INFORMATION TECHNOLOGY

S.Y. B. Tech.
Effective from A. Y. 2012-13

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Item **Page No.**

List of Abbreviations

Sr. No.	Abbreviation	Stands for:
1	BSC	Basic Science Course
2	PSC	Professional Science Course
3	PCC	Program Core Course
4	LC	Laboratory Course
5	HSSC	Humanities and Social Science Course
6	MLC	Mandatory Learning Course
8	LLC	Liberal Learning Course

CURRICULUM STRUCTURE OF S. Y.-B.TECH (Information Technology)

Effective from A. Y. 2012-2013

I-Semester:

Sr. No	Course Type/ code	Subject Title	Contact hours L	T	P	Credits
01	BSC/	Engineering Mathematics-III	3	1	-	4
02	PCC/	Discrete Structures and Graph Theory	3	-	-	3
03	PCC/	Digital Systems	3	-	-	3
04	PCC/	Data Structures	3	1	-	4
05	PCC/	Digital Systems Laboratory	0	-	3	2
06	LC/	Data Structures Laboratory	0	-	3	2
07	HSSC/	Professional Communication	2	-	-	2
08	MLC/	Environmental Studies	2	-	-	2
		Total	**16**	**2**	**6**	**22**

II-Semester:

Sr. No	Course Type/ code	Subject Title	Contact hours L	T	P	Credits
01	BSC/	Applied Biology	3	-	-	3
02	PCC/	Theory of Computer Science	3	-	-	3
03	PCC/	Microprocessor Techniques	3	-	-	3
04	PCC/	Principles of Programming Languages	3	-	-	3
05	PCC/	Data Communication	3	-	-	3
06	PCC/	Microprocessor Techniques Laboratory	0	-	3	2
07	PCC/	Principles of Programming Languages Laboratory	0	-	3	2
08	PSC/*	Refer to Annexure-I	3	-	-	3
09	LLC/	Refer to the Annexure-II	1	-	-	1
		Total	**19**	**0**	**6**	**23**

'*': Professional Science Course/s offered by Information Technology department:

1. Computer Oriented Numerical Methods

DISCRETE STRUCTURES AND GRAPH THEORY

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem Exam - 50 marks

Objective :

- Learn basic terminology, formal logic, proofs, sets, relations, functions, recursion
- Use formal logic proof and logical reasoning to solve problems
- Relate the ideas of mathematical induction to recursion and recursively defined structures
- Learning graphs, trees and related algorithms
- Relate, interpret and apply these concepts to various areas of computer science

Unit 1 **(6 Hrs)**

Logic and Proofs

Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and
Existential Quantifiers, First order logic, Proofs: Proof Techniques, Mathematical Induction.
Set Theory : Set, Combination of sets, Finite and Infinite sets, Un-countably infinite sets, Principle of inclusion and exclusion

Unit 2 **(8 Hrs)**

Relations, Functions, Recurrence Relations

Definitions, Properties of Binary Relations, Equivalence Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains. Theorem on chain, Warshall's Algorithm & transitive closure

Functions Definitions, Pigeonhole Principle

Recurrence Relation, Linear Recurrence Relations With constant Coefficients, Homogeneous Solutions,
Total solutions, solutions by the method of generating functions

Unit 3 **(6 Hrs)**

Graphs

Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path Problems, Euler
and Hamiltonian paths and circuits, factors of a graph, planar graph and Kuratowski‟s graph and theorem, independent sets, graph colouring

Unit 4 **(6 Hrs)**

Trees

Trees, rooted trees, path length in rooted trees, binary search trees, spanning trees and cut set, theorems on spanning trees, cut sets , circuits, minimal spanning trees, Kruskal’s and Prim’ s algorithms for minimal spanning tree.

Unit 5 **(5 Hrs)**

Algebraic Systems

Algebraic Systems, Groups, Semi Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Ring, Field

Unit 6 **(5 Hrs)**

Lattices principles of dualing, basic properties, distributed and complimented lattices, Boolean lattices &□ Boolean algebra

Text Books:

- C. L. LIU, "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw-Hill, 2002, ISBN: 0-07-043476-X.
- G. Shanker Rao, "Discrete Mathematical Structures", New Age International, 2002, ISBN: 81-224-1424-9

References:

- Lipschutz, Lipson, Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1999, ISBN 0-07-463710--X.
- V. K. Balakrishnan, Graph Theory, TMH (Recommended for Graph), ISBN 0-07-058718-3
- B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
- J. Tremblay, R. Manohar, "Discrete Mathematical Structures with application to Computer Science", McGraw-Hill, 2002 ISBN 0-07-065142-6 (Recommended for prepositional Calculus)
- Kenneth H. Rosen: Discrete Mathematics and Its Applications, 5th Edition, Tata McGraw-Hill,□ 2003, ISBN 0-07-053047-5

DIGITAL SYSTEMS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Mid-Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objective :

- To study combinational logic circuits and sequential circuits.
- To develop designing and implementation skills of combinational logic circuits and sequential circuits by using logic gates.
- To have insight into applications of these devices into various fields and day-to-day activities.

Unit 1 **(6 Hrs)**

Introduction

Number systems- Representation of unsigned and signed integers, Fixed-point representation of real numbers, Floating-point representation of real numbers, Minimization of Boolean function using Karnaugh Map (up to four variable) and Quine - Mclusky methods,1's and 2's complement, SOP-POS, Code conversions- Binary code to gray code and gray to binary, BCD to Excess – 3,Excess – 3 to , BCD code etc.

Unit 2 **(8 Hrs)**

Design of Combinational Logic Circuits:

Gate level design of Small Scale Integration (SSI) circuits, Modular combinational logic elements, Overview of multiplexer/ demultiplexer, Implementation of Combinational Logic Circuits using mux / demux, Decoders, Encoders, Priority encoders, Multiplexers and Demultiplexers.

Design of Integer Arithmetic Circuits using Combinational Logic: Integer adders, Ripple carry adder and Carry look ahead adder, Integer subtractors using adders, Design of Combinational Circuits using Programmable Logic Devices (PLDs):Programmable Read Only Memories (PROMs), Programmable Logic Arrays (PLAs),Programmable Array Logic (PAL) devices.

Unit 3 **(8 Hrs)**

Design of Sequential Logic Circuits:

Latches: RS latch and JK latch, Flip-flops-RS, JK, T and D flip flops, Master-slave flip flops, Edge-triggered flip-flops.

Analysis and Design of Synchronous Sequential Circuits: Introduction to sequential circuits, Moore machine and Mealy machine, Characteristic table, Characteristic equation and Excitation table, Analysis of sequential circuits- Flip-flop input expressions, Next state equations, Next state maps, State table and State transition diagram, State transition diagram, State table, Next state maps, Output maps, Expressions for flip-flop inputs and Expressions for circuit outputs.

Unit 4 **(6 Hrs)**

Modular sequential logic circuits: Shift registers, Registers, Counters-Synchronous / Asynchronous, Up-down, Ring, Johnson counter. Design of Synchronous / Asynchronous using different flip-flops.

Unit 5 **(4 Hrs)**

Algorithm State Machines: ASM charts, notation, design of simple controller, multiplexer controller method ,RTL notation and implementation.

Introduction to VHDL: Entity, Architecture, Configuration Declaration, Data Objects and examples of VHDL codes for simple digital circuits like adder, subtractor, mux, demux, counter etc.

Unit 6 **(4 Hrs)**

Memories:

Random access memory, TTL RAM cell, parameter read write cycles, ROMs EPROM,MOS-static RAM cell, dynamic RAM cell, refreshing, memory cycles. Data converters : D/A, A/D conversion techniques, dual slop, successive approx, application of A/D,D/A converters Sampling theorem, choice of sampling frequency.

Text Books:

- M Morris Mano "Digital Design" 3rd Edition Prentice Hall, 2001, ISBN-10 / ASIN: 0130621218 ISBN-13 / EAN: 9780130621214
- R.P. Jain, "Modern Digital Electronics", 3rd Edition, Tata McGraw-Hill, 2003, ISBN 0 – 07 – 049492 – 4
- A.P. Malvino, D. P. Leach and G.Saha, "Digital Principles and Applications," 7th Edition, McGraw Hill, 2010

References:

- Wakerly Pearon, "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2004
- Anand Kumar, "Fundamentals of digital circuits" 1st Edition, PHI publication, 2001
- Mark Bach, "Complete Digital Design", Tata McGraw Hill, 2005
- Stephen Brown, "Fundamentals of digital logic design with VHDL" 1st Edition, TMH Publication 2002

DIGITAL SYSTEMS LABORATORY

Teaching Scheme
Practical : 3 hrs/week

Examination Scheme
Practical/Oral Exam: 50 marks
Term work: 50 marks

Suggested List of Assignments

1. Implementation of Boolean function using Gates
2. Code converters:
    - Binary to gray
    - Gray to binary
    - Excess – 3 code to BCD
    - BCD to Excess – 3 code.
3. Design of half adder, full adder.
4. Design of half subtractor , full subtractor.
5. K-map examples implementation
6. Quine-Mc'clusky examples implementation.
7. Design of :
    - 3 bit odd Parity Checker
    - 4 bit odd Parity Checker
    - 3 bit even Parity Checker
    - 4 bit even Parity Checker
8. Implementation of Multiplexer and Demultiplexer.
9. BCD adder using 4 bit adder IC.
10. Study of flip flops-
    - RS flipflop
    - D flipflop
    - T flipflop
    - J-K flipflop
11. Design of Synchronous Counter.
12. Design of Asynchronous counter.
13. Design of up / down counters.
14. Design of Sequence generator.
15. Design of Ring counter.
16. Design of Johnson Counter
17. Study Assignment on VHDL programming.

DATA STRUCTURES

Teaching Scheme
Lectures : 3+1 hrs/week
Credits: 3-1-0-4 (L-T-P-C)

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objective :

- Study basic concepts and design methods of data structures
- Study common applications of each of the data structures
- Implement user defined data structures in a high level language
- Develop the ability to compute time complexities of algorithms
- Develop ability to design data structures for various applications

Unit 1 **(4 Hrs)**

Introduction

Data, Data types, Object, Data Structure and Abstract Data types (ADT), Concept of Linear and Non-linear data Structures, Characteristics of an algorithm, analyzing programs, frequency count, Time and Space Complexity, Big 'O' and 'Ω" notation, best, average and worst cases.

Unit 2 **(6 Hrs)**

Arrays, Files and Searching

Searching: Binary search algorithm, time complexity analysis. **Hashing:** Hashing functions, chaining, overflow handling with and without chaining, open addressing: linear, quadratic probing, **Files handling:** text and binary files, language interface for handling files.

Unit 3 **(8 Hrs)**

Stacks and Queues

Stack and Queue as ADT, Operations on stack and queue, Implementations using arrays and dynamic memory allocation. Application of stack for expression evaluation, expression conversion, Recursion and stacks, Problems like Maze and Knight's tour

Unit 4 **(8 Hrs)**

Lists

List as ADT, Concept of linked organization, Singly linked list, doubly linked list, circular linked list, Operations on linked list(computation of length, traversal on linked list, etc), Representation & manipulations of polynomials/sets using linked lists, Dynamic memory management, Dangling Pointers and Garbage memory, Representation of sparse matrix, Addition and transpose of sparse matrix.

Unit 5 **(8 Hrs)**

Trees and Graphs

Basic terminology, binary trees and its representation, binary tree traversals (recursive and non recursive), operations such as copy, equal on binary tree, Insertion and deletion of nodes in binary search tree. Representation of graphs using adjacency matrix, adjacency list, Implementation of algorithms for traversals; Implementing Kruskal's, Prim's algorithms, Single Source Shortest path

Unit 6 **(8 Hrs)**

Advanced Data Structures and Applications

Introduction to advanced data structures like: Priority queue, Doubly Ended Queue, Heap, Height balanced trees, AVL Tree, Dictionary, B Trees, B+ Trees, Threaded binary trees, Tries, Suffix trees, etc. (Choice of data structures left to the instructor). Designing data structures for specific applications.

Text Books:

- E. Horowitz, S. Sahni, S.Anderson-freed, "Fundamentals of Data Structures in C", 2nd Edition, University Press, ISBN 978-81-7371-605-8
- B. Kernighan, D. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edition, ISBN 81-203-0596-5
- Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C", Pearson Education Asia, 1st Edition, 2002, ISBN 978-81-317-0229-1

References:

- Ellis Horowitz, S. Sahni, D. Mehta "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi 1995 ISBN 16782928
- Jean-Paul Tremblay, Paul. G. Soresan, "An introduction to data structures with Applications", Tata Mc-Graw Hill International Editions, 2nd edition 1984, ISBN-0-07-462471-7

DATA STRUCTURES LABORATORY

Teaching Scheme
Practical: 3 hrs/week

Examination Scheme
Practical/Oral Exam: 30 marks
Term work: 70 marks

Suggested List of Assignments:

- Write a program to compute sine(x) using series for sine function.
- Write ternary search function for strings.
- Implement a hashing scheme for string data where on a hash collision, the empty slot is searched at each second subsequent location.
- Implement a character stack data type and use it to reverse a string.
- Implement an integer stack data type that grows on demand.
- Write a program using appropriate stacks for evaluating an infix expression with parenthesis.
- Implement a stack using a queue
- Write a program, using a queue data type, to simulate a bank where customers are served on a first-come-first-serve basis.
- Write one program for each of the following operations with singly linked lists:
  a. concatenate two linked list and create third one.
  b. free all nodes in a linked list
  c. reverse a linked list
  d. given two linked list, created a third list which is set-intersection of the elements in the two.
  e. delete every third element from the linked list.
  f. copy a given linked list into another (new) list.
- Implement a queue using a doubly linked list.
- Write the following recursive functions for a singly-linked NULL-terminated list: insert(), traverse(), search().
- Use the linked/dynamic implementation to do sparse matrix multiplication. Find out the time complexity of your algorithm.
- Write following recursive functions for a binary tree: finding the depth, number of nodes, copying the tree, mirroring the tree, destroying the full tree.
- Write a function to print a binary tree so that it looks like a tree.
- Implement Prim's and Kruskal's algorithms.
- Write a program to create a tree from an infix expression.
- Represent a polygon using circular linked list. The list nodes should contain the coordinates (x, y) for each corner of the polygon. Write functions to find: number of sides, perimeter, length of maximum side.
- Implement a priority queue.
- Implement a deque using an array.
- Write following applications using custom designed data structures.
  Simulate an air traffic controller.
  Create the game of maze.
  Write a program to generate and solve sudoku problems.
  Implement an editor.

AS 207 – PROFESSIONAL COMMUNICATION

Teaching Scheme **Examination Scheme**
Lectures: 2 hr/week End Sem. Exam: 50 marks

Objectives

- To encourage the all round development of students by focusing on soft skills.
- To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
- To develop and nurture the soft skills of the students through individual and group activities.
- To expose students to right attitudinal and behavioral aspects, and to build the same through activities.

The coverage of soft skills that help develop a student as a team member, leader, all round professional in the long run have been identified and listed here for reference. As the time allotment for the soft kills laboratory is small and the fact that these skills are nurtured over years, students are encouraged to follow up on these skills as self-study and self driven process.

Unit 1 **(4 hrs)**

Verbal and Nonverbal Spoken Communications

Public speaking, Group discussions, Oral Presentation skills, Perfect interview, listening and Observation skills, Body language, Use of presentation graphics, Use of presentation aids, study of Communication barriers.

Unit 2 **(4 hrs)**

Written Communications

Technical writing: technical reports, project proposals, brochures, newsletters, technical articles, technical manuals.

Official / business correspondence: Business Letters, Memos, Progress Reports, Minutes of Meeting, Event Reporting. Use of: Style, Grammar and Vocabulary for effective Technical Writing. Use of: Tools, Guidelines for Technical Writing, Publishing.

Unit 3 **(4 hrs)**

Leadership Skills and Interpersonal Communications

Leaders: their skills, roles, and responsibilities. Vision, Empowering and delegation, motivating others, organizational skills, Problem solving and conflict management, team building, interpersonal skills. Organizing and conducting meetings, decision making, giving support, Exposure to work environment and culture in today's job places, improving personal memory, Study skills that include Rapid Reading, Notes Taking, Self learning, Complex problem solving and creativity.

Business Ethics, Etiquettes in social as well as office settings, E-Mail Etiquettes, Telephone Etiquettes, Engineering Ethics and Ethics as an IT Professional, Civic Sense

Reference Books

- Raman, Sharma, "Technical Communications", OXFORD.
- Sharon Gerson, Steven Gerson", Technical Writing process and product", Pearson education Asia, LPE Third Edition.
- Thomas Huckin, Leslie Olsen "Technical writing and Professional Communications for Nonnative speakers of English", McGraw Hill.
- Newstrom, Keith Davis, "Organizational Behavior", Tata McGraw Hill.

List of Possible Assignments

1. Write a Personal essay and or resume or statement of purpose which may include:
    a. Who am I (family background, past achievements, past activities of significance).
    b. Strengths and weaknesses (how to tackle them) (SWOT analysis).
    c. Personal short-term goals, long-term goals and action plan to achieve them.
    d. Self assessment on soft skills.
2. Students could review and present to a group from following ideas:
    a. Presentation of a technical report.
    b. Biographical sketch.
    c. Any topic such as an inspirational story/personal values/beliefs/current topic.
    d. Ethics and etiquettes and social responsibilities as a professional.

    Students will present to a group from following ideas:
    e. Multimedia based oral presentation on any topic of choice (Business/Technical).
    f. Public speaking exercise in form of debate or elocution on any topic of choice
3. Students will undergo two activities related to verbal/nonverbal skills from following:
    a. Appearing for mock personal interviews.
    b. Participating in group discussions on current affairs/social issues/ethics and etiquettes.
    c. Participating in Games, role playing exercises to highlight nonverbal skills.
4. Students will submit one written technical documents from following:
    a. Project proposal.
    b. Technical report writing
5. Students will submit one written business documents from following:
    a. A representative Official correspondence.
    b. Minutes of meeting.
    c. Work progress report.
    d. Purchase order checklist for event management etc.
6. Students will participate in one or two activities from following:
    a. Team games for team building.
    b. Situational games for role playing as leaders, members.
    c. Organizing mock events.
    d. Conducting meetings.

APPLIED BIOLOGY

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objective :

- To make the students conversant with basic biology regarding origin of life, cell structures, bio-molecules, membrane transport & so on.
- To give knowledge about latest studies in biology like genetic & tissue engineering, stem cells, biomechanics, bioimaging, bio-nanotechnology etc.
- Last but not least is to make them think what an engineer's role in life sciences is.

Unit 1 **(6 Hrs)**

Origin of life. Molecules of life- biomolecules. Cell as the unit of life.
Development of cell theory. Cell types : prokaryotes and. eukaryotes; cell organelles, single cell to multi-cellular organism, tissue and organ level organization, organ systems (4 Hrs)

Structure of the cell membrane. Fluid mosaic model. Functions of plasma membrane; diffusion, osmosis, membrane transport through plasma membrane, ion channels and electrical properties (2 Hrs)

Unit 2 **(6 Hrs)**

Energy Transduction and Bioenergetics. Mitochondria, ATP, Chemiosmosis, ATPase,Cell to cell junction-gap junctions. Ultra structure of Chloroplast, photosynthetic electron transport, Calvin cycle (2 Hrs)
Cell architecture, cyto-skeletal components, microtubules and microfilaments, motility and motor motions, actomyosin (2 Hrs)
Genomics and proteomics (2 Hrs)

Unit 3 **(8 Hrs)**

Evolution of biological machines- Optimization of biological machines at different levels- molecular, cellular, organismal and populational; principles of generating diverse body plans and design in nature (4 Hrs)
Biomaterials. Applications of nanotechnology in biology. Biosensors & their application (4 Hrs)

Unit 4 **(6 Hrs)**

Bioengineering- genetic engineering, protein engineering, tissue engineering and biochemical engineering. (4 Hrs)
Computational biology and bioinformatics (2 Hrs)

Unit 5 **(8 Hrs)**

Biomechanics - fluid mechanics , examples in living world, aerodynamic, hydrodynamic and

locomotion, mechanism of motion, friction and fracture. (4 Hrs)
Application of biomechanics and biomaterials- Human body motion, use of prosthetics, rehabilitation application (4 Hrs)

Unit 6 **(6 Hrs)**
Instrumentation in biology- spectroscopic methods, bioimaging using various techniques e.g. MRI, CT scan etc. (4 Hrs)
Green environment- use of biotechnology in environmental engineering (2 Hrs)
(Entire course should be taught at introductory level)

References :

- Molecular Biology of Cell by Alberts.
- Biochemistry of Cell by Lehninger
- Plant Physiology by N.K.Sinha & Pandye
- Genes 8 by Benjamin Lewin
- A Text Book of Environmental Engineering by P. Venugopal Rao
- Animal Tissue Culture by Ian Freshlly

THEORY OF COMPUTER SCIENCE

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objective :

- Study the finite automata
- Study the applications of finite automata and pumping lemma
- Understand the importance of grammar of language
- Learn the equivalence of Turing machine and algorithm

Unit 1 **(6 Hrs)**

Introduction

Set theory -Definition, finite and infinite set; count ability of a set, cardinality of a set, Closure of a set. Mapping between sets, functions and relations, closure properties of relations. Basic concepts: symbol, alphabet, string/word. Language - Definition, language states, difference between natural and formal language. Mathematical preliminary-Induction. Graphs and trees-Basic definitions. Basic machine: concept only.

Unit 2 **(8 Hrs)**

Finite State Machine (FSM):

Definition, Finite control, Transition graphs, Adjacency matrix. (FSM must be dealt with Machine functions and state function) Finite automata (FA) - Definition of deterministic finite Automaton (DFA.) and Non-deterministic finite automaton (NFA). Language accepted by FA. NFA and inter conversion.

Regular Expressions-Recursive definition of regular expression. Regular set - recursive definition, NFA with e-Moves definitions, NFA with e- moves, NFA without e moves, inter conversion between NFA and DFA and DFA Regular expression and FA. Regular sets - properties, pumping lemma. FA limitations.

Unit 3 **(6 Hrs)**

Grammars:

Definition production rules, formalization, derivation trees, ambiguous grammar, removal of ambiguity. Reduced form grammar - removal of unit productions, Epsilon production, useless symbols, Chomsky hierarchy. Context Free Grammar (CFG) - definition, simplification of CFG. Context Free Language (CFL) - definition, inherently ambiguous CFLs. Regular grammar definition, left linear and right linear grammar, inter conversion between left linear and right linear regular grammar. Regular grammar and finite automata. Normal Forms -Chomsky normal form (CNF), Greibach normal form (GNF). Derivation graphs - type 0 and type 1 Grammar.

Unit 4 **(6 Hrs)**

Pushdown Stack Memory Machine:

Formal Definition, Pushdown automata (PDA). Deterministic pushdown automata (DPDA) – Definition. Non Deterministic pushdown automata (NPDA) - definition.

Relative Powers of DPDA and NPDA, PDA and CFG, closure properties of CFL s . Production

System –Definition, axioms, Post canonical systems, PMT systems, acceptors and generators, Markov algorithms and labeled Markov algorithm.

Unit 5 **(6 Hrs)**

Turing Machine:

Introduction, Definitions, model, comparison of Turing Machine -(TM), FSM, PDM and PM, Examples of TM, combination of TM, iterative TM, recursive TM, universal TM, Recursive sets, partial recursive functions, recursively enumerable sets. Church's Turing hypothesis, multi stack Turing machine. TM limitations, halting problem. Incompleteness and un decidability Solvability, Semi-solvability and unsolvability.

Unit 6 **(6 Hrs)**

Applications:

Applications of RE and FA - lexical analyzer, text editor and searching using RE.
Applications of PDA - Expression conversion.
Application**s** of CFG - syntax analysis, language definition

Text Books:

- John E Hopcroft, Rajeev Motwani, J D Ullman, "Introduction to Automata theory, Languages and Computations", 3rd Edition, 2009, Pearson Education Publisher, ISBN: 978-81-317-2047-9.
- Michael Sipser, "Introduction to the Theory of Computation", 2nd Edition, 2006, Thomson Course Technology Publishing, ISBN: 0534950973

References:

- E. V. Krishnamurthy, "Theory of computer science", 2004, Affiliated East Press Publications, ISBN: 038791255X.
- John Martin, "Introduction to Languages and Theory of Computations", 4th edition, 2010, McGraw-Hill Publications, ISBN: 0073191469.
- Dexter C. Kozen, Automata and Computability, 1997, Springer Publications, ISBN: 0387-949070.
- Harry Lewis, Christos H. Papadimitriou, "Elements of the Theory of Computation," 2nd Edition, 1997, Prentice-Hall Publications, ISBN: 0132624788.

MICROPROCESSOR TECHNIQUES

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objective :
- To learn the architecture and assembly language programming of 8086 microprocessor.
- To study the peripherals and their interfacing with 8086 microprocessor.

Unit 1 **(6 Hrs)**
Review of tri- state logic, buffers, decoders, memory, and memory expansion using typical RAM Chips. Evolution of microprocessor, Introduction to 16 bit processor architecture, 8086 microprocessor architecture, 8086 with associated latches in minimum mode, clock drivers, buffers. Memory interfacing, Memory Map, Address decoding logic.

Unit 2 **(6 Hrs)**
8086 instruction encoding format, addressing modes and Instruction set, Assembly language programming, Assembler directives, Stacks and subroutines. Bus cycle, wait state, programming with string instructions, loop, rep.

Unit 3 **(6 Hrs)**
I/0 programming, Memory mapped I/O, I/O mapped I/O, Polled I/O, I/O ports using latches, PPI 8255, Various operating modes of 8255, interfacing, and programming, 4x4 key matrix interfacing, Seven Segment display interfacing.

Unit 4 **(6 Hrs)**
8086 Interrupt structure, ISR, PIC 8259 interfacing and programming. 8253 Timer.

Unit 5 **(6 Hrs)**
8279 Keyboard Display Controller, interfacing and programming. HOLD state and DMA, DMAC 8237

Unit 6 **(6 Hrs)**
Serial I/0, Asynchronous and Synchronous serial I/0, 8251 USART programming and interfacing, RS232C interface. Introduction to Maximum mode of 8086.

Text Books:

- Douglas Hall, "Microprocessors and Interfacing", 2nd edition, 1992, McGraw-Hill, ISBN-0-07- 100462- 9
- John Uffenbeck, "The 8086/88 Family: Design, Programming & Interfacing", PHI, ISBN: 978-81-203-0933-3
- A.Ray, K.Bhurchandi, "Advanced Microprocessors and peripherals: Arch, Programming & Interfacing", Tata McGraw Hill, 2004, ISBN 0-07-463841-6

References:

- Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI, 2005, ISBN: 978-81-203-0409-3
- Ray Dunkon, "Advanced MSDOS Programming", 2nd Edition, BPB Publication, ISBN 1-55615-157-8
- Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
- Peter Abel, "Assembly language programming", Pearson Education, 5th Edition, 2002, ISBN-10: 0137566107

MICROPROCESSOR LABORATORY

Teaching Scheme
Practical : 3 hrs/week

Examination Scheme
Practical/Oral Exam : 50
Term Work : 25

Suggested List of Assignments

1. Write 8086 Assembly language program (ALP) to add array of N numbers stored in the memory.

2. Write 8086 ALP to perform non-overlapped and overlapped block transfer.

3. Write 8086 ALP to find and count negative numbers from the array of signed numbers stored in memory.

4. Write 8086 ALP to convert 4-digit Hex number into its equivalent BCD number and 5-digit BCD number into its equivalent HEX number. Make your program user friendly to accept the choice from user for: 1) HEX to BCD. 2) BCD to HEX. 3) EXIT.
   Display proper strings to prompt the user while accepting the input and displaying the result.

5. Write 8086 ALP for the following operations on the string entered by the user.
   Calculate Length of the string
   Reverse the string.
   Check whether the string is palindrome or not
   Make your program user friendly by providing MENU like:
   Enter the string
   Calculate length of string
   Reverse string
   Check palindrome
   Exit
   Display appropriate messages to prompt the user while accepting the input and displaying the result.

6. Write 8086 ALP to perform string manipulation. The strings to be accepted from the user is to be stored in code segment Module_1 and write FAR PROCEDURES in code segment Module_2 for following operations on the string:
   Concatenation of two strings
   Compare two strings
   Number of occurrences of a sub-string in the given string
   Find number of words, characters, number of lines and number of capital letters from the given text in the data segment

7. Write 8086 ALP to arrange the numbers stored in the array in ascending as well as descending order. Assume that the first location in the array holds the number

of elements in the array and successive memory locations will have actual array elements. Write a separate subroutine to arrange the numbers in ascending and descending order. Accept a key from the user.
If user enters 0 = arrange in ascending order.
If user enters 1 = arrange in descending order.

8. Write 8086 ALP to perform multiplication of two 8–bit numbers. Use successive addition and add and shift method.

9. Write a program in C to use assembly language statements using #Pragma inline

10. Interfacing, programming of peripheral chips 8279/8255 / 8259/ 8251/ 8253/8254 / ADC/ DAC

PRINCIPLES OF PROGRAMMING LANGUAGES

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objective :

- Improve the ability to develop software that is both correct and efficient in execution.
- Learn the concepts of various programming paradigms

Unit 1 **(8 Hrs)**

Introduction: Role of programming languages, need to study programming languages, characteristics of a good programming languages, Introduction to various programming paradigms: Procedural, object-oriented, logic and functional, concurrent programming.

Data Types: Properties of structured and non-structured data types and Objects, variables, constants, Derived and abstract data types, declaration, type checking. Binding and binding times, type conversion, scalar data type, composite data types, Implementation and Storage representation of data types and control flow statement.

Unit 2 **(6 Hrs)**

Procedures: Procedure call and return, recursive subprogram, Different parameter passing methods, Lifetime of variables, Scope rules: Static and Dynamic scope, Referencing environment: activation records (Local, Non local and Global), Storage management (static and Dynamic), Exceptions and exception handling

Unit 3 **(6 Hrs)**

Object Oriented Programming: Design Principles: Objects, classes, Messages and methods, Implementation of Object-oriented Programming,

Unit 4 **(6 Hrs)**

Object oriented programming with Java/Python/C++: Program structure, Object and class declarations, constructors, inheritance, polymorphism, access specification, interfaces, packages, exception handling, I/O, GUI development, threads and multithreads, Socket programming.

Unit 5 **(6 Hrs)**

Logic Programming: Logic programming language model, logical statements, resolution, unification, search structures: backward and forward, Applications of logic programming

Unit 6 **(4 Hrs)**

Introduction to concurrent programming

Basic concepts of Concurrent Programming: processes, synchronization primitives, safety and liveness properties, Parallelism in Hardware, streams, concurrency as interleaving, safe access to shared data.

Text Books:

- Roosta S., "Foundations of Programming Languages", Thomson, Brooke/Cole, ISBN 981 - 243-141-1
- Sethi R., "Programming Languages concepts & constructs", 2nd Edition, Pearson Education, ISBN 81 - 7808 - 104 – 0
- Herbert Schilt, "JAVA Complete Reference", 7th Edition, Tata McGraw Hill, ISBN: 9780070636774
- Mark Lutz, "Learning Python", 2nd Edition, O'reilly, ISBN: 978-0-596-00281-7
- Stanley B. Lippman, Josée Lajoie, Barbara E. Moo, "C++ Primer", 3rd Edition, Addison Wesley Professional, ISBN-10: 0201824701

References:

- Scbesta R., "Concepts Of Programming Languages", 4th Edition, Pearson Education, ISBN-81-7808-161-X
- Ghezzi C, Milano P., Jazayeri M., "Programming Languages Concepts", 3rd Edition, John Wiley and Sons Pvt. Ltd (WSE), ISBN - 0195113063
- M. Ben Ari, "Principles of Concurrent Programming, 1989
- Eckel B., "Thinking in Java", 3rd Edition, Pearson Education,
- T. W. Pratt , "Programming Languages", 2nd Edition ,Prentice-Hall Of India, ISBN 81 - 297 - 0524 - 9
- Michael L. Scott "Programming Language Pragmatics", ELSEVIER Publication, ISBN: 81-8147-370-1

PRINCIPLES OF PROGRAMMING LANGUAGES LABORATORY

Teaching Scheme
Practical: 3 hrs/week

Examination Scheme
Practical/Oral Exam: 50 marks
Term work: 25 marks

Suggested List of Assignments:

- a) Write a class of Account-Holder which has a data objects. The date takes the valid date only. The class should have the functionality as follows. To show the date of account creation, balance, account number and name of the account holder. To deposit and withdraw money. To display the current status and transaction.
  b) Write a program(WAP) to implement matrix addition, subtraction and multiplication by using Class matrix
  c) WAP to concatenate strings find a substring in a string by using string Class.

- a) WAP for addition of complex variable by using class complex & use multiple constructor to initialize the objects with no argument, one argument & two arguments respectively.
  b) WAP to calculate interest by using interest function uses the value of rate 11 As default.

- a) Create an hierarchy of Employee, manager, Sales manager They should have the following
  functionality
  Employee :- display the name, DOB and id of the employee
  Manager :- display all above information with salary drawn
  Sales Manager :- display all information and commission if applicable
  b) WAP to create class account as parent class & from that create two subclass savact(for saving
  account) & curract (for current account)& use their private member to perform different operation on them.(single inheritance)

- WAP to demonstrate Operator overloading of '-'operator for unary as well as binary operation. (Overload different arithmetic operators by considering your own Examples. For ex: Matrix addition, matrix subtraction, string concatenation etc).

- Write a java program to copy character from one file into another, use exception handling related to files. Implement a pair of classes, one Reader and one Writer that count the number of times a particular character is read or written. The character can be specified when the stream is created. Write a prog. To test your classes. You can use any text file as the input file.

- Write a java program for package implementation to import the classes 'student', 'teacher' & 'courses'

- Write a frame class to display "hello java" with the setting front-courier, foreground as red and background as blue. Write a program to display one text filed and one button.

- a) WAP for Event delegation Model when mouse is clicked on button text field displays the Message "button clicked" write a program to display one text field and two buttons (OK/CANCEL) such that when mouse is clicked on the OK button text field display the message 'OK clicked' and when mouse is clicked on CANCEL button text field displays the message 'CANCEL clicked'. b) WAP for creating Notepad.

- Write a java program to copy character from one file info another also use exception handling related to files.

- WAP to display two strings moving in the opposite direction.

  Write a program to demonstrate concept of Socket Programming.

  Develop a mini project for web application using Multiple Applets.

DATA COMMUNICATION

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem Exam - 50 marks

Objective :

- To introduce the concepts of data communication and computer networks
- To introduce the layered model of internet and its components
- To provide in-depth knowledge of physical layer and data link layer technologies

Unit 1 **(8 Hrs)**

Introduction

Data Communication, Networks, Internet, Protocols and Standards, Network Models: OSI, TCP/IP, Analog and Digital data, Periodic Analog Signal, Digital Signal, Transmission Impairments, Data Rate Limits, Performance. Signal Conversion: digital-to-digital, Analog-to-Digital, Analog-to-Analog, Digital-to-Analog Conversion.

Unit 2 **(5 Hrs)**

Bandwidth Utilization and Transmission Media

Multiplexing, Spread Spectrum, Guided Media and Unguided media.

Unit 3 **(3 Hrs)**

Switching

Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks, Structure of Switch.

Unit 4 **(6 Hrs)**

Error Detection and Correction

Types of Errors, Redundancy, Detection Vs Correction, FEC Vs Retransmission, Coding, Modular Arithmetic, Block Coding, Linear Block Codes, Cyclic Codes, Checksum, Hamming Code.

Unit 5 **(6 Hrs)**

Data Link Control

Framing, Flow Control and Error Control Protocols, Protocols: stop-and-wait, Go-Back-N, Selective-Repeat, Piggybacking , HDLC,PPP.

Unit 6 **(8 Hrs)**

Medium Access, Ethernet and LAN

Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access, Channelization, IEEE standards, different Ethernets, Connecting devices, Backbone networks, VLAN.

Text Books:

- B. A. Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill, 2008, ISBN: 0072515848
- Alberto Leon Garcia and Indra Widjaja, "Communication Networks, Fundamental Concepts

and Key Architectures", 2nd Edition, Tata McGraw-Hill. 2004, ISBN-10: 007246352X

References:

- William Stallings, "Data and computer Communication", 7th Edition, Pearson Education, ISBN-81-297-0206-1
- A S Tanenbaum, "Computer Networks", 4th Edition, Pearson Education, ISBN 9788177581652
- S. Keshav , "Engineering Approach to Computer Networks", Pearson Education, 1997, ISBN-13: 9780201634426
- J.F. Kurose and K. W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet" , 2nd Edition, Pearson, 2003, ISBN-13: 9780201976991

COMPUTER ORIENTED NUMERICAL METHODS

Teaching Scheme
Lectures : 3 Hrs/week

Examination Scheme
Mid Sem. Exam - 30 marks
Assignment/Quizzes - 20 marks
End Sem. Exam - 50 marks

Objectives :

- To enable students to obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis and gain experience in the implementation of numerical methods using a computer
- They would also gain an appreciation of the concept of error in these methods and the need to analyze and predict it.
- Demonstrate understanding and ability to write codes for various numerical methods using high level language

Unit 1 **(6 Hrs)**

Solution of Algebraic and transcendental equation: Bisection methods of false position, Newton's methods and Newton-Raphson method. Approximate solution of equation – Horner's methods.

Unit 2 **(8 Hrs)**

Solution of simultaneous linear equations and ordinary differential equations: Gauss-Elimination methods, pivoting, Ill-conditioned equations, refinement of solution. Gauss-Seidal iterative method, Euler method, Euler modified method, Taylor-series method, Runge-Kutta methods, Predictor-Corrector methods.

Unit 3 **(8 Hrs)**

Finite Differences: Forward difference operator, Backward Difference operator, Central difference operator, Newton's Interpolation Formulae, Newton's Forward –backward-Central Interpolation Formulae, Sterling Formula, Bessel's Formula Interpolation with unequal intervals

Unit 4 **(6 Hrs)**

Differentiation and Integration: Newton-Cortes Formula. Trapezoidal Rule. Simpson One – Third Rule, Simpson Three- Eight Rule. Weddle's rule

Unit 5 **(6 Hrs)**

Numerical Solution of ODE: Picards methods, Taylor series method, Euler's method, modified Euler's method. Runge- Kutta method. Predictor –Corrector methods-Milne's method

Unit 6 **(6 Hrs)**

Adams-Bash forth method, second –order Differential equation. Numerical Solution For Elliptical Partial differential Equation.

Text Books:

- Rajaraman V., "Computer Oriented Numerical Methods", Prentice Hall, India, 3rd Edition, 2006, ISBN: 978-81-203-0786-5
- S.S. Sastry**, "**Introductory Methods of Numerical Analysis", Prentice Hall, India, 4th Edition,

2005, ISBN :978-81-203-2761-0

Reference Books:

- M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computation, 4th Edition, New Age International Publishers, 2003.
- Samuel D.Conte and Carl de Boor, Elementary Numerical Analysis: An Algorithmic Approach, 3rd Edition, McGraw Hill, 1980.

MLC-505 CONSTITUTION OF INDIA

Teaching Scheme

Lectures :1 hr/week

Examination Scheme

End-Sem Exam- 50

Unit 1 **(02 Hrs)**

Preamble to the constitution of India. Fundamental rights under Part – III, details of Exercise of rights, Limitations & Important cases.

Unit 2 **(02 Hrs)**

Relevance of Directive principles of State Policy under Part – IV, Fundamental duties & their significance.

Unit 3 **(03 Hrs)**

Union Executive – President, Prime Minister, Parliament & the Supreme Court of India.

Unit 4 **(02 Hrs)**

State executive – Governors, Chief Minister, State Legislator and High Courts

Unit 5 **(02 Hrs)**

Constitutional Provisions for Scheduled Castes & Tribes, Women & Children & Backward classes. Emergency Provisions.

Unit 6 **(02 Hrs)**

Electoral process, Amendment procedure, 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments.

Text Books

- Introduction to the Constitution of India by Durga Das Basu (Students Edn.) Prentice – Hall EEE, 19th/20th Edition, 2001.
- Engineering Ethics by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia, 2003-08-05.

Reference Books

- An Introduction to Constitution of India by M.V.Pylee, Vikas Publishing, 2002.