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

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

Operating System Concepts

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.
• 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

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, EBCIDIC 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, Canaanical 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-Salve 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, Weighed 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 Gage Arrays (FPGAs), Programmable Logic Software.

**Computer Concepts**
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
3. Digital Fundamentals-Thomas Floyd. UBS
5. Digital Systems-Principles and applications- Ronald;d 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
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


Short Stories: Reading and Comprehension
Text/Reference Books

- Alice Oshima, *Writing Academic English*, Pearson Longman
- 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 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:**

**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

**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:**

**Text/Reference books**

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
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.


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:
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; Trignometrical ratios of angle θ when θ is acute; trignometrical 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 Moivere’s theorem; n\textsuperscript{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.

3. Problems in Calculus of one variable by I. A. Maron Publication – CBS Publishers
5. Applied & Computational Complex Analysis by Peter Henrici
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


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, 3 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

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


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:**
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.


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**
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 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:
4. Walrand, P. Varaiya, “High Performance Communication Networks”, Morgan Kaufmann
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
### 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:
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.


**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


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 flapping distance for error correction, Single bit error correction or (n, m) flapping 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.

**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:**

10. Walrand, P. Varaiya, “High Performance Communication Networks”, Morgan Kaufmann
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:

2. Dr. Sathya Raj Pantham, Pure JFC swing-A code intensive premium reference.
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.

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 (BNCF); 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:**

IS 1363 Programming Lab – II (1.5 Credits)

Exercise:

Exercise 1 - 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:

Exercise 1 - 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

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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**

**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**
User Interface Design Process-II

Graphical User Interface

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

Information Search and Visualization
**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.
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.


**UNIT II**

**Representing Web Data:** XML-Documents and Vocabularies-Versions and Declaration – Namespaces, JavaScript and XML, AJAX- Introduction, HTTP request, XMHttpRequest, 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:
5. Chris Bales, “Web programming - Building Internet Application”.

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


**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

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 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:
2. Software Engineering, 1E, By Rohit Khurana

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.


**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


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 Objection Oriented Programming; Using PEAR packages, More PEAR packages; more OOP; the Smarty template engine, Parsing XML; PHP 5-specific features

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 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:**

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

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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,

(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.


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:
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 framework, 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 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

Testing Specialized Systems and Application

Selecting and Installing Software Testing tools
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"
- 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
Cyber Security Vulnerabilities and Cyber Security Safeguards

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

UNIT II
Cryptography and Network Security

Cyberspace and the Law

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**

2. Cyber Law and Cyber Security in developing and emerging Economics by Zeinab Karake Shalboub, Lubna Al Qusinie
4. Cyber Space and CyberSecurity by George K. Kostopoulos
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


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


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.


**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.


**Text/Reference Books:**

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

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.


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


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.


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.

**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 - VMMware v Center Converter - Hyper – V Live Migration, Migration - Applications needed for migration - Moving existing data to cloud - Using the Wave approach.


**Text/ Reference Books:**


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).

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-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.


**Text/Reference Books:**
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.
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 – 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 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.


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, Apendix, 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:**

   Course Technology PTR.
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**

**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, Total cost of ownership.

**IT system Management**
Common tasks in IT system management, approaches for organization Management, 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 advantages 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**

**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:**
IT Organization: Building a Worldclass Infrastructure, by Harris Kem, Stuart Gaiup, Guy Nemiro, Publisher: Prentice Hall, 2000
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

NOSQL DATA MANAGEMENT

BASICS OF HADOOP

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

**Text/Reference Books:**

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


Android Software Development Platform

Android Framework Overview

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

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**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:**
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).