Department of Computer Science and Engineering

Syllabus for SY B.Tech (CSE)

From Academic Year 2015-16

Type/Code	Name of the course	Credits	Lectures/ Week	Tutorials/ Week	Practical/ Week
Semester – I					
UMA201	Engineering Mathematics –III (Differential equations)	04	04	-----	-----
UCS203	Discrete Mathematics	04	03	01	-----
UCS205	Digital System Design	04	03	-----	02
UCS207	Basics of Electronics	03	03	-----	----
UCS209	Object Oriented Programming with Java	04	03	-----	02
UCS211	Computer Lab I	01	-----	----	02
UHS221	Professional Communication	03	02	------	02
	Total	23	18	01	08
Semester - II					
UMA202	Engineering Mathematics – IV(Complex Analysis)	04	04	--	--
UCS204	Data Structures	04	03	--	02
UCS206	Microprocessors and Interfacing	04	03	--	02
UCS208	Computer Organization and Architecture	03	03	---	--
UCS210	Numerical and Scientific Computing	04	03	--	02
UCS212	Computer Lab II	01	---	--	02
UHS222	Human Values and Professional Ethics	02	02	--	--
	Total	22	18	---	08

SEMESTER I

UMA201
Engineering Mathematics-III (Differential Equations) (L-4, T-0, P-0, CR-4)

Course objectives*: To acquaint student with: the basic concepts of an ordinary differential equations, partial differential equations, Mathematical Modelling in physical problems. Initial and boundary value problems. Motivate students to use critical thinking skill to solve practical problems.*

Course Outcomes:

- *Calculate the coefficients of both the complex and the real Fourier series for a variety functions, and to use them to solve some ordinary differential equations.*
- *Calculate Fourier transforms, discrete or continuous, for a variety of simple functions students will then be able to use these to compute convolutions in simple cases.*
- *Ability to know the nature of series and sequences.*

Unit 1:

Basic Concepts & Ideas, Geometric Meaning of y′= f(x, y) , direction field , exact equations, Integrating factors, Linear differential equation, Bernoulli's equations, orthogonal trajectories, applications to electrical circuits.

Unit 2:

Second Order Differential equations, Homogeneous linear differential equation for real & complex roots, Euler Cauchy equation, existence & uniqueness theorem (Without proof) &Wronskian.

Unit 3:

Non homogeneous equation, solutions by undetermined coefficients & Variation of parameter methods, modeling, forced oscillation, resonance & electrical circuits, system of differential equations.

Unit 4:

Fourier Series, Periodic function, Fourier theorem Euler's formulae for the Fourier coefficients, convergence of Fourier series, change of interval, even & odd function functions , half range Fourier series.

Unit 5:

Partial differential equations, Separation of Variables, Vibrations of string, one dimensional equation.

Text/Reference Books:

1. Advanced Engineering Mathematics – R.K Jain & S.R.K Iyenger
2. Advanced Engineering Mathematics- Erwin Kreyszig
3. Elementary Differential Equation(eighth edition) W.E Boyce & R. Diprima (John Wiley 2005)
4. Fourier series & boundary Valued Problems., R.V Churchill & JW Brown(Seventh edition) McGraw Hill(2006).

UCS203

Discrete Mathematics (L-3, T-1, P-0, CR-4)

Course Objectives: *students will be able to explain and apply the basic methods of discrete mathematics in Computer Science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, and software engineering.*

Course Outcomes:

- *Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by induction.*
- *Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction, for example, scheduling.*
- *Calculate probabilities and discrete distributions for simple combinatorial processes; calculate expectations.*

The Foundations: Logic sets and Functions. Logic, Propositions and Prepositional equivalences, Predicates and quantifiers, sets and set operations, Functions, Sequences and summations, the growth of functions.

Number Theory: Introduction, Complexity of Algorithms, basic properties, divisibility theory, Congruence and its applications.

Mathematical Reasoning: Mathematical induction, Recursively defined Functions Recursively defined sets, Recursive algorithms, methods of proof, methods of proving theorems, Theorems and Quantifiers.

Counting: The basics of counting, the pigeonhole principle, Permutations and Combinations, Discrete Probability, Probability theory, Generalized Permutations and Combinations, Generating Permutations, Combinations and advanced counting techniques.

Relations: Relations and their properties, n-ary relations and their applications, Representing relations, closures of Relations, Equivalence relations, and Partial orderings.

Group Theory: Introduction, Binary operations, Group, Groupoid, Semigroup and Monoid, Sub-Group, Cyclic Group, Permutation Group, Homomorphism and Isomorphism of Groups.

Rings and Fields: Introduction, Ring, Sub-ring and Ring Homomorphism.

Graphs: Graph Terminology, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest Path Problems, Planar Graphs, Graph Coloring.

Trees: Introduction, Applications of Trees, Tree Traversal, Trees and Sorting, Spanning Trees, Minimum Spanning Trees.

Reference Books:

1. L. Lovasz J. Pellikan K. Vesztergombi, *Discrete Mathematics*, Springer, 2003.
2. Kenneth H. Rosen, *Discrete Mathematics and its applications*, 3rd ed., McGraw Hill, 1995.
3. John Truss, *Discrete Mathematics for computer Scientists*, 2nd ed., Addison Wesley, 1999.

UCS 205 Digital System Design (L-3, T-0, P-2, CR-4)

Course Objective: *The students will learn how a Hardware Description Language (HDL) is used to describe and implement hardware and enable students to design digital systems of medium complexity, and to teach how to implement the design VHDL and different memory device.*

Course Outcomes:

- *An ability to describe, design, simulate, and synthesize computer hardware using the Verilog hardware description language.*
- *An ability to rapidly design combinational and sequential logic that works.*
- *An ability to synthesize logic and state machines using an Automatic Logic Synthesis program.*
- *Write a verilog testbench to test verilog modules and Define and describe digital design flows for system design and recognise the tradeoffs involved in different approaches.*

Introduction

Number systems, code conversions- binary code to gray code and gray to binary, BCD to Excess –3, Excess–3 to, BCD code, error detecting and correcting codes etc.

Combinational Logic Design: Switching algebra, combinational circuit analysis, combinational circuit synthesis, and combinational circuit minimization, K-Map of three, four, five variable functions, minimizing SOP and POS expressions. Quine-McClusky minimization, timing hazards, combinational PLDs, design of encoders, decoders, multiplexers, comparators, arithmetic circuits- half and full adders, ripple adders, subtractors, carry look ahead adders.

Sequential Logic Design: Latches and flip flops, edge triggered and master-slave flip flops (SR, JK, D, T etc), clocked synchronous state machine analysis and design, designing state machines using state diagrams, state machine synthesis using transition lists, decomposing state machines, feedback sequential circuit design.

Counters and Shift Registers: Asynchronous counters, Synchronous counters, MOD counters, presentable counters, shift-counters, Up-down counters, Ripple counters, Shift Registers, Serial in Serial out, Serial in parallel out, Parallel in Serial out, and Parallel in Parallel out shift Registers, impediments to synchronous design.

Designing using VHDL: Introduction to VHDL, modeling styles, data flow, behavioral, structural and mixed, VHDL description of combinational networks, modeling flip flops using VHDL, VHDL models for multiplexer, compilation and simulation of VHDL code, modeling a sequential machine, variables, signals and constants, arrays, VHDL operators, VHDL functions, VHDL procedures, attributes, multilevel logic and signal resolution.

Semiconductor Memories: Introduction, memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read-only memory, read and write memory, content addressable memory.

Reference Books:

1. J. F. Wakerly, Digital design - Principles and practices, PH International Pearson India, Third edition
2. M Morris Mano "Digital Design" 3rd Edition Prentice Hall, 2001, ISBN-10 / ASIN:0130621218 ISBN -13 / EAN:9780130621214
3. R.P. Jain, "Modern Digital Electronics", 3rd Edition, Tata McGraw -Hill, 2003, ISBN 0 –07–049492 –4\
4. A.P. Malvino, D. P. Leach and G.Saha, "Digital Principles and Applications," 7th Edition, McGraw Hill, 2010

5. J. Bhasker, VHDL primer, Pearson Education Asia, third edition
6. W. I. Fletcher, An Engineering approach to digital design, PHI
7. Kevin Skahill, VHDL for programmable logic, Addison Wesley

Note: Student will perform at least 12 Practical based on above syllabus.

UCS207 Basics of Electronics (L-3, T-0, P-0, CR-3)

Course Objectives: *The capability to use abstractions to analyze and design simple electronic circuits and understanding of how complex devices such as semiconductor diodes and field-effect transistors are modeled and how the models are used in the design and analysis of useful circuits.*

Course Outcomes:

- *Learn how to develop and employ circuit models for elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistors.*
- *Become adept at using various methods of circuit analysis, including simplified methods such as series-parallel reductions, voltage and current dividers, and the node method.*
- *Ability to demonstrate an understanding of operational amplifiers and their internal devices, including BJT and CMOS transistors, DC biasing techniques and small signal modelling.*
- *Able to analyze and design basic electronic circuits, particularly with application to diodes, MOS field-effect transistors, bipolar junction transistors, operational amplifiers.*

Semiconductor Diodes - Semiconductor materials-intrinsic and extrinsic types, Ideal Diode, Terminal characteristics of diodes, p-n junction under open circuit condition, p-n junction under forward bias and reverse bias conditions, p-n junction in breakdown region, Diode small signal model, Zener diode and applications, Rectifier Circuits, Clipping and Clamping circuits.

Bipolar Junction Transistors (BJTs): Physical structure and operation modes. Active region operation of transistor, D.C. analysis of transistor circuits, Transistor as an amplifier, biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, Transistor as a switch: cut-off and saturation modes, high frequency model of BJT amplifier.

Transistors: Bipolar and Field effect transistors with their h-parameters equivalent circuits. Basic amplifiers classification and their circuits Regulators and Inverters: Zener Diode regulator, Transistorized an IC regulators and Simple Inverter Circuits.

Modulation and Demodulation Schemes: Amplitude modulation, Frequency modulation, Phase modulation, Demodulation principal, AM Detectors, FM Detectors, Introduction to Digital Modulation.

Oscillators- LC Type and RC Type Oscillators and Crystal Oscillators.

Transducer: LVDT, Straingauge, Temperature, Force. Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, TRAIC, DIAC, UJT Construction and Characteristics only.

Reference Books:

1. Debashis De. *Basic Electronics* Pearson Publisher
2. Paul Horowitz *Art of Electronics*, Cambridge LPE
3. Allen Mottershed*Electronics Devices and Circits* An Introduction –PHI
4. A P Malvino, Donald Leech. Fourth Edition. *Digital Priciples and Applications* TataMcGrawHill.

UCS209

Object Oriented Programming with Java (L-3, T-0, P-2, CR-4)

Course Objectives: *Understand fundamentals of programming such as variables, conditional and iterative execution, methods and Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.*

Course Outcomes:

- *Be able to understand better the object-oriented approach in programming. Students should be able to analyze and design a computer program to solve real world problems based on object-oriented principles.*
- *To learn and appreciate the importance and merits of proper comments in source code and API documentations.*
- *Be able to write simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles.*
- *To be able to apply an object oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.*

Fundamentals of Object oriented Programming: Introduction, Differences with Procedural Languages, Object Oriented Paradigm: Objects and classes, Data abstraction and Encapsulation, Inheritance and Polymorphism, Function overloading, Exceptions.

Java Evolution: Features of java, Java Environment, Java Virtual Machine. Constants, variables and Data types, Arrays, Stings and vectors, Operators & Expressions and Control Structures.

Java Classes, Objects and methods: Abstract classes, Static methods, Inner classes, Packages, Wrapper classes, Interfaces: Multiple Inheritance, Putting Classes together.

Exception handling: Exception as objects, Exception hierarchy, Try catch finally Throw, throws

IO package: Input streams, Output streams, Object serialization, Deserialization, Sample programs on io files, Filter And Pipe Streams.

Multi-Threading: Thread life cycle, Multi-threading advantages and issues, Simple thread program, Thread synchronization.

Reference Books:

1. E. Balagurusamy, *Programming with Java A Primer,* TMH, 1998.
2. Herbert schildt, *The Complete Reference JAVA2,* 2nd ed., TMH, 2002.
3. Horstmann, Cornell, *Core Java 2: Volume 1-Fundanmentals*, Pearson Educa-tion, 2000.
4. Kathy Sierra & Bert Bates *Head First Java*, 2nd edition O'RELLY 2015.

Note: Student will perform at least 12 Practical's based upon above syllabus.

UCS 211

Computer Lab - I (L-0, T-0, P-2, CR-01)

Course Objectives: *Understand fundamentals of Basic OS commands, Various Utilities and Basics of Web design and Programming.*

Course Outcomes:

- *Students able to understand Basic OS Commands.*
- *Able to understand Various Linux Utilities.*
- *Basics of Web design and Programming.*

Course Contents:

- Student will learn "OS Basics/System Commands/Study of various utilities/Basics of Web design and Programming".
- However teacher may teach recent topics in the same area to give exposure to the students.
- Student are expected to carry out at least 10 -15 Experiments / Exercise in this Subject.

UHS 221 Professional Communication (L-2, T-0, P-2, CR-3)

Objectives:

1. *To enable students to speak and write English with a good level of proficiency.*
2. *To build confidence in students to face interview, deliver speech, make presentation and participate in meeting and discussion.*
3. *To lay a strong foundation on the subject by revising and correcting the basics.*

Unit 1: Functional Grammar

Building of a sentence and its components, Tense- the time sense: Present, Past and Future tense with uses and applications, Verbs, Noun, Pronoun, Adjective, Adverb, Prepositions and Conjunctions: classification, identifications, uses and applications Active & Passive voice, direct and indirect speech, clause, principles of effective communication.

Unit 2: Listening Skills

Requirements of listening skill, Phonetics and phonology, Articulation of consonants and vowels, Syllables, Weak form stress, Rhythm and intonation, Face to face conversation, Telephonic conversation.

Unit 3: Reading Skills

Requirements of reading skill**,** Reading poetry, Reading prose, Reading article from standard newspaper/ magazine

Unit 4: Writing Skill

Paragraph, Resumes, Letters- formal and informal, Circular, Notice, Agendas, Minutes, Reports, E-mail and Blog writing

Unit 5: Speaking Skills

Requirement of speaking skills, grammatical difficulties, Practice of public speaking, Conversation between /among students or groups on given situations

Unit 6: Integration of skills

Group discussion, Personal interview, Debate and Quiz competition, ppt Presentation

Practicals and Assignments:

- Practice of building of sentences and identification of components.
- Practice the uses and applications of tense.
- Identification of parts of speech and form changes- use in sentences.
- Identification of various clauses and their use in sentences.
- **Listening Skills:** Listen few BBC / Voice of America/ NDTV 24*7 or similar standard Television channel / Radio or any standard talk/discussion available in CD/DVD and answer the given questions/ write the summery.
- **Reading Skills:** Read few articles from standard newspaper The Hindu/ The Times of India / magazine /books and answer the given questions /write the summery.

1. **Writing Skills: (Assignments)**
    a. Write your own CV
    b. Write an E-mail
    c. Write a blog on current topic of discussion
    d. Write a technical report
    e. Write a letter
    f. Comprehension Tests
2. **Speaking and Integration of Skills:**
    a. Converse on few given situations
    b. Group Discussions on a given topic
    c. Debate competition on a given topic
    d. Quiz competition among few groups of students
    e. ppt presentation

Reference Books:

- Essential English Grammar, Raymond Murphy, Cambridge University Press, 1 December, 2007.
- Oxford English Grammar Course: Advanced, Michael Swan and Catherine Walter, Oxford, 24 February, 2012.
- Advanced English Grammar, Martin Hewings, Cambridge University Press, 1 December, 2007.
- *Developing Communication Skills,* Krishna Mohan and Meera Banerjee, Macmillan India Ltd, New Delhi, 2nd Edition, 2009.
- Oxford Advanced Learner's Dictionary, 8th Edition.

SEMESTER-II

UMA202
Engineering Mathematics – IV (Complex Analysis) (L-4, T-0, P-0, CR-4)

Course objectives*: To acquaint student with: the basic concepts of complex variables and the function of complex variables. Motivate students to use critical thinking skill to solve practical problems in Engineering and technology.*

Course Outcomes:

- *Enhance those mathematical skills required for further studies in, the technological sciences.*
- *Student will able to learn Introduction to Complex Variables.*
- *Able to learn to learn Taylors &Laurent's Series expansions, Function of complex variables, limit, continuity and various mathematical problems.*
- *Able to learn Residues, Cauchy's Residue Theorem and Conformal mappings.*

Unit-1
Introduction to Complex Variables.

Unit-2
Function of complex variables, limit, continuity, differentiability, Analytic function & its properties, Cauchy-Riemann equation, Harmonic functions, elementary functions.

Unit-3
Line Integral, Cauchy's theorem & Cauchy's Integral formula & its Applications.

Unit-4
Taylors &Laurent's Series expansions.

Unit-5
Residues, Cauchy's Residue Theorem.

Unit-6
Evaluation of Improper Integrals, Conformal mappings.

Text/Reference Books:

- Function Of Complex Variables Dr.A.R.Shastri
- Advanced Engineering Mathematics – R.K Jain& S.R.K Iyenger
- Advanced Engineering Mathematics- Erwin Kreyszig
- Complex Variables & application R.V Churchill ,JW Brown(seventh edition),McGraw Hill(2003)

UCS204

Data Structures (L-3, T-0, P-2, CR-4)

Course Objectives: *Designing and applying appropriate data structure using simple algorithms for modeling and solving given computing problems and also able to understand Programming thinking using stack, Pointer etc.*

Course Objectives:

- *Identify, understand and determine the usage of various data structures, operations and associated algorithms.*
- *Compare and contrast the cost and benefits of dynamic and static structure implementations.*
- *Understand, analyze and Develop programs to implement different data structures such as: arrays, linked lists, stacks, queues, trees, hash tables, and graphs and related algorithms.*
- *Some programming languages emphasize data structures, rather than algorithms, as the key organizing factor in software design.*

Introduction to Data Structures: Concepts of data and algorithms, Data object, Data type, Storage of data in memory, Arrays and Representation of Arrays, Pointers and Structures.

Stack and Queues: Stack Definition and concepts, operations on stack, Stacks and Expression Evaluation, Stacks and Recursion, Definition of Queue operations, Stack and Queue implementation, Simulation.

Linked Lists: Linear Linked Lists, Operations on linear Lists using singly linked storage Structures, Circularly Linked lists, doubly Linked lists, applications of lists.

Trees: Definition and concepts, operation on Binary trees, Storage representation and manipulation of Binary trees, Linked storage Representation of Binary tree, conversion of general trees to binary trees, sequential and other representation of trees, applications of trees.

Graphs: Graph definition and concepts, graph representation, Matrix representation of graph, List structures and other representation of graph, Breadth first search and depth first search, spanning trees and applications of graph.

Searching and Sorting: Linear search, Binary search, tree searching, hashing, Bubble sort, quick sort, insertion sort, selection sort.

Reference Books:

1. Tremblay and Sorenson, *An Introduction to Data Structures with Application*, TMH, 2006.
2. Ashok N kamthane*Introduction to Data Structure in C,* Pearson Education.
3. Tenenbaum, Langsam and Angenstein, *Data Structures using C and C++,* 2nd ed., PHI, 2002.
4. Data Structures A Pseudocode Approach with C, Richard F. Gilberg, Behrouz A. Forouzan, Thomson Books/Cole.

Note: Student will perform at least 12 Practical's based upon above syllabus.

UCS206
Microprocessors and Interfacing (L-3, T-0, P-2, CR-4)

Course Objectives: *To learn programming in assembly language and Assembly language programming will be studied as well as the design of various types of digital and analog interfaces. The accompanying lab is designed to provide practical hands-on experience with microprocessor software applications and interfacing techniques.*

Course Outcomes:

- *Understanding of the Intel 8086/8088 architecture.*
- *Knowledge of the 8086/8088 instruction set and ability to utilize it in programming.*
- *Understanding of the Intel 8086/8088 real mode memory addressing.*
- *Ability to interface various devices to the microprocessor.*

Introduction: Internal architecture and pin diagram of 8086/8088 microprocessor, Minimum and maximum mode, Timing Diagrams, Address decoding, even and odd memory banks, Accessing memory and I/O ports.
Programming with 8086/8088: Addressing Modes, Instruction set, Instruction encoding format, Assembler directives, 8086 programming examples, String operations, File I/O processing, Far and Near procedures, Macros, Timing and delay loops, '.EXE' and '.COM' file structures, BIOS calls: INT 10H calls, DOS calls: INT 21H calls, TSRs.
Interrupt Structure: 8086 interrupt structure, 8259 priority interrupt controller, interfacing and programming.

Interfacing with 8086/8088: Memory interfacing, Programmable parallel ports, Intel 8255, Block diagram and interfacing, Keyboard/Display Controller 8279: block diagram, system connections and programming.

Reference Books:

1. Douglas V. Hall, *Microprocessors and Interfacing, Programming and Hardware,* 2nd ed., TMH, 1991.
2. Y. Liu, G. Gibson, *Microcomputer Systems: The 8086/8088 Family, Architecture, Programming and Design,* 2nd ed., Prentice-Hall of India, 1986.
3. A. Ray, K. M. Bhurchandi, *Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing*, Tata McGraw-Hill, 2000.
4. J. Uffenbeck, *80x86 Family: Design, Programming, and Interfacing,* Prentice Hall, 2003.
5. Barry B. Brey, *the Intel Microprocessors: 8086/8088, 80186, 80286, 80386, 80486, Pentium, Pentium Pro, and Pentium II,* 5th ed., Prentice-Hall, 2001.
6. Udaykumar, *Advanced Microprocessors -Intel 8086/8088 architecture, programming and interfacing*, TMH.

Note: Student will perform at least 12 Practical's based upon above syllabus.

UCS208 Computer Organization & Architecture (L-3, T-0, P-0, CR-3)

Course Objectives: *To have a thorough understanding of the basic structure and operation of a digital computer and To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication &division.*

Course Outcomes:

- *Familiar with the number systems including computer arithmetic.*
- *Familiar with the Von Neumann architecture, functional units of the processor such as the register file and arithmetic-logical unit.*
- *Familiar with the basics of systems topics: single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures, cost-performance issues and design trade-offs in designing, quantitative performance evaluation of computer systems.*
- *Familiar with the cache subsystem, assembly language programming, representation of data, addressing modes, instructions sets, basic knowledge the design of digital logic circuits and apply to computer organization.*

Introduction: Organization and architecture, structure and function, a brief history of computers, designing for performance.

The computer system: Computer components and function, interconnection structures, bus interconnection, peripheral component interconnect, computer memory system overview, semiconductor main memory, cache memory, cache organization, advanced DRAM organization, external memory and input/output.

The central processing unit: The arithmetic and logic unit, integer representation, integer arithmetic, floating point representation, floating point arithmetic, processor organization, register organization, instruction cycle, instruction pipelining, Pentium processor, instruction execution characteristics, use of a large register file, compiler-based register optimization, reduced instruction set architecture, RISC pipelining, RISC versus CISC controversy .

The control unit: Micro-operations, control of the processor, hardwired implementation, basic concepts of the micro-programmed control, microinstruction sequencing and execution and applications of microprogramming.

Multiprocessors: Programming multiprocessors, single bus and network oriented multiprocessors, clusters, and network topologies.

Reference Books:

1. David A. Patterson, John L. Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, 2nd ed., Morgan-Kaufman publisher, 2002.
2. William Stallings, *Computer organization and architecture*, 6th ed., Pearson Education, 2003.
3. Randal Bryant and David, *O'Hallaron Computer Systems: A Programmer's Perspective (CS: APP)*, Prentice Hall, 2002.

UCS210
Numerical and Scientific Computing (L-3, T-0, P-2, CR-4)

Course Objectives: *To demonstrate understanding of numerical and statistical methods in support of the analysis, design and application for problem solving in the field of information technology.*

Course Outcomes:

- *Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.*
- *Apply method of interpolation and extrapolation for prediction.*
- *Recognize elements and variable in statistics and summarize qualitative and quantitative data.*
- *Student will able to learn Interpolation, Numerical integration and Differentiation.*
- *Student will able to learn understanding of various data structures, storage schemes etc.*

Introduction: introduction to Scientific Computing.

Review of matrices and linear systems: Matrices and Matrix Operations**,** vectors in 2D and 3D,Linear Transformations of Euclidean n-Spaces with applications in Computer Graphics and Cryptography, Eigenvalues and Eigenvectors, diagonalization, orthogonal diagonalization, Linear Least Squares.

Iterative Methods: Successive Bisection, Method of False position, Newton Rampson Method, Comparison of Iterative Methods, Solution of Polynomial Equations and Solution of Non Linear Equations.

Interpolation, **Numerical integration and Differentiation**: Solving Initial and Boundary Value Problems for Ordinary Differential Equations. Throughout the course implementation of the various methods and their comparisons with professionally written software such as Matlab, Scilab, LINPACK, Mathematica, will be emphasized with the understanding of various data structures, storage schemes etc.

Reference Books:

1. Samuel Conte and Carl De Boor, Elementary Numerical Analysis, McGraw Hill International Edition.
2. V. Rajaraman, Computer Oriented Numerical Methods, PHI, 1994.
3. H. Anton and C. Rorrers, Elementary Linear Algebra (applications version), 9th ed., Willey India Pvt. Ltd., 2009.
4. W. Press, W. Vetterling, B. Flannery, S. Teukolsky, Numerical recipes in C: The Art of Scientific Computing, 2nd ed., Cambridge University Press, 1992.
5. Gilbert Strang, Linear Algebra and its applications, Wellesley-Cambridge Press, 2003.
6. Ralph G. Stanton, Numerical Methods for Science and Engineering, PHI.

Note: Student will perform at least 12 Practical's based upon above syllabus.

UCS 212
Computer Lab - II (L-0, T-0, P-2, CR-01)

Course Objectives: *Student understand Advanced Web design and Programming using Recent Technologies.*

Course Outcomes:

- *Introducing the design principles and techniques of web site design.*
- *Website Development Process.*
- *Implement and understand how to interpret basic web analytics.*

Course Contents:

- Student will learn "Advanced Web design and Programming / HTML5 and advanced tools OR visual design and basics of Android Application".
- However teacher may teach recent topics in the same area to give exposure to the students.
- Student are expected to carry out at least 10 -15 Experiments / Exercise in this Subject.

UHS 222 Human Value and Professional Ethics. (L-2, T-0, P-0, CR-2)

Course Objectives:

1. *Making the students aware and sensitive to value system in real life situations.*
2. *To help the students to discriminate between ephemeral and eternal values.*
3. *To discriminate between essence and form.*

Course Outcomes:

The students will be able to recognize importance of human values, harmony and ethical behavior in real life situations.

Unit 1: Course Introduction

- Need, Basic Guidelines, Content and Process for Value Education
- Understanding the need, basic guidelines, content and process for Value Education.
- A look at basic aspirations: Self Exploration, Happiness and Prosperity.
- Fulfillment of human aspirations and harmony.

Unit 2: Understanding the Harmony

- Thoughtful human being harmony, sentient, attitude and its importance in relationship.
- Significance of restraint and health *(Yama and Niyama).*
- Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order.

Unit 3: Understanding professional Ethics

- Harmony at various levels and understanding professional ethics.
- Creating environmentally aware engineers.
- Humanistic universal education, natural acceptance of human values, ethical human conduct.

Unit 4: Competence of professional ethics

- Management models for present technologies, strategies for integrating humans in family and at all levels of existence.
- Relevance of the above strategies in becoming responsible engineers, technologists and managers.

Unit 5: Motivation

- Contribution of ancestors in science and technology development to raise self-esteem in Indian context.

Reference Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
5. A.N. Tripathy, 2003, Human Values, New Age International Publishers
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

8. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
9. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
10. Subroto Bagchi, The Professional
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008. Scheme and Syllabus Bachelor of Computer.