Syllabus of 3rd Semester

of

Department of Information Technology

for

Batch 2014 Onwards

IT-14301 IT Methodologies

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**

Total Marks: 100

Internet Basics:

Introduction to networks and Internet, TCP/IP vs OSI Model, Working of Internet, Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, Concept of Subnetting, Standard address, DNS, IPv4 and IPv6 [4]

Internet Technologies:

Introduction to various network components like Modem, Router, Bridge, Switches and Gateway, LAN Topologies, Various type of networks, Different type of communication media- Wired and Wireless Media, Troubleshooting utilities like ping, arp, traceroute, nslookup, netstat etc. [4]

World Wide Web :

Introduction to Browsers, Telnet and FTP, The idea of hypertext and hyper media; How the web works: HTTP request message-response message-Web Clients Web Servers; MIME types, plugins. The standards-HTML, XML, XHTML and the W3C. Introduction to Web Servers: PWS, IIS, Apache; Microsoft Personal Web Server. Accessing, Setup & using these servers, E-mail: E-mail basics, Protocols, Format of an E-mail Message, Basic E-mail functions, E-mail clients like Netscape messenger, Outlook Express, E-mail Security. [10]

HTML:

The anatomy of an HTML document; Marking up for structure and style: basic page markup, absolute and relative links, ordered and unordered lists, embedding images and controlling appearance, table creation and use, frames, Forms [6]

Style Sheets:

CSS-Introduction to Cascading Style Sheets-Features-Core Syntax, Separating style from structure with style sheets:Internal style specifications within HTML, External linked style specification using CSS, page and site design considerations. [5]

Client side programming:

Introduction to the JavaScript syntax, operators and functions, Event handling, Forms handling, Introduction to the Document Object Model. [6]

Internet Security:

Need, Web Search engine, web meta searcher, web search agents, E-mail Threats, Introduction to Cryptography, Firewall, Firewall Architecture, Selection of Suitable Firewall.[5]

Text Books:

1. Ivan BayRoss *"HTML, DHTML, JavaScript, Perl CGI"*, BPB Publications 2015
2. Raymond Greenlaw and Ellen Hepp *"Fundamentals of the Internet and the World Wide Web* " TMH 2015
3. Deitel,Deitel & Nieto "Internet & World Wide Programming" Pearson Education 2000
4. Achyut S Godbole , Atul Kahate *"Web Technologies"* T.M.H 2003

Reference Books:

1. Raj Kamal "Internet and Web Technologies" T.M.H ,2000
2. W.R.Stevens. "*TCP/IP Illustrated, Volume 1: The Protocols",* Addison Wesley, 1994.
3. , Behrouz A. Forouzan *"Data Communications & Networking"* McGraw-Hill Fourth Edition,

IT-14302 Social and Professional Aspects of Information Technology

Internal Marks: 40 **L T P**

External Marks: 60 **3 1 0**

Total Marks: 100

Organizational Context:

Business processes, Workflow, IT environment, Organizational culture, Organizational structure, professionalism [4]

Teamwork Concepts and Issues :

Collaboration, group dynamics, leadership styles, personality types, collaboration tools [4]

Professional Communications:

Skill of effective oral presentation, efficient technical writing, system documentation, technical requirements [4]

Security and Legal issues in computing:

Data security, system security and network security, GhostNet, cloud computing and security, cyber terrorism, hacktivism, information warfare, Compliance, Hackers/crackers, computer crime, viruses, system use policies and monitoring, risk and liabilities of computer-based systems [5]

Social context of computing:

Social informatics, social impact of IT on society, online communities and social implications, globalization issues, economic issues in computing, digital divide [6]

Intellectual Property:

Foundations of Intellectual Property, ownership of information, plagiarism, software piracy, fair use, Digital Millennium Copyright Act (DMCA), copyrights, patents, trademarks and trade secrets, Non-Disclosure Agreements (NDAs), International differences [7]

Professional and Ethical Issues and Responsibility:

Relationships with Professional Societies, codes of professional conduct, ethics and history of ethics, whistle-blowing, workplace issues (harassment, discrimination), identify theft, ethical hacking [4]

Privacy and Civil Liberties

Health Insurance Portability and Accountability Act (HIPPA), Family Educational Rights and Privacy Act (FERPA), European Union (E. U.) Data Protection, Gramm-Leach-Bliley Act [6]

Text Books:

1. Robert McGinn, "The Ethically Responsible Engineer: Concepts and Cases for Students and Professionals" John Wiley and Sons Year 2015
2. Michael A. Hitt, C. Chet Miller, Adrienne Colella "Organizational Behavior: A Strategic Approach", John Wiley & Sons.
3. Reeves, S., Lewin, S., Espin, S. and Zwarenstein, M., "Interprofessional Teamwork: Key Concepts and Issues, in Interprofessional Teamwork for Health and Social Care", Wiley-Blackwell, Oxford, UK.

Reference Books:

1. Aruna Koneru, "Professional Communication", Tata McGraw-Hill Education.
2. Penny Duquenoy, Simon Jones, Barry G. Blundell, "Ethical, Legal and Professional Issues in Computing", Cengage Learning EMEA.
3. Chuck Huff, "Social Issues in Computing", Tata McGraw-Hill.
4. Margreth Barret, "Intellectual Property", Aspen Publishers, The Emanuel Law Outline Series.
5. Robert McGinn, "The Ethically Responsible Engineer: Concepts and Cases for Students and Professionals", John Wiley and Sons. Year 2015
6. Helen Fenwick, "Civil Liberties and Human Rights", Cavendish Publishing. Third Edition.

IT-14303 Data Structures and Programming Methodology

	L	T	P
Internal marks: 40			
External marks: 60	**3**	**1**	**0**
Total marks: 100			

Prerequisite: Knowledge of programming and problem solving

Introduction: Definition and brief description of various data structures, operations on data structures, Algorithm development, Complexity analysis, Big O notation, Time space trade-off. [2]

Arrays: Linear and Multi-dimensional arrays and their representation, operations on arrays, Linear Search, Binary Search, Sparse matrices and their storage. [4]

Stacks: Array Representation and Implementation of Stacks, Operations on Stacks, Application of stacks: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack, Balanced parenthesis checking. [4]

Recursion: Recursive definition and examples of recursion, Tower of Hanoi Problem, tail recursion. [2]

Queues: Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, deque, priority queue. [3]

Linked Lists: Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, Circular Linked list, Garbage collection and Compaction, Linked representation of Stack, Linked representation of a Queue. [8]

Trees: Basic terminology, sequential and linked representations of trees, traversing a binary tree, brief introduction to threaded binary trees, AVL trees and B-trees, Heap Trees. [5]

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm. [6]

Graphs: Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth - first search and depth - first search). [3]

Sorting: Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Shell sort. ,complexity [5]

Hashing: Hashing Functions, Collision Resolution Techniques, Rehashing, Double hashing. [3]

Text Books:

1. Seymour Lipschtz, "Data Structures", Scahum's Outline series, Tata McGraw Hill.
2. Y. Langsam, M. J. Augenstein, A. M. Tanenbaum " Data Structures using C and C++", Prentice-Hall of India.
3. Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", Tata McGraw Hill.

Reference Books:

1. Michael T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Alogorithms in C++", Wiley India.
2. Mark A. Weiss, Algorithms, "Data Structures, and Problem Solving with C++", Pearson Education.

CS-14303 Digital Circuits and Logic Design

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: Basic knowledge about capacitors, registers, inductors and semi-conductor devices.

Number System Representation: Binary, Octal, Decimal, Hexadecimal, Number base conversions, 1's, 2's, rth's complements, Signed and unsigned binary numbers. Binary codes - Weighted BCD, Gray code, Excess-3 code, ASCII code and code conversions. [5]

Boolean Algebra: Boolean postulates and laws – De-Morgan's Theorem, Principle of Duality, Boolean arithmetic, Boolean expression – Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterms, Maxterms, Canonical forms, Conversion between canonical forms, Karnaugh Map minimization and Quine-McCluskey method with Don't care conditions. [6]

Logic Gates and Families: Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR gates. Realisation of logic functions using gates and Universal gates. Introduction to logic families, Specification and characteristics of logic families, Circuits of RTL, DTL, DCTL, TTL, MOS, CMOS, ECL for realisations of basic gate, Comparison of various logic families. [6]

Combinational Circuits: Design procedure of Adders, Subtractors, Serial adder/subtractor, Parallel adder/subtractor, Carry look ahead adder, BCD adder, Magnitude comparator, Multiplexer/Demultiplexer, Encoder/Decoder, Parity checker and code converters. Implementation of combinational circuits using Logic Gates, Multiplexers and Demultiplexers. [6]

Sequential Circuits: Latches, Flip flops - SR, JK, T, D and Master slave – Characteristic Table, Excitation table, Edge triggering, Level Triggering, Flip flop realization using other flip flops. Asynchronous/Ripple counters, Synchronous counters, Modulo-n counter, Ring counters. Classification of sequential circuits – Moore and Mealy, Design of asynchronous and synchronous counters – State diagram, Circuit implementation. Shift registers and its applications. [7]

Memory Devices: Classification of memories, RAM organization, Static RAM cell, MOSFET RAM cell, Dynamic RAM cell. ROM organization, PROM, EPROM, EEPROM and EAPROM. Introduction to programmable logic devices - Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA). [5]

Signal Conversions: Analog and digital signals, Types of A/D and D/A converters and characteristics, A/D and D/A conversion techniques – Weighted type, R-2R Ladder type, Counter type, Dual slope type, Successive approximation type. [5]

Text Books:

1. M. Morris Mano, "Digital Design", 3rd Edition, Prentice Hall of India Pvt. Ltd.
2. John F.Wakerly, "Digital Design", 4th Edition, Pearson/PHI.
3. John M. Yarbrough, "Digital Logic Applications and Design", Thomson Learning.
4. Charles H.Roth., "Fundamentals of Logic Design", Thomson Learning.

Reference Books:

1. Donald P. Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH.
2. William H. Gothmann, "Digital Electronics", 2nd Edition, PHI.
3. Anand Kumar, "Fundamental of Digital Circuits" 3rd Edition, PHI, 2014

CS-14305 Object Oriented Programming using C++

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: Basic knowledge of computer and concept of programming language.

Object-Oriented Programming Concepts: Introduction, Comparison between procedural programming paradigm and object -oriented programming paradigm, Basic data types, Derived data types, Constants, Tokens, Keywords, Identifiers and variables, Concepts of an object and a class, Abstraction, Encapsulation, Data hiding, Inheritance, Overloading, Polymorphism, Messaging. [3]

Control structures: Input and Output statements in C++, Various operators, Operator precedence, if statement, Switch-case, break, goto, continue, for, while and do-while loops, Dynamic initialization, Type modifiers, Type casting. [3]

Classes and Objects: Implementation of a class, Operations on objects, Relationship among objects, Specifying a class, Creating class objects, Accessing class members, Access specifiers, Static members, Use of const keyword, Friends of a class, Empty classes, Nested classes, Local classes, Abstract classes, Container classes, Bit fields and Classes. [4]

Functions and Arrays: Function components, Passing parameters, Call by reference, Call by value, Return by reference, Inline functions, Default arguments, Function prototyping, Overloaded function, Recursion, Array of objects, Dynamic allocation operators, Dynamic objects, String handling. [4]

Dynamic Memory Management using Pointers: Declaring and initializing pointers, Accessing data through pointers, Pointer arithmetic, Memory allocation (static and dynamic), Dynamic memory management using new and delete operators, Pointer to an object, this pointer, Pointer related problems - dangling/wild pointers, Null pointer assignment, Memory leak and Allocation failures. [5]

Constructors and Destructors: Need for constructors and destructors, Copy constructor, Dynamic constructors, Explicit constructors, Destructors, Constructors and destructors with static members, Initializer lists, Order of execution of constructors and destructors. [2]

Operator Overloading and Type Conversion: Overloading operators, Rules for overloading operators, Overloading of various operators, Type conversion - basic type to class type, class type to basic type, class type to another class type. [4]

Inheritance: Introduction, Defining derived classes, Forms of inheritance, Ambiguity in multiple and multipath

inheritance, Virtual base class, Objects slicing, Overriding member functions, Object composition and delegation

. [5] **Virtual functions and Polymorphism**: Concept of binding - early binding and late binding, Virtual functions, Pure virtual functions, Abstract classes, Virtual destructors, Function overloading, Friend function. [3]

Exceptions Handling : Review of traditional error handling, Basics of exception handling, Exception handling mechanism, Throwing mechanism, Catching mechanism, Rethrowing an exception, Specifying exceptions.[2]

Standard Input/Output: Concept of streams, Hierarchy of console stream classes, Input/output using overloaded operators >> and << and member functions of I/O stream classes, Formatting output, Formatting using ios class functions and flags, Formatting using manipulators, File streams, File pointer manipulation, File open and close.[3]

Templates: Template concepts, Function templates, Class templates, Illustrative examples. [4]

Files Handling: File streams, Hierarchy of file stream classes, Error handling during file operations, Reading/writing 4of files, Accessing records randomly, Updating files. [3]

Text Books:

1. Lafore R., “Object Oriented Programming in C++”, Waite Group.
2. E. Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill.
3. KanetkarYashavant P., “Let Us C++”, BPB Publications.
4. Bjarne Stroustrup, “The C++ Programming Language”, Addison Wesley.

Reference Books:

1. Herbert Schildt, “The Complete Reference to C++ Language”, McGraw Hill-Osborne.
2. Lippman F. B, “C++ Primer”, Addison Wesley.
3. Farrell, “Object Oriented using C++”, Cengage Learning.

IT-14304 IT Methodologies

Internal marks: 30 **L T P**

External marks: 20 **0 0 3**

Total marks: 50

1. To familiarize with network devices like switch, hub, routers and bridges.
2. To configure the IP address for a computer connected to LAN.
3. To get familiarize with various troubleshooting utilities like ping, ipconfig, arp, traceroute, mtr, tcdump, windump, nslookup and netstat.
4. To setup IIS and Apache Web Server on computer system.
5. To create a simple html file to demonstrate the use of different tags.
6. To create an html file to link to different html page which contains images, tables, and also link within a page.
7. To create an html page with different types of frames such as floating frame, navigation frame & mixed frame.
8. To create a registration form by using various form elements like input box, textarea, radio buttons etc.
9. To write an html file implementing the concept inline, external & internal style sheets.
10. To create an html file to implement the concept of margin, padding using cascading style sheets.
11. To create an html file to implement the styles related to text, fonts, links, lists using cascading style sheets.
12. To create an html file to implement the concept of css styles on html tags like table, anchor, list etc.
13. To create an html file to implement the concept of document object model using javascript.
14. To create an html file and to display the various arithmetic operations on variables using javascript.
15. To create an html file to implement alert box, confirm box, dialog box using javascript.

16. To create an html file to implement concept of functions and arrays using javascript.
17. To create a user defined function in javascript to get array of values and sort them in ascending order.
18. To demonstrate the use of control statements and loops in javascript.
19. To demonstrate string and math object's predefined methods using javascript.
20. To demonstrate array objects and date object's predefined methods using javascript.
21. To implement the concept of event handling and validating registration form.
22. To demonstrate the use of expression, array, math, string, date functions.

IT-14305 Data Structures and Programming Methodology Lab

	L	T	P
Internal marks: 30			
External marks: 20	**0**	**0**	**4**

Total marks: 50

1. Write a program to insert a new element at end as well as at a given position in an array.
2. Write a program to delete an element from a given whose value is given or whose position is given
3. Write a program to find the location of a given element using Linear Search
4. Write a program to find the location of a given element using Binary Search
5. Write a program to implement push and pop operations on a stack using linear array.
6. Write a program to convert an infix expression to a postfix expression using stacks.
7. Write a program to evaluate a postfix expression using stacks.
8. Write a recursive function for Tower of Hanoi problem.
9. Write a program to implement insertion and deletion operations in a queue using linear array.
10. Write a menu driven program to perform following insertion operations in a single linked list:
    a) Insertion at beginning
    b) Insertion at end
    c) Insertion after a given node
    d) Traversing a linked list
11. Write a menu driven program to perform following deletion operations in a single linked list:
    e) Deletion at beginning
    f) Deletion at end
    g) Deletion after a given node
12. Write a program to implement push and pop operations on a stack using linked list.
13. Write a program to implement push and pop operations on a queue using linked list.

14. Program to sort an array of integers in ascending order using bubble sort.
15. Program to sort an array of integers in ascending order using selection sort.
16. Program to sort an array of integers in ascending order using insertion sort.
17. Program to sort an array of integers in ascending order using quick sort.
18. Program to traverse a Binary search tree in Pre-order, In-order and Post-order.
19. Program to traverse graphs using BFS.
20. Program to traverse graphs using DFS.

CS-14306 Digital Circuits & Logic Design Lab

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**
Total Marks: 50			

1. Study of various Integrated Circuits SSI, LSI, MSI, VSLI.
2. Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates using various IC's
3. Realization of OR, AND, NOT and XOR functions using universal gates IC's 7400 and 7402.
4. Half Adder / Full Adder: Realization using basic and XOR gates IC's.
5. Half Subtractor / Full Subtractor: Realization using IC's 7400 and 7402.
6. Realisation of IC7483 as Parallel Adder/Substractor.
7. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using Basic, XOR gates and Universal gates.
8. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
9. Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
10. Demultiplexer: Truth-table verification and realization of Halfsubtractor and Full subtractor using IC74139 chip.
11. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
12. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
13. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
14. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.

15. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip. 13. ADC Operations: Study of 8-bit ADC.
16. To conduct an experiment to store a set of data in RAM using IC2114.

CS-14308 Object Oriented Programming using C++ Lab

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**4**
Total Marks: 50			

1. Program to find the area and circumference of the circle
2. Program to interchange the values of two numbers.

[Control statements]

3. Program to find all roots of quadratic equations.
4. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C++ program to find the 2's complement of a binary number.
5. Program to reverse an integer number.
6. A program that read any line of text & display number of upper case, lower case, digit, space & other character.
7. Write a program that will read the value of x and evaluate the following function:

   $$Y= 2 \text{ for } x>0, Y=0 \text{ for } x=0$$

   Use nested statements with the conditional control statement.
8. Program to display the different colors using the switch statement.

[Arrays and Strings]

9. Program to find the minimum and maximum element of an array.
10. Program to use various string handling functions.
11. Program to perform different operations on matrices including – addition, subtraction, multiplication, transpose.

[Classes and Objects]

12. Program to illustrate the concept of classes and object.
13. Program to illustrate the concept of nesting of member functions.

14. Program to illustrate the concept of inline function within a class.
15. Program to illustrate the concept of friend function in a class.
16. Program to show the working of static members in a class.

[Constructors and Destructors]

17. Program to illustrate the concept of default constructor, parameterized constructor and copy constructor.
18. Program to illustrate the concept of destructors.

[Overloading and Type Conversions]

19. Program to overload the unary operator and binary operator.
20. Program to illustrate the concept of type conversions basic to class type, class to basic type, class to class type.

[Inheritance]

21. Program to illustrate the concept of inheritance.
22. Program to illustrate the concept of ambiguity in multiple inheritance.
23. Program to illustrate the concept of virtual base class in inheritance.
24. Program to illustrate the order of execution of constructors and destructors in inheritance.

[Polymorphism]

25. Program to illustrate the concept of overloaded function having different number of arguments in the different overloaded forms.
26. Program to illustrate the concept of virtual functions and pure virtual functions.

[Exception handling]

27. Program to illustrate the throwing and catching of an exception.

[File handling and Templates]

28. Program to illustrate the concept of file pointers.
29. Program to perform read and write operations on a file.
30. Program to illustrate the concept of templates.
31. Implement any one project from following:

(a) Banking System Project: The C++ programs on BANKING SYSTEM has account class with data members like account number, name, deposit, withdraw amount and type of account. Customer data is stored in a binary file. A customer can deposit and withdraw amount in his account. User can create, modify and delete account.

(b) Library Management System Project: The C++ menu driven programs on LIBRARY MANAGEMENT SYSTEM has book and student class with data members like book no, bookname, authorname. Books records are stored in a binary file. A student can issue book and deposit it within 15 days. Student is allowed to issue only one book. Student Records are stored in binary file. Administrator can add, modify or delete record.

Syllabus of 4th Semester

of

B.Tech. Information Technology

for

Batch 2014 onwards

IT-14401 DATABASE MANAGEMENT SYSTEM

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**

Total Marks: 100

Prerequisites: Fundamentals of Computer Programming and Information Technology.

Introduction to Database System

Database Systems versus File Systems, View of Data, Data Models, database languages, Database Users and Administrators. Transaction Management, Decision Support Systems, Components of a Database management Distributed Processing and Client Basic Concepts, Keys, Design Issues, ER Diagrams [4]

Relational Model

Structures of relational databases, Integrity Constraints, Logical database Design, Tables, Views, Data Dictionary. Relational Algebra, Relational Calculus. SQL – Basic Structures, Query Handling, Embedded SQL, Triggers, Security and Authorization. Overview of Relational Query Optimization [5]

Relational Database Design

Functional Dependencies, Multivalued Dependencies, Normal Forms (1NF ,2NF, 3NF, BCNF, 4NF and 5NF), Decomposition into Normalized Relations, Physical Database Design – File Structures (Sequential files, indexing, B and B+ tree). Object Relational Databases- Nested Relations, Complex Data types. [6]

Transaction Management and Concurrency Control

ACID properties, failure and recovery, concurrency control, serializability, two phase locking protocols, Timestamp and Validation based protocols, deadlocks, logs and logging protocol [6]

Recovery Systems

Failure Classification, Recovery and Atomicity, Log Based Recovery, Shadow Paging, Recovery with Concurrent Transactions

[5]

NoSQL Database

Introduction to NoSQL Database, NoSQL Database Terms and Terminology, Evaluating NoSQL, Key Value Stores, Bigtable Clones, Case studies of Metlife, Facebook and Google using NoSQL. [8]

Advanced Topics

Introduction to Data Mining, Process of Data Mining, Applications of Data Mining, Data Warehousing , Advantages of Data Warehousing, Data Marts, Introduction and Applications of Spatial and Multimedia Databases. [6]

Text Books:

1. Abraham Silberschatz, S. Sudarshan, Henry F. Korth, "Database System Concepts", 6th Edition, Tata McGraw - Hill Education, 2011.
2. Shamkant B. Navathe, Ramez Elmasri, "Fundamentals of Database Systems", 6th Edition, Addison Wesley Pub Co Inc, 2010.
3. Connolly, "Specifications of Database Systems : A Practical Approach to Design, Implementation and Management", 4th Edition, Pearson India, 2008.
4. Hector Garcia - Molina, "Specifications of Database Systems : The Complete Book", 2nd Edition, Pearson India, 2014.
5. Gaurav Vaish, "Getting Started with NoSQL", Packt Publishing, 2013.

Reference Books:

1. Essentials of Data Base Management System - Alexis Leon and Mathews Leon - Vikas Publishing Limited, Chennai First Edition, 2009
2. SQL and PL/SQL - Sharad Maheswari Ruchin Jain - Firewall Media New Dehi First Edition 2010
3. Database Management Systems - Ramon a.Mato-Toledo, Pauline K.Cushman - Schaums'Outline series, TMH, New Delhi Special Indian Edition 2007
4. Data Warehousing - BPB Editorial Board - BPB Publications, New Delhi - First Indian Edition 2004, Reprinted 2008
5. Mastering Database Technologies - Ivan Bayross - BPB Publications, New Delhi - First

Indian Edition 2006, Reprinted 2011

6. Database Management Systems - Sharad Maheswari, Ruchin Jain - Firewall Media, New Delhi - Second Edition Reprint 2010
7. Database management and oracle Programming - Dr.S.S.Khandare - S.Chand and Co, New Delhi - Second Revised Edition 2010
8. Oracle for Professionals - Sharanam Shaw - Shroff Publishers and Disitributors - Third print Sep 2011

CS-14402 Operating Systems

Internal Marks: 40 **L T P**

External Marks: 60 **3 1 0**

Total Marks: 100

Pre-requisites: Basic knowledge of computer fundamentals and computer system architecture.

Introduction: Introduction to Operating systems, Different types of operating systems - Batch, Multi-programmed, Time sharing, Real time, Distributed, Parallel. Functions of kernel and shell, General structure of Operating System, O/S services, System calls. [5]

Process Management: Concept of processes and threads, Process states, Process control block, Process scheduling, Scheduling Algorithms, Inter Process Communication, Process synchronization – Critical sections, Mutual Exclusion, Semaphores. [8]

Deadlocks: Introduction to deadlocks, Conditions for deadlock, Resource allocation graphs, Deadlock prevention and avoidance, Deadlock detection and recovery. [5]

Memory Management: Background, Overlays, Logical versus physical address space, Memory management policies, Fragmentation types, Partitioned memory managements, Paging, Segmentation, Segmentation with paging, Need of Virtual memories, Demand Paging, Page replacement Algorithms – FIFO, Optimal, LRU. Thrashing, Cause of Thrashing, Local and Global page replacement. [9]

Secondary Storage: Disk structure**,** Disk scheduling – FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK. Disk Management, Disk Formatting, Boot blocks, Bad blocks. [4]

File Management: Concept of files, File types, Access methods, File attributes, File operations, Allocation methods – Contiguous, Linked, Indexed. File System Architecture, Layered Architecture, Protection mechanisms. [5]

Case Studies: Windows, UNIX and LINUX. [4]

Text Books:

1. A.Silberschatz and Peter B. Galvin, “Operating System Concepts”, Addison Wesley.
2. Dhamdhere, “Systems Programming & Operating Systems”, Tata McGraw Hill.
3. GaryNutt, “Operating Systems Concepts”**,** Pearson Education Ltd.
4. Tanenbaum A.S., “Operating System Design & Implementation”, Pearson Education.

5. Pramod Chandra and P. Bhatt, "An introduction to operating systems concepts & Practices", Prentice Hall of India Publication.

6. A. Godbole, "Operating systems", Tata McGraw Hill.

Reference Books:

1) Andrews S. Tanenbaum, "Modern Operating Systems", Pearson Education (2015) 4th Edition.
2) Pramod Chandra and P. Bhatt, "An introduction to operating systems concepts & Practices", PHI Publication

IT-14403 Data Communication & Computer Networks

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Pre-requisites: Basic Internet Philosophy

Introduction to Computer Networks

Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model. [7]

Physical Layer

Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons. [7]

Data Link Layer

Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP. [6]

Medium Access Sub-Layer

Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.[6]

Network Layer:

Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms [6]

Transport Layer:

Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, introduction to TCP/UDP protocols and their comparison. [3]

Application Layer

World Wide Web (WWW), Domain Name System (DNS), E-mail [1]

Text Books:

1. Forouzan, B.A., Data communication and Networking, McGraw Hill (2006), 4th edition
2. Tanenbaum , A.S., Computer Networks, Prentice Hall (2010) , 5th edition
3. Stallings, W., Computer Networking with Internet Protocols and Tech, Prentice Hall of India (2010), 9th edition
4. Kurose and Ross, Computer Networking: A Top Down Approach, Addison-Wesley, (2012), 6th edition
5. L. Peterson and B. Davie, Computer Networks: A Systems Approach (The Morgan Kaufmann Series in Networking),(2007) 5th edition

Reference Books:

1. Comer, D.E., Internetworking with TCP/IP Vol. 1 Principles, Portals and Architecture, Prentice Hall of India (2005) 5th edition
2. Narasimha Karumanchi, Elements of Computer Networking: An Integrated Approach (Concepts, Problems and Interview Questions)CareerMonk Publication,2014,1st Edition
3. Norman F. Schneidewind, Computer, Network, Software, and Hardware Engineering with Applications, Wiley-IEEE Press
4. Victor Olifer , Computer Networks: Principles, Technologies and Protocols for Network Design Paperback , Wiley 2006

IT-14404 Web Technologies

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisite: IT Methodologies

Introduction to Dynamic Web Content

HTTP, HTML, Request Response Methods, Benefits of using PHP, MySQL, Javascript, CSS and HTML5, The Apache Web Server. [3]

HTML5 & CSS3

Introduction to HTML5, The Canvas, Audio and Video, Forms, Local Storage, Web Workers, Gelocation and GPS Services, Advanced CSS with CSS3: CSS3 Backgrounds, CSS3 Borders, Multicolumn Layout, Text Effects, Web Fonts, 3D Transformations, Transitions, Deploying HTML5 and CSS3 using Bootstrap Framework. [7]

AJAX

Concept of AJAX, Benefits and Applications, Using XMLHttp Request, Sending and Receiving Data using GET and POST methods. [4]

jQuery

Including and Customization of jQuery, jQuery Syntax and Selectors, Handling Events, Special Effects and Manipulating DOM, jQuery without Selectors, Plugins, Using jQuery for slider design and AJAX. [4]

Setting up Development Server

Introduction to Apache Server, Setting Apache Server, PHP and MySQL package for Windows and Linux using XAMP/ LAMP packages, Components of Apache server configuration file and php.ini file. [3]

PHP5

Introduction to PHP, Basic syntax and variable declaration, Expression and Control Flow in PHP, PHP Array, Inbuilt and User defined PHP Functions, Creating classes, constructors and objects.

Assessing functions using objects, Implementing Inheritance, Editing PHP files using editors like geany, netbeans etc. Using MySQL with PHP for performing insertion, deletion, updation, selection and other basic database related operations.[12]

Advanced Topics- (PHP Framework and CMS)

Basic advantages of PHP framework and basic knowledge about industry used frameworks, Features of Codeigniter Framework, Advantages of a PHP Content Management System, Different CMS variants, Setup of Wordpress CMS and explore features available. [7]

Text Books:

1. Robin Nixon, "Learning PHP, MySQL & JavaScript With jQuery, CSS and HTML5", O'Reilly, 4th Edition, 2015.
2. Kogent Learning Solutions Inc. "HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery", Dreamtech Press, 2011.
3. W. Jason Gilmore, "Beginning PHP and MySQL: From Novice to Professional", 4th Edition, Dreamtech Press, 2010
4. Richard York, "Beginning Javascript and CSS Development with jQuery", John Wiley and Sons Inc., 2009.
5. Audra Hendrix, "AJAX and PHP: Building Modern Web Applications", Shroff/ Packt, 2nd Edition, 2015.

Reference Books:

1. Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 3rd Edition, Shroff/ O'reilly
2. William Sanders, "Learning PHP Design Patterns", O'Reilly, 1st Edition, 2013
3. Jack Herrington, "PHP Hacks: Tips & Tools for creating for Dynamic Web Sites", John C. Maxwell, 1st Edition, 2006.
4. Adam Freeman, "Pro jQuery 2.0", Apress, 2013.
5. Nicholas C. Zakasm, Jeremy McPeak and Joe Faweett"Professional AJAX", Wiley India Pvt. Ltd., 2nd edition, 2007.
6. Thomas Mayer, "Professional Codeigniter", John Wiley and Sons Inc., 2008.

7. Brad Williams, David Damstra and Hal Stern, "Professional Wordpress: Design and Development", Wiley India Private Ltd., 2nd edition, 2013.

IT-14405 Computer Architecture and Microprocessors

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**

Total Marks: 100

Prerequisites: Basic knowledge about Digital circuits, Logic gates, flip flops and computer hardware.

Basic Computer Organisation: Computer Register, Computer Instructions, Timing and Control, Memory Reference Instructions, Input/Output, control functions, Accumulator Logic. [6]

Design of Control Unit and CPU: Control Memory, Address Sequencing, Micro programmed and Hardwired Techniques, Addressing modes, Instruction Formats, Program Control, RISC and CISC architecture. [7]

Input/Output & Memory Organisation: Input/Output Interface, DMA Technique, Input/Output Processor, Memory hierarchy, Memory Management Hardware. [6]

Basics of Microprocessor: 8085 Microprocessor Architecture, Data flow and Instruction Execution Sequence, Instruction cycle, 8086 Microprocessor Architecture, overview of 16 bit and 32 bit Microprocessor. Applications of microprocessors [10]

Assembly Language Programming: Data Transfer Operations, Arithmetic, Logical and Branch Operations [7]

Text Books:

1.M. Moris Mano , " Computer System Architecture",3rd Edition, Pearson Education ,2005.

2.Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", 5th Edition , Penram International Publishing (India) Pvt. Ltd.

3. Stallings ," Computer Organization and Architecture : Designing for Performance 9th Edition ,Pearson India .

4. Parthasarathy K A ," Advanced Computer Architecture "3rd Edition, McGraw Hill Education (India) Private Limited .

5. Carl Hamacher, Zvonko Vranesic and Safwat Zaky," Computer Organization" , 5th Edition, Tata McGraw Hill, 2011.

6. David A. Patterson and John L. Hennessy," Computer Organization and Design: The Hardware/Software Interface" , 4th Edition, Elsevier, 2008.

Reference Books:

1. John P. Hayes, Computer Architecture and Organization, McGraw Hill, 3rd Edition, 2002.

2. Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, Pearson Education, 2nd Edition, 2004

3. Linda Null Julia Lobur ," The Essentials of Computer Organization and Architecture" 4th Edition ,Jones & Bartlett India Private Limited .

4.Charles M. Gilmor, "Microprocessor: Principles and Applications", 2nd Edition, McGraw Hill,1995

IT-14406 Database Management Systems Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**4**
Total Marks: 50			

Prerequisite: BTCS-101 Fundamentals of Computer Programming and IT

Special Instruction related to resources requirement: Except practical number 11, any DBMS software like MySQL, Oracle etc. can be used.

Practical 1: Writing Basic SQL SELECT Statements

Basic SELECT Statement; selecting - all columns, specific columns; using arithmetic operators; operator precedence; using parenthesis; defining a NULL Value; NULL values in arithmetic expressions; using column aliases; concatenation operator; using literal character strings; duplicate rows, eliminating duplicate rows; displaying table structure.

Practical 2: Restricting and Sorting Data

Limiting rows using a selection; character strings and dates; comparison conditions; using the BETWEEN condition; IN condition; LIKE condition; NULL conditions; logical conditions-AND, OR and NOT operators; rules of precedence; ORDER BY clause; sorting – ascending, descending order, column alias, multiple columns.

Practical 3: Single Row Functions

Character functions - case manipulation and character manipulation functions; number functions, date functions; using arithmetic operators with dates; date functions, conversion functions-implicit data-type conversion and explicit date-type conversion; nesting functions; conditional expressions.

Practical 4: Displaying Data from Multiple Tables

Cartesian products; different types of joins specific to the software package; SQL compliant joins.

Practical 5: Aggregating Data Using Group Functions

Group functions for various statistical metrics; group functions and NULL values; inclusion of NULL values in mathematical computations; creating groups of data by GROUP BY clause;

grouping by more than one column; excluding group results- HAVING Clause; nesting group functions; advanced subqueries.

Practical 6: Subqueries

Single-row subqueries; multiple-row subqueries; using group function in a subquery; HAVING clause with subqueries; usage of operators in multiple-row subqueries; NULL Values in a subquery; advanced subqueries (multiple-column subqueries, column comparisons, pairwise, non-pairwise comparison subquery, correlated subqueries).

Practical 7: Manipulating Data

Data manipulation language; adding a new row to a table; inserting- new rows, rows with NULL values, special values, specific date values; creating a script; copying rows from another table; changing data in table; updating rows in a table; updating two columns with a subquery; updating rows based on another table; updating rows- integrity constraint error; removing a row from a table deleting rows from a table; deleting rows based on another table; deleting rows- integrity constraint error; using a subquery in an INSERT statement; using explicit default values; merging rows.

Practical 8: Creating and Managing Tables

Database objects; naming rules; create table statement; referencing another user's tables; the DEFAULT option; querying in data dictionary; data types; creating a table using a subquery syntax; alter table statement; adding a column; modifying a column; dropping a column; dropping a table; changing the name of an object; truncating a table; adding comments to a table.

Practical 9: Including Constraints

Constraints- Adding, disabling, enabling, cascading, viewing columns associated with constraints.

Practical 10: Creating Views

Simple views and complex views; creating a view; retrieving data from view; querying a view; modifying a view; rules for performing DML operations on view; denying DML operations; removing a view; inline views.

Practical 11: Overview of MongoDB: A NoSQL database

Create and drop-database, collection; data types; insert document; query document; logical operators; update document; delete document; projection; limit records; sort documents; aggregation.

Practical 12: Mini Project

By using standard database design rules, database has to be designed for a specific assigned problem to a

group of two to three students. ER diagram related to project with an open source database tool like MySQL workbench must also be prepared. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

CS-14406 Operating Systems Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisite: Fundamentals of Computer with any basic programming language

1. Installation Process of various Operating Systems.
2. Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine.
3. Execute various basic Linux commands, commands for files and directories, creating and viewing files, File comparisons, Disk related commands.
4. Execute Linux commands for Processes in Linux, connecting processes with pipes, background processes, managing multiple processes.
5. Study and usage of vi Editor.
6. Basics of Shell programming, various types of shell, Shell Programming in bash.
7. Study and implementation of shell variables, shell keywords.
8. Implement conditional statements, looping statement and case statement in Shell programming.
9. Implement parameter passing and arguments in Shell programming.
10. Implement Shell programs for automate system tasks and report printing.
11. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

IT-14407 Data Communication & Computer Networks Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisite: Fundamentals of Computers

1. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
2. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
3. Preparing straight and cross cables.
4. Study of various LAN tpologies and their creation using network devices, cables and computers.
5. Configuration of TCP/IP Protocols in Windows and Linux.
6. Implementation of file and printer sharing.
7. Use of commands like ping, ipconfig etc for troubleshooting network related problems.
8. Installing QualNet on Windows
9. Visualization of network using QualNet.
10. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

IT-14408 Web Technologies Laboratory

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	3
Total Marks: 50			

Prerequisite: Knowledge of Fundamentals of Computer and Programming

1. Creation of Web pages using HTML5 and CSS3.
2. Creation of Web pages using jQuery.
3. Creation of Web pages using AJAX.
4. Setup of development server like XAMP/ WAMP in Windows and Linux.
5. Creating web pages using PHP.
6. Setup of codeigniter framework and to study its different components.
7. Setup of wordpress and to learn theme and module installation
8. Developing a PHP5 and MySQL based project.
9. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

IT-14409 Computer Architecture and Microprocessors Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisites: Basic knowledge about Digital circuits, Logic gates, flip flops and computer hardware.

1. To study design and working of basic computer system.
2. To study various parts of motherboard:- microprocessor chip, memories and memory slots, interfacing slots.
3. Introduction to 8085 microprocessor kit.
4. Write a program to perform addition operation for two 8-bit numbers, sum is 8 bit.
5. Write a program to perform addition operation for two 8-bit numbers, sum is 16 bit.
6. Write a program to perform subtraction of two 8-bit numbers.
7. Write a program to perform subtraction of two 16-bit numbers.
8. Write a program to find 1's complement of 8 bit numbers.
9. Write a program to find 1's complement of 16 bit numbers.
10. Write a program to find sum of series of 8 bit numbers.
11. Introduction to 8086 microprocessor kit.
12. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

Syllabus of 5th Semester

of

B.Tech Information Technology

for

Batch 2014 onwards

IT-14501 Discrete Mathematics

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**

Total Marks: 100

Prerequisites: Basic concepts of Set Theory, Graphs and Trees

Fundamentals of Sets, Relations and Functions: Sets – Operations on sets, Subsets, Types of sets, Ordered pairs, Proofs of general identities of sets, Classes of sets and partitions, Inclusion and exclusion principle, **Relations –** Properties of relations, Types of relations, Composition of relations, Closure properties of relations, Equivalence relations, Compatibility relations, Partial order relations. **Functions –** Introduction and types of functions, Composition of functions, Invertible function, Hashing functions, Recursively defined functions. [10]

Prepositional and Predicate Logic: Propositional logic, Truth tables, Normal forms (conjunctive and disjunctive), Validity of well-formed formula, Propositional inference rules, Predicate logic, Universal and existential quantifiers
[8]

Combinatorial Mathematics: Basic counting principles, Permutations and combinations, Pigeonhole principle, Recurrence relations – Solving homogeneous and non-homogeneous recurrence relations, Generating function. [8]

Graph Theory: Graphs – Graph terminology, Directed and undirected graphs, Eulerian chains and cycles, Hamiltonian chains and cycles, shortest path algorithms – Dijkstra's algorithm, Warshall's algorithm, Graph coloring, Chromatic number, Planar graphs, Euler's Theorem for Planar Graphs, Isomorphic and homomorphic graphs, Applications of graph theory, **Trees**-Tree Terminology, Spanning tree algorithms – Kruskal's algorithm, Prim's algorithm. [10]

Algebraic Systems: Definition and elementary properties of groups, abelian groups, semi-groups, monoids, rings. [4]

Text Books:

1. S. Lipschutz, "Discrete Mathematics", Schaum series McGraw Hill, 2007.

2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Mc.Graw Hill, 2002.

Reference Books:

1. Alan Doerr and Kenneth Levarseur, "Applied Discrete Structures for Computer Science", Pearson Education, Inc., 2013.
2. K.H. Rosen, "Discrete Mathematics and its applications", Mc Graw Hill, 2012.
3. C.L. Liu , " Elements of Discrete Mathematics" , Tata McGraw Hill, 2008.

IT-14502 Programming in Java

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Pre-requisites: Object Oriented Programming

Overview of Java: History and evolution, byte code, buzzwords, object oriented programming two paradigms, abstraction, the three OOP principles, structure of Java program, Java typical environment, lexical issues. [3]

Date Types, Variables and Arrays: Primitive data types - integers, floating-point types, characters, booleans; literals, variable, type casting, arrays- 1D and 2D. [3]

Operators and Control Statements: Arithmetic operators, bitwise operators, relational operators, boolean logical operators, the conditional operator, operator precedence, selection statements, iteration statements, jump statements, compare various control statements, recursion v/s iteration.[4]

Introduction to Classes and Methods: Class fundamentals, declaring object, assigning object reference variable, introducing methods, constructors ,overloading methods, objects as parameters, returning objects, overloading constructors, this keyword, garbage collection, the finalize () method, introduction to access various control, static , final, command line arguments. [5]

Inheritance: Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance, constructor in derived class, object class. [3]

Package and Interfaces: Introducing package, package access protection, importing packages, interfaces - defining, implementing, nesting, extending, default interface methods. [3]

Exception Handling: Exception handling fundamentals, exception types, uncaught exceptions using try and catch, multiple catch clauses, nested try statements, throw, finally, built-in exceptions, creating your own exception sub classes, chained exceptions. [4]

Multithreaded Programming: The Java thread model, life cycle of thread, the main thread, creating thread, creating multiple threads, using isAlive() and join(), thread priorities, thread synchronization, inter thread communications, suspending, resuming and stopping threads. [3]

I/O and Applets: I/O basics, reading console input, writing console output, PrintWriter class, reading from and writing to a file, introduction to applet, applet v/s application program, applet life cycle (initialization state, running state, idle or stopped state, dead state, display state), creating an executable applet. [4]

Event Handling: Introduction, two event handling mechanisms, delegation event model, Event Classes, KeyEvent Class, sources of Events, Event Listener interfaces, using the delegation event model, Adapter Classes, Inner Classes [3]

String Handling: The string constructors, string length, special string operations, character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, StringBuffer [2]

Java database connectivity (jdbc): JDBC-ODBC Bridge, DriverManager class, java.sql package (Connection interface, Statement interface, Prepared Statement interface, ResultSet interface, ResultSetMetaData interface) [3]

Text Books

1. Herbert Schildt, "The Complete Reference", McGraw-Hill, 2015.
2. Joseph O'Neil , "Teach Yourself Java", McGraw-Hill ,1998.
3. Paul Deitel, Harvey Deitel "Java How To Program", Prentice Hall, 2011.
4. Balagurusamy, "Programming in Java" Tata McGraw- Hill,2009.

Reference Books

1. Bruce Eckel, "Thinking in Java", Pearson, 2008.
2. R. Nageswara Rao, "Core Java: An Integrated Approach", Wiley India Pvt. Ltd., 2008.

IT-14503 Theory of Computation

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Pre-requisites: Principles of Applied Mathematics and Basics of Set Theory

Strings and Alphabets – Basics of strings, alphabets and languages, Operations on languages, Chomsky Classification of languages. [2]

Finite Automata – Introduction- Basic Mathematical Notation and techniques, Finite State systems, Basic Definitions – Finite Automaton – DFA & NDFA, Finite Automaton with €-moves, Regular Languages and Regular Expression, Equivalence of NFA and DFA , Minimization of DFA, Moore and Mealy Machines.[6]

Regular grammar- Introduction- Types of Grammar, regular expressions, equivalence between regular languages, properties of regular languages and pumping lemma [6]

Context Free Languages –Introduction, Leftmost and Rightmost derivation trees, parsing and ambiguity, ambiguity in grammar and languages, Normal forms-Chomsky and Greibach Normal forms [7]

Pushdown Automata – NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL. [6]

Turing Machines-Introduction, Techniques for Turing machine construction – Multi head and Multi tape Turing Machines, The Halting problem , Problems about Turing machines., Language of Turing machines, Variations, Universal Turing Machines, Difference between Finite Automata and Turing Machines. [5]

LR (k) Grammars & LL (k) grammars- Introduction and their properties [3]

Text Books:

1. K.L.P. Mishra and N. Chandrasekaran, "Theory of Computer Science, Third Edition", PHI Learning Private Limited, 2011

2. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

3. K. V. N. Sunitha , N. Kalyani, "Formal Languages and Automata Theory", McGraw-Hill, 2010.

Reference Books:

1. JE Hopcroft, R Motwani, JD Ullman, Automata Theory, Languages, and Computation, 3rd edition, Addison Wesley 2007.
2. M Huth, M Ryan, Logic in Computer Science: Modelling and Reasoning about Systems, Cambridge University Press, 2004.
3. HR Lewis, CH Papadimitriou, Elements of the Theory of Computation, Prentice-Hall, 1997.

IT-14504 Human Computer Interaction

Internal Marks: 40 **L T P**

External Marks: 60 **3 1 0**

Total Marks: 100

Prerequisites: Introductory Course

Human and Interactive Systems: Human memory, reasoning and problem solving, emotion and psychology, effects of affect, measuring user affect, human information processing and perceptual-motor behavior, attention in information processing, human based design of interactive systems, models of interaction, ergonomics, HCI in the software process. [10]

Cognitive and Interaction Models for HCI: Cognitive neuroscience, mental models, Cognitive architectures, The Model Human Processor (MHP), GOMS, Cognitive Complexity Theory, Task loading and stress in Human Computer Interaction, Relationship between stress and cognitive workload, mitigation of stress, Human error Identification in HCI, Interactions models, Status-event analysis, sensor-based interaction. [10]

Technology, Design and Evaluation Techniques for HCI: Input Technologies and Techniques, Modalities of Interaction, Sensor and Recognition-based input for interaction: sensors and signal processing, Haptic Interface, Non-speech sound in HCI, Wearable computers, Interactive design and prototyping, User Interface Management Systems, Universal design principles, user support and help systems, evaluation through expert analysis and user participation, choosing an evaluation method. [10]

Formal Methods in HCI & Design Issues in Critical Systems: Failure Modes and Effect Analysis (FMEA), Human Factors Process FMEA, Cognition-Adaptive Multimodal Interface (CAMI), consequences of human errors, catastrophic effects, state transition diagram, PIE model. [10]

Text Books:

1. Alan Dix, Janet Finlay, Gregory D. Abowd, and Russell Beale, Human-Computer Interaction (3rd Edition), Pearson, 2004.

2. Ben Shneiderman and Catherine Plaisant, Designing the User Interface: Strategies for Effective Human- Computer Interaction (5th Edition), 5th ed., Pearson Addison-Wesley, 2009
3. Maxine Cohen, Steven M. Jacobs, Ben Shneiderman, Catherine Plaisant, Designing the User Interface: Strategies for Effective Human- computer Interaction (5^{th} Edition), Pearson Education, 2010

Reference Books:

1. Donald A. Norman, The Design of Everyday Things, Basic Books, 2002
2. Serengul Smith-atakan, Human Computer Interaction, Cengage Learning India Pvt. Ltd., 2006
3. Helen Sharp, Interaction Desing Beyond Human Computer Interaction (2^{nd} Edition), Wiley India Pvt. Ltd., 2007.

IT-14505 Programming in Java Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**4**

Total Marks: 50

Pre-requisites: Object Oriented Programming

Programs to demonstrate

1. Handling various data types
2. Type casting
3. Arrays – 1D and 2 D
4. Various control structures
5. Various decision structures
6. Recursion
7. Method Overloading by passing objects as arguments
8. Constructor Overloading by passing objects as arguments
9. Various access control and usage of static, final and finalize ( )
10. Command line arguments
11. Various types of inheritance by applying various access controls to its data members and methods
12. Method overriding
13. Abstract class
14. Nested class
15. Constructor chaining
16. Importing classes from user defined package and creating packages using access protection
17. Interfaces, nested interfaces and use of extending interfaces
18. Exception Handling - using predefined exception
19. Exception Handling - creating user defined exceptions
20. Multithreading by extending Thread Class

21. Multithreading by implementing Runnable Interface
22. Thread life cycle
23. Applet life cycle
24. Applet for configuring Applets by passing parameters
25. Event Handling
26. Reading and writing from a particular file
27. Database connectivity for various DDL and DML operations
28. String class and its methods
29. StringBuffer class and its methods
30. Without using inbuilt features of Java implement following concepts related to Data Structures:
    a) Stack
    b) Queue
    c) LinkList
    d) Quicksort
31. Implement following concepts related to Digital Electronics:
    a) Octal to Hexadecimal ,Decimal, Binary
    b) Convert Gray code to Binary
    c) Half Adder
    d) Full Adder
32. Implement following concepts related to Operating Systems:
    a) First come first serve scheduling algorithm
    b) Shortest job first
    c) Condition for Occurrence of deadlock
    d) Multithreading approach to do Matrix multiplication
32. Implement following concepts related to Computer Networks:
    a) Sliding window sender
    b) Sliding window receiver

c) To create a program for the implementation of ARP(Address Resolution Protocol)

d) To create a program for the implementation of RARP (Reverse Address Resolution Protocol)

33. Mini Project : By using various concepts of Java students are required to prepare a project in a group of two to three students. The usage of concepts like applets, multithreading and JDBC for project is to be encouraged. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

IT-14506 Human Computer Interaction Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**3**

Total Marks: 50

Prerequisites: Fundamentals of Computer

Resources Required: Any object-oriented programming language can be used to implement the models like C++, Java, etc.

1. To understand and design the interaction models.
2. To understand and design the status-event analysis.
3. To design and implement the user interface which takes into consideration the cognitive models.
4. To design and implement a user support and help system for emergency conditions.
5. To design and simulate the sensor-based interactive system.
6. To design and implement the effective interface for a system which mitigates the human errors.
7. To design and implement HCI for a critical system involving human safety.
8. **Mini Project: -** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately)and the team will have to demonstrate as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14508 Advanced Computer Networks (Elective-I)

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**

Total Marks: 100

Prerequisites: Computer Networks

Internetworking: Half and Full Duplex Ethernet, Ethernet at the Data Link Layer, Ethernet at the Physical Link Layer, Ethernet Cabling: Straight-through, Crossover and Rolled Cable, Data Encapsulation, Three-Layer Hierarchical Network Model . [4]

TCP Protocols: Internet Layer Protocols: IP, ICMP, ARP, RARP; Host to Host Layer Protocols: TCP, UDP; Application Layer Protocols: Telnet, FTP, TFTP, NFS, SMTP, LPD, X Window, SNMP, DNS, and DHCP. [6]

Switching: Overview of Switch, Unmanaged and Managed Switches, Switch Administrative Configurations, Viewing, Saving and Erasing Configurations, Spanning Tree Protocol, VLAN Basics, Static VLAN, Dynamic VLAN, Frame Tagging, Trunking Protocol, Routing between VLANs, Configuring VLANs, Configuring VLAN Trunk Ports, Configuring Inter-VLAN Routing.[10]

Network Routing: Overview of Router, Static and Dynamic Routing, Introduction to Classless Routing, Distance Vector Routing Protocols, Router Administrative Configurations, Router Interfaces, Viewing, Saving and Erasing Configurations, Routing Information Protocol, Configuration of EIGRP (Enhanced IGRP) and OSPF (Open Shortest Path First). [10]

Adhoc Networks: Features, Advantages and Applications, Adhoc versus Cellular networks, Network Architecture, Protocols: MAC protocols, Routing Protocols, Technologies, Applications of Mobile Adhoc Networks [8]

Text Books:

1 Todd Lammle, "Cisco Certified Network Associate Study Guide", 7th Edition, Sybex publishers, 2011.

2. Todd Lammle, "CCNA Routing And Switching Study Guide", 3rd Editon, Wiley India Pvt Ltd, 2013.

3. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri "Wireless and Mobile Networks: Concepts and Protocols", Wiley India Pvt. Ltd., 2013

Reference Books:

1. Wendell Odom, "CCNA Exam Certification Guide", 2nd Edition, Cisco Press publication, 2007.

2. Andrew S. Tanenbaum, "Computer Networks", 5th Edition, Pearson Education, 2011.

3. Behrouz A. Forouzan, "Data Communication & Networking", 5th Edition,Tata McGraw Hill, 2014.

4. James F. Kurose and Keith W. Ross, "Computer Networking", 7th Edition, Pearson Education, 2012.

5. Douglas E. Comer, "Internetworking with TCP/IP", Volume-I, Prentice Hall, 6 Edition Pearson Education, 2013

6. W. Stallings, "Data and Computer Communication", Prentice Hall of India, 6th Edition, 2007.

DEIT-14509 Advanced Computer Networks Laboratory (Elective-I)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisites: Basic knowledge about Computer Network Components, Devices and Protocols.

1. Installing Wireshark.
2. Packet Capturing with Wireshark.
3. Working with captured packets (Saving, exporting, marking, printing, capture settings, display options using filters)
4 Analyzing lower Layer Protocols ARP, IP, TCP, UDP, ICMP.
5. Configuring different types of switches.
6. Configuring VLANs
7. Configuring Trunk Ports
8. Configuring a Router.
9. Working on Network Management Software (NMS).
10. Configuring Adhoc Network

DEIT-14510 Business Intelligence and its Applications (Elective-I)

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: Database Management Systems

Introduction : Introduction to the multidisciplinary field of data mining,. Discussion on the evolution of database technology that has led to the need for data warehousing and data mining. Applications of Data Mining. [4]

Data Warehousing And OLAP: Evolution of Data Warehousing, Data warehousing Concepts, Benefits of Data Warehousing, Data Warehouse Queries, Problems of Data Warehousing, Architecture of Data Warehouse, Data Warehouse Tools and Technologies, Data Mart, Reasons for creating Data Mart, Issues in Data Mart, Designing Data Warehouse, Dimensionality Modeling, Star Schema, Introduction to Online Analytical Processing (OLAP), OLAP Applications, Benefits of OLAP, Representation of Multidimensional Data, OLAP Tools , MOLAP, ROLAP, HOLAP, DOLAP [8]

Data Mining Primitives: Data preprocessing including data cleaning, data integration, data transformation. Definition and Specification of a generic data mining task. Description of Data mining query language with few example queries. Relationship between data warehouse and data mining.[5]

Association Analysis: Different methods (algorithms) for mining association rules in transaction based databases. Classification of association rules, Apriori, frequent pattern growth algorithm. [5]

Classification and Predictions: Different Classification algorithm, including C4.5, CART., use of genie index, decision tree induction, Bayesian classification [5]

Clustering: Different types of clustering Methods -Partition based clustering, Density based clustering, and Distribution based clustering, Hierarchical clustering. K-Means and DBSCAN Clustering Algorithm.[5]

Business Intelligence: Improvement in Decision Making Process, Need of Business Intelligence Program, Introduction to Business Intelligence, Analytics Spectrum, Value Drivers and Information Use, Performance Metrics and Key Performance Indicators, Horizontal and Vertical Use Case for Business Intelligence (BI). Applications of BI. [5]

Text Books:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques," 1 st Edition Indian Reprint 2001, Harcourt India Private Limited, ISBN 1-55860-489-8.
2. Margaret Dunham, "Data Mining: Introductory and Advanced Topics," 1st Edition, 2003, Prentice Hall (Pearson Publication), ISBN 0-13-088892-3.
3. Arun K Pujari, "Data Mining Techniques". Universities Press.

Reference Books:

1. T. Mitchell, "Machine Learning", McGraw Hill, 1997,.
2. S.M. Weiss and N. Indurkhya, "Predictive Data Mining", Morgan Kaufmann, 1998
3. M. Jarke, M. Lenzerni, Y. Vassiliou, and P. Vassiladis, "Fundamentals of Data Warehouses", 2000, Springer Verlag, Isbn 3-540-65365-1.
4. Data Mining Introductory and advanced Topics –Margaret H Dunham, Pearson Education,2011

DEIT-14511 Business Intelligence and its Applications Laboratory (Elective-I)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**
Total Marks: 50			

Prerequisites: Database Management Systems

1. Case Study and Design of a Data Mart Application
2. To study different Data Mining tools
3. To Perform Data Cleaning on Data Sets
4. To Perform association rule mining using Apriori and FP-Growth algorithms on data set in WEKA
5. To Perform classification using Naïve Bayes, J48 algorithms on data set in WEKA
6. To Perform clustering techniques for data mining on data set in WEKA
7. To interpret and visualize the output of data mining using WEKA
8. Case study on BI tools like: QlikView, Tableau, Google Analytics.
9. **Mini Project** : By using various concepts of Business Intelligence students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14512 Digital Image Processing (Elective-I)

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**

Total Marks: 100

Prerequisites: Basic Mathematics course

Introduction: Fundamental steps in digital image processing, Components of an image processing system, Applications of image processing, Sampling, Quantization [4]

Digital Image Processing Operations: Pixel relationships and distance metrics: Image coordinate system, Image topology, Connectivity, Relations, Distance measures. Convolution and Correlation operations [6]

Image Enhancement in Spatial Domain: Image enhancement point operations: Linear and non-linear functions, Piecewise linear functions, Histogram processing. Spatial filtering - basics of filtering in the spatial domain, Smoothing linear and non-linear filters, sharpening filters [9]

Image Enhancement in Frequency Domain: Basics of filtering in the frequency domain, Image smoothing and sharpening using frequency domain filters [4]

Image Compression: Image compression model, Compression measures, Compression algorithm and its types (Entropy, Predictive, Transform and layered coding), Types of redundancy (Coding, Inter-pixel, Psycho-visual and Chromatic), Lossless compression algorithms – Run-length, Huffman, Bit-plane, Lossy compression algorithms – Lossy predictive, Block transform coding [8]

Image Segmentation: Classification of image segmentation algorithms, Point, Line and Edge detection, Global thresholding, Otsu's method, Region-based segmentation [5]

Color Image Processing: Color Image-Processing Fundamentals, RGB Models, HSI Models, Relationship between different models [4]

Text Books

1. R. C. Gonzalez and R. E. Woods, "Digital Image Processing", Pearson Education, 2013.

2. S. Sridhar, “Digital Image Processing”, Oxford University Press, 2011.

Reference Books:

1. M. Sonka, V. Hlavac and Roger Boyle, “ Image Processing, Analysis and Machine Vision”, Thomas Learning, 2007.

2. K. R. Castleman, “Digital Signal Processing”, Pearson Education, 2007.

DEIT-14513 Digital Image Processing Laboratory (Elective-I)

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisite: Basic understanding of programming concepts.

Resource requirement: Any source software like Octave, Scilab, MatLAB with Image Processing Toolbox etc. can be used.

1. Introduction about the software tool.
2. Understanding the basic data types and their conversion from one to another.
3. Understanding arrays and vectors.
4. Learning to build functions and scripts.
5. Implementation of various flow control and decision statements.
6. Implementation of various arithmetic, logical, and geometrical operations.
7. Implementation of various image enhancement techniques in the spatial domain.
8. Implementation of various image enhancement techniques in the frequency domain.
9. Implementation of various image compression techniques.
10. Implementation of various image segmentation techniques.
11. Implementation of various color models and conversion of an image from one model to another.
12**. Mini- Project:** By using various concepts of image processing, students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14514 .NET Technologies (Elective-I)

	L	T	P
Internal: 40			
External: 60	**3**	**1**	**0**
Total: 100			

Prerequisites: Basic Understanding of Object Oriented Programming

Introduction :.Net Framework and Fundamentals, Building Blocks of the .NET Platform(CLR, CTS, CLS), Managed Code, Microsoft Intermediate Language (MSIL), Just In Time Compiler (JIT) , Assembly, Types of Assembly, Garbage Collection, Strong Name, Global Assembly Cache (GAC), .Net Framework Development Goals, Overview of Dot Net Technologies(WPF, ASP.NET, WCF, LINQ, EF, MVC4). [8]

Basic .NET Programming using C#: Structure of a C# Program, Data Types, Basic Control Structures, classes and objects, Arrays, Introduction to Visual Studio .NET IDE, Compilation options - /doc, /target, /out, /bugreport, FxCOP Tool Demo, Introduction to debugging, Classes and Objects, this keyword, Static, Properties and Indexer, Inheritance Overloading (Compile Time Polymorphism), Overriding and Runtime Polymorphism, Abstract, Interface, Namespaces, Structures, System.Object, Boxing and Unboxing, Typecasting, Memory Management, Exception Handling, Collection, Basic Windows Controls, Delegates, Events and Event Handling, Assembly, Attributes, File Handling, Serialization, NUnit tool Demo.[10]

Introduction to ADO.NET: Brief introduction of ADO.NET solution architecture, Data Access Models, Dissecting ADO.NET, Working with ADO.NET in Connected Mode, Working with ADO.NET in Disconnected Mode, Data Centric Application Architecture, Data Binding XML Integration in ADO.NET, Transactions in ADO.NET, DBConcurrency Exception – Disconnected Mode, ADO.NET Technology – The Complete Picture, Recommendations for Data Access Strategies with Specific Types of Applications.[10]

ASP.NET and Web Services: Introduction to Web Applications, Introduction to ASP.NET, ASP.NET Web Forms, ASP.NET Controls, User Controls and Custom Controls, Error Handling and Tracing, Data Binding, ASP.NET Built in Objects, Introduction to Web Services. [7]

WCF, WF & WPF: WCF security, Data Access (ADO Dot Net), Basics SQL, .NET and SQL Server, Application Blocks, Code Review Tools, Silverlight, WF, WPF, Card Space. [5]

Text Books:

6. Andrew Troelsen, Philip Japikse, "C# 6.0 and the .NET 5 Framework, 7th edition", 6th Edition, Tata McGraw - Hill Education, 2011.
7. Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress, Sixth edition,2012
8. Dave Grundgeiger, "Programming Visual Basic .NET", Publisher: O'Reilly, First Edition January 2002

Reference Books:

1. NET Framework 2.0 Application Development Foundation by Tony Northup and Shawn Wildermuth, with Bill Ryan of Grand Masters, PHI. 2011
2. Karli Watson, Jacob Vibe Hammer..et .al, Beginning Visual C# 2012 Programming, Wiley Publications,2012

DEIT-14515 .NET Technologies Laboratory (Elective-I)

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisite: Basic Understanding of Object Oriented Programming

1. Program to Perform Unboxing Operation
2. Program to perform concept of Array
3. Program to Implement for-each in Interface
4. Program to Demonstrate Multilevel Inheritance
5. Program to Illustrate Inheritance Overloading
6. Program to Illustrate Inheritance Overriding
7. Implementation using LINQ
8. Create a VB.Net Window form Application
9. Usage of LINQ in SQL Clauses Program to Display the Student Details using Select, from and where Clause LINQ
10. Program to Perform Sorting
11. Program to Implement Delegates
12. Mouse Handling Events: Program to Perform Addition with MOUSEUP Event
13. Program to Create Input Box and Display the Text
14. Program to Demonstrate Exceptions
15. Program to Illustrate Exception Handling for Invalid TypeCasting in UnBoxing
16. Connecting Databases Using ADO.NET in VB.NET
17. Different Ways To Access DataBase In ADO.NET
18. Binding GridView using SqlDatasource in ASP.NET
19. Bind a Dropdownlist in ASP.NET
20. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and

the team will have to demonstrate as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14516 Advanced Web Technologies (Elective-I)

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: Web Technologies.

HTML5 Framework- Bootstrap: Introduction: Introduction to Bootstrap, Basic HTML Template, Default Grid System, Fluid Grid system, Bootstrap CSS: Typography, Code, Tables, Forms, Buttons, Images, Icons, Bootstrap Layout Components: Dropdown menus, Button Groups, Navigation Elements, Navbar, Pagination, Alert Bars, Bootstrap Javascript Plugins: Overview, Transitions, Modal, Scrollspy, Toggleable Tabs, Tooltips, Popover, Alerts, Buttons, Collapse, Carousel, Typeahead, Affix [8]

MVC Approach for Web Applications: Introduction to MVC: Introduction, Popular MVC Framework, Design Patterns, Foundation: Autoloading, Exceptions, Type Methods, Base Class, Configuration of MVC, Caching: Performance Bottlenecks, Routing, PHP Framework Codeigniter: Model, Views, Controllers and related functions, Creation of simple application using Codeigniter. [14]

Responsive Web Design using AngularJS: Introduction to Responsive Single Page Application and AngularJS, AngularJS dynamic routing-based approach, AngularJS Directive Based Approach, AngularJS Based Breakpoints for Layout Manipulation, Debugging and Testing Responsive Applications. [12]

Version Control and Data Repository Maintenance: Introduction to Git, Installation of Git, Setting up account on Bitbucket using SSH, Local Git: Creating a new commit, View history and differences between Git, Remote Git: Adding remote repository, Pushing changes to remote repository, Cloning remote Bitbucket repository, Merging branches, Patches: Generating, mailing and Applying Patches. [6]

Text Books:

1. Chris Pitt , "Pro PHP MVC" Apress, 2012.

2. Sandeep Kumar Patel, "Responsive Web Design with AngularJS" Packt Publishing, First Edition- December 2014.
3. Bootstrap- Jake spurlock- O'Reilly, May 2013.
4. Git in Practice, Mike McQuaid, Manning Publication Co., 2015.
5. Version Control with Git, Jon Loeliger & Matthew McCullogh, O'Reilly, 2015.
6. Learning Web Development with Bootstrap and Angular JS, Stephen Radford, Packt Publishing, 2015.

Reference Books:

1. Bootstrap Essentials- Snig Bhaumik, Packt Publishing, August 2015.
2. Programming with CodeIgniter MVC, Eliahou Orr, Yehuda Zadik, Packt Publishing, 2013.
3. CodeIgniter for Rapid PHP Application Development, David Upton, Packt Publishing, 2007
4. Pro Git, Ben Straub, Scott Chacon, Apress, 2014.
5. Professional AngularJS, Diego Netto, Valeri Karpov, Wrox Publishers, 2015.
6. AngularJS by Example, Chandermani, Packt Publishing, 2015.

DEIT-14517 Advanced Web Technologies Laboratory (Elective-I)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**
Total Marks: 50			

Prerequisites: Web Technologies

1. To install and setup the HTML5 based Bootstrap framework and to deploy basic HTML elements using Bootstrap CSS.
2. To understand and deploy the multicolumn grid layout of Bootstrap.
3. To deploy different types of buttons, progress bars, modals and navigation bars using Bootstrap.
4. To install and setup the CodeIgniter Framework and to understand its MVC architecture.
5. To construct a simple login page using CodeIgniter Framework by changing necessary configuration and other files.
6. To perform unit testing on the login module constructed using CodeIgniter
7. To install and setup the AngularJS Framework and to deploy dynamic routing based approach.
8. To implement AngularJS Directive based approach.
9. To perform debugging and testing of AngularJS module created using MVC approach.
10. To create and setup the Git repository on Bitbucket using SSH
11. To push all the practical performed to Bitbucket repository.
12. To perform push, clone and patch operation to Bitbucket repository.
13. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

    Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practical's. Instructor may also frame additional Practical's relevant to the course contents (if required).*

Syllabus of 6th Semester

of

B.Tech Information Technology

for

Batch 2014 onwards

IT-14601 Information Assurance and Security

Internal Marks: 40 **L T P**

External marks: 60 **3 1 0**

Total Marks: 100

Prerequisites: Data Communication and Computer Networks

Security Fundamentals: Introduction, Terminology, Attacks, Security Goals : Authentication, Authorization, Cipher Techniques: Substitution and Transposition, One Time Pad, Modular Arithmetic, GCD, Euclid's Algorithms, Discrete Logarithm, Fermat Theorem, Block Ciphers, Stream Ciphers. Secret Splitting and Sharing, Intrusion Detection and Prevention. [7]

Cryptography: Symmetric Key Algorithms: DES, AES, BLOFISH, Attacks on DES. Modes of Operations, Linear Cryptanalysis and Differential Cryptanalysis. Public Key Algorithms: RSA, Key Generation and Usage, ECC. Hash Algorithms: SHA-1, MD5. [6]

Key Management: Introduction, Key Management: Generations, Distribution, Updation, Digital Certificate, Digital Signature, PKI. Diffiee Hellman Key Exchange. One Way Authtication, Mutual Authentication, Neeham Schroeder Protocol. [6]

Network Security: Intrusion Detection Systems: Introduction, Anomaly Based, Signature Based, Host Based, Network Based Systems. [4]

Security Management and Applications:ISO 27001 Security Standard: Introduction, Evolution of standard, Organizational Context, Implementation, Certifications and benefits. Electronic Payment: Introduction, Payment types, Smart Cards, Chip card transactions and attacks, Payment over internet, Mobile Payments, Electronic Cash. [5]

Cyber Crimes & Laws : Introduction, Computer Forensics, Online Investigative tool, tracing and recovering electronic evidence, Internet fraud, Identity Theft, Industrial Espionage. [4]

Text Books:

1. Bruice Schneier, "Applied Cryptography- Protocols, Algorithms and Source code in C", 2nd Edition, Wiely India Pvt Ltd, ISBN 978-81-265-1368-0

2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, ISBN-978-81-315 1349-1

Reference Books:

1. Nina Godbole, " Information Systems Security", Wiley India Pvt Ltd, ISBN -978-81-265-1692-6.
2. Willaim Stallings, "Computer Security : Principles and Practices", Pearson Ed. ISBN : 978-81-317-3351-6.
3. Mark Merkow, " Information Security-Principles and Practices", Pearson Ed. 978-81-317-1288-7.
4. CK Shyamala et el., "Cryptography and Security", Wiley India Pvt Ltd, ISBN 978-81-265-2285-9.
5. Berouz Forouzan, "Cryptography and Network Security", 2 edition, TMH, ISBN : 9780070702080.

IT-14602 Software Engineering and Testing

	L	T	P
Internal Marks: 40			
External marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisite: Basics of Computer and knowledge of Human Computer Interaction course

Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models. [5]

Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEICMM Model.[6]

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams - Activity Diagrams - Package Diagrams – Component Diagrams – Deployment Diagrams - Diagram Organization- Diagram Extensions. Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.
[10]

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom- Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta

Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards. [7]

Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management. [6]

Text Books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill, 2010

2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication, 2009

Reference Books:

1. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers,2007

2. Ian Sommerville, Software Engineering, Addison Wesley.2004

3. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publication, 2005

IT-14603 Probability and Statistics

Internal Marks: 40	**L**	**T**	**P**
External marks: 60	**3**	**1**	**0**

Total Marks: 100

Introduction to statistics: meaning, scope, importance and limitations. Analysis of data: source of data, collection, classification, tabulation, depiction of data. Measures of Central tendency: Arithmetic, weighted, geometric mean, median and mode. Measures of Dispersion: Range, Quartile deviation, Mean deviation, Standard deviation Coefficient of variation, Skewness and Kurtosis. [4]

Sampling Distribution & testing of Hypothesis :Sampling , Distribution of means and variance , Chi – Square distribution, t – distribution , F – distribution . General concepts of hypothesis, Testing a statistical Hypothesis, One and two tailed tests , critical region , Confidence interval estimation . Single and two sample tests on proportion , mean and variance . [7]

Correlation Analysis: Significance, types, Methods of correlation analysis: Scatter diagrams, Graphic method, Karl Pearson‟s correlation co-efficient, Rank correlation coefficient, Properties of Correlation. Regression analysis: meaning, application of regression analysis, difference between correlation & regression analysis, regression equations, standard error and Regression coefficients. curve fitting. [7]

Theory of Probability: Definition, basic concepts, events and experiments, random variables, expected value, types of probability, classical approach, relative frequency and subjective approach to probability, theorems of probability, addition, Multiplication and Bays Theorem and its application. [6]

Probability Distributions: Difference between frequency and probability distributions, Binomial, Poisson and normal distribution [5]

Text Books:

1. C. B. Gupta, "An Introduction to Statistical Methods", Vikas Publications House Pvt. Ltd. 2010
2. S. P Gupta, Sultan Chand ,"Statistical Methods", Publishers Sultan Chand & Sons 2014.
3. E.Kreyszig , " Advanced Engineering Mathematics" , Wiley International Edition 2006

Reference Books:

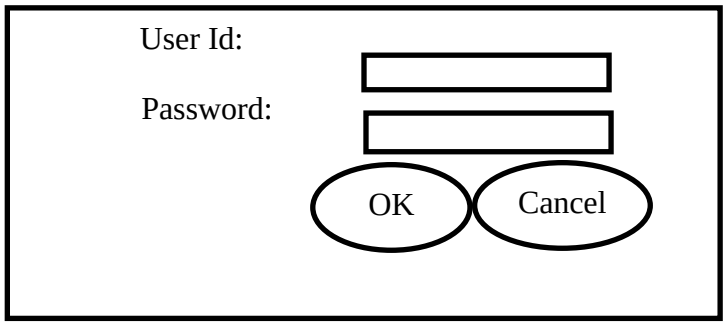
1. Bali , N.P. , " A Text Book On Engineering Mathematics " , Luxmi Publications, New Delhi 2010.
2. Hossein Pishro-Nik **,"**Introduction to Probability, Statistics, and Random Processes**",** Kappa Research, LLC **,** 2014

IT-14604 Software Engineering and Testing Laboratory

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**4**
Total Marks: 50			

Prerequisite: Basics of Computer and knowledge of Human Computer Interaction course

1. Draw the Use Case Diagram of any Desktop Application / Web Application using UML pad.
2. Apply Test Cases



   a) Only small alphabets are acceptable in User id
   b) Min 6 Max 9 characters in user id
   c) Password can be alphanumeric
   d) Null value in user id and password is not acceptable
3. Draw the DFD of any Desktop application/ Web Application using Microsoft Visio
4. Use the following Automated Testing Tools
   a) QTP (Functional Testing)
   b) Win-Runner (Functional GUI Testing Tool)
   c) Selenium (Testing web application)
5. Case Study of Library Management System by using any Designing Tool
6. Case Study of Online Banking System by using any Designing Tool
7. Case Study of Inventory Control System by using any Designing Tool
8. Case Study of University Management System by using any Designing Tool

9. **Mini Project: -** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately)
   and the team will have to demonstrate as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practical's. Instructor may also frame additional Practical's relevant to the course contents (if required).*

IT-14605 Information Assurance and Security Laboratory

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**4**

Total Marks: 50

Prerequisite: Data Communication and Computer Networks.

Programming Languages: C++, C# or Java

1. Implement RSA algorithm for key generation and cipher verification.
2. Implement to demonstrate Client – Server for authenticating verification.
3. Writing program to implement RSA algorithm.
4. Writing program to implement SHA-1 algorithm.
5. Writing program to implement AES algorithm.
6. Configure and demonstrate use of IDS tool such as snort.
7. Configure and demonstrate use of Traffic monitoring tool such as Wireshark.
8. Configure and demonstrate use of vulnerability assessment tool such as OpenVAS.
9. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14607 Advanced Java (Elective-II)

	L	T	P
Internal Marks : 40			
External marks : 60	**3**	**1**	**0**
Total Marks : 100			

Pre-requisites: Programming in Java

Enumerations, Autoboxing, and Annotations (Metadata): Enumerations, Type Wrappers, Autoboxing, Annotations (Metadata), Type Annotations, Repeating Annotations. [3]

Generics: Basics of Generics, A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Using Wildcard Arguments, Creating a Generic Method, Generic Interfaces, Raw Types and Legacy Code, Generic Class Hierarchies, Type Inference with Generics, Erasure, Ambiguity Errors, Generic Restrictions. [4]

Images: File Formats, Image Fundamentals: Creating, Loading, and Displaying, ImageObserver, Double Buffering, Double Buffering, MediaTracker, ImageProducer, ImageConsumer, ImageFilter. [3]

Multithreading and Concurrency Utilities: Basics of Multithreading, The Concurrent API Packages, Using Synchronization Objects, Phaser, Using an Executor, The TimeUnit Enumeration, The Concurrent Collections, Locks, Atomic Operations, Parallel Programming via the Fork/Join Framework, The Concurrency Utilities Versus Java's traditional Approach. [5]

Introducing Swing: The Origins of Swing, Swing is Built on the AWT, Two Key Swing Features, The MVC Connection, Components and Containers, The Swing Packages, Event Handling, Create a Swing Applet, Painting in Swing. [4]

Exploring Swing: JLabel and ImageIcon, JTextField, The Swing Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTabl [3]

Swing Menus: Menu Basics, An Overview of JMenuBar, JMenu, and JMenuItem, Create a Main Menu, Add Mnemonics and Accelerators to Menu Items, Add Images and Tooltips to Menu Items, Use JRadioButtonMenuItem and JCheckBoxMenuItem, Create a Popup Menu, Create a Toolbar, Use Actions. [3]

Java Beans: An Overview of Java Bean, Advantages of Java Beans, Introspection, Bound and Constrained Properties, Persistence, Customizers, The Java Beans API. [3]

Servlets: Background, The Life Cycle of a Servlet, Servlet Development Options, Using Tomcat, A Simple Servlet, The Servlet API, The javax.servlet Package, The Servlet Interface, Reading Servlet Parameters, The javax.servlet.http Package, Handling HTTP Requests and Responses, Using Cookies, Session Tracking. [4]

Java Server Pages (JSP): Introducing JSP technology, Listing advantages of JSP over Java Servlet, exploring the architecture of a JSP page, describing the Life Cycle of a JSP Page, working with JSP Basic Tags and Implicit Objects, Working with action tags in JSP [3]

Socket Programming: Introduction, TCP/IP Protocol, UDP Protocol, Ports, Using TCP/IP Sockets, Using UDP Sockets. [2]

Remote Method Invocation: Introduction to Remote methods, classes, RMI Architecture (Application Layer, Proxy Layer, Remote Reference Layer, Transport Layer), Naming class, Remote Interface, Unicast Remote Object class, Socket Vs RMI programming. [3]

Text Books

1. Herbert Schildt, "The Complete Reference", McGraw-Hill, 2014.
2. M.T. Savaliya, DT Editorial Services "Advanced Java",WILEY,2016
3. Paul Deitel, Harvey Deitel "Java How to Program", Prentice Hall, 2011.
4. James Gosling "The Java Language Specification", Pearson Education. 2014.

Reference Books

1. DT Editorial Services "Java 8 Programming Black Book" WILEY, 2003
2. Jaime Nino , Frederick A. Hosch "Introduction to Programming and Object-Oriented Design Using Java" WILEY,2009

DEIT-14608 Advanced Java Laboratory (Elective-II)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**
Total Marks: 50			

Pre-requisites: Programming in Java

1. Write program to show use of enum variable.
2. Write a program to returns an array that contains a list of the enumeration constants
3. Write a program to encapsulate a primitive type within an object using type wrappers.
4. Write a program to show difference between java comments and annotations.
5. Write program to make use of annotations at the runtime.
6. Using Generics create a class that automatically works with different types of data.
7. Write a single sort method that could sort the elements in an Integer array, a String array or an array of any type that supports ordering
8. Write a program for creating, loading, and displaying of the image.
9. Write a program to receive notification of an image
10. Write a program to do offscreen drawing surfaces.
11. Write a program to check the status of an arbitrary number of images in parallel.
12. Using ImageProducer write program for objects that want to produce data for images.
13. Write a program to extract a rectangular region from an image using CropImageFilter.
14. Using RGBImageFilter convert one image to another, pixel by pixel to perform the operations like :
    a. Returning a gray pixel that is the same brightness as the color source
    b. Inverts the colors of an image
    c. contrast enhancement
    d. move the source pixels of an Image into an array
    e. Blur an image
    f. Sharpen an image

15. Using multithreading perform the matrix multiplication in a parallel manner to decrease the computation time.
16. Write a program to control access to a shared resource using Semaphore.
17. Write a program to exchange data between two threads using Exchanger classes.
18. Using Executor API write a program that initiates and controls the execution of threads
19. Write a program using Locks to share a resource among various resources.
20. Design a simple swing application using container (JFrame) and Components (JLabel, JButton, JTextField etc).
21. Design an application with one JLabel and JButton and change the text of the label on button click.
22. Create an applet with one button and JLabel. Set your name on JLabel with button click.
23. Draw any basic shape in JFrame using painting fundamentals.
24. Design a registration form using following Swing components:
    - JButton
    - JLabel
    - JCheckBox
    - JComboBox etc
25. Create a swing application which implements:
    a. The concept of JTree
    b. The concept of JMenuBar and JMenuItems
26. Demonstrate the use of Mnemonics and Accelerators to menu items.
27. Make a Custom menu using images and JRadioButton/JCheckbox.
28. Create a popup menu and JToolBar.
29. Create a menu item “Message”, that show a message box when the user click on “Message” (menu item).
30. Write a program by making use of introspection, BeanInfo, Introspector, PropertyDescriptor, and EventSetDescriptor classes
31. Design a simple servlet to demonstrate its life cycle.

32. Implement the concept of cookies.
33. Write a program to handle http request and response.
34. Write a program to implement the concept of session.
35. Demonstrate the Life cycle of JSP program by design a registration form using various tags of JSP and HTML.
36. Using Socket programming create a distributed application to transfer data from one system to another.
37. Using RMI client server architecture perform the following operations:
    a. Sending an array of data from one system to another
    b. A system calling remote methods for calculating perimeter, area of a circle
38. **Mini Project**: By using various concepts of Advance Java students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14609 Big Data Analytics (Elective-II)

Internal Marks : 40	**L**	**T**	**P**
External marks : 60	**3**	**1**	**0**
Total Marks : 100			

Prerequisites: Basic Quantitative skills, including elementary statistics, as well as Basic programming skills in SQL, CRUD Operations and Basic Operating System Skills Preferably Linux and One Programming Language Either Java/Python

Introduction to Big Data : W hat is Data, Forms of Data Unstructured Data, Structured data and semi structured data, Big Data Overview, Big Data Fast Data, State of the Practice in Analytics, When to consider Big Data Solutions, Applications of Big Data in Industry. [3]

Apache Hadoop : Introduction to Hadoop, Understanding distributed systems and Hadoop, Components Of Hadoop (Namenode, Datanode, JobTracker, TaskTracker, etc.),Understanding Map Reduce, Working with files in HDFS, Basic HDFS commands, Introduction to Hive, Working with Hive. [10]

Apache Spark : Spark Overview, RDD Fundamentals, Spark SQL and Data Frames, Spark Job Execution, Cluster Architectures for Spark, Intro to Spark Streaming, Machine Learning Basics (SparkML). [7]

NoSQL Databases: Introduction to NoSQL Document, Wide Column, Key Value, Graph, NoSQL Basic Operations, Working with HBase/Cassandra, Working with Document Database, Working with Titan Graph, Applications of NoSQL. [8]

Machine Learning: Defining Machine Learning, Applications of Machine Learning, Clustering ,Classification, Association rules, Linear Regression, Logistic Regression. [5]

Case study: Recommendation Engines, Fraud Detection, Network Analysis with Graph Database [5]

Text Books:

1. Chuck Lam ,"Hadoop in Action", Dreamtech Press/Wiley India, 2011
2. Jared Dean ,"Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners", Wiley Publication, 2014 .

3. Eric Siegel, Thomas H. Devanport ,"Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die ", Willey 2016
4. Holden Karau and Andy Kowinski ,"Learning Spark", Kindle Edition2015

Reference Books

1. John W. Foreman ,"Data Smart: Using Data Science to Transform Information into Insight" , Wiley Publication, 2013.
2. Benjamin Bengfort and Jenny Kim, "Data Analytics with Hadoop: An Introduction for Data Scientists", Kindle Edition 2016

DEIT-14610 Big Data Analytics Laboratory (Elective-II)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**
Total Marks: 50			

Prerequisites: Knowledge of Java/Python, SQL

1. Refresher On CRUD Operations
    - SQL Operations Lab
    - SQL Operations with Python / Java
    - File I/O with Python / Java
2. Working With Hadoop Ecosystem
    - Hands On HDFS commands
    - HDFSfile I/O with Python / Java
    - Understand the basic Data types of MapReduce
    - Programming Paradigm
    - Steps to write a mapreduce program
    - Writing a Program to count number of words in a file.
    - Working with Hive & Pig
3. Working with Apache Spark
    - Writing MapReduce jobs in PySpark / RSpark
    - Working with Spark RDD
    - Hive with Spark (SparkSQL)
    - Accessing HDFS with PySpark.
4. NoSQL Databases
    - Working with Document Database MongoDB.
    - Working with Wide Column Store HBase
    - Working with Graph Database TitanDB

- CRUD operations on NoSQL with Python / Java

5. SparkML & R Programming

- Basic constructs of R programming
- Data Analysis in R
- Machine Learning in SparkML
- Data visualization libraries in R

6. **Mini Project**: By using various concepts of Big Data students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14611 E-Commerce (Elective-II)

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: Internet and WWW

Introduction to Electronics Commerce: Defining Electronics Commerce, Forces fuelling Electronics Commerce, Electronics Commerce Industry Frame work, Types of Electronics Commerce [3]

E-Commerce Infrastructure: Need for Intelligent Website, Web and Database Integration, Web Software development tools, Multimedia Web extensions (VRML, Real Audio, Internet and Web based Technology), Directories and search engines, Business to Customer, Business to Business, Consumer to Consumer, Consumer to Business [4]

Legal Framework: General-Shrink-Weap-Contracts, Laws relating to online Contracts , Jurisdiction of Owner Website, Domain Name- Strategy of holding certain Names, Legal Issues, Trademark, Current Global and Indian, Standardization of Procedure and Practice of Business, Sole Trading, Joint Stock Company, Cooperative Society, Concept and Significance of Foreign Trade [5]

Firewalls and Transaction Security Considerations: Introduction to firewalls and network security (Types, policies and Management), Third party payment processing, Cryptography, Encryption and Transaction Security, The comparison of encryption methods, Digital Signatures, Virtual Private Network, Security in WWW (Netscape's secure socket layer, security and online web based banking), Copyright Protection Techniques, Policy and Procedure, Electronic Sabotage, Hacking Vulnerabilities, Viruses, Wireless Security Issues, Cooking, National Government involvement in Internet Crime and E-Business Security [10]

Electronics Commerce, banking and Retailing: Home Banking, Banking via the PC using Internet/Intranet, Banking via online services, Banking via Web, Changing Retail industry dynamics and technology improvements in Electronics retailing, Mercantile models from

consumer's perspective [5]

International Agencies: Role of International Agencies involved in addressing these issues and their future initiatives, United Nation Commission in International Law OECD, World Trade Organization, World Intellectual Property Organization [3]

E-Business Framework: Challenges and strategy creation, E-business blueprint creation, E-Business project planning checklist, an execution blueprint, Failures of E-Business Initiatives [3]

Advanced Topics: Mobile Commerce, Wireless Application Protocol (WAP), Generations of Mobile Wireless Technology, Components of Mobile Commerce, Networking Standards for Mobiles, Electronic Data Interchange, E-CRM, E-SCM, , E-Security, E-Banking, E-Trading and E-Marketing

[5]

Policy and Implementation: Legal and ethical policy issues, Protection of privacy and Intellectual property [2]

Text Books:

1. Ravi Kalakota and Andrew B. Whinston, "Electronic Commerce: A Manager's Guide", Pearson India 2009.
2. Dr Ravi Kalkota, "E-Business - Roadmap for success", Addison Wesley (Pearson Education), 2001
3. Elias M. Awad, "Electronic Commerce: From Vision to Fulfilment", 3rd Edition, P HI India. 3rd Edition

Reference Books:

1. David Kosiur, "Electronic Commerce", Microsoft Press 1997.
2. Karabi Bandyopadhyay, "Mobile Commerce", 1st Edition, PHI India, 2013

DEIT-14612 E-Commerce Laboratory (Elective-II)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Prerequisite: Knowledge of Fundamentals of Computer and Programming

1. Introduction to Front end and Back end languages.
2. Development of personal webpage with
    - Bio-data
    - Contacts
    - Hobbies
3. Development of website of any organization, informative websites.

   Website must contain
    - Links to homepages
    - Features/ Products of company/ organization
    - Employee information
    - Administration information
    - Company policies
4. **Mini Project**: By using various concepts of E-Commerce students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

IT-14613 Embedded Systems in C (Elective-II)

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: Microprocessor and Assembly Language Programming, Programming in

Introduction to Embedded System in C: Their classification & characteristics, Concepts and Processes of system level design of embedded system, Applications and features of embedded system (3)

Introduction to 8051 : Microprocessor, Micro-controllers and their comparison. 8051 Architecture: Introduction, 8051 micro-controller hardware, input/ output, pins, ports and circuits, external memory, flag bits and PSW register banks ,Stacks, Addressing Modes, Counters and timers, serial data input/ output, Interrupts, Interrupt Service Routine, Interrupt vector ,8051 Assembly Language Programming**:** The mechanics of programming, assembly language programming process, programming tools and techniques, instruction set (data moving, logical operations, Arithmetic operations, jump and call instructions). (14)

Embedded system based Architectures: Introduction to PIC 16F8XX Flash Microcontrollers-Architecture, Pin Description, Introduction to PLDs and FPGA- architecture, DAC, ADC, UART. (8)

Embedded Core Based Design: System -on -Chip, Application specific Integrated circuit, Overview of Embedded Processors like ARM, MIPS and Intel MMX series, Architecture, Organization, Memory management

(7)

Real Time programming and Operating System (RTOS):RTOS Overview, Basics of RT-Linux as a RTOS, Assembly language (3)

Recommended Books:

1. The 8051 Microcontroller and Embedded systems: Ali Mazidi
2. Microcontrollers (Theory and Applications)- Ajay V. Deshmukh
3. An Embedded System Primer, by David E. Simon
4. PIC Microcontroller by John B. Peatman
5. ARM system architecture by Steve Furber(Addison Wesley)
6. Programming Embedded System in C/C++ by M.Barr
7. Real Time Systems by H. Kopetz

Reference Books:

1. Embedded Systems- Raj Kamal
2. Embedded system Design by Steve Heath

DEIT-14614 Embedded Systems in C Laboratory (Elective-II)

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**
Total Marks: 50			

Prerequisites: Microprocessor and Assembly Language Programming

1. Study of 8051 Micro controller kit.
2. Write a program to add two numbers lying at two memory locations and display the result.
3. Write a program for multiplication of two numbers lying at memory location and display the result.
4. Write a program to check a number for being ODD or EVEN and show the result on display.
5. Write a program to split a byte in two nibbles and show the two nibbles on display.
6. Write a Program to arrange 10 numbers stored in memory location in Ascending and Descending order.
7. Write a program to find a factorial of a given number.
8. Study of Interrupt structure of 8051/8031 micro controllers.
9. Write a program to show the use of INT0 and INT1.
10. Write a program of Flashing LED connected to port 1 of the Micro Controller
11. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

DEIT-14615 Information Storage and Management (Elective-II)

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Prerequisites: To understand the content and successfully complete this course, a participant must have a basic understanding of computer architecture, operating systems, networking, and databases.

Introduction to Information Storage Technology: Review data creation and the amount of Data being created and understand the value of data to a business, Challenges in Data Storage And Management, Data Storage Infrastructure. Identify Data Centre infrastructure elements and their requirements. Detail disk drive architecture and performance. [4]

Data protection: Concept of RAID and its Components Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Comparison of Levels. [8]

Intelligent Storage Systems: Intelligent Storage System (ISS) and its components. Implementation of ISS as high- end and midrange storage arrays. [4]

Introduction to Networked Storage: Evolution of networked storage, Architecture, overview of FC-SAN, NAS, and IP-SAN. Network -Attached Storage (NAS): Benefits of NAS, NAS components, Implementations, File Sharing, I/O operations, Performance and availability.[8]

Content Addressed Storage (CAS): features and Benefits of a CAS. CAS Architecture, Storage and Retrieval, Examples. [4]

Disaster Recovery: Backup, Methods, And Technologies, Replication technologies: Local replicas, Technologies, Restore and Restart, Multiple Replicas and Remote Replication. [6]

Storage and Security Management: Introduction Security, Identity management, Single sign-on, Access Management, Basics of network security, LDAP fundamentals, Intrusion detection, firewall, security information management. Introduction to Storage, Backup & Restore, Archive & Retrieve, Space Management, SAN & NAS, Disaster Recovery, Hierarchical space management, Database & Application protection, Bare machine recovery, Data retention. [6]

Text Books:

1. EMC Educational Services, "Information Storage and Management", Wiley India,2015.

2. Richard Barker and Paul Massiglia, "Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs", Wiley India, 2003.

Reference Books:

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill Osborne, 2003.

2. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.

DEIT-14616 Information Storage and Management Laboratory (Elective-II)

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Total Marks: 50

Practical's to demonstrate:

1. To study the rotational and loading mechanism of storage drives like hard disk etc.
2. To implement the concept of RAID using concept of virtualization.
2. To configure OpenLDAP server in Linux
3. To configure the firewall using tools like OPNsense, pfSense, ipfire etc.
4. To illustrate the features of NAS using software like FreeNAS,
5. To undserstand the need of data recovery and implement tools like photorec, recuva, mini tool partition recovery etc.
6. **Mini Project**: By using various concepts of syllabus, students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: *It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*

OEIT-14601 IT Enabled Services

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**0**	**0**
Total Marks: 100			

Prerequisites: Fundamentals of Information Technology, Project Management, Web Engineering and Technology

Business Strategy: Challenges and Opportunities of IT: Business Strategy: Challenges and Opportunities in the Globalized, Interconnected, Convergent World, Establishing Principle before practice; IT Strategy: Application, Management and Technology Strategy for IT, Business and IT Alignment: Challenges of IT and Business Strategy Alignment, Inhibitors of Business and IT Strategy Alignment, Three-D Framework for Business and IT Alignment: Discipline, Design and Drive. [5]

Enterprise IT Architecture: Defining EITA, Contents of Typical Enterprise IT Architecture, Technology Management Strategy framework, Prevalent Technology Reference Architectures Framework and Standards, Program Management, Benefits of PMO, Desired Qualities of Program Office Manager, Maturity of PMO, Implementation of PMO Strategy, Measuring PMO Performance, Success Factors of PMO, Project Scope Management, PMO Dashboard and Reporting [6]

Introduction to IT Enabled Services: Definition and Meaning of IT Enabled Services, Users and Technology involved in IT Enabled Services, Deployment challenges and issues in establishment of IT enabled services, Major Application areas like Medical, Legal and Ethical, E-banking and E-commerce/ E-business. [5]

IT Enabled Services in Diverse Areas: IP Based Emergency Services:- Overview, Building Blocks, Location based Protocols Used, Overview of Geography Markup Language, NENA i2 vs NENA i3 Architecture for Delivery of Emergency Services, Security issues concerned with IP Based Emergency Services; Role of IT enabled web Services in Medical, Case Study: GNUHealth, openEHR, IT Services in Manufacturing Industries:- Importance of good IT infrastructure for discrete manufacturing companies, Goal, Components and Implementation of

good IT infrastructure for manufacturing industries, Case study: AutoCAD, SAP. [8]

Current Trends in IT Enabled Services: Current Employment in the IT and ITES industry: Newly emerging area and requirement of IT enabled service sector. Overview of India's IT and ITES Industry - IT Services (ITES/ BPO Engineering Services, R&D, and Software Products), Industry Oriented Human Resource Requirements: Outlook of IT and ITES industry. Barriers to Trade in ITES Role of International Bodies (WTO & UNCTAD) in facilitating Trade in ITEST/ ITES, experience and Case studies of ITES- call centers, ERP, google. [8]

Text Books:

1. Dubey, Sanjiva Shankar, "IT Strategy and Management ", PHI Learning Pvt. Ltd., 2016.
2. Nikhil Treebhoohu, "Promoting IT Enabled Services ", Addison-Wesely, 2013.
3. Sanjiva Shankar Dubey, "IT Services Business Management: Concepts, Processes and Practices ", PHI Learning Pvt. Ltd., 2012.
4. Hannes Tschofenig and Henning Schulzrinne, "Internet Protocol Based Emergency Services ", Wiley, 2013.

Reference Books:

1. S.A. Kelkar, "Strategic IT Management: A concise Study ", PHI Learning Pvt. Ltd., 2010
2. Shiro Uesugi , "IT Enabled Services ", Springer- Verlag Wein, 2013.
3. Lois Burns and Florence Maloney, "Medical Transcription and Terminology: An Integrated Approach ", Thomson Delmar Learning, 2nd Edition.
4. Kevin Ake, John Clemons, Mark Cubine, Bruce Lilly, "Information Technology for Manufacturing: Reducing Costs and Expanding Capabilities " , CRC Press 2016

OEIT-14602 Management Information System

Internal Marks: 40 **L T P**

External Marks: 60 **3 0 0**

Total Marks: 100

Prerequisites: E-Commerce, Human Computer Interaction.

Managing Information Systems in Organizations: Information in organizational functions, types of information technology, types of information systems- transaction processing systems-management information systems, Managing in the Internet Era, Managing Information Systems in Organization-the IT interaction model, Challenges for the manager, Decision making with MIS-Tactical decisions-operational decisions, strategic decisions, communication in organizations- types of communication. [7]

Strategy: Information goods-properties-technology lock-in and switching costs-network externalities-positive feedback-tippy markets, information systems and competitive strategy-value chain, the Role of CIO-information system's plan-vendor coordination-technology updates-return on investment on technology. [4]

Business Process Integration with IT: Introduction, Business Process Integration- Business processes-example of a complex process, Motivation for Enterprise Systems, Enterprise Resource Planning systems- finance and accounting module-human resource management module-manufacturing and operations module- sales and marketing module [4]

SCM, CRAM and International Systems: Introduction to Supply Chain Management Systems & Customer Relationships Management Systems, Challenges of Enterprise Systems Implementations, International Information Systems-Outsourcing and off-shoring, Introduction to E-commerce Technology, doing business over internet- networks-electronic data interchange (EDI)-online payment technology, E-business [6]

Managing IT Function & Decision Support Systems: Introduction, Challenges of Managing the IT function- Modern IT environment-Centralization versus Decentralization-IT security-Technology selection, Vendor Management- vendor selection-vendor contracts and service

levels-Ongoing relationship management- vendor retention or termination, Understanding: DSS, MIS, ESS, Analytics and Business Intelligence techniques [9]

Text Books:

1. S.A Kelkar ,"Management Information System", Publisher: PHI Learning Pvt. Ltd. 2003.
2. A.K Gupta , "Management Information Systems", Published by S. Chand & Company Ltd, 2013
3. C.S.V.Murthy, " Management information systems", Himalya Publishing House, 2011.

Reference Books:

1. Kenneth C. Laudon, Jane P. Laudon, "Management Information Systems", Published by Pearson, 2014.
2. R. Kelly Rainer, Hugh J. Watson , "Management Information Systems", Publisher Down Felly, 2013.