SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Outcome based Curriculum for

Undergraduate Degree Courses in Engineering & Technology

Department of Information Technology

ITA-601
Compiler Design

ITA-601	Compiler Design	2L:1T:2P	4 credits	5 Hrs/Week

Objective:
The main objective of this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course is a study of the theory and practice required for the design and implementation of interpreters and compilers for programming languages.

Outcome :
By the end of the course, the successful student will be able to do:

- To realize basics of compiler design and apply for real time applications.
- To introduce different translation languages To understand the importance of code optimization.
- To know about compiler generation tools and techniques.
- To learn working of compiler and non-compiler applications.
- Design a compiler for a simple programming language

UNIT–I **(9 Hr.)**
Introduction: Alphabets, Strings and Languages, Automata and Grammars, Deterministic finite Autom ata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular Expressions, Arden's theorem.

UNIT–II **(10 Hr.)**
Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Implementation of Lexical Analyzer. The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers.

UNIT–III **(8 Hr.)**
Bottom–Up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC, Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

UNIT–IV **(8 Hr.)**
Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

UNIT–V **(5 Hr.)**
Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection

REFERENCES:

1.Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2.Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.
3.A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
4.Raghavan, Compiler Design, TMH Pub.

List of Experiments:

1. Develop a lexical analyzer to recognize a few patterns.
2. Write a program to parse using Brute force technique of Topdown parsing.
3. Develop LL (1) parser (Construct parse table also).
4. Develop an operator precedence parser (Construct parse table also)
5. Develop a recursive descent parser
6. Write a program for generating for various intermediate code forms i) Three address code ii) Polish notation
7. Write a program to simulate Heap storage allocation strategy
8. Generate Lexical analyzer using LEX
9. Generate YACC specification for a few syntactic categories.
10. Given any intermediate code form implement code optimization techniques

ITA-602
Computer Network

ITA-602	**Computer Network**	**2L:1T:2P**	**4 credits**	**5 Hrs/Week**

Objective:

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols.

Outcomes:

The students will be able to:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

UNIT–I **(9 Hr.)**

Introduction to computer networks and Internet, overview Advantages - network, Types-server based, peer, hybrid, Server types, Network Topology: Bus, Star, Ring, Star bus, Star ring, Mesh, Network Protocols Hardware Protocols, Software Protocols, Selecting and design the network for an organization.

UNIT-II **(8 Hr.)**

Signal Transmission: Digital signaling, Analog Signaling, Bit synchronization, Baseband and Broadband transmission, Network Media types- properties & specialties, Network adapters– working principals, configuration and selection.

UNIT-III **(8Hr.)**

Network Layer: Network Layer Design issues, Store and Forward Packet Switching, connection less and connection oriented networks, routing algorithm's, optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

UNIT-IV **(8 Hr.)**

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, IMCP, ARP, RARP, DHCP. Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Crash Recovery.

UNIT-V **(7 Hr.)**

UDP, RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP. Application Layer: Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH.

REFERENCES:

1. Andrew & Tanenbaum, "Computer Network ".
2. Prakash C Gupta, "Data Communication.
3. William Stallings, "Data and Computer Communication".
4. Computer Networking and the Internet (5th edition),Fred Halsall, Addison Wesley.
5. TCP/IP Protocol Suite (3rd edition), Behrouz Forouzan, McGraw Hill.

LIST OF EXPERIMENTS:

1. Establishment and configuration of LAN.
2. Study of WAN.
3. Case study of ARP AND RARP Protocols.
4. Study of basic networking commands like ping, ipconfig, etc.
5. Case study of various Routing Strategies.
6. Case studies of various Network Topologies.
7. Study of sliding window protocol.
8. Configuring routers, bridges and switches and gateways.
9. Case study of client-server application.
10. Study of IPv4, IPv6 Protocol.

Program Elective-II
ITA-603(A)
Distributed System

ITA-603(A)	Distributed System	3L:0T:0P	3 credits	3Hrs/Week

OBJECTIVE:

1. To learn the principles, architectures, algorithms and programming models used in distributed systems.
2. To examine state-of-the-art distributed systems, such as Google File System.
3. To design and implement sample distributed systems.

OUTCOME:

1. Students will identify the core concepts of distributed systems: the way in which several machines orchestrate to correctly solve problems in an efficient, reliable and scalable way.
2. Students will examine how existing systems have applied the concepts of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems.

UNIT-I **(7 Hr.)**

Introduction to distributed systems Architecture: for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

UNIT-II **(9 Hr.)**

Distributed Share Memory And Distributed File System :Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing, Desirable features of good Distributed File System, File Model ,File Service Architecture ,File Accessing Model ,File Sharing Semantics, File Catching Scheme ,File Application & Fault tolerance, Naming: Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

UNIT-III **(8 Hr.)**

Inter Process Communication And Synchronization API for Internet Protocol :Data Representation & Marshaling, Group Communication, Client Server Communication, RPC-Implementing RPC Mechanism, Stub Generation, RPC Messages ,Synchronization :Clock Synchronization, Mutual Exclusion, Election Algorithms: Bully & Ring Algorithms

UNIT-IV **(8 Hr.)**

Distributed Scheduling And Dead lock Distributed Scheduling: Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues, Deadlock-Issues indead lock detection & Resolutions ,Deadlock Handling Strategy, Distributed Deadlock Algorithms.

UNIT-V **(8 Hr.)**

Distributed Multimedia &Database system: Distributed Data Base Management System(DDBMS), Types of Distributed Database, Distributed Multimedia: Characteristics of multimedia Data, Quality of Service Managements.

REFERENCES:

1.Sinha,Distributed Operating System Concept & Design, PHI.
2. Coulouris & Dollimore,Distributed SystemConcepts and Design, Pearson Pub
3. Singhal & Shivratari, Advance Concept in Operating System, McGraw Hill.
4. Attiya &Welch, Distributed Computing, Wiley Pub

ITA-603(B)

Digital Image Processing

ITA-603(B)	DIGITAL IMAGE PROCESSING	3L:0T:2P	4Credits	5Hrs/Week

OBJECTIVE:-

- Describe and explain basic principles of digital image processing;
- Design and implement algorithms that perform basic image processing (e.g., noise removal and image enhancement);
- Design and implement algorithms for advanced image analysis (e.g., image compression, image segmentation & image representation);
- Assess the performance of image processing algorithms and systems.

OUTCOME:-

- Design and Implementation of different transforms like: Fourier Transform, Z Transform, Discrete Cosine Transform, Walsh Transform, Hadamard Transform,
- Design and Implementation of Digital Filters like: FIR, IIR.
- Design and Implementation of multi-rate and adaptive systems.
- Power spectrum estimation and analysis

UNIT-I **(8 Hr.)**

Digital Image Processing: Elements of a Digital Image Processing system, Structure of the Human eye, Image formation and contrast sensitivity, Sampling and Quantization, Neighbors of a pixel, Distance measures, Photographic file Structure and exposure, File characteristics, Linear scanner, Video camera, Image processing applications.

UNIT-II **(7 Hr.)**

mage Transforms: Introduction to Fourier transform DFT, Properties of two dimensional FT, Separability, Translation, Periodicity, Rotation, Average value, FFT algorithm, Walsh transform, Hadamard transform, Discrete Cosine transform.

UNIT-III **(8 Hr.)**

Image Enhancement: Definition, Spatial domain methods,Frequencydomain methods, Histogram modify technique, Neighborhood averaging, Media filtering, Lowpass filtering, Averaging of multiple images, Image sharpening by differentiation and high pass filtering.

UNIT-IV **(9 Hr.)**

Image Restoration: Definition,Degradationmodel, Discrete formulation, Circulant matrices, Block circulant matrices, Effect of diagnolization of circulant and block circulant matrices, Unconstrained and constrained restorations, Inverse filtering, Wiener filter, Restoration in spatial domain.

UNIT-V **(8 Hr.)**

Image Encoding: Objective and subjective fidelity criteria, Basic encoding process, The mapping, The quantizer, The coder, Differential encoding, Contour encoding, Run length encoding, Image encoding relative to fidelity criterion ,Differential pulse code modulation.

REFERENCES:

1. Rafael, C. Gonzlez., and Paul, Wintz, "Digital Image Processing", Addison-Wesley Publishing Company.
2. Jain Anil K., "Fundamentals of Digital Image Processing", Prentice Hall.
3. Sosenfeld, and Kak, A.C., "Digital Image Processing", Academic Press
4. William K. Pratt., "Digital Image Processing", John Wiley and Sons.

LIST OF EXPERIMENT:-

1. To study the Image Processing concept.
2. To obtain histogram equalization image.
3. To Implement smoothing or averaging filter in spatial domain.
4. Program for opening and closing of the image.
5. To fill the region of interest for the image.
6. Program for edge detection algorithm.
7. Program of sharpen image using gradient mask.
8. Program for morphological operation: erosion and dilation
9. Program for DCT/IDCT computation.

ITA-604(A)
Data Mining and Data Warehousing

ITA-604(A)	Data Mining and Data Warehousing	3L:0T:0P	3 Credits	3Hrs/Week

Objectives:

The objective of this course is to familiar with mathematical foundations of data mining tools, Understand and implement classical models and algorithms in data warehouses and data mining, Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

Outcomes:

Students will be able to:

1. Understand Data Warehouse fundamentals, Data Mining Principles
2. Design data warehouse with dimensional modeling and apply OLAP operations.
3. Identify appropriate data mining algorithms to solve real world problems
4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
5. Describe complex data types with respect to spatial and web mining

UNIT- I **(9 Hr.)**

Data Mining: Basic concept ,technology and rules, application of data mining, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

UNIT-II **(9 Hr.)**

Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules. Clustering paradigms; Partitioning algorithms like K- Method, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.

UNIT-III **(7 Hr.)**

Data mining techniques: Exploration of data mining methodologies, decision tables, decision trees, classification rules, association rules, clustering, statistical models &linear models.

Web mining: Introduction to web mining techniques, web basics and HTTP, data sources on the web, personalization, working with logs, forms and cookies, user identification and path analysis. E-Metrics.

UNIT-IV **(8 Hr.)**

Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

UNIT-V **(7 Hr.)**

Data warehousing : Data warehouse, OLAP and Data mining. OLTP vs OLAP. Data Warehouse Design Identifying facts & dimensions, designing fact tables, dimension tables, star flake schema query redirection. OLAP operations Data ware house High Performance Computing architecture, Multidimensional schemes:1 partitioning strategy, aggregation, data marting, metadata. Capacity planning, tuning the data warehouse testing the data warehouse: developing test plan, testing operational environment Distributed and virtual data warehouses.

Reference Books :

1. Data Mining Techniques ; Arun K.Pujari ; University Press.
2. Data Mining; Adriaans & Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff; Wiley.
4. Data Mining; Dunham; Pearson education.

ITA-604(B) Soft Computing

ITA-604(B)	**Soft Computing**	**3L:0T:0P**	**4 credits**	**5Hrs/Week**

Objective:

The objective of this course is to develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory, introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

Scope:

The students are expected to:

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
- To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
- Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
- Reveal different applications of these models to solve engineering and other problems

UNIT-I **(9 Hr.)**

Soft Computing:- Introduction of soft computing, soft computing vs hard computing, various types of soft computing techniques, applications of soft computing. Introduction to Neural Network:- Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervised) and activation function, Models of ANN-Feed forward network and feedback network, Learning Rules Hebbian, Delta, Perceptron Learning and Windrow-Hoff, winner take all.

UNIT – II **(9 Hr.)**

Supervised Learning: Perceptron learning,- Single layer/multilayer, linear Separability, Adaline, Madaline, Back propagation network, RBFN. Application of Neural network in forecasting, data compression and image compression.

UNIT – III **(7 Hr.)**

Unsupervised learning: Kohonen SOM (Theory, Architecture, Flow Chart, Training Algorithm) Counter Propagation (Theory, Full Counter Propagation NET and Forward only counter propagation net), ART (Theory, ART1, ART2), Application of Neural networks in pattern and face recognition, intrusion detection, robotic vision.

UNIT – IV **(7 Hr.)**

Fuzzy Set: Basic Definition and Terminology, Set-theoretic Operations, Member Function, Formulation and Parameterization, Fuzzy rules and fuzzy Reasoning, Extension Principal and Fuzzy Relations, Fuzzy if-then Rules,

Fuzzy Inference Systems. Hybrid system including neuro fuzzy hybrid, neuro genetic hybrid and fuzzy genetic hybrid, fuzzy logic controlled GA. Application of Fuzzy logic in solving engineering problems.

UNIT – V **(7 Hr.)**

Genetic Algorithm: Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing, timetabling problem. GA implementation using MATLAB.

REFERENCES:

1. S.N. Shivnandam, "Principle of soft computing", Wiley
2. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
3. Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli., PHI Pub.
4. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication.

LIST OF EXPERIMENTS

1. Form a Perceptron Net for basic gates with binary input and output
2. Using ADALINE Net, generate XOR function with bipolar inputs and targets
3. To Study the ADALINE NET and their training algorithm
4. To study the MADALINE NET and their training algorithm
5. Learn pattern, target output, learning rate and activation function
6. To implement AND function using Mc-Culloch Pitts neuron model
7. Design fuzzy inference system for a given problem
8. Implement Travelling salesman problem using Genetic algorithm
9. To study the training algorithm of ART

ITA-605(A) PHP Technology

ITA-605(A)	PHP TECHNOLOGY	**2L:1T:2P**	**4 credits**	**5Hrs/Week**

Objectives: -

The main objective of this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course is a study of the theory and practice required for the design and implementation of interpreters and compilers for programming languages.

Learning Outcomes:

At the end of the course, students will have basic understanding of the web technology and be able to architect, write, debug, and run complete web applications using PHP and MySQL.

UNIT-I **(8 Hr.)**

Introduction to PHP: Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression. Handling HTML Form With PHP: Capturing Form Data, Dealing with Multi-value filed, Generating File uploaded form , Redirecting a form after submission.

UNIT-II **(8 Hr.)**

Decisions and loop: Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html. Function: What is a function, Define a function, Call by value and Call by reference, Recursive function.

UNIT-III **(8 Hr.)**

String: Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function. Array: Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index based array, Looping with associative array using each() and for each(), Some useful Library function.

UNIT-IV **(8 Hr.)**

Working with file and Directories: Understanding file& directory, Opening and closing a file, Coping, renaming and deleting a file, Working with directories, Building a text editor, File Uploading & Downloading. State management: Using query string(URL rewriting), Using Hidden field, Using cookies, Using session.

UNIT-V **(8 Hr.)**

String matching with regular expression: What is regular expression, Pattern matching in Php, Replacing text, Splitting a string with a Regular Expression. Generating Images with PHP: Basics of computer Graphics, Creating Image, Manipulating Image, Using text in Image.

REFERENCES:

1. Learning PHP, MySQL, books by „ O‟ riley Press.

2. PHP & MySQL: Novice to Ninja by Kevin Yank.

3. PHP for the Web: Visual QuickStart Guide (4th Edition) by Larry Ullman.

ITA-605(B)

Cyber Law & Ethics

ITA-605(B)	**Cyber Law & Ethics**	**3L:0T:0P**	**3 credits**	**3 Hrs/Week**

Objective:

The Objectives Of This Course Is To Enable Learner To Understand, Explore, And Acquire A Critical Understanding Cyber Law. Develop Competencies For Dealing With Frauds And Deceptions (Confidence Tricks, Scams) And Other Cyber Crimes For Example, Child Pornography Etc. That Are Taking Place Via The Internet.

Outcomes:

Student will be able to:

1. Make Learner Conversant With The Social And Intellectual Property Issues Emerging From „Cyberspace.
2. Explore The Legal And Policy Developments In Various Countries To Regulate Cyberspace;
3. Develop The Understanding Of Relationship Between Commerce And Cyberspace; And
4. Give Learners In Depth Knowledge Of Information Technology Act And Legal Frame Work Of Right To Privacy, Data Security And Data Protection.
5. Make Study On Various Case Studies On Real Time Crimes.

UNIT-I **(9 Hr.)**

Cyber world: an overview, internet and online resources, security of information, digital signature, intellectual property (IP), historical background of IP, IPR governance, National patent offices, the world intellectual property organization (WIPO).

UNIT-II **(9 Hr.)**

Introduction about the cyber space, cyber law, regulation of cyber space, scope of cyber laws: ecommerce; online contracts; IPRs (copyright, trademarks and software patenting), e-taxation; e-governance and cyber-crimes, cyber law in India with special reference to Information Technology Act, 2000.

UNIT-III **(8 Hr.)**

Introduction to computer and cyber-crimes, Cyber-crimes and related concepts, distinction between cyber-crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber-crimes cyber stalking; cyber pornography, forgery and fraud, crime related to IPRs, cyber terrorism; computer vandalism etc. Cyber forensics, computer forensics and the law, forensic evidence, computer forensic tools.

UNIT-IV **(7 Hr.)**

Regulation of cyber-crimes, Issues relating to investigation, issues relating to jurisdiction, issues relating to evidence, relevant provisions under Information Technology Act 2000, Indian penal code, pornography Act and evidence Act etc.

UNIT-V **(7 Hr.)**

Copyright issues in cyberspace: linking, framing, protection of content on web site, international treaties, trademark issues in cyberspace: domain name dispute, cyber-squatting, uniform dispute resolution policy, computer software and related IPR issues.

REFERENCES:

1. Nelson, Phillips, “Computer Forensics and Investigations”, Cengage Learning India.
2. Vinod V. Sople, “Managing Intellectual Property” PHI Learning Private Limited.
3. Dr.R.K.Tiwari P.K.Sastri,K.V. Ravikumar, “Computer crime and Computer Forensics”, First Edition 2002, Select publishers.
4. NIIT, Understanding Forensics in IT, PHI Learni