web 2.0 Applications: Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).

Course Outcomes

- Ability to compare and contrast approaches to natural language processing
- Ability to comprehend and analyze the various elements of speech processing
- Ability to design and develop machine learning techniques in the area of NLP

Text Books

1. Jurafsky, Dan and Martin, James, "*Speech and Language Processing, 2nd Edition*", Prentice Hall, 2013.
2. Manning, Christopher and Heinrich, Schutze, "*Foundations of Statistical Natural Language Processing*", MIT Press, 1999.

Reference Books

1. Allen, James, "*Natural Language Understanding, 2nd edition*", Benjamin Cumming, 2002.
2. Charniack, Eugene, "*Statistical Language Learning*", MIT Press, 1996.