BANGALORE UNIVERSITY

SYLLABUS : 2K11

(Third – Fourth Semester)

SCHEME OF STUDY AND EXAMINATIONS
FOR BE DEGREE COURSE IN

COMPUTER SCIENCE AND ENGINEERING

UNIVERSITY VISVESVARAYA COLLEGE OF ENGINEERING
K.R. CIRCLE, BANGALORE – 560 001

COMPUTER SCIENCE AND ENGINEERING

III SEMESTER

Sl. No	Code	Subject	No. of Hr. / week		Duration of Exams		Sessional Marks	Exam Marks	Total Marks
			Theory	Practical	Theory	Practical			
1.	2K11 M31	Engineering Mathematics - III	04	--	03	--	25	100	125
2.	2K11CI 32	Data Structures with C	04	--	03	--	25	100	125
3.	2K11CI 33	Digital System Design	04	--	03	--	25	100	125
4.	2K11CI 34	Discrete Mathematical Structures	04	--	03	--	25	100	125
5.	2K11CI 35	Electronic Circuits	04	--	03	--	25	100	125
6.	2K11CI 36	Object Oriented Programming with C++	04	--	03	--	25	100	125
7.	2K11CIL 37	Digital System & Electronic Circuits Lab	--	03	--	03	25	100	125
8.	2K11CIL 38	Data Structures Lab	--	03	--	03	25	100	125
Total			24	06	18	06	200	800	1000

IV SEMESTER

Sl. No	Code	Subject	No. of Hr. / week		Duration of Exams		Sessional Marks	Exam Marks	Total Marks
			Theory	Practical	Theory	Practical			
1.	2K11 M41	Engineering Mathematics – IV	04	--	03	--	25	100	125
2.	2K11CI 42	Microprocessors	04	--	03	--	25	100	125
3.	2K11CI 43	Computer Organization & Architecture	04	--	03	--	25	100	125
4.	2K11CI 44	Design and Analysis of Algorithm	04	--	03	--	25	100	125
5.	2K11CI 45	Finite Automata and Formal Languages	04	--	03	--	25	100	125
6.	2K11CI 46	Java & Internet Programming	04	--	03	--	25	100	125
7.	2K11CIL 47	Microprocessor Lab	--	03	--	03	25	100	125
8.	2K11CIL 48	Algorithms Laboratory Using C++	--	03	--	03	25	100	125
Total			24	06	18	06	200	800	1000

BE III SEMESTER COMPUTER SCIENCE & ENGINEERING

2K11 M31: ENGINEERING MATHEMATICS – III

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Unit 1 : Partial Differential Equations (P.D.E):
Formulation of P.D.E, solution of non-homogenous P.D.E by direct integration, Method of separation of variables. (First and second order equations) Solution of Lagrange's linear PDE of type Pp+Qq=R, solution of standard types of non-linear partial differential equations - Charpit Method.

Unit 2 : Fourier Series:
Periodic functions, Fourier expansions, half range Fourier expansions, Complex form of Fourier Series. Practical harmonic analysis.

Unit 3 : Fourier Transforms:
Finite and Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms.

Unit 4 : Z-Transforms Basic definition:
Standard Z-transforms, Linearity property, damping rule, shifting rule, initial value and final value theorems. Inverse Z-transform. Application of Z-transforms to solve difference equations.

PART B

Unit 5 : Statistics and Probability:
Curve fitting, Fitting of a straight line, Fitting of curves of the form $y=ab^x$, Fitting of a parabola, correlation, Regression, basic concepts of probability, Addition theorem, conditional probability, multiplication theorem, Baye's theorem.

Unit 6 : Random variables:
Discrete and continuous random variables PDF-CDF, Binomial, Poisson, Exponential and normal distributions.

Unit 7 : Joint Probability and Markov Chains:
Joint probability distributions, concept of joint probability, joint distributions, discrete and continuous, independent random variables, problems on expectations and variance.
Markov Chains: probability vector, stochastic matrices, Fixed vectors and regular stochastic matrices, higher transition probabilities, stationary distributions and absorbing states.

Unit 8 : Calculus of Variations:
Variation of a function and a functional, External of a function, variational problems, Euler's equation, standard variational problems, includiong Geodesics, Minimal surface of revolution, hanging chain, brahistochrone problems.

2K11 CI32: DATA STRUCTURES WITH C

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Unit 1. Special features of C:
Register variables, Bitwise operators, Bit fields, Enumerations, Command line parameters, Macros, Pre-processor statements, Arrays in C, Structures and unions in C.

Unit 2. Introduction to Data Structure:
Definition, Brief Introduction on classification of Data Structure, Dynamic Memory allocation: malloc, calloc, free, realloc.

Unit 3. Linked List:
General Linear lists, Lists in C, Basic Opeartions: Creation of List- insertion (front, last, Specified Position), Deletion (front, last, Specified position, specified data) Searching, traversal, Implementation of above operations using: i. Head Node ii) Data Node.

Unit 4. Stack:
Stack Concept: Basic Stack Operation:- push, pop, stack top, empty stack, full stack, stack Array implementation, stack linked list implementation, Conversion from Infix to postfix and infix to prefix, evaluation of postfix expressions.

Unit 5. Queue:
Concept, Queue operations:- Insertion, deletion, empty, full. Array implementation of queue and linked list implementation of queue, Dequeue:- I/P restricted dequeue, O/P restricted dequeue, Priority Queue:- Ascending and Descending.

PART B

Unit 6. Recursion:
Recursive definition and processes, Factorial – A case study, Recursion defined, interactive solution, recursive solution, Writing recursive programs in C, Simulating recursion, GCD, Fibonacci, Tower of Hanoi, Binary Search, Binomial coefficient.

Unit 7. Trees:
Tree Concept: Definition of tree, leaf, height or depth of a tree, level, siblings, degree of a node, degree of a tree, Binary tree, Strictly Binary tree, complete Binary tree, Binary tree representations, creation and deletion, Traversals, Implementation of Binary tree and Binary Search tree, Expression trees, Threaded binary trees, Introduction to B-trees. Construction of tree with given inorder and preorder, inorder and postorder traversals.

Unit 8. Sorting And Searching:
Bubble sort, Selection sort, Insertion sort, Quick sort, Heap sort, Topological sort, Recursive : Linear and Binary search, Tree searching, Binary search tree, Hashing and its techniques, collision detection techniques.

2K11CI 33: DIGITAL SYSTEMS DESIGN

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Unit 1. Digital Principles, Digital Logic:
Definitions for Digital Signals, Digital Waveforms, Digital Logics, 7400 TTL Series, TTL Parameters, The Basic Gates: NOT, OR, AND, Universal Logic Gates: NAND, NOR, Positive and Negative Logic.

Unit 2. Combinational Logic Circuits:
Sum-of-products methods, Truth table to Karnaugh map, Pairs, Quads, Octets, Karnaugh Simplification, Dont care conditions, Product of sums Simplifications, Simplification by Quine-Mccluskey method.

Unit 3. Data Processing Circuits:
Multiplexers, De-Multiplexers, 1of 16 Decoder, Encoders, Exclusive OR gates, Parity generator and checker, Magnitude Comparator, Programmable Array Logic, Programmable Logic Arrays.

Unit 4. Clocks, Flip-Flops:
Clock Waveforms, TTL Clock, Schmitt Trigger, Clocked D Flip-Flop, Edge triggered D Flip Flop, Edge triggered JK Flip Flop Timing, JK Master-slave Flip-Flop, Switch Contact Bounce Circuits, Various representation of Flip-flops, Analysis of Sequential Circuits.

PART B

Unit 5. Registers:
Types of Registers, SISO, SIPO, PISO, PIPO, Universal shift register, Applications of shift registers.

Unit 6. Counters:
Asynchronous counters, decoding gates, synchronous counters, changing the counter modulus, Decade Counters, Presettable Counters, Counter Design as Synthesis Problem, A digital Clock.

Unit 7. Design of synchronous and asynchronous sequential circuits:
Model Selection, State transition Diagram, State Synthesis Table, Design Equations and Circuit Diagrams, Implementation using Read only Memory. Algorithmic State Machine, State Reduction Technique, Asynchronous Sequential Circuits: Analysis of Asynchronous Sequential Circuits: problems with asynchronous sequential circuits, design of asynchronous sequential circuits.

Unit 8. D/A Conversion and A/D Conversion:
Variable, Resistor Networks, Binary Ladders, D/A Converters, D/A accuracy and Resolution, A/D Converter – Simultaneous Conversion, A/D Converter-Counter Method, Continuous A/D Conversion, A/D techniques, Dual-s;ope A/D Conversion, A/D Accuracy and Resolution.

2K11 CI34: DISCRETE MATHEMATICAL STRUCTURES

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Unit 1. Fundamentals:
Sets and subsets, Operations on sets, Counting – Permutations, Combinations, Pigeonhole principle, Recurrence relations.

Unit 2. Logic:
Propositions and logical operations, Conditional statements, Methods of proof, Mathematical Induction.

Unit 3. Relations and Digraphs:
Product sets and partitions, Relations, Digraphs, Paths in relations and digraphs, Properties of relations, Equivalence relations, Computer representation, Manipulation of relations, Transitive closure and Warshall's algorithm.

Unit 4. Functions:
Functions for computer science, Permutation functions, Growth of functions.

PART B

Unit 5. Topics in Graph Theory:
Graphs, Euler paths and circuits, Hamiltonian paths and circuits, colouring graphs.

Unit 6. Trees:
Trees, Labelled trees, Tree searching, undirected trees, Minimal spanning trees.

Unit 7. Order Relations and Structures:
Partially ordered sets, External elements of partially ordered sets, Lattices, Finite Boolean Algebras, Functions on Boolean algebras.

Unit 8. Semi Groups and Groups:
Binary Operations, Semi groups, Products and quotients of Semi groups, Groups, Products and Quotients of Groups.

2K11 CI35: ELECTRONIC CIRCUITS

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Unit 1. Diode Circuits:
Diode resistance, Diode equivalent circuits, Load line analysis, AND/OR Gates, Clippers and Clampers.

Unit 2. Transistor Biasing:
Operating Point, Fixed bias circuits, Emitter stabilizer, biased circuits, Voltage divider biased, DC bias with voltage feedback, Miscellaneous bias configurations, Design operations, Transistor Switching networks, PNP transistors and Bias Stabilization.

Unit 3. Transistor at Low Frequencies:
BJT Transistor modelling, CE Fixed Bias configuration, Voltage divider bias, emitter follower, Collector feedback configuration, Analysis of Circuits: re model, Analysis of CE configuration using h-parameter model. Relationship between h-parameter model of CE, CC, CB configuration.

Unit 4. FET Amplifiers:
FET small signal model, Biasing of FET, Common drain common gate configurations, MOSFET's, FET amplifier networks.

PART B

Unit 5. (a) General Amplifiers: Cascade connections, Darlington connection
(b) Feedback Amplifiers: Feedback concepts, Feedback connection types, Practical feedback circuits, Design procedures for feedback amplifiers.

Unit 6. Power Amplifiers:
Definitions and amplifier types, series fed Class A, transformer coupled class A amplifiers, Class B amplifier operations, Class B amplifier circuits, Amplifier distortions, Designing of Power amplifiers.

Unit 7. Oscillators:
Oscillator operation, Phase shift oscillator, Wien Bridge Oscillator, tuned Oscillator circuits, Crystal Oscillator (BJT version only) Simple design methods of Oscillator.

Unit 8. D/A and A/D Convertors:
D/A conversion, Weighted resistor and R-2R ladder type DAC, using Op-amps, DAC specifications, A/D conversion, Principle of A/D conversion, Simultaneous ADC, Successive approximation ADC, ADC specifications.

2K11 CI36: OBJECT ORIENTED PROGRAMMING WITH C++

Note :
FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Unit 1. Introduction to OOP:

Procedure oriented Programming, Object oriented programming paradigm, Basic concepts of OOP, Benefits of OOP, Object Oriented language, Applications of OOP, Introduction to C++, Applications, A basic structure of C++ program, Difference b/w C and C++, complilation and execution of C++ program.

Unit 2. C++ Tokens, Expressions and Control Statements:

Tokens, Keywords, Identifiers, Constants, Data types, Operators in C++, manipulators, statements, control structures, Scope Resolution Operator, Type cast operator, Implicit conversions.

Unit 3. Functions in C++:

Introduction to functions, Function prototyping, Call by Reference, Inline functions, Default arguments, constant arguments, Recursion, Function Overloading, Friend Functions.

Unit 4. Classes and Objects:

Introduction, Defining a member functions, member Access specifiers, nesting of member functions, array with in a class, memory allocation for objects, Static data members,
Static member Functions, Arrays of objects, objects as function arguments, Returning objects, constant member functions, pointers to members, Local Classes.

Unit 5. Templates:

Class Templates, Class templates with multiple parameters, Function template, Function template with multiple parameters, Overloading of functions Template Non-type Template arguments.

PART B

Unit 6. Constructors and Destructors:

Constructors, Parameterised Constructors, Multiple Constructors in a class, Constructors with default arguments, Dynamic Initialisation of Objects, Copy constructors, Dynamic constructors, constructing two- Dimensional arrays, Constant objects, Destructors.

Unit 7. Operator Over loading and Type Conversions:

Defining operator overloading, overloading unary and binary operators, overloading binary operators using friends, manipulation of strings using operators. Rules for overloading operators, type conversions.

Unit 8. Inheritance:

Defining Derived class, Single Inheritance, Making a private member inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchial Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of classes, Inheritance and constructors, Inheritance and Destructors.

Unit 9. Pointers, Virtual functions, Polymorphism:

Pointers to Objects, this pointer, Pointers to Derived classes, polymorphism, Virtual functions, Pure Virtual functions, Virtual Destructors.

Unit 10. The C++ I/O Library and Exception handling:

C++ stream, C++ stream classes, Unformatted I/O operations, formatted console I/O operations, Managing output with manipulators, Basics of Exception handling, Exception.

2K11 CIL37 : DIGITAL SYSTEMS AND ELECTRONIC CIRCUITS LAB

1. Design and implementation of Half and full adders, half and full Subractor using NAND

2. Design and implementation of 4 to 1 multiplexer using NAND gates only.

3. Design Full adder and Full Subractor using multiplexer (74153)

4. Design Full adder and Full Subractor using 7483 and Basic gates.

5. Design and implementation of BCD to Excess-3 code converter using 7483 and Basic gates.

6. Design and implementation of synchronous counters (mod 5 and mod 8) using 7476.

7. Study of IC Counters 7490, 7493. Design of MOD-N counters using the same.

8. Design SISO, SIPO, PIPO, PISO modes of shift register using 7495 and FET characteristics in common
source configuration.

9. BJT characteristics in common emitter configuration

10. R-C coupled amplifier, determination of Zin, Zout, frequency response and bandwidth.

11. Voltage shunt regulator using zener diode.

12. Inverter, Non-Inverter, Adder, Subtractor, Voltage Follower

13. RF Oscillators (i) Colpitt's (ii) Hartley (iii) Wein Bridge Oscillators (iv) RC phase shift Oscillator.

14. Schmitt Trigger

15. Digital to Analog Converter using R-2R method.

2K11 CIL38: DATA STRUCTURES LABORATORY

1. a) Tower of Hanoi
b) Stack Using Array

2. Infix expression to Postfix form

3. Infix expression to Prefix form

4. a) Insertion sort
b) Queue using Array

5. Create singly linked list

6. Stack using singly linked list

7. Queue using singly linked list

8. Singly circular linked list

9. Create doubly linked list

10. Create doubly linked list

11. Circular doubly linked list

12. Create binary tree

13. Create binary search tree and perform traversals

14. Create binary search tree

15. Evaluate expression using binary tree

16. Threaded binary tree

BE IV SEMESTER COMPUTER SCIENCE & ENGINEERING

2K11 M 41: ENGINEERING MATHEMATICS – IV

Note :
FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART-A

Unit 1 :
Sets in a complex plane – Functions of a complex variables. Limit, Continuity and Differentiability (definitions only). Analytic function, Cauchy-Riemann equations in Cartesian and Polar form. Harmonic functions, constructions of analytic functions (Cartesian and polar forms).

Unit 2 :
Line integral. Cauchy's theorem-corollaries. Cauchy's integral formula for complex function and for derivatives, conformal transformations: $1/z$, z^2, e^2, and $z+(a^2/z)$ ($z \neq 0$). Bilinear transformations.

Unit 3 :
Power series, convergence, radius of convergence, Taylor's and Laurent's theorems (statements only) Singularities. Poles. Calculation of residues. Residue theorem (without proof)-problems.

Unit 4 :
Evaluation of counter integrals.

PART-B

Unit 5 :
Numerical solutions of algebraic and transcendental equations- solution by Bisection, Ramanujan method, linear iteration and Newton-Raphson methods. Solution of linear simultaneous equations: Gauss elimination method, Gauss Jordan method, Gauss seidel methods, LU decomposition method of Crout, Doolittle and Cholesky.

Unit 6 :
Finite differences (Forward and Backward differences), Interpolation, Newton's forward and backward interpolation formulae, Central difference formulae: Stirling's and Bessel's formula. Interpolation with unequal spaced points: Lagrange interpolation formula and inverse interpolation formulae and Hermite interpolation formula.

Unit 7 :
Divided differences and their properties: Newton's general interpolation formula. Interpolation by iteration, Numerical differentiation using Newton's forward and backward interpolation formulae. Numerical integration: Trapezoidal method, Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Boole's and weddle's rule.

Unit 8 :
Numerical solution of ordinary differential equations: Solution by Taylor's series, Picard's method of successive approximation, modified Euler's method, Runge Kutta methods of second and fourth order, Predictor and corrector methods- Adams-Bashforth method, Adams-Moultons method.

References:

1. *Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley, 10th edition, 2011.*
2. *O Neil, Advanced Engineering Mathematics, Pearson/Thompson.*
3. *S.S.Sastry, Introductory methods of Numerical analysis, 3rd edition, Prentice-Hall India*
4. *M.K.Jain, S.R.K.Iyengar, R.K.Jain, Numerical methods for scientific and engineering computation, New Age International publishers.*

2K11 CI 42 : MICROPROCESSORS

Note :
FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART-A

Unit 1. Microprocessors Architecture and Addressing Mode:
Introduction to Microprocessors, Modern Microprocessors, Architecture of 8-86 Microprocessor, the Programming Model, Real Mode Memory Addressing, Protected Mode Memory Addressing, Memory Paging, Data Addressing modes, Program Memory Addressing Modes, Stack Memory Addressing.

Unit 2. Instruction Set and Programming:
Data Movement Instructions, Assembler Directives, Arithmetic and logic Instructions, Program Control Instructions, Procedures and Macros, Introduction to Hardware and Software Interrupts, Machine Control and Miscellaneous Instructions, Programming Examples.

PART-B

Unit 3. Programming:
Modular programming, Using the Keyboard and Video Display, Using Assembly language with C/C++for 16-bit applications.

Unit 4. 8086 Hardware specifications:
Pin functions, Clock generators, Bus buffering and Latching, Timing diagram, Min/Max Mode.

Unit 5. Memory and I/O interfacing:
Memory devices, Addressing decoding, 8086 Memory Interface, Dynamic RAM, Introduction to I/O Interfaces.

Unit 6. Interfacing Devices:
82C55 Programmable Peripheral Interface, 8254 Programmable Interval Timer, Introduction to DMA Process, 8237 DMA controller, 8259 Programmable Interrupt Controller, Programmable Interval timer chips.

References:

1. *Barry B Brey - The Intel Microprocessors 8086- Pentium processor,8th edition, Prentices Hall of India, 2009*
2. *Venugopal K R, Rajkumar –Microprocessor x86 programming, BPB Publications, New Delhi, 1995*
3. *Douglas V Hall – Microprocessors and Interfacing, Revvised second edition, TMH, 2006*
4. *K. Udaya Kumar and B S Umashankar – Advanced Microprocessors and IBM-PC Assembly Language Programming Family, TMH 2003*

2K11 CI43 : COMPUTER ORGANIZATION AND ARCHITECTURE

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART –A

Unit 1. Introduction:

The General Purpose Machine: The general purpose machine, The user's view, The machine /assembly language programmer's view, The computer architecture's view, The computer system logic designer's view, Historical perspective, Machines machine Languages and digital logic: Classification of computers and their instructions, Computer instruction sets.

Unit 2. Machines, machine languages and Digital logic:

Informal description of the simple RISC computer, SRC: Formal description of SRC using register transfer notation, RTN , Description of addressing modes with RTN, Register transfer and logic circuits: from behaviour to hardware.

Unit 3. Real Machines:

Machine characteristics and Performance, RISC versus CISC microprocessor: The Motorola MC68000, A RISC architecture: The SPARC.

Unit 4. Processor Design and Microprogramming:

The design Process, A 1-bus micro architecture for the SRC, Data path implementation, Logic design for the 1-bus SRC, The control unit, The 2 and 3-bus processor designs, The machine reset, Machine exceptions, Microprogramming.

PART-B

Unit 5. Computer Arithmetic:

Addition and Subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, signed operand multiplication ,Fast multiplication, Integer division, Floating point numbers and operations.

Unit 6. The Memory Systems:

Some basic concepts, Semiconductor RAM memories, Read Only Memories, Speed, Size and cost, Cache Memories, Performance Considerations, Virtual Memories, Memory management requirements.

Unit 7. Input and Output:
The I/O subsystems, Programmed I/O, I/O interrupts, Direct Memory access, I/O data format change and error control.

Unit 8. I/O Organization and Peripheral devices:
Buses, Interface circuits, Standard I/O interfaces, Magnetic Disk drives, Display devices, Printers, Input Devices, Interfacing to the analog world.

References:

1. *Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, Second edition, Pearson education, Indian Reprint, 2003.*
2. *Carl Hamachar, Zvonko Vranesic, and Safwat Zaky, Computer Organization, fifth edition, McGraw Hill.*
3. *William Stallings, Computer Organization and Architecture, Fourth edition , PHI.*
4. *M. Mano, Computer Architecture, Prentice Hall, Third edition, 2001.*
5. *Hayes, Computer Architecture and Organization, Third edition , TMIL.*
6. *Patierson, Computer Architecture, third edition,PHI*

2K11 CI44 : DESIGN AND ANALYSIS OF ALGORITHM

Note :
FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART – A

Unit 1. Introduction:
The notations of Algorithms, Fundamentals of algorithmic problem solving, Important Problem types, A review of fundamental data structures.

Unit 2. Fundamentals of the Analysis of Algorithm efficiency:
The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive algorithms. Mathematical Analysis of recursive algorithms. An example: the Fibonacci Numbers. Emperical Analysis of Algorithms. Algorithm Visualisation.

Unit 3. Brute-Force:
Selection sort and Bubble sort. Sequential search and Brute String matching. Closest Pair and Convex-Hull problems by Brute Force. Exhaustive search.

Unit 4. Divide and Conquer:
Merge sort, Quick Sort, Binary Search, Binary tree traversals and related properties. Multiplication of Large Integers and Strassen's Matrix multiplication. Divide and conquer algorithm for closest-pair and convex-hull problems.

Unit 5. Decrease and Conquer:
Insertion Sort, Depth-First Search and Breadth-First Search. Topological sorting. Algorithms for Generating Combinatorial objects. Decrease-by-a constant factor Algorithm. Variable-size-Decrease algorithms.

PART – B

Unit 6. Transform and Conquer:
Presorting and its applications. Gaussian Elimination. Balanced search trees. Heap and Heapsort. Horner's and Binary Exponentiation. Problem Reduction.

Unit 7. Space and Time Tradeoff in algorithms:
Sorting by distribution counting. Horspool's and Boyer-Moore Algorithms for String Matching. Hashing. B-Trees.

Unit 8. Dynamic Programming:
Computing a Binomial Coefficient. Warshall's and Floyd's Algorithm. Optimal binary Search trees. The Knapsack Problem and memory functions.

Unit 9. Greedy Approach:
Prim's algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees.

Unit 10. Limitations of Algorithm Power:
Lower-Bound Arguments. Decision Trees. P, NP and NP-Complete Problems. Challenges of Numerical Algorithms.

Unit 11. Coping with the Limitations of Algorithm Power
Backtracking, Branch-and-Bound, Approximation Algorithms for NP-Hard Problems, Algorithms for solving Non-linear Equations

References:

1. *Anany Levetin, Introduction to the Design and Analysis of Algorithms, Pearson Education 2003*
2. *Thomas H Cornen, Leiserson C E, Rivest R L, Introduction to Algorithms, MIT Press 1990*
3. *Aho AV, Hopcroft JE, The Design and Analysis of Computer Algorithms, Addison-Wesley 1974*
4. *Horowitz and Smith, Fundamentals of Computer Algorithms, Galgotia Publications 1978*

2K11 CI45: FINITE AUTOMATA AND FORMAL LANGUAGES

Note :
FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART-A

Unit 1. Introduction To Finite Automata:
Introduction to grammars-Production systems, Introduction to Finite Automata; The central concepts of Automata Theory, Deterministic Finite Automata, Nondeterministic Finite Automata

Unit 2. Finite Automata, Regular Expressions:
An application of Finite Automata; Finite Automata with epsilon –Transitions, regular expressions, Finite automata with Regular Expressions, Applications of regular expressions.

Unit 3. Regular Languages, Properties Of Regular Languages:
Regular languages; proving languages not to be regular languages; closure properties of regular languages; Decision properties of regular languages; equivalence and minimization of automata.

Unit 4. Context-Free Grammars And Languages:
Context-free grammars, Parse trees applications; Ambiguity in grammars and languages.

PART-B

Unit 5. Pushdown Automata:
Definition of the Pushdown Automata; The languages of PDA: Equivalence of PDA's and cfg's; Deterministic Pushdown Automata.

Unit 6. Properties of Context-Free Languages:
Normal forms of CFG's, the pumping lemma for CFG's, Closure Properties of CFL.

Unit 7. Introduction To Turing Machine:
Problems that computer cannot solve; the Turing machine; Programming techniques of Turing machines, Extensions to the basic Turing Machines, Turing Machine and Computers.

Unit 8. Undecidability:
A Language that is not recursively enumerable; An undecidable problem that is RE; Post's correspondence problems; other undecidable problems.

References:

1. *Introduction to Automata: Theory , Languages and Computations- John E.Hoperoft, Rajeev Motwani, Jeffery D. Ullman, 3rd edition, Pearson Education,2007.*
2. *Introduction to Languages and Automat Theory- John C. Martin, 3rd edition, Tata McGraw-Hill,2007.*
3. *Introduction to Formal Languages and Automata- Peter lenz, Narosa Publishing house.*
4. *Fundamentals of theory of computation: Principles and Practice- Raymond Greenlaw, H. James Hoove, Morgan Kitufmann,1998.*

2K11 CI 46: JAVA & INTERNET PROGRAMMING

Note :
FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART.
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART-A

Unit 1.Fundamentals:
Class Fundamentals, Object and Object reference, Object life time &Garbage collection, Creating and operating objects, Constructors and initialization code block, Access controls, Modifiers, Methods nested inner class and Anonymous Classes, Abstract Classes & Interfaces, Defining methods, Argument Passing Mechanism method overloading, Recursion, Dealing with Static members, Finalize methods, Native method, Use f "This" reference, Use of modifiers with classes and method.

Unit 2. Input/output operation in JAVA (java.io package):
Streams and the new I/O capabilities, Understanding Streams The classes for Input & output ,The standard streams working with file Objects file I/O Basic Reading& write to file buffer & buffer management Read/Write Operations with File Channel Serializing objects.
Extending classes and Inheritance, Use and benefits of inheritance of OOP, Types of Inheritance in JAVA, Inheriting data members and methods, Role of constructors in inheritance, Overriding Super Class methods, Use of "Super", Polymorphism in heritance, Type Compatibility and conversion implementing interfaces.

Unit 3. Array and Strings:
Defining an Array Initialization and Accessing Array Multidimensional Array, Operating on string mutable and immutable string using collection bases Loop for string, Tokenizing a string, Creating string using string Buffer.
Exception handling: The idea behind Exception: Exception and error types of Exception, Control flow of Exceptions, JVM reactions of Exceptions, Use of Try, Catch, Finally, Throw and throws in Exception handling, In-built and user defined exceptions, checked and unchecked Exceptions.

Unit 4. Thread:
Understanding Threads, Needs of multithreaded Programming, Thread Lifecycle, Thread Priorities, Synchronizing threads, Inter-communication of Threads, critical factor in thread deadlock :applet and applet architecture, Parameters to applet, embedding applets in web page, applet security politics.

PART-B

Unit 5. Perl, Cgi Programming:
Origin and uses of Perl: Scalars and their operations; assignment statement and simple input and output; control statements; fundamentals of arrays; hashes; references; functions; pattern matching; file input and output; examples. The common gateway interface; CG linkage; query string Format configuring server , input to the CGI environmental variables assessing the input, output from CGI-CGI and response headers; Accept, types and content length header, server redirection the expire and pragma header, status header, designing application with Perl, server side includes(SSI), survey example.

Unit 6. Fundamentals of Web, XHTML-1:
Internet, www, web browsers and web servers; URL's MIME; HTTP; Security; the web programmer's toolbox. XHTML: origins and evaluation of HTML and XHTML; Basic syntax; standard XHTML document structure; Basic text markup,
XHTML-2: images; hypertext links; lists; tables; forms; frames; syntactic difference between HTML and XHTML.

Unit 7. Java Scripts:
Overview of JavaScript's; Object orientation and java scripts, general syntactic characteristics, Primitives, Operations and expressions; screen output and Keyboard output ; Control statements; Object creation and modifications; Arrays; Functions; Constructor; Pattern matching using regular expressions, Errors in scripts and examples.

Unit 8. Java Scripts and Html Documents:
The java script execution environment; The document object model; Element access in java scripts; Events and event handling events, handling events from the body elements, button elements, text box and password elements; The DOM2 event model; navigator object; DOM tree traversal modifications.

References:

1. *Programming the World Wide Web-Robert W. Sebesta, fourth edition, Pearson Education, 2008.*
2. *Internet and World Wide Web How to H Pogram- M. Dietel, P. J. Deitel, A. B. Goldberg, third edition, Pearson Education /PH1,2004.*
3. *CGI Programming on World Wide Web Oriely- Shishir Gundavaram Oriely Publication, 2nd edition, 2002.*
4. *Java Complete Reference by Herbert Schildt*

2K11 CIL 47: MICROPROCESSOR LAB

PART - A

1) Write an 8086 program to Search a key element in a list of 'n' 16-bit numbers using the Binary Search Algorithm.
2) Write an 8086 program to Sort a given set of n numbers in ascending order using Bubble Sort algorithm.
3) Write an 8086 program to find the GCD of Two 16 bit Numbers.
4) Write an 8086 program to Reverse a given string and check whether it is a palindrome or not.
5) Read two strings, store them in locations STR1 and STR2.Check whether they are equal or notand display appropriated messages. Also display the length of the stored strings.
6) Read your name from the keyboard and display it at a specified location on the screen after the message "**What is your name?"** you must clear the entire screen before display.
7) Write a program to compute**nCr** using recursive procedure. Assume that 'n' and 'r' are non-negative integers.
8) Read the current time from the system and display it in the standard format on the screen.
9) Write a Program to simulate a Decimal Up-counter to display 00-99.
10) Write a Program to Generate the first 'N' Fibonacci numbers.
11) Read a pair of input co-ordinates in BCD and move the cursor to the specified location on the screen
12) Write a Program to create a file (input file) and to delete an existing file.

PART – B

1) Read the status of eight input bits from the Logic controller Interface and display FFif it is even parity bits otherwise display 00, Also display number of 1's in the input data.
2) Perform the BCD Up-down counter using the Logic Controller Interface.
3) Read the status of two 8 bit inputs(X & Y) from the Logic controller Interface and display X*Y.
4) Display the messages FIRE and HELP alternately with flickering effects on a 7-Segmentdisplayinterface for a suitable period of time. Ensure a flashing rate that makes it easy to readboth the messages.
5) Assume any suitable messages of 12 characters length and display it in the rolling fashion on a7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read the messages.
6) Convert a 16- bit binary value (assumed to be an unsigned integer) to BCD and display it from left to right and right to left for specified number of times on a 7 – segment display interface.
7) Scan a 4X4 keypad for key closure and to store the code of the key pressed in a memory location or display on screen. Also display row and column numbers of the key pressed.

8) Drive a Stepper Motor interface to rotate the motor in specified direction (clockwise or counter-clockwise) by N steps(Direction and N are specified by the examiner). Introduce suitable delay between successive steps (Any arbitrary value for the delay may be assumed by the student).

9) Generate a Sine Wave using the DAC interface (The output of the DAC is to be displayed on a CRO).

10) Generate a Half Rectified Sine Wave form using the DAC interface (The output of the DACis to be displayed on a CRO).

11) Generate a Fully Rectified Sine Wave form using the DAC interface (The output of the DAC is to be displayed on a CRO).

12) Drive an Elevator Interface in the following way.

a. Initially the elevator should be in the ground floor, with all requests in OFF state.
b. When a request is made from a floor, the elevator should move to that floor, wait there forcouples of seconds, and then come down to ground floor and stop. If some requests occur during going up or coming down they should be ignored.

NOTE: The student has to write and execute one program from each part of the practical examination.

2K11 CIL 48: ALGORITHMS LABORATORY USING C++

- **Brute Force Technique**
  Find the time complexity of
  1. Sequential Search and Selection sort

- **Divide and Conquer Techniques**
  Find the time complexity of
  2. Binary search and Quick sort
  3. Merge sort
  4. Tree Traversals(Preorder, Inorder, Postorder)

- **Decrease and ConquerTechniques**
  5. Find Time complexity of Insertion sort
  6. DFS and BFS search
  7. Topological Sorting

- **Transform and Conquer Technique**
  8. Find the time complexity of Heap sort
  9. AVL tree

- **Speed and Time Trade off**
  10. Horspool's String Matching Algorithm

- **Dynamic Programming**
  11. Warshall's and Floyd's Algorithm
  12. Knapsack problem

- **Greedy Technique**
  13. Prim's Algorithm

14. Kruskal's Algorithm
15. Dijkstra's Algorithm

- **Backtracking**
  16. N-Queen's problem

- **Branch and Bound**
  17. Travelling Salesman Problem
