

**B.Sc. (IT)**  
**Detailed Syllabus**

**BSc IT Semester - I**

| <b>Course Code</b> | <b>Course Title</b>                    | <b>Credits</b> |
|--------------------|--|----------------|
| IS 1101            | Fundamentals of Information Technology | 4              |
| IS 1102            | Digital Electronics                    | 4              |
| IS 1103            | English                                | 4              |
| IS 1104            | Principles of C Programming            | 4              |
| IS 1161            | Programming Lab – I                    | 1.5            |
|                    | <b>Total Credits</b>                   | <b>17.5</b>    |

**IS 1101 Fundamentals of Information Technology (4 Credits)**

**Questions to be set:**                    **Eight (Four from each unit)**

**Questions to be answered:**        **Any Five selecting at least Two from each unit**

**UNIT I**

**Introduction to Computers**

Basics of computer , Characteristics of computers, Limitations of computers, System Components, Input devices, Output devices, Computer Memory, Central Processing Unit, Mother Board

**Computer Generations & Classifications**

Evolution of computers, Classification of Computers, Types of Microcomputers Distributed Computer

### **Number Systems and Boolean algebra**

Decimal, Binary, Octal, Hexadecimal, Converting Techniques in Number systems, 1's Complements, 2's Complements, Computer Codes, Rules and Laws of Boolean algebra, Basic Gates (NOT, AND & OR)

### **Logical Circuits**

Combinational Circuits, Sequential Circuits, Flip Flops, Shift registers, Types of shift registers, Counters

### **CPU**

CPU Essentials, Modern CPU concepts- CISC vs. RISC CPUs, Circuit Size and Die Size, Processor Speed, Processor Cooling, System Clocks, CPU Overclocking

### **Computer Memory**

Memory System, Memory Cells, Memory Arrays, Random Access Memory (RAM) Read Only Memory (ROM), Physical Devices Used to construct Memories

### **Bus**

Bus, Bus Interface, Industry standard architecture (ISA), Micro Channel Architecture (MCA), VESA (Video Electronics Standards Association, Peripheral component Interconnect, Accelerated graphics Port, FSB, USB, Dual Independent Bus, Troubleshooting

## **UNIT II**

### **Storage Devices**

Hard Disk- Construction, IDE drive standard and features, Troubleshooting, DVD, Blue-Ray disc, Flash Memory,

### **Input Output Devices**

Wired and Wireless connectivity, Wired and Wireless Devices, Input Devices, Touch Screen, Visual Display Terminal, Troubleshooting

### **Introduction to Computer Software**

Computer Software, Overview of different operating systems, Overview of different application software, Overview of proprietary software, Overview of open source technology

### **Software Development, Design and Testing**

Requirement Analysis, Design Process, Models for System Development, Software Testing Life Cycle, Software Testing, Software Paradigms, Programming Methods, Software Applications

### **Operating System Concepts**

Operating System Concepts, Functions of Operating System, Development of Operating System, Operating system virtual memory, Operating System Components, Operating System Services, Operating System Security

### **Internet and Its Working**

History of Internet , Web browsers, Web servers, Hypertext Transfer Protocol , Internet Protocols Addressing, Internet Connection Types, How Internet Works

### **Internet and Its Uses**

Internet Security, Uses of Internet, Virus, Antivirus, Cloud System, Cloud Technologies, Cloud Architecture, Cloud Infrastructure, Cloud Deployment Models

### **Text/Reference books:**

- Introduction to Digital Media by Tony Feldman.
- Kaye, Barbaka K.Norman J Medoff (2001), The World Wide Web – A mass communication perspective, Mc Graw Hill Higher Education, New York.
- Feldman, Tony – Introduction to Digital Media
- Digital Computer Fundamentals by Bartee, Thomas C.

## IS 1102 **DIGITAL ELECTRONICS (4 Credits)**

**Questions to be set:**                      **Eight (Four from each unit)**

**Questions to be answered:**        **Any Five selecting at least Two from each unit**

### **UNIT I**

#### **Introduction to Digital Systems**

Introduction to Digital electronics ,Digital and Analog Signals and Systems, Binary Digits, Logic Levels, and Digital Waveforms, Logic Systems-Positive and negative, Logic Operations, Combinational and Sequential Logic Functions, Programmable Logic, Fixed-Function Logic Devices.

#### **Number Systems and Codes**

Introduction to Number Systems-Types-Decimal, Binary, Octal, Hexadecimal; Conversion from one number system to other; Binary arithmetic operations; Representation of Negative Numbers;1's complement and 2's complement, Complement arithmetic, BCD code, Digital Codes - Excess-3 code, Gray code, Binary to Excess -3 code conversion and vice versa, ASCII code, EBCDIC code , Error Detection Codes.

#### **Logic Gates**

Logical Operators, Logic Gates-Basic Gates, Other gates, Active high and Active low concepts, Universal Gates and realization of other gates using universal gates, Gate Performance Characteristics and Parameters.

#### **Boolean Algebra**

Rules and laws of Boolean algebra, Demorgan's Theorems, Boolean Expressions and Truth Tables, Standard SOP and POS forms; Minterm and Maxterms, Canaonical representation of Boolean expressions, Duality Theorem, Simplification of Boolean Expressions, Minimization Techniques for Boolean Expressions using Karnaugh Map and Quine McCluskey Tabular method.

#### **Combinational Circuits-Part 1**

Introduction to combinational Circuits, Adders-Half-Adder and Full-Adder, Subtractors- Half and Full Subtractor; Parallel adder and Subtractor; Ripple Carry and Look-Ahead Carry Adders.

#### **Combinational Circuits- Part 2**

BCD adder, BCD subtractor, Parity Checker/Generator, Multiplexer, Demultiplexer, Encoder, Priority Encoder; Decoder, BCD to Seven segment Display Decoder/Driver, LCD Display, and Comparators.

### **Sequential Circuits**

Introduction to Sequential Circuits, Flip-Flops: Types of Flip Flops -RS, T, D, JK; Triggering of Flip Flops; Flip Flop conversions; Master-Slave JK.

## **UNIT II**

### **Shift Registers**

Introduction to shift registers, Basic Shift Register Operations, types of shift registers, Bidirectional Shift Registers, Shift Register Counters. Typical ICS for shift registers; PRBS generators.

### **Counters**

Introduction to counters, Types of Counters-Asynchronous and synchronous counters, Up/Down Synchronous Counters, Cascaded Counters, Counter Decoding, State table, excitation table concepts, Design of asynchronous and synchronous counters, Typical ICS for counters, Applications of counters.

### **A/D and D/A Converters**

Digital to Analog Converter, Weighted Register: R-2R Ladder Network: Analog to Digital Conversion, Successive Approximation Type, Dual Slope Type.

### **Programmable Logic**

Simple Programmable Logic Devices (SPLDs), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Arrays (FPGAs), Programmable Logic Software.

### **Computer Concepts**

Basic Computer System, concepts of hardware and software, Operating Systems, Microcontrollers and Embedded Systems., Digital Signal Processing, Digital Signal Processor (DSP).

## **Memory and Storage**

Semiconductor Memory Basics, Types-RAM, ROM, Programmable ROMs, Flash Memory, Memory Expansion, Special Types of Memories, Magnetic and Optical Storage.

## **Logic Families**

Transistor as a switch, Definition of parameters-current voltage parameters, Fan in, Fan out, Noise Margin, Propagation Delay, Power Dissipation; Resistor Transistor Logic(RTL), Diode Transistor Logic (DTL), Transistor-Transistor Logic (TTL), Typical TTL NAND Gate, Function of the Input Transistor, Volt-Ampere Characteristics, Output Stages: Totem Pole and Modified Totem Pole, Open collector outputs; Emitter Coupled Logic (ECL), Integrated Injection Logic (IIL) and MOS-logic, Comparison of Various Logic Families.

## **Text/Reference Books**

1. Digital Electronics-An Introduction to Theory and Practice”, William H.Gothman, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Digital Circuits and Logic Design” Morris Manno, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Digital Fundamentals-Thomas Floyd. UBS
4. Digital Integrated Electronics” Herbert Taub and Donald Schilling, McGraw Hill Book Co.
5. Digital Systems-Principles and applications- Ronald J Tocci
6. Digital Principles and applications-Albert Paul Malvino Donald P.Leach, Tata Mc Graw-Hill
7. Microprocessors and Digital Systems-Douglass V.Hall
8. Modern Digital Electronics-R.P Jain, 4<sup>th</sup> edition ,2010.Tata Mc Graw-Hill.
9. Digital Electronics: Principles and Integrated circuits by Anil k. Maini,2008,Wiley

**IS 1103 English (4 credits)**

**Questions to be set: Eight (Four from each unit)**

**Questions to be answered: Any Five selecting at least Two from each unit**

**UNIT I**

Vocabulary: Use of Dictionary, Use of Words: Diminutives, Homonyms & Homophones

Essentials of Grammar – I: Articles, Parts of Speech, Tenses

Essentials of Grammar – II: Sentence Structure, Subject -Verb agreement, Punctuation

Communication: The process and importance, Principles & benefits of Effective Communication

Spoken English Communication: Speech Drills, Pronunciation and accent, Stress and Intonation

Communication Skills-I: Developing listening skills, Developing speaking skills

**UNIT II**

Communication Skills-II: Developing Reading Skills, Developing writing Skills

Written English communication: Progression of Thought/ideas, Structure of Paragraph, Structure of Essays

Writing Skills: Note Taking; Paraphrasing; Elements of writing; Business Letter Writing; Other Business Communications

Business Writing: Business Letter Writing, Types of Business Letter, Job application, Other Business Communication.

Short Stories: Reading and Comprehension

### **Text/Reference Books**

- Randolph Quirk, Sidney Greenbaum, Geoffrey Leech, Jan Svartvik, *A Comprehensive Grammar of the English Language*, LongMan Publications
- Raymond Murphy, *Essential English Grammar*, Cambridge University Press
- Urmila Rai and S.M. Rai, *Business Communication*, Himalaya Publishing House
- Susan F. Miller, *Targeting Pronunciation: The Intonation, Sounds and Rhythm of American English*, Houghton Mifflin Company
- Alice Oshima, *Writing Academic English*, Pearson Longman
- Betty Schramper Azar, *Understanding and Using English Grammar*, Prentice Hall College Div
- Raymond Murphy, *English Grammar In Use*, Cambridge University Press



## IS 1104 Principles of C Programming (4 Credits)

Questions to be set: Eight (Four from each unit)

Questions to be answered: Any Five selecting at least Two from each unit

### UNIT I

#### **Introduction to Principles of programming:**

Introduction to Programming , Programing Domain : Scientific Application , Business Applications, Artificial Intelligence, Systems Programming , Web Software Categories of Programming Languages: Machine Level Languages, Assembly Level Languages , High Level Languages Programming Design Methodologies : Top Down and Bottom UP Program Development Cycle with case study, Program Execution and Translation Process ,Problem solving using Algorithms and Flowcharts, Performance Analysis and Measurements: Time and Space complexity

#### **Introduction to C Programming:**

Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables

#### **Operators and Expressions:**

Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators.

#### **Data Types and Input/Output Operators:**

Floating-point Numbers, Converting Integers to Floating-point and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions, Interactive Programming.

#### **Control Statements and Decision Making:**

The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while

loop, The do...while loop, The for loop, The nesting of for loops, The break statement and continue statement.

**Arrays and Strings:**

One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings

**Pointers – I:**

Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays.

## UNIT II

**Pointers – II:**

Null pointers, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers

**Structures and Unions:**

Basics of Structures, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions.

**Functions:**

Function Philosophy, Function Basics, Function Prototypes, and Passing Parameters: Passing Parameter by value and Passing Parameter by reference, passing string to function, Passing array to function, Structures and Functions Recursion

**Storage Classes:**

Storage Classes and Visibility, Automatic or local variables, Global variables, Static variables, External variables

**The Pre-processor:**

File Inclusion, Macro Definition and Substitution, Macros with Arguments, Nesting of Macros, Conditional Compilation

**Dynamic Memory Allocation and Linked List:**

Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory, Reallocating Memory Blocks, Pointer Safety, The Concept of linked list, Inserting a node by using Recursive Programs, Sorting and Reversing a Linked List, Deleting the Specified Node in a Singly Linked List.

**File Management:**

Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.

**Text/Reference books**

1. E. Balagurusamy, "Programming with ANSI C", Tata McGraw-Hill Publishers, New Delhi.
2. Byron S. Gottfried, Schaum's Outline Series, "Theory and Problems of Programming with C", Tata McGraw-Hill Publishers, New Delhi.
3. Stephen C. Kochan, "Programming in C", CBS Publishers, Revised Edition, New Delhi.
4. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Second Edition, Prentice-Hall of India, New Delhi.

## IS 1161 **Programming Lab – I (1.5 Credits)**

### **Exercise:**

Exercise 1 - Sum of Individual Digits

Exercise 2 - Operators and Expressions

Exercise 3 - Data Types and Input/Output Operators

Exercise 4 - Control Statements

Exercise 5 - Functions

Exercise 6 - Storage Classes

Exercise 7 - Arrays and Strings

Exercise 8 - Structures

Exercise 9 - Unions

Exercise 10 - Pointers

Exercise 11 - File Management

## BSc IT Semester - II

| Course Code | Course Title                      | Credits     |
|-------------|-----------------------------------|-------------|
| IS 1201     | Object Oriented Programming - C++ | 4           |
| IS 1202     | Basic Mathematics                 | 4           |
| IS 1203     | Data and File Structure           | 4           |
| IS 1204     | Computer Architecture             | 4           |
| IS 1205     | Basics of Data Communication      | 4           |
| IS 1262     | Programming Lab – II              | 1.5         |
|             | <b>Total Credits</b>              | <b>21.5</b> |

### IS 1201 Object Oriented programming - C++ (4 Credits)

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### UNIT I

**Evolution of Programming methodologies:** Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Selection control statements in C++.

**Data types, Expression and control statements Iteration:** statements in C++, Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions.

**Functions:** Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C++.

**Creating classes and Abstraction:** Classes objects, data members, member functions, this Pointer, Friends, Friend Functions, Friend Classes, Friend Scope, and Static Functions.

**Unit 5: Constructors and Destructors,** Static variables and Functions in class.

**Operator Overloading in C++:** Overloading Unary Operators, Overloading binary operators.

**Inheritance in C++:** Types of Inheritance, Pointers, Objects and Pointers, Multiple Inheritance.

## UNIT II

**Virtual Functions:** Polymorphism, Abstract classes.

**Files and streams in C++:** Character and String input and output to files, Command Line Arguments and Printer Output.

**Standard input and output operations:** C++ iostream hierarchy, Standard Input/output Stream Library, Organization Elements of the iostream Library, Programming using Streams, Basic Stream Concepts.

**File input and output:** Reading a File, Managing I/O Streams, Opening a File – Different Methods, Checking for Failure with File Commands, Checking the I/O Status Flags, Dealing with Binary Files, Useful Functions.

**Class templates:** Implementing a class template, Implementing class template member functions, Using a class template, Function templates, Implementing function templates, Using template functions, Template instantiation, Class template specialization, Template class partial specialization, Template function specialization, Template parameters, Static members and variables, Templates and friends, Templates and multiple-file projects.

**Standard Template library:** Containers, iterators and application of container classes.

**Exception handling:** Throwing an exception, catching an exception: The try block, Exception handlers, Termination vs. Resumption, Exception specification, rethrowing an exception, uncaught exceptions, Standard exceptions, Programming with exceptions.

**Reference Books:**

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003
2. Ira Pohl, "Object oriented programming using C++", Pearson Education Asia, 2003
3. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, 2000
4. John R.Hubbard, "Programming with C++", Schaums outline series, TMH, 2003
5. E.Balagurusamy "Object Oriented Programming with C++", TMH 2/e

## IS 1202 **Basic Mathematics (4 Credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

#### **Set theory**

Sets and their representations; The empty set; finite and infinite sets; equal and equivalent sets; subsets; power set; universal set; Venn diagrams; complement of a set operations on sets; applications of sets.

#### **Mathematical Logic**

Basic Logical connections; Conjunction; Disjunction; Negation; Negation of Compound Statements; Truth tables. Tautologies; Logical Equivalence; Applications.

#### **Modern algebra**

Binary Operation; Addition Modulo  $n$ ; Multiplication modulo  $n$ ; semi group; properties of groups; subgroup.

#### **Trigonometry**

Radian or circular Measure; Trigonometric Functions; Trigonometrical ratios of angle  $\theta$  when  $\theta$  is acute; trigonometrical ratios of certain standard angles; allied angles; compound angles; multiple and sub- multiple angle.

#### **Limits and Continuity**

The real number system; the concept of limit; concept of continuity.

#### **Differentiation**

Differentiation of powers of  $x$ ; Differentiation of  $e^x$  and  $\log x$ ; differentiation of trigonometric functions; Rules for finding derivatives; Different types of differentiation; logarithmic differentiation; differentiation by substitution; differentiation of implicit functions; differentiation from parametric equation. Differentiation from first principles.

### **UNIT II**

#### **Integrations**

Integration of standard Functions; rules of Integration; More formulas in integration; Definite integrals.



**Differential equations**

First order differential equations; practical approach to Differential equations; first order and first degree differential equations; homogeneous equations. Linear equations; Bernoulli's equation; Exact Differential Equations.

**Complex Numbers**

Complex Numbers; Conjugate of a complex number; modulus of a complex Number; geometrical representation of complex number; De Moivre's theorem;  $n^{\text{th}}$  roots of a complex number.

**Matrices and Determinants**

Definition of a matrix; Operations on matrices; Square Matrix and its inverse; determinants; properties of determinants; the inverse of a matrix; solution of equations using matrices and determinants; solving equations using determinants.

**Infinite Series**

Convergence and divergence; series of positive terms; binomial series; exponential series; logarithmic series.

**Probability**

Concept of probability; sample space and events; three approaches of probability; kolmogorov's axiomatic approach to probability; conditional probability and independence of events; bay's theorem.

**Basics Statistics**

Measures of central Tendency; Standard Deviation; Discrete series. Methods; Deviation taken from assumed mean; continuous series; combined standard deviation; coefficient of variation; variance.

**Text/ Reference Books:**

Algebra and Trigonometry by Richard Brown

1. Integral calculus by Shanthi Narayan Publication – S. Chand & Co.
2. Differential calculus by Shanthi Narayan Publication – S. Chand & Co.

3. Problems in Calculus of one variable by I. A. Maron Publication – CBS Publishers
4. Trigonometry by S.L. Loney Publication – S. Chand & Co.
5. Applied & Computational Complex Analysis by Peter Henrici
6. Mathematical Analysis by K.G. Binmore.

## IS 1203 **DATA AND FILE STRUCTURES (4 Credits)**

**Questions to be set: Eight (Four from each unit)**

**Questions to be answered: Any Five selecting at least Two from each unit**

### **UNIT I**

Data Structures Basics: Structure and Problem Solving, Data Structures, Data Structure Operations, Algorithm: Complexity and Time- Space Tradeoff.

Algorithm: Complexity Notations: Mathematical Notation and Functions, Algorithm Notation, Control Structures, Complexity of Algorithm, Rate of Growth- Asymptotic Notation.

Linked List: Linked List and its representation in memory, Traversing a Linked List, Searching a Linked List, Memory Allocation and Garbage Collection, Insertion into Linked list, Deletion from a Linked list, Types of Linked List.

Stacks and Queues: Stack, Applications of Stack, Queue.

Trees and Binary Trees: Tree: Definition and Concepts, Binary Tree: Definition and Concepts, Types of Binary Tree, Traversal on Binary Tree, Representation of Binary Tree.

Binary Search Tree: Conversion of General Tree to Binary Tree, Sequential and Other Representations of Binary Tree, Concept of Binary Search Tree (BST), Operations on BST.

Balanced Trees: Definition and Structure of AVL Tree, Operations on AVL Tree, Definition and Structure of B-Tree, Operations on B-Tree, Applications of B-Tree.

### **UNIT II**

Graphs: Basic Concepts about Graphs, Matrix Representation of Graphs, List Structures, Other Representations of Graphs, Algorithms for Graph Traversal, Spanning Trees.

Applications of Graphs: Topological Sorting, Weighted Shortest Path – Dijkstra’s Algorithm, Minimum Spanning Tree (MST), Introduction to NP-Completeness.

Dynamic Storage Management: Dynamic Storage Management, Memory Management, First-fit Storage Allocation, Storage Release, Buddy Systems, Garbage Collection.

Searching and Sorting Techniques: Sorting- Notations and concepts, Bubble sort, Merge sort, Selection sort, Heap sort; Searching- Sequential searching, Binary searching.

File Structures: External Storage Devices, Introduction to File Organization, Sequential Files, Indexed Sequential Files, Direct Files.

External Sorting Techniques: External Sorting- Run lists, Tape sorting; Sorting on Disks, Generating Extended Initial Runs.

External Searching Techniques: External Searching, Introduction to Static Hashing, Dynamic Hashing Techniques.

**Text/Reference Books:**

1. Jean-Paul Tremblay Paul G. Sorenson (1991). An Introduction to Data Structures with Applications, Adarsh printers, The McGraw-Hill.
2. Seymour Lipschutz (2006). Data Structures, Pashupati printers, Tata McGraw-Hill.
3. Patel R. B. (2000).Expert Data Structures with C, New Delhi, Khanna Book Publishing co.
4. D. Samanta (2006) Classic Data Structures, New Delhi, Prentice Hall of India private Ltd.

## IS 1204 **Computer Architecture (4 Credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### UNIT I

**Fundamentals of Computer Architecture:** Computational model, Evolution of computer architecture, process thread, Concurrent and parallel execution, types of parallelism, levels of parallelism.

**Fundamentals of computer design:** The changing face of computing and the task of the computer designer, technology trends, Quantitative principles of computer design, Power consumption and efficiency of the matrix.

**Instruction set principles:** Classifying instruction set architecture, memory addressing, address modes for signal processing, Operations in the instruction sets, instruction for control flow, MIPS architecture.

**Pipelined processor:** Review of Pipelining, Examples of some pipeline in modern processors, pipeline hazards, data hazards, control hazards. Techniques to handle hazards, performance improvement with pipelines and effect of hazards on the performance, Design space of pipelines, Pipeline instruction processing, Pipelined execution of integer and Boolean instructions – the design space.

**Design space of pipelines:** Introduction, Pipeline instruction Processing, Pipelined execution of Integer and Boolean Instructions, Pipelined processing of loads and stores.

**Instruction:** level parallelism and its dynamic exploitation- Concepts, overcoming data hazards with dynamic schedule, Dynamic scheduling examples and algorithm, High performance instruction delivery, hardware based speculation.

**Exploiting Instruction:** Level parallelism with software approach- Basic compiler techniques for exposing ILP, Static branch prediction, The Intel IA-64 architecture and Itanium processor, ILP in the embedded and mobile markets, ILP in the embedded and mobile markets.

## UNIT II

**Memory Hierarchy technology:** Cache memory organization, Cache addressing modes, direct mapping and associative caches, Elements of cache design, Techniques to reduce cache misses via parallelism, techniques to reduce cache penalties, technique to reduce cache hit time, Shared memory organization, Interleaved memory organization, bandwidth and fault tolerance, Sequential and weak consistency model.

**Vector processors:** Use and effectiveness, memory to memory vector architectures, vector register architecture, vector length and stride issues, compiler effectiveness in vector processors.

**SIMD Architecture:** Introduction, Parallel Processing, classification of Parallel Processing, Fine-Grained SIMD Architecture, coarse-Grained SIMD Architecture

**Vector architecture and MIMD Architecture:** addressing modes, instructions formats, effect of simplification on the performance, example processors such as MIPS, PA-RISC, SPARC, Power PC, etc.

**Storage systems:** introduction, types of storage devices, Connecting I/O devices to CPU/memory, reliability, availability and dependability, RAID, I/O performance measures.

**Scalable, Multithreaded and data flow architecture:** Principles of multithreading, Scalable and multithreaded architecture, Data Flow Graphs, Petri nets, Static & Dynamic DFA. Reduction computer architectures, Systolic Architectures. Different Models, Languages, Compilers, dependency Analysis. Message Passing, Program mapping to Multiprocessors, Synchronization.

**Case Study:** Basic Features of Current Architectural Trends. DSP Processor, Dual core Technology

### **Text/ Reference Books**

1. Hwang, K. (1993) Advanced Computer Architecture. McGraw-Hill.

2. Godse, D. A. & Godse, A. P. (2010) Computer Organisation. Technical Publications.
3. Hennessy, J. L., Patterson, D. A. & Goldberg D.(2011). Computer Architecture: A Quantitative Approach, Morgan Kaufmann.
4. Sima, Dezső, Fountain, T. J. & Kacsuk, P. (1997). Advanced computer architectures - a design space approach. Addison-Wesley-Longman: I-XXIII, 1-766.

## **IS 1205 Basics of Data Communication (4 Credits)**

**Questions to be set:** Eight (Four from each unit)  
**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

#### **Data Communications, Data Networking, and the Internet**

Data communication and networking for today's enterprise, communication model, data communications, networks, the Internet.

#### **Protocol architecture, and Internet based applications**

The need for a protocol architecture, the TCP/IP protocol architecture, the OSI model, standardization within a protocol architecture, traditional Internet based applications, multimedia.

#### **Data transmission**

Analog and digital data transmission, transmission impairments, channel capacity

#### **Transmission media**

Guided transmission media, wireless transmission, wireless propagation, line-of-sight transmission

### **UNIT II**

#### **Signal encoding techniques**

Digital data-digital signals, digital data-analog signals, analog data-digital signals, analog data – analog signals.

#### **Digital data communication techniques**

Asynchronous and synchronous transmission, types of errors, error detection, error correction, line configuration.



## **Multiplexing**

Frequency division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, Asymmetric digital subscriber line.

## **Spread spectrum**

Concept of spread spectrum, frequency hopping spread spectrum, direct sequence spread spectrum, code-division multiple access

## **Text/Reference books:**

1. S.Tanenbaum,"Computer Networks", Pearson Education, Fourth Edition.
2. N. Olifer, V. Olifer, "Computer Networks: Principles, Technologies and Protocols for Network design", Wiley India Edition, First edition.
3. Simon Poulton (2003), packet Switching and X.25 Networking, Pitman Publishing.
4. Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
5. William Stalling. (2010), High speed networks and Internet, Dorling Kindersley (India) Pvt. Ltd. Pearson Education.
6. Data and Computer Communications, Eighth Edition, Pearson Education, ISBN 978-81-317-1536-9

## IS 1262 **Programming Lab – II (1.5 Credits)**

### **Exercise:**

- Exercise 1 - Linked List
- Exercise 2 - Stack
- Exercise 3 - Queue
- Exercise 4 - Stack Applications
- Exercise 5 - Tree Traversals
- Exercise 6 - Graph Traversals
- Exercise 7 - Sorting Methods
- Exercise 8 - Searching
- Exercise 9 - Elementary Algorithms
- Exercise 10 - Sorting Methods
- Exercise 11 - Greedy Methods
- Exercise 12 - Dijkstra's Algorithm

## BSc IT Semester – III

| Course Code | Course Title                       | Credits   |
|-------------|------------------------------------|-----------|
| IS 1301     | Operating System                   | 4         |
| IS 1302     | Computer Networks                  | 4         |
| IS 1303     | Object Oriented Programming – Java | 4         |
| IS 1304     | Database Management Systems        | 4         |
| IS 1363     | Programming Lab – III              | 1.5       |
| IS 1364     | Database Management Systems Lab    | 1.5       |
|             | <b>Total Credits</b>               | <b>19</b> |

### IS 1301 **Operating System (4 Credits)**

**Questions to be set:**                      **Eight (Four from each unit)**

**Questions to be answered:**        **Any Five selecting at least Two from each unit**

#### **UNIT I**

**Operating System- An Introduction:** This unit gives the definition and functions of operating systems. This unit also discusses the evolution of operating systems and different structures of operating systems.

**Operating System Architecture:** This unit discusses different architectural approach to operating systems such as simple and layered approach. This unit also introduces micro-kernels and UNIX kernel components. An introduction to Virtual Machines and Machine Aggregation are also discussed in this unit.

**Process Management:** A process can be simply defined as a program in execution. A process is created and terminated. This unit discusses process state, control block and scheduling. Also this unit throws light on operation on processes and threads.

**CPU Scheduling Algorithms:** CPU scheduling is the basis for multi-programmed operating systems. This unit discusses different CPU scheduling algorithms and their evaluation.

**Process Synchronization:** A co-operating process is one that can affect or be affected by the other processes executing in the system. These processes may either directly share a logical address space or be allowed to share data only through files. This unit discusses Interprocess communication and critical section problem. Also definition of semaphores and monitors are given in this unit.

**Deadlocks:** Deadlock is a situation in which a process may never change its state because the requested resources are held by other processes which themselves are waiting for additional resources and hence in a wait state. This unit deals with avoidance, prevention, detection and handling of deadlocks.

**Memory Management:** A set of processes needs to reside in memory. The memory is thus shared and the resource requires to be managed. This unit discusses various memory management techniques such as swapping, contiguous allocation, paging and segmentation.

## UNIT II

**Virtual Memory:** Virtual memory allows execution of processes that may not be entirely in memory. Virtual memory allows mapping of a large virtual address space onto a smaller physical memory. This unit discusses various virtual memory techniques such as demand paging, page replacement algorithms and thrashing.

**File System Interface and Implementation:** This unit discusses various file concepts. This unit also throws light on file access methods, directory structure and allocation methods.

**Input-Output Architecture:** I/O devices have characteristics quite different from memory devices, and often pose special problems for computer systems. This unit discusses various I/O structures and control strategies.

**Operating System in Distributed Processing:** With the advent of micro and mini computers, distributed processing is becoming more and more popular. This unit discusses centralized and distributed processing. This unit also introduces Network Operating Systems and Global Operating Systems.

**Security and Protection:** Security and protection are the two main features that motivated development of a network operating system. This unit discusses different security concerns such as computer worms, computer virus and authentication. Ways of protecting the system using authentication and encryption techniques are also discussed in this unit.

**Multiprocessor Systems:** Multiprocessor systems provide an alternative for improving performance of computer systems by coupling a number of low cost standard processors. This unit discusses different classification of multiprocessor systems and their interconnections. A brief introduction to multiprocessor operating system is also given in this unit.

**Windows Operating System:** Windows 2000, Windows XP and Windows Server 2003 are all part of the Windows NT family of Microsoft operating systems. This unit discusses the architectures of Windows NT and Windows 2000 operating systems.

**TEXT/ REFERENCE BOOKS:**

1. Operating System Principles – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 7th edition, Wiley-India, 2006.
2. Operating Systems: A Concept Based Approach – D.M Dhamdhere, 2nd Edition, Tata McGraw- Hill, 2002.
3. Operating Systems – P.C.P. Bhatt, 2nd Edition, PHI, 2006.
4. Operating Systems – Harvey M Deital, 3rd Edition, Addison Wesley, 1990.

## IS 1302 **Computer Networks (4 Credits)**

**Questions to be set:**                      **Eight (Four from each unit)**

**Questions to be answered:**        **Any Five selecting at least Two from each unit**

### **UNIT I**

**Introduction to Computer Networks:** Introduction, Definition of a Computer Network, What is a Network? Components of a computer network: Use of Computer networks; Networks for companies, Networks for people, Social Issues: Classification of networks; Based on transmission technology, Based on their scale, Local area networks, Metropolitan area networks, Wide area networks, Wireless networks.

**Network Software & Network Standardization:** Introduction, Networks Software, Protocol hierarchy, Design issues for the layers, Merits and Demerits of Layered Architecture, Service Primitives: Reference models; The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models: Network standardization; Who's who in the telecommunication world?, Who's who in the standards world, Who's who in the Internet standards world?

**Data Communications:** Introduction, Theoretical basis for communication, Fourier analysis, Band limited signals, Maximum data rate of a channel: Transmission impairments; Attenuation distortion, Delay distortion, Dispersion, Noise: Data transmission modes; Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission:

**Physical Layer:** Introduction, Network topologies, Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology

Comparison, Considerations when choosing a Topology: Switching; Circuit switching, Message switching, Packet switching, Implementation of packet switching, Relationship between Packet Size and Transmission time, Comparison of switching techniques: Multiplexing; FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing, TDM – Time division multiplexing.

**Transmission Medium:** Introduction, Transmission medium, guided & Unguided Transmission medium, Twisted pair, Coaxial cable, Optical fiber, Comparison of fiber optics and copper wire: Wireless transmission; Electromagnetic spectrum, Radio transmission, Microwave transmission.

## UNIT II

**Data Link Layer:** Introduction, Goal of DLL, Design issues of DLL, Services provided to the Network layer, Framing, Error control, Flow control, Link Management, ARQ strategies: Error Detection and correction; Parity bits, Importance of framing distance for error correction, Single bit error correction or (n, m) framing code, Error Detection or Cyclic Redundant Code (CRC): Data Link layer protocols; Transmission control protocols, HDLC.

**Medium Access Control Sub Layer:** Introduction: The channel allocation problem; Static channels allocation, Dynamic channels allocation in LAN's and MAN's: Multiple access protocols; Pure ALOHA or Unslotted ALOHA Protocol, Slotted ALOHA or Impure ALOHA Protocol, CSMA Protocol, CSMA/CD Protocol, Binary exponential Algorithm, Comparison of channel access protocols: IEEE standards; Ethernets, Fast Ethernet, Gigabit Ethernet, IEEE 802.3 frame format.

**Network Layer:** Introduction: Design issues of Network layer; Nature of the service provided, Internal organization, Routing, Congestion control, Internetworking: Principles of Routing; Types of routing algorithms, Classes of routing algorithms, Properties of routing algorithms, Optimality principle: Routing algorithms; Shortest path algorithm, Flooding, Distance vector routing, Hierarchical routing, Link state routing, Comparison of routing algorithms: Congestion; Factors of congestion, Comparison of flow control and congestion control, General principles of congestion control, Closed loop solution: IP protocol (IPV4).

**Transport Layer:** Introduction: Services of Transport layer; Service primitives: Connection establishment: Connection Release: Transport Protocols; TCP protocol, UDP protocol.

**Networking Devices:** Introduction; Goal of networking devices: Repeaters; Uses of Repeaters: Hubs; Classification of Hubs, Stackable Hubs, USB Hub: Switches; Switching Methods, Comparison of switching methods, Working with Hubs and Switches, Cables Connecting Hubs and Switches, Managed Hubs and Switches, Port Density: Bridges; Bridge Implementation Considerations, Types of Bridges: Routers; Dedicated Hardware versus Server-Based Routers, Advantages and Disadvantages of dedicated hardware routers, Drawbacks of Routers: Gateways; Advantages of gateways, Gateways Functionality: Other Devices; Modems, Proxy Server, Wireless router, Brouter, Wireless Access Point (WAPs).

**Text/Reference books:**

7. S.Tanenbaum,"Computer Networks", Pearson Education, Fourth Edition
8. N. Olifer, V. Olifer, "Computer Networks: Principles, Technologies and Protocols for Network design", Wiley India Edition, First edition.
9. Simon Poulton (2003), packet Switching and X.25 Networking, Pitman Publishing.
10. Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
11. William Stalling. (2010), High speed networks and internet, Dorling Kindersley (India) Pvt. Ltd. Pearson Education.



## IS 1303 **Object Oriented programming – Java (4 Credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

**Introduction to Java:** History of Java, Features of Java, Java Development Kit (JDK), Security in Java.

**Java Basics:** Keywords; Working of Java; Including Comments; Data Types in Java; Primitive Data Types; Abstract / Derived Data Types; Variables in Java; Using Classes in Java; Declaring Methods in Java, Code to Display Test Value; The main() Method, Invoking a Method in Java; Saving, Compiling and Executing Java Programs.

**Operators and Control Statements:** Operators, Arithmetic Operators, Increment and Decrement Operators, Comparison Operators, Logical Operators, Operator Precedence; Control Flow Statements, If-else Statement, Switch Statement, For Loop, While Loop, Do...While Loop, Break Statement Continue Statement.

**Arrays and Strings:** Arrays; String Handling; Special String Operations; Character Extraction; String Comparison; Searching Strings; String Modification; String Buffer.

**Inheritance, Package and Interface:** Inheritance, Types of Relationships, What is Inheritance?, Significance of Generalization, Inheritance in Java, Access Specifiers, The Abstract Class; Packages, Defining a Package,

CLASSPATH; Interface, Defining an Interface, Some Uses of Interfaces, Interfaces versus Abstract Classes.

**Exception Handling:** Definition of an Exception; Exception Classes; Common Exceptions; Exception Handling Techniques

## UNIT II

**Streams in Java:** Streams Basics; Abstract Streams; Stream Classes; Readers and Writers; Random Access Files; Serialization.

**Applets:** What are Applets?; The Applet Class; The Applet and HTML; Life Cycle of an Applet; The Graphics Class; Painting the Applet; User Interfaces for Applet; Adding Components to user interface; AWT (Abstract Windowing Toolkit) Controls.

**Event Handling:** Components of an Event; Event Classes; Event Listener; Event-Handling; Adapter Classes; Inner Classes; Anonymous Classes.

**Swing:** Concepts of Swing; Java Foundation Class (JFC); Swing Packages and Classes; Working with Swing- An Example; Swing Components.

**Java Data Base Connectivity:** Java Data Base Connectivity; Database Management; Mechanism for connecting to a back end database; Loading the ODBC driver.

**RMI, CORBA and Java Beans:** Remote Method Invocation (RMI); RMI Terminology; Common Object Request Broker Architecture (CORBA), What is Java IDL?, Example: The Hello Client-Server; Java Beans, The BeanBox, Running the BeanBox.

**Networking in Java:** Networking in Java; URL Objects.

**Java Server Pages and Servlets:** Java Server Pages (JSP), What is needed to write JSP based web application?, How does JSP look?, How to test a JSP?; Servlets, History of Web Application, Web Architecture, Servlet Life Cycle

**Text/References Books:**

1. Brian Cole, Robert Eckstein, James Elliott, Marc Loy, David Wood, Java™ Swing, 2nd Edition.
2. Dr. Sathya Raj Pantham, Pure JFC swing-A code intensive premium reference.
3. Weber Joe, Using Java 1.2, 4th edition, Que 1998.
4. Schildt Herbert. The Complete Reference Java2, 6th Edition, McGraw Hill.
5. Kathy Sierra, Bert Bates, Head First Java, 2nd Edition, O'Reilly Media.
6. Cay S. Horstmann, Gary Cornell, Core Java 2- Vol I and Vol II, Java series, Sun Microsystems Press, Prentice-Hall.

## IS 1304 Database Management Systems (DBMS) (4 Credits)

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### UNIT I

**Database Management System Concepts:** Introduction, Significance of Database, Database System Applications; Data Independence; Data Modeling for a Database; Entities and their Attributes, Entities, Attributes, Relationships and Relationships Types, Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS.

**Database System Architecture:** Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; MySQL Architecture; SQL Server 2000 Architecture; Oracle Architecture; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Management System Structure, Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture.

**Database Models and Implementation:** Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model, Object/Relational Model, Object-Oriented Model; Entity-Relationship Model, Modeling using E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types; Associative Database Model.

**File Organization for Conventional DBMS:** Storage Devices and its Characteristics, Magnetic Disks, Physical Characteristics of Disks, Performance Measures of Disks, Optimization of Disk-Block Access; File Organization, Fixed-Length Records, Variable-Length Records,

Organization of records in files; Sequential file Organization; Indexed Sequential Access Method (ISAM); Virtual Storage Access Method (VSAM).

**An Introduction to RDBMS:** An informal look at the relational model; Relational Database Management System; RDBMS Properties, The Entity-Relationship Model; Overview of Relational Query Optimization; System Catalog in a Relational DBMS, Information Stored in the System Catalog, How Catalogs are Stored.

**SQL – 1 :** Categories of SQL Commands; Data Definition; Data Manipulation Statements, SELECT - The Basic Form, Subqueries, Functions, GROUP BY Feature, Updating the Database, Data Definition Facilities.

**SQL – 2:** Views; Embedded SQL \*, Declaring Variables and Exceptions, Embedding SQL Statements; Transaction Processing, Consistency and Isolation, Atomicity and Durability.

## UNIT II

**Relational Algebra:** Basic Operations, Union (U), Difference (-), Intersection, Cartesian product (x); Additional Relational Algebraic Operations, Projection, Selection, JOIN, Division.

**Relational Calculus:** Tuple Relational Calculus, Semantics of TRC Queries, Examples of TRC Queries; Domain Relational Calculus; Relational ALGEBRA vs Relational CALCULUS.

**Normalization:** Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; First Normalization; Second Normal Form Relation; Third Normal Form; Boyce-Codd Normal Form (BCNF); Fourth and Fifth Normal Form.

**Query Processing and Optimization:** Query Interpretation; Equivalence of Expressions; Algorithm for Executing Query Operations, External sorting, Select operation, Join operation, PROJECT and set operation, Aggregate operations, Outer join, Heuristics in Query Optimization, Semantic Query Optimization, Converting Query Tree to Query Evaluation Plan, Cost

Estimates in Query Optimization , Measure of query cost, Catalog information for cost estimation of queries, Join Strategies for Parallel Processing, Parallel join, Pipelined multiway join, Physical organisation.

**Distributed Databases:** Structure of Distributed Database; Trade-offs in Distributing the Database, Advantages of Data Distribution, Disadvantages of Data Distribution; Design of Distributed Databases, Data Replication, Data Fragmentation.

**Object Oriented DBMS:** Next Generation Data Base System, New Database Application; Object Oriented Database Management System; Features of Object Oriented System; Advantages of Object Oriented Database Management System; Deficiencies of Relational Database Management System; Difference between Relational Database Management System and Object Oriented Database Management System, Alternative Object Oriented Database Strategies.

**Object Relational Mapping:** Significance of Mapping; Mapping Basics; Mapping a Class Inheritance Tree; Mapping Object Relationships, Types of relationships, Implementation of object relationships, Implementation of relational database relationships, Relationship mappings, Mapping ordered collections, Mapping recursive relationships, Modelling with Join Tables, Open Source Object Relational Mapping Software.

#### **Text/Reference Books:**

1. Database Systems, Third Edition, Paul Beynon-Davies
2. Database Management Systems, second Edition, Raghu Ramakrishanan & Johannes Gehrke
3. Database System Concepts, Fourth Edition, Silberschatz – Korth–Sudarshan
4. Database Modeling & Design, Fourth Edition, Toby Teorey, Sam Lightstone and Tom Nadeau
5. Fundamentals of Database Systems, Second Edition, Elmasri, Navathe, Somayajulu, Gupta

## IS 1363 **Programming Lab – II (1.5 Credits)**

### **Exercise:**

- Exercise1 - Java Basics
- Exercise 2 - Operators and Control Statements
- Exercise 3 - Arrays and String
- Exercise 4 - Inheritance and Package
- Exercise 5 - Exception Handling
- Exercise 6 -Java Streams
- Exercise 7 - Applets
- Exercise 8 - Event Handling
- Exercise 9 - Swings
- Exercise 10 - Java Data Base Connectivity

## IS 1364- **Database Management Systems Lab (1.5 Credits)**

### **Exercise:**

- Exercise1 - DDL Commands
- Exercise 2 - DML Commands – I
- Exercise 3 - DML Commands – II
- Exercise 4 - Functions
- Exercise 5 - PL/SQL – Commit, Rollback and Save Points
- Exercise 6 - PL/SQL – If – Case, Case Expression
- Exercise 7 - PL/SQL – Loops and Exceptions
- Exercise 8 - PL/SQL – Procedures
- Exercise 9 - PL/SQL – Stored and Invoke Functions
- Exercise 10 - PL/SQL – Triggers
- Exercise 11 - PL/SQL – Cursor

## BSc IT - Semester – IV

| Syllabus | Course Title               | Credits     |
|----------|----------------------------|-------------|
| IS 1401  | Human Computer Interface   | 4           |
| IS 1402  | Web Systems and Technology | 4           |
| IS 1403  | Probability and Statistics | 4           |
| IS 1404  | Software Engineering       | 4           |
| IS 1405  | Web Programming – I        | 4           |
| IS 1465  | Web Programming Lab - I    | 1.5         |
|          | <b>Total Credits</b>       | <b>21.5</b> |

### IS 1401 **HUMAN COMPUTER INTERFACE (4 Credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

#### **UNIT I**

##### **Introduction to Human Computer Interface**

Importance of User Interface, History of Human Computer Interface, Importance of Good Design, Benefits of Good Design, Principles of User Interface Design.

##### **Interaction Devices**

Keyboard Keys, Function Keys, Pointing Devices, Speech Recognition, Handwriting Recognition, Speech Generation, Image Display, Video Display, Device Drivers.

##### **Color and Content**

Why Colors, Color Uses, Choosing Colors, Possible Problems With Colors, Page Title, Headings, Text, Messages, Error Messages, Icons.

##### **User Interface Design Process-I**

Understanding How User Interact With Computers, User Interface Models, Design Methodologies, Designing an Interface, Process of Interaction Design.



### **User Interface Design Process-II**

Human Interaction with Computers, Human Interaction Speeds, Human Characteristics in Design, Human Consideration in Design.

### **Graphical User Interface**

Popularity of Graphics, Characteristics of Graphical User Interface, Concepts of Direct Manipulation, Graphical System Advantages and Disadvantages, Web User Interface Characteristics and Popularity.

### **Device and Screen-Based Control**

Device Based Controls, Operable Controls, Text Entry/Read-Only Controls, Selection Controls, Combining Entry/Selection Controls, Other Operable Controls, Presentation Controls and Selecting Proper Controls.

## **UNIT II**

### **Screen Design**

Design Goals, Test for a Good Design, Screen and Web Page Meaning and Purpose, Organizing Screen Elements Clearly, Ordering of Screen Data and Content, Screen Navigation and Flow.

### **Windows**

Window characteristics, Components of Window, Window Presentation Styles, Types of Windows, Window Management.

### **Understanding Business Functions**

Business Definitions and Requirement analysis, Determining Business Functions, Design Standards or Style Guides, System Training and Documentation.

**Software Tools** Specification Methods, Interface Building Tools-Interface Mock Up Tools, Software Engineering Tools, Windowing System Layer, GUI Tool Kit Layer.

### **Information Search and Visualization**

Database Query, Phrase Search in Documents, Multimedia Document Searches, Information Visualization, Advanced Filtering, Hypertext, Web Technology, Static Web Content and Dynamic Web Content.

## **Time**

Response Time, Dealing With Time Delays, Echo Delay, File Delay, Blinking for Attention, Use of Sound, Preventing Errors

## **Usability and Prototypes**

**Usability:** Purpose of Usability, Importance of Usability, Usability Testing.

**Prototypes:** Hand Sketches and Scenarios, Interactive Paper Prototypes, Program Facades, Prototype-Oriented Languages, Comparisons of Prototypes.

## **Text/ Reference Books:**

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.
3. Human – Computer Interaction. Alan Dix, Janet Finckay, Greg Goryd, Abowd, Russell Bealg, Pearson Education
4. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
5. User Interface Design, Soren Lauesen, Pearson Education.

## IS 1402 **WEB SYSTEMS AND TECHNOLOGY (4 Credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

**Web essentials and standards:** Clients, servers, Markup languages, HTML, XHTML, CSS - Introduction to Cascading Style Sheets-Features-Core Syntax- Cascading and Inheritance- Text properties-Box Model, Normal Flow, Box Layout, Beyond the Normal Flow, Other Properties.

**Host Objects:** Browsers and the DOM- Introduction to DOM, DOM History, Modifying element style, the document tree, DOM event handling, Accommodating Noncompliant Browsers, Additional properties of window.

**Web Systems Architecture:** Architecture of Web based systems-client/server (2-tier) architecture, 3-Tier architecture, Building blocks of fast and scalable data access: - Caches-Proxies- Indexes-Load Balancers-Queues, Web Application architecture (WAA), Web Platform Architecture (WPA).

### **UNIT II**

**Representing Web Data:** XML-Documents and Vocabularies-Versions and Declaration – Namespaces, JavaScript and XML, AJAX- Introduction, HTTP request, XMLHttpRequest, AJAX server script, Ajax database.

**Web Servers:** Web servers –HTTP request types – System architecture – Accessing web servers- IIS – Apache web server.

**Web Services:** JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP Related Technologies-

Software

Installation-Storing Java Objects as Files-Databases and Java Servlets.

**References:**

1. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
3. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
4. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.
5. Chris Bales, "Web programming- Building Internet Application".
6. Guide to Web Application and Platform Architectures By Ilia Petrov, Christian Meiler, Udo Mayer

**IS 1403 PROBABILITY AND STATISTICS (4 Credits)**

**Questions to be set:                      Eight (Four from each unit)**

**Questions to be answered:          Any Five selecting at least Two from each unit**

**UNIT I**

**Probability:** Random experiment, outcome, trial and event, Exhaustive events, favourable events, Independent events, sample space, definition of probability, addition theorem of probability, conditional probability, independent events, Mutually and pair wise independent events, multiplication theorem of probability for independent events, Baye's theorem.

**Random Variable (Univariate):** Random Variable, Distribution function, discrete random variable, Probability mass function, Distribution function of discrete random variable, Continuous random variable, Probability density function. Distribution function of continuous random variable. Two dimensional probability mass function, Marginal probability function, conditional probability function, Two dimensional distribution function,

marginal distribution function, Joint density function, marginal density function.

**Mathematical Expectations:** Definition, Expected value of random variable, expected value of function of a random variable, properties of expectations, Various measures of Central Tendency, Dispersion, skewness and Kurtosis for continuous probability distribution, continuous distribution function, Variance, Properties of variance, covariance.

**Moment Generating Function:** Definition, Properties of moment generating function, cumulants.

**Measures of Central Tendency:** Explain the meaning and application of averages, define the meaning and calculation of positional averages, and discuss merits, demerits and limitations of averages.

**Measures of Dispersion:** Explain the meaning of dispersion, describe the measures of dispersion, and classify the measures of shape of data

**Moments:** Raw and central moments. Relation between moments: raw moments & central moments, Effect of change of origin and scale on moments, Pearsonian coefficients Measures of skewness, kurtosis.

## UNIT II

**Standard Distribution:** Binomial, Poisson, Negative Binomial Distribution, Normal Distribution and their properties.

**Correlation & Regression:** Explain the meaning of correlation and regression, measure the coefficients of correlation and regression, and define and measure coefficient of determination.

**Index Numbers:** Learn about the need of index numbers, explain the different methods of constructing index numbers, evaluate the tests for judging the soundness of an index number.

**Time Series:** Explain about time series, describe components of time series, and define measurement of variations of time series.

**Sampling Theory:** Sampling Theory, Random Samples and random Numbers, Sampling with and without replacement, sampling distributions, sampling distribution of means, sampling distribution of properties, sampling distribution of differences and sum, standard errors, software demonstration of elementary sampling Theory.

**Hypothesis Testing:** Explain meaning of hypothesis, interpret statistical procedure of hypothesis testing, use application of hypothesis testing in several business contexts.

**Tests Of Significance:** Based On t, F and Z Distributions:-Student's (t) distribution, definition, properties, critical value of t, Application of t-distribution, Test for single mean, t-test for difference of mean, Fischer Z-transformation, F-statistic, critical value of F distribution, application.

#### **TEXT/ REFERENCE BOOKS**

1. K.S Trivedi, Probability & Statistics with Reliability, Queuing and Computer Science Applications, 2008, Wiley.
2. P.L. Meyer : Introductory Probability theory and statistical Applications, Second Ed. Oxford & IBM Publishers
3. Introduction to Probability Theory and its Applications, William Feller, 2008, Wiley.
4. Introduction to Probability with Statistical Applications, Geza Schay, 2007, Brikhau

## IS 1404 **SOFTWARE ENGINEERING (4 Credits)**

**Questions to be set: Eight (Four from each unit)**

**Questions to be answered: Any Five selecting at least Two from each unit**

### **UNIT I**

#### **Introduction to software engineering**

What is software engineering, software engineering principles, Software characteristics, applications. Objectives of software engineering, Phases of software engineering.

#### **SOFTWARE PROCESS and Life Cycle models**

Software process, project and product, process assessment, Software Process capability maturity model: CMM Model. Life cycle models: Waterfall model, Incremental model, spiral model, advantages and disadvantages.

#### **Software LIFE CYCLE Models**

Prototyping Model, Object-oriented model, Agile model, Extreme programming (Latest models can be discussed), advantages and disadvantages.

#### **Software Requirements**

Functional- non-functional requirements, User requirement, System requirements, Software requirements documentation.

#### **Software Requirement Engineering Process**

Feasibility studies, Requirements elicitation and analysis, requirement validation, software prototyping, requirement management.

#### **Software Reliability**

Software Reliability; Software Reliability Metrics; Programming for Reliability; Software Reuse.

#### **Software design**

Basics of software design, Data design, Architectural design, component level design and user interface design ,Fundamental design concepts- module and modularization, Design techniques.

## UNIT II

### **Object oriented design**

Objects and object classes, relationship: An Object Oriented design process, Object identification, design model (sequence model, state diagram).

### **Software Implementation**

Implementation: Structures coding techniques, coding styles, Coding methodology, Coding verification techniques, Coding tools, code documentation, standards and guidelines

### **Software maintenance**

Software re-engineering, Change management, configuration management, maintenance tools and techniques.

### **Software testing strategies**

A strategic approach to software testing, test strategies for convention software, Black-box and white box testing, validation and system testing, and debugging.

### **Software metrics**

Software quality metrics, Metrics for analysis models, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance.

### **Quality Management**

Quality Management; Quality concepts, software quality assurance, Software reviews, Formal Technical reviews, The ISO 9000 quality standards

### **Software project management**

Project planning, project scheduling, project staffing, people capability maturity model.

### **Text/Reference books:**

1. Software Engineering VI Edition, Author: ROGER S. PRESSMAN
2. Software Engineering, 1E, By Rohit Khurana
3. Software Engineering By Kassem A. Saleh.



4. Sommerville I, Software Engineering, 5th edition, Pearson Education, 1996.
5. Jawadkar W S, Software Engineering – Principles and Practice, Tata McGraw-Hill, 2004.
6. Behforooz A, and Hudson F J, Software Engineering Fundamentals

### IS 1405 **Web Programming – I (4 Credits)**

**Questions to be set: Eight (Four from each unit)**

**Questions to be answered: Any Five selecting at least Two from each unit**

#### **UNIT I**

**Introduction to Internet:** What is Internet? : A Network of Networks, Gateway; History of the Internet: Connecting to the Internet, Internet Service Providers, DNS Servers, Connection Types, Modems, Connecting to the Internet using Dialup Networking; Web Browsers; Using Web Browser; How does the Internet Work?; Routers; What you can do with the Internet; Origins and Development of the Internet; How Internet Standards are Developed; Moving Data across the Internet: Internet Addresses.

**The World Wide Web:** Introduction to world wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Applications, Websites – Home Pages: Web Site Development ; How to Builds Web Sites? , Web Content Authoring, Web Graphics Design, Web Programming, Webserver Administration, Protocols, Search Engines & Search Engines, Plug-ins, FTP Applications.

**Internet Services & Internet Security:** Electronic Mail, FTP, Newsgroups, Other Internet Services, Security and the Internet, Security Tools, E-commerce Security Issues, TCP/IP, Domain Names and IP addressing, Host Names, Domain Names, Addressing - Reserved IP addresses.

**HTML – URI, LIST, Hyperlinks:** History of HTML, Introduction to URI: Fragment Identifier & Relative Uniform Resource indicator, Standard Generalized Markup Language, Structure of HTML document, Switching between your Editor and Browser, Structuring Web Page, Paragraph and

Line Break Tags, Adding Comments, Formatting your Text; Creating Lists: Ordered List Tags, Unordered List Tag & Nesting Lists: Controlling How Ordered Lists are displayed, Creating a Multilevel Outline, Using Start and Value Attributes in an Ordered List, Controlling the Display of Unordered List, Creating Definition List; Creating Hyper Text Links, Linking to a File or Data Object, Linking to NON-WWW Files, Linking to a Place in the Same HTML File, Linking to a Place in Another HTML File, Creating Link Lists, Creating a Simple Link List.

**HTML – Images, Links, Rules, Address Tag and Text:** Inserting Images: Using the Align Attribute in Inline Graphics, Setting the Height and Width of an Inline Image; Creating Image Links; Horizontal Rules: Changing the Height of a Horizontal Rule, Changing between Shaded and Un-shaded Horizontal Rule, Changing the Width of a Horizontal Rule, Setting the Alignment of a Horizontal Rule; Address Tag; Working with Text: Text Alignment, Changing Font Sizes and Colors: Setting Font Sizes, Setting the Base Font, Using the Small and Big tags, Changing the Font Color; Using a Background Image; Marquee Tag.

**Web Page Authoring using HTML:** Tables, Creating Columns and Rows, Adding a Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the Table Width and Height, Aligning Cell Contents, Setting Column Width, Centering a Table, Inserting an Image, Spanning Columns & Spanning Rows, Setting Font Size and Colors, Assigning Background Colors; Frames:Percentage dimensions, Relative dimensions, Creating two rows Frames, Creating two columns frames, Creating two rows and the second row containing two columns; Forms: What is Form?, Form Tag, Method, Action, Input Tag, Type Attribute: Check box, Hidden, Image, Radio, Reset, Submit, Text; Other `<INPUT>` attributes: Value, SRC, Checked, Size, Max length, Align, Select tag, Text Area, CGI, Get, Post.

**Cascading Style Sheets (CSS):** Properties of Table, Using the style Attribute, Creating Classes and IDs, Generating External Style Sheets, Typography, Consistency, Types of styles, Specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Text and font attributes: Font Vs CSS, changing fonts, text attributes, Advance CSS properties: Backgrounds, Box properties and Positioning.

## UNIT II

**DHTML:** DHTML Overview & Definitions, Dynamic Images, Image Rollovers, Slide Shows, Dueling DOMs, The Document Object Model, The Navigator 4.x DOM, The Internet Explorer DOM, Dealing with DOM Differences, Creating the Core DHTML Library, The Custom Object Technique, Adding Methods to a Custom Object, Adding Secondary Methods and Properties & Active Element Object, Moving Elements on the Page, Moving in Geometric Shapes.

**PHP – Part-1:** Introduction to PHP, History of web programming; how PHP fits into the web environment, PHP Installation and configuration, Hello World"; syntax, Variables, operators, flow control structures, More language basics; using GET and POST input, working with HTML forms; built-in and user-defined functions; variable scope; using the PHP manual, getting help, Input validation, string manipulation and regular expression functions; date and time functions

**PHP – Part-2:** Code re-use, require(), include(), and the include\_path; file system functions and file input and output; file uploads; error handling and logging; sending mail, HTTP headers and output control functions; HTTP cookies; maintaining state with HTTP sessions; writing simple web clients, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL API, More MySQL database access; graphic manipulation with the GD library, Introduction to Object Oriented Programming; Using PEAR packages, More PEAR packages; more OOP; the Smarty template engine, Parsing XML; PHP 5-specific features

**JavaScript Programming – I:** Introduction to JavaScript: Utility of JavaScript, Evolution of the JavaScript Language, JavaScript Versions and Browser Support, Differences Between Client-Side vs. Server-Side JavaScript, Statements and Operators, Variable Declarations, Assignment Operators and Statements, Arithmetic Operators, Logical Operators, Comparison Operators, String Operators, Conditional Operators, Operator Precedence; Implementing Control Constructs: Conditional and Looping Constructs, if else Statements, do while Statements, for in Statement, switch Statement; Implementing Functions: Defining Functions, Calling Functions,

Passing Arguments, Local vs. Global Variables, Using the Return Statement, Nested Functions; JavaScript Objects: The JavaScript Object Model and Hierarchy, JavaScript Object Properties, Object Methods, New Keyword, This Keyword, Creating New Object Instances Using Constructor Functions, String, Date and Array Objects, Construction of Custom Objects with Individual Properties and Methods

**JavaScript Programming – II:** Fundamental JavaScript Directives: In-Line JavaScript, Linking Web Pages to External JavaScript Files, JavaScript Using `<script>` Tags and Attributes, Utilizing the `<head>` Tags `<noscript>` Tags; Implementing Arrays: Why array need in Scripting, Creating Arrays, Reading and Writing to an Array, Array Methods and Properties; The delete Keyword: Introduction to Server-Side JavaScript, Purpose of Server-Side JavaScript, ASP and Microsoft Server Architecture, Netscape's Livewire Run-Time Engine, Server-Side Objects; Cookies: Introduction to Cookie, Uses of Cookie, Components of a Cookie, Cookie Controversy, Using Cookies on a Web Page, Cookie Examples; Common Applications: Form Validation and Testing, Specific Form Methods and Event Handlers, User Interaction, Local Form Processing, Creating New Windows, Writing to the Window Object, Browser Awareness Using the Navigator Object, Affecting the Browser Itself, Interactive Graphics; Event Handling: Event-Driven Programming Model, How JavaScript Handles Events, Handling Link Events, Handling Window Events, Handling Image Events, Handling Form Events, Setting Event Handlers In-Line or Referencing

**XHTML – I:** Understanding the World Wide Web: The relationship between browser and server, The roles of HTML, HTML, CSS, and other technologies used in Web development; XHTML page framework tags: `<html>` and `</html>`, The role of the `<head>...</head>` region, The role of the `<body>...</body>` region, Adding a title, meta keywords, and meta description tags; Text formatting and layout with HTML: Headings and subheadings, Paragraph text (including how to bold, italicize, and underline text), Bulleted and numbered lists, Using attributes to align text, Setting up text regions with `<div>...</div>` and `<span>...</span>` tags, Padding vs margin, Floats; Working with images : Understanding the GIF, JPEG, and PNG image formats (and when to use them), Positioning images on the page, Flowing text around images, Using a `<div>` or `<span>` region to position an image

**XHTML – II:** Using tables to display grids of data: Positioning tables on the page, Turning grid lines on and off, Customizing the table's appearance, Creating table heading and table data cells, Configuring cells to span multiple rows or columns; Linking it all together: Creating links to other pages on your site, Creating links to pages on other sites, mail to: links (for sending email), Techniques for automatically filling in the subject, cc:, and bcc: fields, Creating links to specific positions within the same page and other pages, Handling link management challenges; Fill-in Forms: The role of forms and how they interact with server-side programs, Techniques for effective form design, Creating text fields, text areas, password fields, and hidden fields, Designing radio button and checkbox sets, Adding lists and menus to your forms, Finishing the form with submit, reset, or image buttons, Discussion of how JavaScript can improve forms (by validating user input, performing calculations on entered numbers, controlling cursor tabbing order, etc.).

**Text/Reference Books:**

1. Ethan Cerami (2002). Web Services Essentials. O'Reilly Media.
2. Nicholas Chase (2002).XML Primer Plus. Sams, December 16, 2002.
3. Teague, J.C. (2001). DHTML and CSS: for the World Wide Web. Peachpit press.
4. Thomas Erl, Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services.
5. Jerry Lee Ford Jr. Ajax Programming for the Absolute Beginner. Course Technology PTR.
6. Estelle Weyl (2013). Mobile HTML5. O'Reilly Media, Inc., Pub.
7. Matthew David (2013). HTML5 Mobile Websites. Focal Press.

## IS 1465 Web Programming Lab – I (1.5 Credits)

Exercise:

- Exercise 1 - Basic HTML
- Exercise 2 - Creation of Frame
- Exercise 3 - Creation of Form
- Exercise 4 - PHP Concepts
- Exercise 5 - Validation of form using JavaScript
- Exercise 6 - DHTML Concepts
- Exercise 7 - XHTML Concepts

## BSc Semester – V

| Course Code | Course Title                     | Credits   |
|-------------|----------------------------------|-----------|
| IS 1501     | Mobile and Wireless Technologies | 4         |
| IS 1502     | Software Testing                 | 4         |
| IS 1503     | Cyber Security                   | 4         |
|             | Elective – I                     | 4         |
| IS 1566     | Software Engineering Lab         | 1.5       |
| IS 1567     | Mobile Programming Lab           | 1.5       |
| IS 1571     | Mini Project                     | 12        |
|             | <b>Total Credits</b>             | <b>31</b> |

## IS 1501 **Mobile and Wireless Technologies (4 Credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

**Introduction to mobile communication and computing:** Why mobile communications, Use-cases, applications, Definition of terms: Challenges, history, Wireless Transmission, Wireless networks in comparison to fixed networks, Simple reference model (TCP/IP model), Influence of mobile communication to the layer model.

**Wireless Transmission-I :** Frequencies for communication- Frequencies for mobile communication, Frequencies and regulations, Signals (physical representation of data, function of time and location), Fourier representation of periodic signals, Different representations of signals (w.r.t. freq and amp), Antennas (isotropic radiator, simple dipoles, directed and sectorized) , MIMO, Signal propagation ranges, Signal propagation – shadowing, reflection, refraction, scattering, diffraction), Multipath propagation, Effects of mobility, Multiplexing (FDM, TDM, SDM, CDMA), OFDM.

**Wireless Transmission –II:** Modulation (Digital, analog), spread spectrum technology – DSS, FHSS, Cell structure – frequency planning, cell breathing.

**Wireless Telecommunication Systems:** GSM: Overview, Performance characteristics of GSM (w.r.t. analog sys.), GSM: Mobile Services, Architecture of the GSM system, system architecture, GSM - TDMA/FDMA , GSM hierarchy of frames, GSM protocol layers for signaling, Mobile Originated Call, Mobile Originated Call, 4 types of handover, Handover decision, Handover procedure, Data services in GSM, GPRS quality of service, GPRS architecture and interfaces, GPRS protocol architecture,

**3G – The Universal Mobile Telecommunication System (UMTS):** -UMTS Network Architecture –Release 99, UMTS Interfaces, UMTS Network Evolution, UMTS Release 5, UMTS FDD and TDD, UMTS Channels, Logical Channels, UMTS downlink transport and physical channels, UMTS uplink transport and physical channels, UMTS Time Slots, UMTS Network Protocol, Architecture, Mobility Management for UMTS Network

**(Wireless) Medium Access Control:** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), FDMA, TDMA, CDMA.

**Wireless LANs :** Mobile Communication Technology according to IEEE (examples), Characteristics of wireless LANs (Advantages and disadvantages), Comparison: infrared vs. radio transmission, Comparison: infrastructure vs. ad-hoc networks, 802.11 - Architecture of an infrastructure network, 802.11 - Architecture of an ad-hoc network, IEEE standard 802.11, 802.11 - Layers and functions, WLAN: IEEE 802.11b, WLAN: IEEE 802.11a, Some more IEEE standards for mobile communications.

## UNIT II

**Mobile Network Layer:** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**Mobile Transport Layer I:** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP.

**Mobile Transport Layer II:** Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.



**Data processing and mobility:** Effect of mobility on the management of data: Data Categorization; Location Dependent Data Distribution-Effect of Connectivity on Transaction Processing. Transaction Management in Mobile Database Systems: Mobile Database System; Transaction Execution in MDS; Mobile Transaction Model; Execution Model based on ACID Transaction Framework; Execution Model with Reporting Transactions; Two-Level Consistency Model; Pro-Motion: Proactive management of Mobile; Pre-write Transaction Execution Model; Pre-write Execution in Mobile Database Systems; Mobile Transaction Model- HiCoMo: (High Commit Mobile Transaction Model, Moflex Transaction Model, Kangaroo Mobile Transaction Model, MDSTPM Transaction Execution Model.)

**Mobile Ad hoc Networks (MANETs):** Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**4G Technology:** The basics of 4G, What is 4G, 4G capable phone, ITU, Three Flavours of 4G: WiMax, LTE, Difference between LTE and WiMax, HSPA+.

**HTML5 on Mobile Devices:** HTML5 for mobile websites and mobile applications on Mobile operating systems, Tools: Offline Web Storage, GeoLocation API, Canvas Drawing, CSS3.

**TEXT/Reference BOOKS:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley. second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.
3. Vijay Kumar, "Mobile Database System", Wiley publication.
4. Mark Pilgrim, "HTML 5- Up and running" O'Reilly, Google Press.

## IS 1502 **Software Testing (4 Credits)**

**Questions to be set:**                      **Eight (Four from each unit)**

**Questions to be answered:**        **Any Five selecting at least Two from each unit**

### **UNIT I**

#### **Introduction to Software Testing**

Definition of Software Testing, Need for software Testing, various approaches to Software Testing, defect distribution, Software Testing Fundamentals. General characteristics of testing, seven principles of testing.

#### **Software testing strategies**

Testing strategies in software testing, basic concept of verification and validation, criteria for completion of testing and debugging process.

#### **Software development life cycle and testing**

Water fall model, V-model, Spiral model, agile model, Life cycle testing concepts, testing methods, testing levels.

#### **Static Testing and dynamic testing**

Static Testing, static analysis tools, dynamic testing, White box testing, block box testing, Regression testing, dynamic testing tools.

#### **Functional testing**

Functional testing concepts, Equivalence class partitioning, Boundary value analysis, Decision tables, Random testing, Error guessing.

#### **Test management**

Test planning, cost-benefit analysis of testing, Test organization, Test strategies, Test progress monitoring and control- test reporting, test control, Specialized testing.

## **Testing tools**

Test automation approach, Testing frame work, types of testing tools

## **UNIT II**

### **Object-Oriented testing**

Object-Oriented testing challenges, Unit testing for Object-Oriented programming, Integration testing (top-down, bottom-up), cluster testing.

### **Software quality and software quality assurance**

Introduction to software quality and software quality assurance, basic principles about the software quality and software quality assurance. Planning for SQA, Composition of SQA plan and organizational initiatives required for a SQA.

### **Product quality and Process quality**

Product quality and process quality, various models for software product quality and process quality.

### **Software Configuration Management**

Software configuration management activities like software configuration identification, software configuration control, software configuration auditing.

### **Software Testing Report**

Access Project Management Development Estimate and status, Requirement Phase Testing, Design Phase Testing program Phase Testing, Execute Test and record results, Acceptance Test Report Test results, Testing Software Installation, Test Software Change, Evaluate Test Effectiveness. Testing calculating model(TCM)

### **Testing Specialized Systems and Application**

Client/Server Systems, RAD, System Documentation, Web based systems, Off-the self software, Multi platform environment, Security, Data Warehouse.

### **Selecting and Installing Software Testing tools**

Testing tools-hammers of testing, Selecting and using the test tools, appointing managers for testing tools

### **Text/ Reference Books**

- Boris Beizer, " Software Testing Techniques", Dreamtech
- Louise Tamres, " Introducing Software Testing", Pearson Education
- Rex Black, "Software management principal"
- SEBOK, "Software Engineering Body of Knowledge", IEEE & W. E. PERRY, "Effective Methods For Software Testing", John Wiley
- KANER C., NGUYEN H., FALK J., "Testing computer Software", John Wiley
- Testing in 30 + open source tools by shende SPD
- Software testing foundations 2edandreasspillner SPD

### **IS 1503 CYBER SECURITY (4 credits)**

**Questions to be set:                      Eight (Four from each unit)**

**Questions to be answered:          Any Five selecting at least Two from each unit**

## **UNIT I**

### **Introduction to Cyber Security**

Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.

### **Cyber Security Vulnerabilities and Cyber Security Safeguards**

Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

### **Securing Web Application, Services and Servers**

Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

### **Intrusion Detection and Prevention**

Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

## **UNIT II**

### **Cryptography and Network Security**

Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

### **Cyberspace and the Law**

Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

### **Cyber Forensics**

Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation, Conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.

### **Text/ Reference Books**

1. Computer and Information Technology Handbook, John R.Vacca, Elsevier, 2013.
2. Cyber Law and Cyber Security in developing and emerging Economics by Zeinab Karake Shalboub, Lubna Al Qusinie
3. Cyber Security by Edward Amoroso, 2007
4. Cyber Space and CyberSecurity by George k.Kostopoulos
5. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition by Albert J. Marcella, Jr. and Doug Menendez.
6. Cryptography and Network Security by Forouzan.
7. Inside Cyber Warfare: Mapping the Cyber Underworld by Jeffrey Carr.
8. India's Cyber Security Challenges by Institute for Defence Studies and Analyses

## IS 1531 **Advanced Computer Networks (4 credits)**

**Questions to be set:**                   **Eight (Four from each unit)**

**Questions to be answered:**       **Any Five selecting at least Two from each unit**

### **UNIT I**

**Introduction, Protocols and standards:** Definition and Uses of Computer Network, Classification of Computer network, Network Architecture, Internet Standards, Internet Administration; Overview of reference models: The OSI model, The OSI Reference Model, TCP/IP protocol Suite, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models, Addressing, IP versions. Connectors, Transceivers and Media converters, Network interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways etc. H/W selection. , Telephone networks, networking principles.

**Multiplexing and Local area networks:** Multiplexing, Types of Multiplexing- FDM, TDM, SM; - Ethernet, token ring, FDDI; switching - circuit switching, packet switching, multicasting.

**Optical Networking:** SONET/SDH standards, Dense Wavelength division multiplexing (DWDM), Performance and design Considerations

**Integrated Service Digital Network:** History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN - X.25 Layers - Packet Layer Protocol.

**ATM: The WAN Protocol:** Faces of ATM, ATM Protocol operations (ATM cell and Transmission) ATM Networking basics, Theory of Operations, B-ISDN reference model, PHY layer, ATM Layer (Protocol model), ATM layer and cell, Traffic Descriptor and parameters, Traffic Congestion control defined, AAL Protocol model, Traffic contract and QoS, User Plane overview, Control Plane AAL, Management Plane, Sub-DS3 ATM, ATM public services.

**Packet Switching Protocol:** X.25, theory of Operation and Network Layer functions, X.75, Internetworking protocols, SMDS, Subscriber Interface and Access Protocol, Addressing and Traffic Control Common Protocols and

interfaces in upper Layer: TCP/IP suite, Network Layer, Transport Layer, Applications Layer, Addressing and routing design, Socket programming

**Internet protocols:** Internet basics, IP, TCP, UDP, ICMP, HTTP; World Wide Web (WWW), Security in Internet, E-mail Security.

## UNIT II

**Routing in the Internet:** Intra and interdomain routing; Unicast .Routing Protocols: RIP, OSPF, BGP; Multicast Routing Protocols: MOSPF, DVMRP, Drawbacks of traditional routing methods, Idea of TE, TE and Different Traffic classes. IP over ATM, Multi-protocol Label switching(MPLS), Storage Area Networks (SAN).

**Network Management: SNMP:** Concept, Management Components, SMI, MIB, SNMP format, Messages.

**Network Security:** Cryptography, Symmetric Key Algorithms, Public Key Algorithms, Digital Signatures, Management of Public Keys, Communication Security, And Web Security.

**Web security and Traffic Management Basics:** Introduction, Web Security Requirements, Secure Socket Layer (SSL), Traffic Management, Quality characteristics and requirements.

**Quality of Service and Queue Analysis:** Introduction, Applications and Quality of service, Queue Analysis, Queue Management Algorithms.

**Multi-Media over Internet:** RTP, RSVP, IP Multicasting, Voice Digitization standards, G.729 and G.723 and H.323.

**Enterprise Network Security:** DMZ, NAT, SNAT, DNAT, Port Forwarding, Proxy, Transparent Proxy, Packet Filtering and Layer 7 Filtering. Backbone Network Design: Backbone Requirements, Network Capacities Topologies, Topologies Strategies, Tuning Network.

### Text/Reference Books:

1. Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann



2. William Stalling. (2010), High speed networks and internet, Dorling Kindersley (India) Pvt. Ltd. Pearson Education.
3. Simon Poulton (2003), packet Switching and X.25 Networking, Pitman Publishing.
4. AtulKahate, " Cryptography and Network Security", Tata McGraw Hill edition, Second edition
5. B. A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill edition, Third Edition.
6. Buckwalter T. Jeff (2000) – Frame relay technology and practices, Addison Wesley longman, Inc.
7. Harry G. Perros, "Connection-Oriented Networks", John Wiley & Sons Edition.
8. Larry L. Peterson and Bruce S. Davie, "Computer Networks- A systems approach" Morgan Kaufmann Publishers, Fourth Edition.
9. N. Olifer, V. Olifer, "Computer Networks: Principles, Technologies and Protocols for Network 6.design", Wiley India Edition, First edition.

## IS 1532 **Cloud Computing (4 Credits)**

**Questions to be set:** **Eight (Four from each unit)**

**Questions to be answered:** **Any Five selecting at least Two from each unit**

### **UNIT I**

**Introduction-** Objectives, From collaborative to the Cloud – A short history Client – Server Computing, Peer-to-Peer Computing, Distributed Computing, Collaborative Computing, Cloud Computing, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications.

**Business Values, Introduction-**Objectives, Service Modeling, Infrastructure Services, Platform Services, Software Services - Software as service modes- Massively scaled software as a service- Scale of Economy, Management and Administration.

**Inside Cloud Computing-** Introduction- Objectives, Feeling Sensational about Organization, Making Strategy Decisions- Governance Issues- Monitoring Business Processes- IT Cost Management.

**Cloud Service Administration-** Service Level Agreements and Monitoring- Support Services- Accounting Services, Resource Management- IT Security- Performance Management- Provisioning- Service Management, Untangling Software Dependencies.

**Cloud Computing Technology-** Introduction-Objectives, Clients – Mobile – Thin – Thick, Security - Data Linkage - Offloading Work - Logging - Forensics - Development – Auditing, Network- Basic Public Internet- The Accelerated Internet- Optimised Internet Overlay- Site-to-Site VPN- Cloud Providers- Cloud Consumers - Pipe Size- Redundancy, Services- Identity- Integration- Mapping- Payments- Search.

**Accessing the Cloud-** Introduction-Objectives, Platforms- Web Application Framework- Web Hosting Services- Proprietary Methods, Web Applications- API's in Cloud Computing, Browsers for Cloud Computing- Internet Explorer- Mozilla Firefox- Safari- Chrome.

**Data Management-** Introduction- Objectives, Data Security- Data Location- Data Control- Securing data for transport, Scalability and Cloud Services- Large Scale Data Processing- Databases and Data Stores- Data Archival.

## UNIT II

**Information Storage in Cloud Computing-** Introduction- Objectives, Storage as a Service, Storage Providers- Amazon Simple Storage Service- Nirvanix- Google Bigtable Datastore- MobileMe- Live Mesh, Storage Security, Merits and Demerits of Storage.

**Discovery of Private and Hybrid Clouds-** Introduction- Objectives, Need for Privacy- Defining a private cloud- Public, Private, and Hybrid Clouds – A Comparison, Examining the Economics of the private cloud- Assessing capital expenditures- Vendor Private Cloud Offerings, The Up Key Vendors- Service Oriented- Systems Integrators- Technology Enablers.

**Cloud Computing Standards-** Introduction- Objectives, Best Practices and Standards, Practical Issues- Interoperability- Portability- Integration- Security, Standards Organizations and Groups- Cloud Security Alliance- Distributed Management Task Force (DMTF)- National Institute of Standards and Technology (NIST)- Open Cloud Consortium (OCC)- Open Grid Forum (OGF)- Object Management Group (OMG)- Storage Networking Industry Association (SNIA)- Cloud Computing Interoperability Forum (CCIF)- Vertical Groups.

**Desktop and Device Management-** Introduction- Objectives, Desktop Virtualization- Across Industries- Client Desktops, Desktop placement in the cloud- Merits- Desktop as a Service (DaaS), Desktop Management- Watching the four areas- Asset Management.

**Cloud Governance-Introduction-objectives-** IT Governance, Deciding the Governor, Risk Assessment of running the cloud- Understanding possible risks- Performance monitoring and measurement- Measurement Methods, Working of Governance- Establishment of the Governance Body- IT Service Performance – Monitoring and Measuring- Cataloging control and Compliance Data.

**Migrating to the Cloud- Introduction-** Objectives, Cloud Services for individuals- Available Services - Skytap Solution, Cloud Services Aimed at the mid – market, Enterprise Class Cloud Offerings- MS Exchange - VMotion- VMWare v Center Converter- Hyper – V Live Migration, Migration- Applications needed for migration - Moving existing data to cloud- Using the Wave approach.

**Migrating to the Cloud- Introduction-** Objectives, Analyzing the Services- Establishing a Baseline and Metrics- Tools, Best Practices- Finding the Right vendor- Phased-in Vs Flash-cut Approaches- Bringing in Creativity, How Cloud computing might evolve- Researcher Predictions- Responding to Changes- Getting ready.

**Text/ Reference Books:**

1. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online; Author: Michael Miller, Que Publications, 2009.
2. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper; Wiley Publishing Inc., 2010 Edition.
3. Cloud Computing and SOA Convergence in Your Enterprise: A step by step guide, by David S. Linthicum, Addison Wesley Information Technology Series
4. Cloud Security and Privacy: An enterprise perspective on Risks and Compliance, by Tim Mather, Subra Kumaraswamy, and Shahed Latif, O’rielly Series

## IS 1533 E-Commerce (4 Credits)

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### UNIT I

**Introduction to E-Commerce:** Defining Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities; Process of E-Commerce; Types of E-Commerce; Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models.

**E-Commerce Activities:** Various Activities of E-Commerce; Various Modes of Operation Associated with E-Commerce; Matrix of E-Commerce Types; Elements and Resources Impacting E-Commerce and Changes; Types of E-Commerce Providers and Vendors; Man Power Associated with E-Commerce Activities; Opportunity Development for E-Commerce Stages; Development of E-Commerce Business Case; Components and Factors for the Development of the Business Case; Steps to Design and Develop an E-Commerce Website.

**Internet – The Backbone for E-Commerce:** Early Ages of Internet; Networking Categories; Characteristics of Internet; Components of Internet – Internet Services, Elements of Internet, Uniform Resource Locators, Internet Protocol; Shopping Cart, Cookies and E-Commerce; Web Site Communication; Strategic Capabilities of Internet.

**ISP, WWW and Portals:** Internet Service Provider (ISP); World Wide Web (WWW); Portals – Steps to build homepage, Metadata; Advantages of Portal; Enterprise Information Portal (EIP).

**Reference Models:** Open Systems Interconnection (OSI) Model – Physical layer, Data link layer, Network layer, Transport layer, Session layer, Presentation layer, Application layer; Transmission Control Protocol (TCP) / Internet Protocol (IP) Model; Protocol – Internet Protocol (IP), User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Dynamic

Host Configuration Protocol (DHCP), Hyper Text Transfer Protocol (HTTP), File Transfer Protocol (FTP), Telnet, Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP).

**XML and Data Warehousing:** Definition of eXtensible Markup Language (XML); XML Development Goals; Comparison between HTML and XML; Business importance in using XML Based Technology; Advantages, Disadvantages and Applications of XML; Structure of an XML Document; XHTML and X/Secure; Data Warehousing; Data Marts and Operational Data Stores.

**E-Marketing:** Traditional Marketing; E-Marketing; Identifying Web Presence Goals – Achieving web presence goals, Uniqueness of the web, Meeting the needs of website visitors, Site Adhesion: Content, format and access; Maintaining a Website; Metrics Defining Internet Units of Measurement; Online Marketing; Advantages of Online Marketing.

## UNIT II

**E-Security:** Security on the Internet; Network and Website Security Risks – Denial-of-Service attacks, Viruses, Unauthorized access to a computer network; Vulnerability of Internet Sites; Network and Website Security – Transaction security and data protection, Security audits and penetration testing; E-Business Risk Management Issues; Firewall – Network policy, Advanced authentication mechanism, Packet filtering, Application gateways; Defining Enterprise Wide Security Framework.

**E-Payment Systems:** Electronic Funds Transfer; Digital Token Based E-Payment Systems; Modern Payment Systems; Steps for Electronic Payment; Payment Security; Net Banking.

**E-Customer Relationship Management:** Customer Relationship Management (CRM) – Marketing automation, Enterprise customer management; Customer Relationship Management Areas; CRM Processes; Architectural Components of a CRM Solution – Customer's information repository, Campaign management, Event triggers, business logic and rules repository, Decision support tools, Higher level statistical analysis, Forecasting and planning tools, True channel management, Workflow

management, Collateral management; Electronic Customer Relationship Management; Need, Architecture and Applications of Electronic CRM.

**Supply Chain Management:** Supply Chain Management (SCM); Goals of SCM; Functions of SCM; Strategies of SCM; Electronic SCM and its benefits; Components of Electronic SCM; Electronic Logistics and its Implementation.

**Wireless Application Protocol:** Wireless Application Protocol (WAP); Architecture of WAP; Working of WAP; Wireless Technologies; Generations in Wireless Communications; Security Issues related to Wireless Communications; Mobile Computing in Four Dimensions; Wireless Millennium.

**Knowledge Management:** Knowledge Management and its Goals; Collaborative Computing and Knowledge Management; Knowledge Management Tools; Features of Knowledge Management Tools; Knowledge Creating Process; Knowledge Management Strategies for Different Organizations; Knowledge Management in Research and Development Organizations.

**Implementation of E-Commerce:** WWW.EBAY.COM - B2C Website – Registration, Time factor, Bidding process, Growth of eBay; PayPal – New Trend in Making Payments Online; National Electronic Funds Transfer.

**Text/Reference Books:**

1. Ahmad, A. (2005). Wireless and Mobile Data Networks. Canada: John Wiley & Sons, Inc.
2. Ha'c, A. (2003). Mobile Telecommunications Protocols for Data Networks. England: John Wiley & Sons Ltd.
3. Tse, D and Viswanath, P. (2005). Fundamentals of Wireless Communication. USA: Cambridge University Press.
4. 4.Gow, G. A. and Smith, R. K. (2006) Mobile and Wireless Communications. Poland: McGraw-Hill Education
5. 5.Pro. Webb W. (2007). Wireless Communications. England: The Future. John Wiley & Sons Ltd.

### **IS 1566 Software Engineering Lab**

Exercises (at least 6) are to be carried out considering different phases of software development life cycle(s), using CASE tool (s).

### **IS 1567 Mobile Programming Lab (1.5 Credits)**

Exercises are to be based on the HTML5, J2ME

### **IS 1571 Mini Project (12 Credits)**

A project work of minimum 16 weeks duration has to be carried out in the area relevant to the curriculum. The project work may be carried out in groups of students comprising of 2-3 students.



## BSc Semester – VI

| Course Code | Course Title             | Credits     |
|-------------|--------------------------|-------------|
| IS 1601     | Web Programming - II     | 4           |
|             | Elective - II            | 4           |
| IS 1668     | Web Programming Lab - II | 1.5         |
| IS 1675     | Major Project            | 20          |
|             | <b>Total Credits</b>     | <b>29.5</b> |

### IS 1601 Web Programming – II (4 Credits)

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

#### UNIT I

**HTML Basics:** HTML Introduction, HTML Elements, Attributes, HTML Headings, Paragraphs, HTML Formatting, Fonts, Styles, HTML Links, Images, Tables, HTML Lists, Forms, Frames, HTML Colours, Colornames, Colorvalues, HTML Quick List.

**XML Programming – I:** Introduction, The Need for XML, Structured Data and Formatting, Advantages of XML, SGML, XML, and HTML, World Wide Web Consortium (W3C) Specifications and Grammars, XML Applications and Tools, Creating and Viewing XML Documents, Transforming XML Documents, XML Document Syntax, Validating XML Documents with DTDs, XML Namespaces.

**XML Programming – II:** Introduction, Transforming XML Documents with XSLT and XPath, Formatting XML Documents with XSL-FO, Purpose of XSL Formatting Objects (XSL-FO), XSL-FO Documents and XSL-FO Processors, XSL-FO Namespace, Page Format Specifiers, Page Content Specifiers.

**XML Programming – III:** Validating XML Documents with Schemas, Introduction to Simple Object Access Protocol (SOAP), SOAP's Use of XML and Schemas, Elements of a SOAP Message, Sending and Receiving SOAP Messages (SOAP Clients and Receivers), Handling SOAP Faults, Current SOAP Implementations, Introduction to Web Services: Architecture and Advantages of Web Services, Purpose of Web Services Description Language (WSDL), WSDL Elements, Creating and Examining WSDL Files, Overview of Universal Description, Discovery, and Integration (UDDI), UDDI Registries (Public and Private), Core UDDI Elements, Deploying and Consuming Web Services, ebXML Specifications ebXML Registry and Repository, Introduction to the XML Document Object Model (XMLDOM).

**XML applications:** B2B Scenarios, e-business system involved: delivery, sales, cross company communication: replacement for EDI, the document as the application, XML and relational databases, XML and dynamic Web publishing, benefits of XML schemas to applications, XML processors enforcing structure, application access to document structure, fixed values, channels.

**Ajax - Asynchronous JavaScript and XML – overview:** Web Applications - Pre and Post Ajax, Ajax in the Real World, Alternatives to Ajax, XML In A Nutshell, Syntax, Rules, JavaScript In A Nutshell, Primitive Data Types and Reference Types, Variables Loops, Function Definition and Function Call, Objects, Expressions, Operators and Escape Sequences, Document Object Model (DOM), Window Object, HTML & XML DOM, Node, Element, Accessing Element Nodes, Inner HTML, Properties of Element and Text Nodes, Node Attributes Node Name & Node Value, Event Handling, Key Word – this, Whitespace, Interpretation - Browser Differences, Removing Nodes, Creating New Nodes, Node Methods

**Ajax - XML Http Request Object:** XML Http Request Instantiation, XML Http Request open() Method, Asynchronous Vs Synchronous Requests, Callback Function, ready State, CSS In A Nutshell, Syntax, Units, Selectors, Positioning properties, float Property, Types of Positioning 3D, XML and Ajax, Creating a DOM Document with JavaScript, load XML, Receiving XML Responses from the Server, Passing XML to the Server 90, Different Server Side Technologies - an overview, Frameworks and Toolkits - an overview, Some Popular Frame Works - in brief.

## UNIT II

**AJAX - Object-Oriented JavaScript:** Multiple Simultaneous Asynchronous Requests, Prototype, Extending Built-in Objects, Object-Oriented XML Http Request, Refactoring the Creation and Handling of XHR Http Request, Model-View-Control (MVC), Design Patterns, MVC Examples, Ajax Web Application, JavaScript Object Notation (JSON), JavaScript Object and Array Creation Using Literals, JavaScript Objects in Arrays & Arrays in Objects, JSON Syntax, JSON Parsers, JSON Data Transfer Between Client and Server Autosuggest example.

**AJAX - XSLT:** XSLT, Overview, XSLT in the Browsers, Sarissa, Advantages and Disadvantages, XPath – Overview, Drag and Drop, Overview, Scriptaculous, Draggable Options, Droppables, Drag and Drop, Ajax and Scriptaculous, Appendix, Download / Install Software –Wamp, Regular, xpressions, Some characteristics of regular expressions Metacharacters, Non-assertions and Quantifiers, Assertions and Quantifiers, XML Basics, XML Benefits, XML Parsers, Content Management, Web Services, A Document Type Declaration, Elements Attributes, CDATA, Special Characters.

**J2ME:** Java Environments Comparison, J2ME (Java 2 Micro Edition), J2SE (Java 2 Standard Edition) & J2EE (Java 2 Enterprise Edition)  
J2ME specifics, ME components: KVM, J2ME, CLDC, MIDP - Comparison of different ME platforms, Profiles - Overview of profile system, Architecture - How the J2ME works, Differences between J2ME environments - Comparisons between J2ME and Personal Java, MIDP, Mobile information device profile, Creating MIDP applications, Midlet suites and deployment, MIDP GUI, Graphical User Interfaces with MIDP, Displays, Commands, Pointers, Screens, Animations and drawing, Data structures: Storing data in Java, Hash table and Hash Map, Vector and List, Comparison between different types, Inner classes, Using inner classes, Types of inner classes, Anonymous, Inner, Member, Static, Exceptions, IO and Networking, Error handling, Streamed IO, Socket IO (TCP/IP), J2ME, IO, Connector architecture, Networking with HTTP, Threading, Creating threads in Java, Synchronization

**Introduction to HTML5:** HTML5 - New standard for HTML, XHTML, and the HTML DOM, How Did HTML5 Get Started? Rules for HTML5, New Features, Some of the most interesting new features in HTML5, Browser Support, New Elements in HTML5, New Markup Elements, New Media Elements, The Canvas Element, New Form Elements, New Input Type Attribute Values, Video on the Web, Video Formats, How It Works, All <video> Attributes

**HTML5 – Audio and Canvas:** Audio on the Web, Audio Formats, How It Works, All <audio> Attributes, HTML5 Canvas, What is Canvas? Create a Canvas Element, Draw With JavaScript, Understanding Coordinates, More Canvas Examples, HTML5 Web Storage, Storing Data on the Client, The local Storage Object, The session Storage Object, HTML5 Input Types, HTML5 New Input Types, Browser Support, Input Type – email, Input Type – url, Input Type – number, Input Type – range, Input Type - Date Pickers, Input Type – search, Input Type – color.

**HTML5 Form Elements and Attribute:** HTML5 New Form Elements, Browser Support, datalist Element, keygen Element, output Element, HTML5 Form Attributes, HTML5 New Form Attributes, Browser Support, autocomplete Attribute, autofocus Attribute, form Attribute, Form Override Attributes, height and width Attributes, st Attribute, min, max and step Attributes, multiple Attribute, novalidate Attribute, pattern Attribute, placeholder Attribute, required Attribute: HTML5 Tag Reference, HTML5 Global Attributes, HTML5 Event Attributes, Global Event Attributes, Window Event Attributes, Form Events, Keyboard Events, Mouse Events, Media Events

**WAP Simulator for Mobile Phones:** Introduction, WAP toolkit software includes: WML and WML Script encoders, phone simulators, WML Deck and Card, WML Document Structure, Character data, WML Entities, Prolog, XML Declaration and Character Encoding, Comments in WML, Line Breaking in WML, Paragraphs and Line Breaks, Text Formatting, WML Tables, Wireless Bitmap (WBMP), Links, <anchor> tag, <a> tag.

**Text/Reference Books:**

1. Ethan Cerami (2002). Web Services Essentials. O'Reilly Media.
2. Nicholas Chase (2002).XML Primer Plus. Sams, December 16, 2002.
3. Teague, J.C. (2001). DHTML and CSS: for the World Wide Web. Peachpit press.

4. Thomas Erl, Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services.
5. Jerry Lee Ford Jr. Ajax Programming for the Absolute Beginner. Course Technology PTR.
6. Estelle Weyl (2013). Mobile HTML5. O'Reilly Media, Inc., Pub.
7. Matthew David (2013). HTML5 Mobile Websites. Focal Press.

## IS 1634 **IT Infrastructure Management (4 credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

#### **IT Infrastructure: Overview**

Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their Management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment, Total cost of complexity issues, Value of Systems management for business.

#### **IT Infrastructure Management**

Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

#### **Current computing environment**

Complexity of current computing, multiple technologies, multiple vendors, multiple users, e- Waste disposal, Toal cost of ownership.

#### **IT system Management**

Common tasks in IT system management, approaches for organization Managemnt, Models in IT system design, IT management systems context diagram, patterns for IT system Management

#### **Establishing business value of information system**

Information system costs and benefits, Capital budgeting for information system, Real Options pricing models, Limitation of financial models.

#### **Service Delivery Processes - I**

Service-level management, financial management and advandges of financial management

#### **Service Delivery Processes - II**

IT services continuity management, Capacity management, Availability management and service desk.

## **UNIT II**

### **Service Support Management -I**

Service support process, Configuration Management. Incident management.

### **Service Support Management -II**

Problem management, Change management, Release management.

### **Storage Management – I**

Types of Storage management, Benefits of storage management, backups, Archive, Recovery, Disaster recovery.

### **Storage Management – II**

Space management, Hierarchical storage management, Network attached storage, Storage area network, bare Machine recovery, data retention, database protection

### **Security Management -I**

Introduction Security, Identity management, Single sign-on, Access Management.

### **Security Management -II**

Basics of network security, LDAP fundamentals, Intrusion detection, firewall, security information management

### **IT Ethics**

Introduction to Cyber Ethics, Intellectual Property, Privacy and Law, Computer Forensics, Ethics and Internet, Cyber Crimes

### **Text/Reference Books:**

1. Foundations of IT Service Management: based on ITIL, by Jan Van Bon, Van Haren, Publishing, 2nd edition 2005
2. High Availability: Design, Techniques, and Processes, by Floyd Piedad, Michael Hawkins, Prentice Hall, 2000

- IT Organization: Building a Worldclass Infrastructure, by Harris Kem, Stuart Gaiup, Guy Nemiro, Publisher: Prentice Hall, 2000
3. IT Systems Management: Designing, Implementing, and Managing World-Class Infrastructures Rich Schiesser, Prentice Hall PTR; 2001



## IS 1635 **MANAGING BIG DATA (4 credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

#### **UNDERSTANDING BIG DATA**

What is big data – why big data –.Data!, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System , Grid Computing, Volunteer Computing, convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics

#### **NOSQL DATA MANAGEMENT**

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schema less databases – materialized views – distribution models – sharding – version – Map reduce – partitioning and combining – composing map-reduce calculations

#### **BASICS OF HADOOP**

Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures

### **UNIT II**

#### **MAP-REDUCE APPLICATIONS**

MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats

#### **HADOOP RELATED TOOLS**

Hbase – data model and implementations – Hbase clients – Hbase examples –praxis. Cassandra – cassandra data model – cassandra examples – cassandra clients –Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data

types and file formats – HiveQL data definition – HiveQL data manipulation  
– HiveQL queries.

**Text/Reference Books:**

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilly, 2012.
2. Eric Sammer, "Hadoop Operations", O'Reilly, 2012.
3. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilly, 2012.
5. Lars George, "HBase: The Definitive Guide", O'Reilly, 2011.
6. Alan Gates, "Programming Pig", O'Reilly, 2011.

## IS 1636 **MOBILE APPLICATION DEVELOPMENT (4 credits)**

**Questions to be set:** Eight (Four from each unit)

**Questions to be answered:** Any Five selecting at least Two from each unit

### **UNIT I**

**Introduction:** What is Android, Android versions and its feature set The various Android devices on the market , The Android Market application store , Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

#### **Android Architecture Overview and Creating an Example Android**

**Application:** The Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files.

#### **Android Software Development Platform**

Understanding Java SE and the Dalvik Virtual Machine , The Directory Structure of an Android Project , Common Default Resources Folders , The Values Folder , Leveraging Android XML, Screen Sizes , Launching Your Application: The AndroidManifest.xml File, Creating Your First Android Application.

#### **Android Framework Overview**

Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

#### **Understanding Android Views, View Groups and Layouts**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers

The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool.

### **Graphical User Interface Screen with views**

Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with SeekBar, Working with Menus using views.

### **Displaying Pictures**

Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation

## **UNIT II**

### **Files, Content Providers, and Databases**

Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers.

### **Intents and Intent Filters**

Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers.

### **A Basic Overview of Android Threads and Thread handlers**

An Overview of Threads, The Application Main Thread, Thread Handlers, A Basic Threading Example, Creating a New Thread, Implementing a Thread Handler, Passing a Message to the Handler.

### **Messaging and Location-Based Services**

Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location-Based Services, Geocoding and Map-Based Activities.

**Multimedia: Audio, Video, Camera**

Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures.

**Windows Phone App Development Fundamentals**

Introduction to Windows Phone App Development, Installing the Windows Phone SDK, Creating Your First XAML for Windows Phone App.

**Fundamental Concepts in Windows Phone Development**

Understanding the Role of XAP Files, the Windows Phone Capabilities Model, the Threading Model for XAML-Based Graphics and Animation in Windows Phone, Understanding the Frame Rate Counter, The Windows Phone Application Analysis Tool, Reading Device Information, Applying the Model-View-ViewModel Pattern to a Windows Phone App, Property Change Notification, Using Commands

**Books:**

1. Android 4.4 App Development Essentials , Neil Smyth , eBookFrenzy; 1 edition (28 January 2014)
2. BEGINNING Android™ 4 Application Development by Wei-Meng Lee , John Wiley & Sons, Inc
3. Professional Android 4 Application Development by Reto Meier , Wrox Publication
4. Windows Phone 8 UNLEASHED by Daniel Vaughan, SAMs Publication.

## **IS 1668 Web Programming Lab – II (1.5 Credits)**

### **Exercises**

Exercise 1 - XML  
Exercise 2 – AJAX  
Exercise 3 - AJAX with Database  
Exercise 4- Active Server Page  
Exercise 5 - ASP Database Connectivity  
Exercise 6- SOAP  
Exercise 7 – J2ME

### **IS 1675 Major Project (20 Credits)**

A project work of minimum 16 weeks duration has to be carried out in the area relevant to the curriculum. The project work may be carried out in groups of students comprising of 2-3 students or individually under the supervision of faculty member(s).