1. Computer Network
2. Compiler Design
3. Machine Learning
4. Elective-1
5. Elective-II
6. Project-I
7.Professional Elective Lab-I


## Computer Network

### Module-1

### Data communication Components (8 Hours)

Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

### Module-2

### Data Link Layer and Medium Access Sub Layer (8 Hours)

Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA.

### Module-3

### Network Layer (8 Hours)

Switching, Logical addressing – IPV4, IPV6; Address mapping - ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

## Module-4

### Transport Layer (8 Hours)

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

## Module-5

### Application Layer (8 Hours)

Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

## Books

### Suggested Books


1. Data Communication and Networking, 4 th Edition, Behrouz A. Forouzan, Mc GrawHill.
2. Data and Computer Communication, 8 th Edition, William Stallings, Pearson Prentice Hall India.
1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, 6 th Edition Douglas Comer, Prentice Hall of India.


# Compiler Design

## Module-1

### Introduction ( 6 Lectures )

Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).
Phase of compilation and overview.

## Module-2

### Syntax Analysis (Parser) ( 9 Lectures )

Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

## Module-3

### Symantic Analysis and Symbol Table ( 10 Lectures )

Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.
Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

## Module-4

### Code Generation and Architecture Improvement ( 10 Lectures )

Intermediate Code Generation: Translation of different language features, different types of intermediate forms.
Code Improvement (optimization) Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc.
Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation.

## Module-5

### Advanced Topics ( 5 Lectures )

Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

## BOOKS

### Suggested Books

CompilersPrinciples.Techniques. AndToolsbyAlfredV.Aho. RaviSethiJefferyD.Ullman. PearsonEducation.
2. Compiler Design by Santanu Chattopadhyay. PHI
3. Modern Compiler Design by Dick Grune . E. Bal. Ceriel J. H. Jacobs. And Koen G. Langendoen Viley Dreamtech.

# Machine Learning

## Module-1

## Introduction ( 8 Hrs )

Basic definitions, Linear Algebra, Statistical learning theory, types of learning, hypothesis space and Inductive bias, evaluation and cross validation, Optimization.

## Module-2

Statistical Decision Theory, Bayesian Learning (ML, MAP, Bayes estimates, Conjugate priors), Linear Regression, Ridge Regression, Lasso, Principal Component Analysis, Partial Least Squares.

## Module-3

Linear Classification, Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Perceptron, Support Vector Machines + Kernels, Artificial Neural Networks + Back Propagation, Decision Trees, Bayes Optimal Classifier, Naive Bayes.

## Module-4

Hypothesis testing, Ensemble Methods, Bagging Adaboost Gradient Boosting, Clustering, K- means, K-medoids, Density-based Hierarchical, Spectral .

## Module-5

Expectation Maximization, GMMs, Learning theory Intro to Reinforcement Learning , Bayesian Networks.

### Elective-I

**Signal and System**

**Graph Theory**

Computer Graphics

Introduction To Java Programming Language

Probability and Statistical Inference

Numerical Methods

Information Theory and Coding

Elective-II

Soft Computing

Distributed Database

Advanced Data Structures and Algorithms

Advance Java Programming Language

Web and Internet Technology

Multimedia Technology and its Applications

Cryptography and Network Security

Mobile and Wireless Computing

## Project-I

Make project your own

## Professional Elective Lab-I

Website development using PHP ( HTML, XHTML, XML, JavaScript, CSS[Bootstrap]) laboratory

Python Programming.

Working on MATLAB

Working on Android Studio

Working with UNIX/ LINUX

AKU
Bihar