Guru Nanak Dev Engineering College, Ludhiana
Department of Information Technology
Scheme 2014

Syllabus of 3rd Semester

of

Department of Information Technology

for

Batch 2014 Onwards

Guru Nanak Dev Engineering College, Ludhiana
Department of Information Technology
Scheme 2014

IT-14301   IT Methodologies

				L	T	P
Internal Marks: 40   L   T   P

External Marks: 60   3   1   0

Total Marks: 100

Course Outcomes:

After studying this students will be able to:

1. Understanding the basic concepts of Internet model and addressing, different physical media, networking devices and Internet troubleshooting commands, WWW and it's applications.

2. Apply the knowledge of basic Internet Technologies and WWW like troubleshooting utilites, FTP, Email to address the Network communication issues and functionalities.

3. Design and Create GUI based client side web applications to address diverse application areas using HTML, CSS.

4. Use the technique and skills for developing and integrating client side tools like Javascript to address client side dynamic programming issues in WWW

5. Select suitable internet security tools like firewall using knowledge on cryptography and firewall techniques.

6. Function on diverse teams through web application designing and client side development

Detailed Contents:

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,

Guru Nanak Dev Engineering College, Ludhiana
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Scheme 2014

IT-14302 Social and Professional Aspects of Information Technology

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

Total Marks: 100

Course Outcomes:

After studying this students will be able to:

1. Apply knowledge of Organizational culture, Professionalism.

2. Outline social context of computing

3. Discuss Intellectual property acts, Copyrights and plagiarism

4. Identify Professional and ethical issues and responsibilities

5. Utilize skills of effective oral presentation and writing skills

6. Explain Privacy and Civil Liberties using various acts.

Detailed Contents:

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.

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IT-14303 Data Structures and Programming Methodology

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

Course Outcomes:

After studying this students will be able to:

1. Create and evaluate new algorithms to solve complex engineering problems.

2. Illustrate various data structures to solve multi-disciplinary projects.

3. Utilize the templates for modularity.

4. Compare and classify various data structures

5. Demonstrate the reusability of data structures for implementing complex iterative problems.

Detailed Contents:

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 recur Recursion [2]

Queues: Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, deque, priority queue. [5]

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.

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CS-14303 Digital Circuits and Logic Design

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

Course Outcomes:

After studying this students will be able to:

1) Identify concepts and terminology of digital logic circuits.

2) Utilize knowledge of number systems, codes and Boolean algebra to the analysis and design of digital logic circuits.

3) Formulate and employ a Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms.

4) Identify, formulate, and solve engineering problems in the area of digital logic circuit design.

5) Use the techniques, skills, and modern engineering tools such as logic works necessary for engineering practice.

6) Function on multi-disciplinary teams through digital circuit experiments and projects.

7) Design combinational and sequential circuits using Boolean algebra.

8) Explain the Memory Organization and its classification.

Detailed Contents:

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

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CS-14305 Object Oriented Programming using C++

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

Course Outcomes:

After completing this course students will be able to:

1. Understanding the concepts of PoP, OOPS and their components
2. To identify, formulate and Solve the programming problems in the areas of OOPS
3. Apply the techniques and skills of OOPS paradigm such as Functions, Inheritance, Polymorphism and Exception handling
4. Function on Multi-disciplinary team by using OOPs experiments and Projects.
5. Design of Templates and generic programming.
6. To execute the concept of File Handling and Exception handling of Specific Programming Problem.

Detailed Contents:

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] **V**

irtual 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.

Guru Nanak Dev Engineering College, Ludhiana
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IT-14304 IT Methodologies Laboratory

Internal marks: 30   **L   T   P**

External marks: 20   **0   0   3**

Total marks: 50

Course Outcomes:

After completing this course students will be able to :

1. Demonstrate an understanding of basic networking devices
2. Apply the knowledge for Configuring IP Addresses, Troubleshooting Commands to address network communication related issues.
3. Setup and build basic server side environment using Apache and IIS Server
4. Design and Construct Static Web Pages using Basic HTML Tags and CSS for varied application areas
5. Integrate and develop client side modules based on Java script to provide interactivity and address web based engineering problems
6. Function on diverse teams to identify, formulate and design static web project using HTML, CSS and Java script in multi-disciplinary environment

Detailed Contents:

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.

Guru Nanak Dev Engineering College, Ludhiana
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IT-14305 Data Structures and Programming Methodology Laboratory

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

Course Outcomes:

After completing this course students will be able to :

1. Improve practical skills in designing and implementing data structure algorithms
2. Compose algorithms to solve complex engineering problems
3. Implement the templates for modularity
4. Design graphical user interface for better human computer interaction.
5. Utilize data structure algorithms in a better way to solve responsibilities relevant to other professional engineering practices
6. Execute projects for individual or team based on data structure algorithms.

Detailed Contents:

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.

Guru Nanak Dev Engineering College, Ludhiana
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CS-14306 Digital Circuits & Logic Design Laboratory

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

Course Outcomes:

After completing this course students will be able to

1. Demonstrate the logic gates and realization of AND, OR, NOT and XOR functions using universal gates.

2. Design and implement combinational circuits like half adder/ Full adder, half subtractor/ Full subtractor, code converters, comparators, MUX/DEMUX.

3. Design and implement sequential circuits like flip-flops, counters and shift registers

4. Compare and contrast the outputs of flip flops ,coumters , registers by using different chips.

5. Analyze the working of DAC, ADC and examine the data storage in RAM by using IC2114.

6. Execute the various experiments and projects on individuals and multidisciplinary teams through various logic designs and circuits.

Detailed Contents:

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.

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CS-14308 Object Oriented Programming using C++ Laboratory

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

Course Outcomes:

After completing this course students will be able to

1. Implement programs using Control Structures
2. create Classes & Objects, Constructors & Destructors
3. Apply the concepts of Function overloading, Type Conversion, Pointers & Memory Management
4. Design of Programs using Inheritance & Polymorphism
5. Creation of Templates
6. Executing File Handling and Exception Handling

Detailed Contents:

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 for x>0, Y=0 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

Guru Nanak Dev Engineering College, Ludhiana
Department of Information Technology
Scheme 2014

IT-14401 Database Management Systems

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

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Apply knowledge of database system, No Sql database, data mining and SQL structure.

2. Identify, formulate database design, Functional dependencies and recovery techniques

3. Use the techniques, skills and tools such as query handling, normalized relations

4. Design Physical and object relational database

5. Investigate various case studies using NoSql

6. Apply the Applications of spatial and multimedia databases for real world

Detailed Contents

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

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CS-14402   Operating Systems

Internal Marks: 40   **L   T   P**

External Marks: 60   **3   1   0**

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Exemplify various types of Operating Systems, deadlocks, Process, File and Memory management.

2. Implement various deadlock scheduling algorithms.

3. Analyze and apply various memory and file management mechanisms.

4. Classify various page replacement algorithms for demand paging.

5. Use different disk scheduling algorithm for better utilization of external memory.

6. Examine the case studies of different Operating Systems to recapitulate the concepts of Operating System.

Detailed Contents:

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			

Course Outcomes:

After completing this course students will be able to

1. Understand Network essentials, Network Architecture, TCP/IP and OSI model.

2. Analyze and solve networking problems in the area of guided and unguided transmission media.

3. Illustrate multi - channel access protocols and IEEE 802standards for LAN and MAN.

4. Contrast the design issues and working of protocols at different layers of TCP/IP and OSI models.

5. Formulate the various congestion and routing algorithms.

6. Implement the concepts of N/W security and protocols such as HTTP, FTP, Telnet, DNS.

Detailed Contents:

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

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IT-14404 Web Technologies

| Internal Marks: 40 | **L** | **T** | **P** |

External Marks: 60   **3**   **1**   **0**

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Understand the basic tools required for Web designing and applications.
2. Build HTML5 and CSS3 for designing interactive Webpages.
3. Analyze the basic operations of an AJAX application.
4. Develop an interactive websites using jQuery.
5. Acquire the basic usage of PHP construct and its integration with database for developing web modules like, login module, session authentication.
6. Create and design dynamic web application using contemporary development tools like, MVC framework, WordPress.

Detailed Contents:

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.

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IT-14405 Computer Architecture and Microprocessors

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

Course Outcomes:

After completing this course students will be able to understand:

1. Identify computer systems, memory organization, Microprocessor and assembly language programming

2. Clarify instruction formats, RISC and CISC architecture and different addressing modes

3. Solve basic binary math operations by using the instructions of microprocessor 8085

4. Compare different types of Microprocessor

5. Design structured, well commented, understandable assembly language programs to provide solutions to real-world problems

6. Organize multi-disciplinary settings through assembly language programming and projects

Detailed Contents:

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

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IT-14406 Database Management Systems Laboratory

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

Course Outcomes:

After completing this course students will be able to

1. Apply knowledge of SQL and create tables, views.

2. Identify, formulate database design using single row function and group function

3. Displaying data from multiple tables

4. Design single row and multiple row sub queries, advanced sub queries

5. Investigate MongoDB using NoSql

6. Design Mini Project   in multidisciplinary environment

Detailed Contents:

Prerequisite: 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.

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CS-14406 Operating Systems Laboratory

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

Course Outcomes:

After completing this course students will be able to

1. Carry out the installation of UNIX, LINUX and Windows Operating System

2. Analyze the concept of Virtual Machine and install Operating System through it.

3. Execute Linux and shell programming commands.

4. Use vi editor for editing the documents.

5. Implement shell programs for automate system tasks and report writing.

6. Design and execute the projects related to operating system concepts on multi-disciplinary teams.

Detailed Contents:

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.

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IT-14407 Data Communication & Computer Networks Laboratory

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

Course Outcomes:

After completing this course students will be able to

1.Demonstrate the hardware components, transmission media and tools used in computer networks.

2. Implement the LAN based on different topologies.

3.Execute various networking commands related to troubleshooting.

4. Implementation of file and printer sharing.

5. Use the Qualnet to visualize the network.

6. Design and execute projects in networking on multi-disciplinary teams.

Detailed Contents:

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.

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IT-14408 Web Technologies Laboratory

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

Total Marks: 50

Course Outcomes:

After completing this course students will be able to

1. Implement HTML5 and CSS3 using Bootstrap Framework.
2. Setting and building the Development environment using XAMP/ WAMP in Windows and Linux.
3. Develop an interactive websites using jQuery.
4. Develop Web based application using AJAX like, Login Form, dependable Dropdown.
5. Creating Web pages integrating with database for developing web modules like, login module, session authentication.
6. Use Codeigniter Framework and WordPress to create a unique theme and/or child theme.

Detailed Contents:

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			

Course Outcomes:

After completing this course students will be able to

1. Recognize the basic Architecture of Computer System and various parts of Motherboard

2. Illustrate the operation of typical microprocessor: the role of the ALU, registers, stack and the use of interrupts

3. Solve basic binary math operations using the instructions of microprocessor 8085

4. Distinguish various types of Microprocessor

5. Construct code and debugs Assembly Language programs to implement simple programs

Detailed Contents:

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

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IT-14501 Discrete Mathematics

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

Course Outcomes:

After completing this course students will be able to

1. Study and apply the basic concepts of set theory, Inclusion and Exclusion Principle to solve applied problems

2. Determine the domain and range functions, identify one-to-one functions, perform the composition of functions, find and/or graph the inverse of a function, and apply the properties of functions to application problems.

3. Apply conceptual knowledge of Relation theory for identifying type of relations, finding composition and closure properties of relations and classifying the relations into different types including Equivalence relations, Compatibility relations and Partial Order relations

4. Formulate convincing arguments, conceive and/or analyse basic mathematical proofs and discriminate between valid and unreliable arguments.

5. Study the various counting principle, permutation, combination and recurrence relation and solve the related problems.

6. Identify, formulate and solve the complex engineering problems like shortest path and minimal spanning trees using properties and concept of graphs and trees

7. Ability to discriminate and Identify the basic properties related to various algebraic entities

Detailed Contents:

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			

Course Outcomes:

After completing this course students will be able to

1. Use primitive data types, operators and control statements to write programs.

2. Discuss methods and arrays along-with basic object oriented principles.

3. Implement Exception handling, multithreading, string handling, event handling, packages and interfaces.

4. Create an event handling techniques for interaction of the user with a GUI.

5. Design client/server applications using socket programming and database connectivity.

6. Identify and solve complex problems in the environment of Java programming.

Detailed Contents:

Prerequisites: 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.

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IT-14503 Theory of Computation

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

Course Outcomes:

After completing this course students will be able to

1. Identify the different concepts in automata theory- deterministic automata, regular expressions, regular languages, context-free grammars, context-free languages and Turing machines.

2. Illustrate the finite automata, regular expressions and context-free grammars accepting or generating a certain language

3. Examine if a certain word belongs to a language

4. Design finite automata, pushdown automata, Turing machines, formal languages, and grammars

5. Contrast the computational strengths and weaknesses of these machines

6. Utilize automata concepts and techniques in designing systems that address real world problems.

7. Develop abstract machines that demonstrate the properties of physical machines and be able to specify the possible inputs, processes and outputs of these machines

Detailed Contents:

Prerequisites: 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.

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IT-14504   Human Computer Interaction

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

Course Outcomes:

After completing this course students will be able to

1.   Illustrate human psychology, information processing, reasoning and cognition.

2.   Examine human interaction models and the various factors effecting human performance.

3.   Relate stress, cognitive workload and human errors.

4.   Integrate input technologies, sensor-based interactions, User Interface and help systems for an effective human computer interaction.

5.   Select the evaluation method for human computer interaction systems.

6.   Judge the consequences of human errors and catastrophic effects by using failures and human factors analyses.

Detailed Contents:

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 (5th 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 (2nd Edition), Wiley India Pvt. Ltd., 2007.

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IT-14505 Programming in Java Laboratory

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

Course Outcomes:

After completing this course students will be able to

1. Practice primitive data types, variables, and various control and decision structures to write programs.

2. Implement classes, methods and arrays in java programs.

3. Create java programs using Exception handling, multithreading, string handling, packages, interfaces and applets.

4. Generate event handling techniques for interaction of the user with a GUI.

5. Apply the concepts of data structures, digital electronics, operating systems and computer networks without using the inbuilt features of Java programming.

6. Design and execute the projects by using Java programming concepts on multi-disciplinary teams.

Detailed Contents:

Prerequisites: 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

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

Course Outcomes:

After completing this course students will be able to

1. Design the human interaction models.

2. Design the system involving the event and its status analysis.

3. Create the user interface which takes into consideration the human cognition and mitigates the predicted human errors.

4. Construct a user support and help system which is capable of enhancing the effectiveness of human decision making during emergency conditions.

5. Generate the simulation that involves the interaction between the human and input sensors.

6. Construct a simulation of a critical system where human computer interaction and cognition effects the safety of human.

Detailed Contents:

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).

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DEIT-14508 Advanced Computer Networks (Elective-I)

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

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Understand internetworking, TCP protocols, switching, network routing and adhoc networks.

2. Evaluate the internet layer protocols, host to host layer protocols, application layer protocols, Virtual LAN, Network Routing Protocols, adhoc routing protocols

3. Implement the switch administrative configurations, routing between different VLANs, router administrative configurations

4. Analyze Enhanced IGRP and Open Shortest Path First routing protocols

5. Compare adhoc networks with cellular networks.

6. Formulate communication between VLANs of different configuration.

Detailed Contents:

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.

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

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

Course Outcomes:

After completing this course students will be able to

1. Illustrate the working of wireshark in different modes.

2. Distinguishing the different types of data traffic with the help of wireshark.

3. Analyze different lower layer protocols

4. Synthesize and configure the switches, VLANs, Trunk Ports and Routers with the help of packet tracer.

5. Evaluate the working of Network Management Software

6. Formulate Adhoc Network between different mobile devices

Detailed Contents:

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

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

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

Course Outcomes:

After completing this course students will be able to

1. Utilize the concept of data warehouse and data mining for solution to primarily business projects which are enabled using information technology.

2. Analyze and document the complexity of the business information requirement regarding data marts.

3. Design and develop solutions using OLAP tools , classification and clustering methods necessary for real world problems like public health, safety etc.

4. Formulate and investigate the complex data mining problem with the help of modern query languages and data mining tools for interpretation of data and valid conclusions.

5. Function on multi-disciplinary teams through collection of datasets, experiments and projects.

6. Apply Business intelligence inferences to assess social, health , safety, legal and cultural issues.

Detailed Contents:

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

Course Outcomes:

After completing this course students will be able to

1. Conduct Investigation on real world problems using BI tools like Qlikview, google analytics etc.

2. Exemplify the implementation of data mart.

3. Apply data mining algorithms like J48, naïve bayes, Apriori etc. for analysis and prediction of data for health , social , cultural issues etc.

4. Develop solutions for multi-disciplinary data using WEKA tool of Data Mining

5. Identify different Business intelligence tools for different applications

6. Function effectively as individual or as team in multidisciplinary area of engineering practices.

Detailed Contents:

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)

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

Course Outcomes:

After completing this course students will be able to

1. Apply techniques and principles of image formation, sampling, quantization, spatial and frequency domain which will allow them to investigate specific image processing techniques.

2. Identify, formulate, and design algorithms in the area of digital image processing.

3. Use the techniques, skills, and modern engineering tools such as MATLAB and OCTAVE for processing digital images.

4. Function on multi-disciplinary teams through experiments and projects related to imaging techniques.

5. Identify potential applications of image processing to advancement of knowledge in sciences and engineering with benefits in, e.g., policing, public safety, and social issues such as rivacy.

6. Demonstrate a high level of self-directed learning ability, good oral and written communication skills on technical topics of digital image processing.

Detailed Contents:

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)

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

Course Outcomes:

After completing this course students will be able to

1. Apply knowledge of software tools and techniques with hands-on experience for processing digital images.

2. Design solutions for the understanding of the image enhancement, image compression, image segmentation.

3. To conduct investigation and develop programming skills in digital image processing related problems.

4. Use the modern engineering tools such as Scilab, MATLAB Octave etc. for solving problems related to image processing.

5. Function on multi-disciplinary teams through mini projects based on image processing problems.

6. Predict knowledge and skill base necessary to further explore advanced topics of Digital Image Processing.

Detailed Contents:

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).*

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DEIT-14514 .NET Technologies (Elective-I)

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

Course Outcomes:

After completing this course students will be able to

1. Use new types like, enumerations, classes, and structures, reference type and value type and conversion of types in C#.

2. Build pattern matching expression, encoding and decoding

3. Use collections and generics and working with graphic

4. Develop .NET framework Web Service-based applications and components

5. Examine Framework Libraries , inbuilt function, interfaces, exception handling and multi-threading.

6. Apply WCF Security, Application Blocks

Detailed Contents:

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

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

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

Total Marks: 50

Course Outcomes:

After completing this course students will be able to

1. Design Console based application

2. Create derived classes that inherit from custom- written or .NET Frame work Library classes

3. Use attributes to configure program behavior and efficiently manage resources

4. Build exception handling into methods , to create robust ,user-friendly application behavior

5. Use window forms, serialization and installing project for a service.

6. Apply to access Database

Detailed Contents:

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).*

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DEIT-14516 Advanced Web Technologies (Elective-I)

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

Course Outcomes:

After completing this course students will be able to

1. Apply the knowledge of HTML5 based Bootstrap framework for web page designing

2. Create and design web applications using MVC approach and Bootstrap.

3. Develop Responsive web applications using the concept of AngularJS.

4. Demonstrate the understanding of version control and data repository maintenance using Git.

5. Identify, formulate and solve engineering problems in the area of dynamic responsive web applications

6. Function on multi-disciplinary teams through web application creation

Detailed Contents:

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.

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

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

Course Outcomes:

After completing this course students will be able to

1. Deploy and implementation of HTML5 based Bootstrap framework elements.

2. Design and construct web module using CodeIgniter Framework.

3. Installation and Implementation of different AngularJS Framework approaches for designing responsive web applications.

4. Create, setup and perform different operations on git based data repository

5. Recognize, contrive and build solutions for engineering problems in the area of contemporary web applications

6. Function on diverse teams through web application designing and development

Detailed Contents:

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

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

Course Outcomes:

After completing this course students will be able to

1. To select appropriate techniques to tackle and solve problems in discipline of information security and assurance.

2. Implementation of Cryptography algorithms and their typical applications.

3. To understand the role of key management, digital certificates and how digital signatures are performed.

4. Evaluate the working of N/w security system

5. To study foundation and importance of e-commerce and security management.

6. Ethical implications of IT legal decisions.

Detailed Contents:

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.

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IT-14602 Software Engineering and Testing

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

Course Outcomes:

After completing this course students will be able to

1. Examine the Software Requirements Engineering and stages of software development.
2. Relate the requirements modeling and design techniques to infer the flow and behaviour of the system.
3. Examine the design issues and metrics for an effective software design.
4. Differentiate between the testing strategies to verify and validate the developed system.
5. Monitor the quality of the software for its reliability, availability and safety.
6. Relate software maintenance, reengineering and version control.

Detailed Contents:

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

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IT-14603 Probability and Statistics

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

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Demostrate the measures of central tendency to analyze the given data set

2. Create the histogram for a given data set

3. Verify the predicted data sets using Binomial, Poisson and normal distribution

4. Select a critical value from a normal, t, chi - square, and f distribution

5. Predict the linear regression parameters and correlation coefficient.

6. Apply probability theory via Bayes' Rule

7. Formulate the marginal and conditional distributions of bivariate random variables

Detailed Contents:

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

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IT-14604 Software Engineering and Testing Laboratory

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

Total Marks: 50

Course Outcomes:

After completing this course students will be able to

1. Examine the requirements of the required software system.

2. Design use cases for software requirements specifications of the desired system.

3. Construct models for data flow and behaviour of the system.

4. Compose the effective User Interface for an application.

5. Formulate test cases to test the application.

6. Practice the automated software testing tools.

Detailed Contents:

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
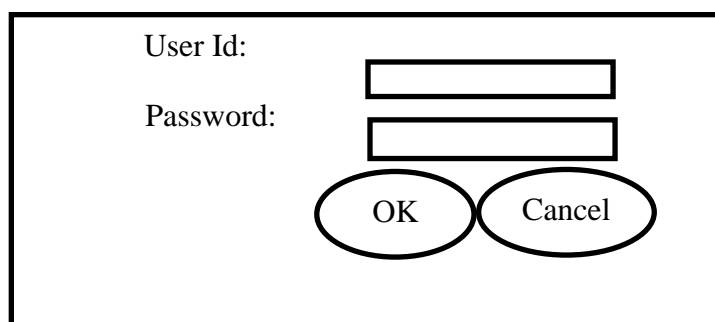
   a)   Only small alphabets are acceptable in User id

   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

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

Total Marks: 50

Course Outcomes:

After completing this course students will be able to

1. Examine of various aspects like operational issues, policy, attacks, security domains related to information security

2. Identify the security related aspects related to client-server authentication.

3. Evaluate the working of IDS tool such as snort

4. Function on multi-disciplinary teams through mini projects based on various security related issues.

5. Distinguish between the different types of algorithms used for information security.

6. Configuration of tool such as Wire shark and OpenVAS necessary to further explore information assurance and security.

Detailed Contents:

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).*

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DEIT-14607 Advanced Java (Elective-II)

Internal Marks : 40   **L   T   P**

External marks : 60   **3   1   0**

Total Marks   : 100

Course Outcomes:

After completing this course students will be able to

1. Apply the knowledge of java to Illustrate and Integrate its application in multidisciplinary areas.

2. Demonstrate and Create distributed applications using Remote Method Invocation and socket programming to solve complex engineering problems.

3. Create and evaluate multithreading based Concurrenct approach to solve multasking requirements.

4. Implement Java Beans to Improve software reusability

5. Outline the use of Swing to create user friendly interfaces for different applications

6. Formulate the use of Servlets in creating dynamic content for the Web

Detailed Contents:

Prerequisites: 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				

Course Outcomes:

After completing this course students will be able to

1. Analyze and design a computer program to solve real world problems based on object-oriented principles

2. Demonstrate the importance and merits of proper comments in source code and API documentations

3. Compose GUI interfaces for a computer program to interact with users

4. Design Web based applications for Client Server Architecture to solve complex problems

5. Verify relationships among various access specifies as needed for a specific problem

6. Implement the concepts of polymorphism and inheritance

Detailed Contents:

Prerequisites: 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).*

Guru Nanak Dev Engineering College, Ludhiana
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DEIT-14609 Big Data Analytics (Elective-II)

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

Course Outcomes:

After completing this course students will be able to

1. Understand the concept and challenge of big data

2. Demonstrate hands-on experience on large-scale analytics tools to solve some open big data problems

3. Examine the impact of big data for business decisions and strategy

4. Apply the novel architectures and platforms like Hadoop introduced for Big data

5. Implement the analytics techniques on a variety of complex applications

6. Apply non-relational databases, for storing and processing large volumes of structured and unstructured data, as well as streaming data

Detailed Contents:

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

Guru Nanak Dev Engineering College, Ludhiana
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Scheme 2014

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

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

Course Outcomes:

After completing this course students will be able to

1. Understand Big Data and Hadoop ecosystem
2. Detect complex problems and synthesise suitable solutions
3. Compile collect, manage, store, query, and analyze various form of big data
4. Formulate balance between algorithmic and systems issues
5. Construct the Integration of Big Data with traditional data warehouses
6. *Applying machine learning to computing tasks, where designing and programming algorithms with good performance is difficult*

Detailed Contents:

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				

Course Outcomes:

After completing this course students will be able to

1. Understanding the Significance and Importance of Electronic Commerce, Its Infrastructure and Legal Framework

2. Apply the Knowledge of Web Software Development Tools, Multimedia Web Extensions, Firewalls and Transaction Security Considerations for the Analysis and Design of Website

3. Identify, formulate, analyze and Solve Engineering Problems in the Area of Electronic Commerce

4. Use the Techniques, skills and Modern Engineering Tools Such as WAP, E-CRM and E-SCM, necessary for Engineering Practice

5. Use Research based Knowledge including Design of Experiments, Analysis and Interpretation of Data, and Synthesis of the Information to Provide Valid Conclusions

6. Create Select and Apply Appropriate Resources and Modern Engineering and IT Tools with an Understanding of Limitations

7. Apply Reasoning Informed by the Contextual Knowledge to Access Legal Issues and the Consequent Responsibilities relevant to the Professional Engineering Practice

Detailed Contents:

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

Course Outcomes:

After completing this course students will be able to

1. Remembering and Revising the different Front-End and Back-End Languages

2. Apply the Knowledge of Different Web Development Tools and Techniques for the Construction of Personal Web-Page

3. Identify, formulate, analyze and Solve Engineering Problems in the Area of Electronic Commerce

4. Design System Components or Processes that meet the specified needs with appropriate consideration for the website of any organization

5. Use Research based Knowledge including Design of Experiments, Analysis and Interpretation of Data, and Synthesis of the Information to Provide Valid Conclusions

6. Create Select and Apply Appropriate Resources and Modern Engineering and IT Tools with an Understanding of Limitations

7. Function effectively as an individual, and as a member or leader in diverse teams

Detailed Contents:

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).*

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

Internal Marks: 40   **L   T   P**

External Marks: 60   **3   1   0**

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Discuss the concept of embedded system, microprocessors
2. classify and compare the various microcontrollers
3. Illustrate the concept of 8051 microcontroller
4. Use 8051 Assembly language programming for various arithmetic and logical operations
5. Analyze the design and architecture of embedded core processors
6. Utilize the basics of RT-Linux as RTOS

Detailed Contents:

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

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

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

Course Outcomes:

After completing this course students will be able to

1. Illustrate the functioning of 8051 Microcontroller Kit
2. Use 8051 Assembly language programming for various arithmetic and logical operations
3. 3.Conceptual description of the Interrupt Structure of 8051/8031 Microcontrollers
4. 4.Utilize knowledge of Interrupt Structure to design codes of programming
5. Design, test and critically evaluate embedded solutions to real world situations.
6. Function on multi-disciplinary teams through experiments and projects.
7. Apply gained theoretical knowledge in order to design, analyze and implement embedded systems

Detailed Contents:

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).*

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

Internal Marks: 40	**L**	**T**	**P**
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)

Internal Marks: 30   **L   T   P**

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).*

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OEIT-14601 IT Enabled Services

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

Course Outcomes:

After completing this course students will be able to

1. Apply knowledge about Business Strategy with special emphasis on challenges and opportunities of IT.
2. Identify, formulate, and review literature to define enterprise IT architecture.
3. Understand the impact of IT enabled services on major areas like medical, legal and ethical.
4. Function on multi-disciplinary teams through various case using AutoCAD and SAP.
5. Identify potential applications of IT Enabled Services that can lead to advancement of knowledge in sciences and engineering with benefits in, areas like geography, medical sciences, manufacturing industries etc.
6. Construct knowledge and understanding of Current Trends in IT Enabled Services that can assist in lifelong learning.

Detailed Contents:

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

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OEIT-14602 Management Information System

Internal Marks: 40   **L T P**

External Marks: 60   **3 0 0**

Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Understand the need of MIS in organization, business process integration with IT

2. Define SCM, CRM, ESS, DSS, EDI & E-Commerce

3. Identify, formulate and implement different strategies for competitive advantage

4. Study and analyze the Business Intelligence techniques

5. Monitor the challenges and changes in IT in an organization

Detailed Contents:

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.

Syllabus of 7th/8th Semester

of

B.Tech Information Technology

for

Batch 2014 onwards

IT-14701 Business Enterprise Application

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

Total Marks: 100

Prerequisites: Software Engineering

Introduction to enterprise applications: Introduction to enterprise applications and their types, integration with legacy systems, life cycle of raising an enterprise application, integration with partners, heterogeneous environment, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications, ETL, direct data integration, middleware requirements [7]

Inception of enterprise applications: Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation [4]

Concept of architecture: Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture - design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design [7]

Construction readiness of enterprise applications: Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage [6]

Types and methods of testing an enterprise application: Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application. [6]

Advanced Topics: Integration Patterns, Service oriented integration-Web services, Sevice Choreography and Orchestration, BPMN, BPEL, Messaging based integration- Synchronous and Asynchronous Messaging, message structure, JAVA messaging services, Enterprise service bus-routing, scalable connectivity and protocol, Global and Brokered ESBs, Support to SOA [8]

Text Books:

1. Anubhav Pradhan, Satheesha B. Nanjappa et. al., "Raising Enterprise Applications", Wiley India, 2016.

2. George Mentzas and Andreas Frezen (Eds), "Semantic Enterprise Application Integration for Business Processes: Service - oriented Frameworks", Business Science Reference, 2015.

Reference Books:

1. Waseem Roshen, "SOA Based Enterprise Integration", Tata McGrawHill, 2015.

2. Martin Fowler, "Patterns of Enterprise Application Architecture", Addison - Wesley, 2015.

3. Kapil Pant and Matiaz Juric, "Business Process Driven SOA using BPMN and BPEL: From Business Process Modeling to Orchestration and Service Oriented Architecture", Packt Publishing, 2016.

IT-14702 ICT in Agriculture and Rural Development

Internal Marks: 40   **L   T   P**

External Marks: 60   **3   1   0**

Total Marks: 100

Prerequisite: Fundamentals of Information Technology

Introduction: Introduction to ICT, ICT in Agricultural and Rural Development. [2]

ICT Infrastructure, Appliances and Services : Making ICTs Affordable in Rural Areas, Mobile Money Moves to Rural Areas, M-PESA's :Pioneering Money Transfer Service, Delivering Content for Mobile Agricultural Services. [6]

Impact of Mmobile Devices on Agriculture and Rural Development: Key Benefits and Challenges Related to Mobile Phones and Agricultural Livelihoods, General Principles for Using Mobile Phones in Agricultural Projects.   [6]

Increasing Productivity through ICT: Increasing Crop, Livestock, Fishery, Dairy Productivity through ICT, Preventing Yield Losses through Proper Planning and Early Warning Systems . IT Tools for India's with applications in Dairy Industry[6]   .

Agricultural Marketing with ICT: Mobile Phones as a Marketing Tool, Improvement of Logistics through ICT, Facilitation of Market Research, Access to and Delivery of Inputs   [5]

Globalization of e-agriculture: Global e-agriculture and rural development, evolution of e-agriculture and global ICT trends, key characteristics of e-agriculture development, key lesson from global e-agriculture development, e-agriculture and rural development in Asia.   [5]

Applications of ICT: ICT and its potential to transform Indian agriculture, ICT based pest management for sustainable pulse production. Learning in agriculture and rural development, ICT use in agriculture, key success factors for ICT application in agribusiness, implications of ICT use in agriculture and agribusiness industry.   [7]

Case Studies: Impact of digital revolution on rural society in India, Agricultural knowledge dissemination system, Community radio for development of rural India, Mobile communication and development of rural India, Harnessing ICTs for Indian Agricultural and rural development,

Agricultural development through Information Communication Technology (ICT) in India. [6]

Text Books:

1. VK Dubey and Farida Ahmad, Agrotech Publishing Academy, 2014.

2. ICT in Agriculture, Connecting Smallholders to Knowledge, Networks, and Institutions, ARDB, 2011, The World Bank, Washington, USA.

3. Tomas Mildorf and Karel Charvat, ICT FOR Agriculture, Rural Development, and Environment, Czech centre for science and society, 2012.

Reference Books

1. R Saravanan, C.Kathiresan and T.Indra Devi, Information and Communication Technology for Agriculture and Rural Development, New India Publishing Agency, 2011

IT-14703 Engineering Entrepreneurship

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

Total Marks: 100

Prerequisite: None

Entrepreneurship and the Entrepreneurial Mind-Set: The nature of entrepreneurship, entrepreneur's thinking, the intention to act entrepreneurially, Entrepreneur background and characteristics, Role models and support systems, sustainable entrepreneurship. [2]

Corporate Entrepreneurship: Reasons for interest in corporate entrepreneurship, managerial versus entrepreneurial decision making, establishing corporate entrepreneurship in organization. [2]

Generating and Exploiting New Entry opportunities: new entry, generation of new entry of opportunity, entry strategy for new entry exploitation, risk reduction strategies for new entry exploitation. [2]

Creativity and the Business Idea: ideas from trend analysis, trends, sources of new ideas, methods of generating ideas, creative problem solving, creativity and entrepreneurship, innovation, entrepreneurial innovation, opportunity recognition, product planning and development process, e-commerce and business startup. [3]

Identifying and Analyzing Domestic and International Opportunities: Opportunity recognition and the opportunity assessment plan, information sources, sources of information for start-up entrepreneurs in India, the nature of international entrepreneurship, the importance of international business to the firm, international versus domestic entrepreneurship. [3]

Protecting the Idea and Other Legal Issues for the Entrepreneur: intellectual property, need for a lawyer, selection of a lawyer, legal issues in setting up the organization, patents, business methods patents, startup without a patent, trademarks, copyrights, trade secrets and noncompetition agreements, licensing, product safety and liability, insurance, Sarbanes-Oxley act, Contracts. [3]

The Business Plan: planning as part of the business operation, writing the business plan, scope and values of the business plan, evaluation of the plan, presenting the plan, information needs, financial information needs, using the internet as a resource tool, using and implementing the business plan, reasons of business plan failure. [2]

The Marketing Plan: Industry Analysis, Marketing research for the new venture, difference between a business plan and a marketing plan. Preparing the marketing plan, characteristics of a marketing plan, the marketing mix, steps in preparing the marketing plan. [2]

The Organizational Plan: Developing the management team, legal forms of business, tax attributes of forms of business, the limited liability company versus the S-corporation, designing the organization, building the management team and a successful organization culture, the role of a board of directors, the board of advisors. [3]

The Financial Plan: Operating and capital budgets, forecasting sales, pro forma income statements, pro forma cash flow statement, pro forma balance sheet, break-even analysis, pro forma sources and applications of funds statement, software packages. [2]

Sources of Capital: An overview, personal funds, family and friends, commercial banks, role of Government Agencies in small-business financing, research and development limited partnerships, Government grants, Private placement, bootstrap financing, financing the business, informal risk-capital market, venture capital, valuing your company, going public. [4]

Strategies for Growth and Managing the Implications of Growth: Growth strategies, implications of growth for the firm, overcoming pressures on existing human resources, overcoming pressures on management of employees, overcoming pressures on Entrepreneur's time, overcoming pressures on existing financial resources, using external parties to help grow a business, joint ventures, acquisitions, mergers, leverage buyouts, franchising. [5]

Succession Planning and Strategies for Harvesting and Ending the Venture: Exit strategy, succession of business, option for selling the business. Bankruptcy laws for companies in India: SICA(BIFR/AAIFR) and the companies bill, Strategy during reorganization. [3]

Case Studies. Case studies related to successful entrepreneur

[4]

Text Books:

1. Robert D. Hsirich, Mathew J. Manimala, Michael P. Peters and Dean A. Shepherd, "Entrepreneurship", 9/e, McGraw Hill Education, 2014.

2. Thomas H. Byers, Richard C. Dorf, Andrew J. Melson, "Technology Ventures: From idea to Enterprise", 4/e McGraw Hill, 2014.

Reference Books:

1. Kenji Uchino, "Entrepreneurship for Engineers", CRC Press, 2009.

2. Vasant Desai, "Entrepreneurship Development", PHI, 2011.

3. Anjan Raichaudhri, "Managing New Ventures : Concepts and Cases On Entrepreneurship", PHI, 2010.

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IT-14704 Business Enterprise Application Laboratory

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

Total Marks: 50

Pre-requisites: JAVA/ ANDROID/ PHP AND MYSQL

Candidates will be required to develop an Enterprise Application. At the end of the course, students will make a presentation and submit the project report. Project report may include requirements of project, Flow Chart, DFDs, Coding and Test Results.

Enterprise Application should be a working project and must have a future perspective. It may be a among the database, application software, system software, multimedia or web related. Enterprise Application should include following phases: 1) Inception of Enterprise Applications 2) Enterprise Architecture and Construction and 3) Testing and Rolling Out

This project must specify the different layers and categorization used to build an enterprise application and must signify its role with reference to software engineering and software project management. Procedure for this application development should be followed as:

1. To Analyze the enterprise with its requirements elicitations
2. To Specify the functional and non-functional requirements with their validation process
3. To Elaborate all views and viewpoints
4. To Categorize logical, technical, data and infrastructure architecture
5. To build the policies for Infrastructure Management and Deployment Strategy
6. To Implement the Construction Plan and Configuration Management Plan
7. To Perform Code Reviews, Static and Dynamic Code Analysis
8. To Justify the Testing Approach with Rolling Out of an Enterprise Application

DEIT-14705 Agile Software Development (Elective-III)

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

Total Marks: 100

Prerequisite: Software Engineering

Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Plan-driven and agile development, Extreme Programming: Practices, user stories, refactoring, pair programming, testing; Agile Project Management, Scaling Agile methods.   [6]

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management. [8]

Agile Testing: Overview, ten principles for agile testers, The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester. [8]

Agile Software Design and Development: Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.[10]

Industry Trends Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and

Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.[8]

Text Books:

1. Ken Schawber, Mike Beedle , "Agile Software Development with Scrum" Publisher Pearson,2002

2. Robert C. Martin , "Agile Software Development, Principles, Patterns and Practices" Publisher Prentice

   Hall, 2002

3. Lisa Crispin, Janet Gregory , "Agile Testing: A Practical Guide for Testers and Agile Teams" Publisher

   Addison Wesley: 2008

4. Alistair Cockburn , "Agile Software Development: The Cooperative Game" Publisher Addison

   Wesley,2006

Reference Books:

1. Mike Cohn, "User Stories Applied: For Agile Software" 2016

2. Mary Poppendieck and Tom Poppendieck, " Learn Software Development: An Agile Toolkit" 2003

DEIT-14706 Agile Software Development Laboratory (Elective-III)

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

Total Marks: 50

Prerequisites: Any Web Language

1. Introduction to Apache JMeter

2. JMeter Installation Guide

3. Discuss various Elements of JMeter

4. Hands on with JMeter GUI

5. How to do Performance Testing using JMeter

6. Timers in JMeter to involve some delay between requests.

7. Use of Assertions in JMeter to verify and ensure that testing process is going in a right direction

8. Controllers in JMeter to provides control on "when & how" to send a user request to a web server under test

9. Processor in JMeter

10. To make use of JUnit for writing and running test cases of java programs.

11. Write JUnit test suites for combining several test classes.

12. **Mini Project** : By using various concepts of syllabus students 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).*

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DEIT-14707 Bioinformatics (Elective-III)

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

Total Marks: 100

Prerequisites: DBMS

Introduction: Historical Overview and Definition of Bioinformatics, Applications of Bioinformatics, Molecular Biology and Bioinformatics, Central Dogma of Molecular Biology: Concept of DNA, RNA, Transcription and Translation, Proteins and Amino Acids. [8]

Biological Databases: Role of bioinformatics in biological sciences, Goal, Scope, Biological Databases, Pitfalls of biological databases, Information Retrieval from NCBI Genbank. [6]

Sequence Alignment: Introduction, Concept of Alignment, Scoring Matrices, PAM (Percent Accepted Mutations), BLOSU M (BLOcks SUbstitution Matrix), Pair-wise Alignment, Global Alignment, Local Alignment, Needleman-Wunsch Algorithm, Smith-Waterman Algorithm, Multiple Sequence Alignment. [10]

Next-generation Sequencing: Introduction, Accessing GenBank and moving around NCBI databases, performing basic sequence analysis, working with modern sequence formats, working with alignment data, Analyzing data in the variant call format, Studying genome accessibility and filtering SNP data. [10]

Special topics in Bioinformatics: Microarrays, DNA and protein microarrays. Bioinformatics in pharmaceutical industry, Drug discovery and designing. [06]

Text Books:

1. Tiago Antao, "Bioinformatics with Python Cookbook", PACKT Publishing, Birmingham, UK, 2015.

2. Z. Ghosh and B. Mallick "Bioinformatics: Principles and Applications", Oxford University Press, UK, 2013.

3. S.C., Rastogi, N. Mendiratta, P. Rastogi, "Bioinformatics: Methods and Applications (Genomics, Proteomics And Drug Discovery)" PHI Learning, 4th edition, 2013.

Reference Books:

1. Jin Xiong "Essential Bioinformatics", Cambridge University Press, 2012

2. B. Bergeron "Bioinformatics Computing", Prentice Hall Inc., 2015.

3. S. Ignacimuthu, s.j. "Basic Bioinformatics", Narosa Publishing House Pvt. Ltd, New Delhi, 2013.

DEIT-14708 Bioinformatics Laboratory (Elective-III)

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

Total Marks: 50

Prerequisites: DBMS

1. Knowledge of different biological database

   Protein and gene sequence data bases

   (NCBI, DDBJ, EMBL, SWISS PROT, PIR)

2. Information Retrieval from NCBI Genbank.

3. To install R and a brief introduction to R

4. R packages for bioinformatics: Bioconductor and SeqinR

5. Retrieving and reading genome sequence data using SeqinR

6. A sliding window analysis of GC content using R

7. To perform Sequence analysis of FASTA files using python.

8. Working with modern sequence formats using python.

9. **Mini Project** : By using various concepts of syllabus students 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).*

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DEIT-14709 Simulation and Modeling (Elective-III)

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

Total Marks: 100

Prerequisites: Fundamentals of Discrete Mathematics

Introduction: Introduction to simulation and modeling, Application areas, System and system environment, components of a system, Discrete and continuous systems, System models and its types, Discrete-event simulation, steps in a simulation study, simulation examples. Monte-Carlo method, types of system simulations, Real time simulation, stochastic variables, discrete probability functions, Proprietary and open source simulation software.   [6]

General Principles: Concepts in discrete event simulation, Event scheduling/ time advance algorithms, World views, List processing using dynamic allocation and linked list.   [4]

Statistical Models in Simulation: Terms and concepts, Statistical models, Discrete and continuous distributions, Poisson distributions, Empirical distributions, Little's equation.   [4]

Queuing Models: Characteristics of queuing systems, Queuing notation, Long-Run measures of performance of queuing systems, Steady state behavior of infinite and finite calling population models, Use of network of queues.   [5]

Random Number Generation: Pseudo random numbers, techniques of generation of pseudo random numbers, Tests for random numbers, Random variate generation, Maximum likelihood estimation, Confidence intervals and hypothesis testing, Stochastic processes and Markov model. [6]

Input Modeling and Output Analysis of a Single Model: Data collection, Identifying the distribution of data - histograms and quantile plots, Parameter estimation, Goodness of fit tests applied to simulation inputs, Verification and Validation of simulation models, Output analysis and measures of performance and estimation.   [6]

Comparison and Evaluation of Alternative System Designs: Comparison of two system designs, Sampling with equal and unequal variances, Common random numbers, Comparison of several system designs, linear regression, Random number assignment for regression.   [5]

Text Books:

1. Averill M. Law, "Simulation modeling and analysis (SIE)", Tata McGraw Hill India, 2013.

2. Jerry Banks, John S. Carson II, Barry I. Nelson and David M. Nicol, "Discrete- event system and simulation", Prentice Hall of India, 2015.

Reference Books:

1. Gabriel A. Wainer, "Discrete- event modeling and simulation: a practitioner's approach", CRC Press, 2009

2. David Cloud, Larry Rainey, "Applied Modeling and Simulation", Tata McGraw Hill.

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DEIT-14710 Simulation and Modeling Laboratory (Elective-III)

		L	T	P

Internal Marks: 30

External Marks: 20

Total Marks: 50

Internal Marks: 30   L   T   P

External Marks: 20   0   0   2

Total Marks: 50

Prerequisite: Knowledge of programming languages like C, C++, MATLAB etc.

1. Implementation of Basic Operations on Matrices.

2. Implementation of Chi-square goodness-of-fit test.

3. Practical implementation of Queuing Models.

4. Design Inventory System.

5. Implementation of Monte-Carlo Simulation method.

6. Analysis of Discrete and Continuous Distributions.

7. Generation of Random Numbers using Linear Congruential Method.

8. Generation of Random Numbers using Combined Linear Congruential Method.

9. Evaluation of System Design using Regression Analysis.

10. Simulate a network using any network simulator.

11. **Mini- Project:** By using various concepts of Simulation, 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-14711 Mobile Application Development (Elective-III)

| | L | T | P |

Internal: 40

External: 60   **3   1   0**

Total: 100

Prerequisites: Prerequisites: IT-14502

Introduction to Mobile Development: Brief History of Mobile: Beginning and evolution, Mobile ecosystem: Operator, Network, Devices, Platforms, Operating System, Application Frameworks, Types of Mobile applications, Seven rules for developing mobile strategy [5]

Android Development Environment : Introduction to android, Advantage of Android over other development environment, Android execution environment, Components of android application, Android activity and service lifecycle, Android 7.0 nougat and comparison with older version, Assembling android 7 development workstation, Downloading and installing Android Studio2, Introduction to Android Studio IDE.   [6]

Android User Interface Design: XML Naming scheme, XML syntax, XML Referencing, XML constants, XML Styles, XML Colors, View Group Class, View Class, Activity Class, UI Design from scratch: Checkbox, TextView, Button element to interface, Error elimination using XML Editor, Working with Relative, Linear, Table and Grid Layouts, Understanding Activity Life Cycle.   [8]

Apps Interactivity in Android: Android Fragment: Fragment Class, Fragment Life Cycle, Android Intent Class: Intent types, Intent Filters, Instantiating Intent Object, Android Context Class, Event Processing: Events, Event Listener, Event Handler   [5]

Persistent Data Storage: SQLite: Android Built in SQLite content provider, Modifying data using your android application, Creating basic activity, Configuring manifest, Packaging and managing SQLite with android app   [5]

Android Services and Threads: Android service class: Controlling services, Spawning process, Process Life Cycle, Thread Caveats, Background Processing Services   [3]

Android Security and Debugging: Requesting permissions, Creating custom Permissions, Securing application for publication and execution, Tools for debugging, Eclipse Java Editor:

Java errors, Debugger, Logcat, Android Debug Bridge (adb), DDMS: Dalvik Debug monitor service, Traceview   [5]

Text Books:

1. Brian Fling, "Mobile Design and Development", First Edition, O'Reilly, 2009.
2. Rick rogers, John Lombardo, Zigurd Mednieks and Blake Meike, "Android Application Development", First Edition, O'Reilly, 2009
3. Wallace Jackson, "Android Apps for absolute beginners", Apress, 4th Edition, 2017.

Reference Books:

1. Grant Allen, "Beginning Android Get Started building apps for android platform", Apress, Fifth Edition 2014
2. Raimon Raflos Montane, Laurence Dawson, "Learning Android Application Development", Packt Publishers, 2014
3. Jerome F. DiMarzio, "Beginning Android Programming with Android Studio", 4th edition, Wrox Publishers, 2016.
4. Antonio Pachon Ruiz, "Mastering Android Application Development", Packt Publishers, Edition 2015

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DEIT-14712 Mobile Application Development Laboratory (Elective-III)

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

Total Marks: 50

Prerequisites: Web Technologies

1. To study design aspects of development environment like Android, iOS.

2. To setup Android studio2 and study its basic components.

3. To study various XML files needed for interface design

4. To implement different type of layouts like relative, grid, linear and table

5. To incorporate element of interactivity using Android Fragment and Intent Class.

6. To perform database connectivity of android app using SQLite

7. To implement the concept of multithreading using Android Service class.

8. To implement concept of permission and perform request for permission to access different hardware components of mobile.

9. To perform debugging and testing of android app using tools like Logcat, Android debug bridge, DDMS

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.

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-14713 Cloud Infrastructure and Services (Elective-III)

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

Total Marks: 100

Prerequisites: Web Technologies.

Overview of Computing Paradigm: Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Roots of cloud computing, Business driver for adopting Cloud Computing, Cloud Computing vs. Cluster computing vs. Grid computing.   [3]

Introduction to Cloud Computing: Cloud Types: The NIST Model, The Cloud Cube Model, Deployment models, Service Models, Benefits of Cloud Computing, Disadvantages of Cloud Computing, Role of Open Standards   [3]

Migration into Cloud: Introduction**,** Broad Approaches to Migration into Cloud, The Seven-Step Model of Migration into Cloud   [2]

Cloud Concepts and Technologies: Virtualization: Definition, Characteristics and benefits of virtualization, Virtualization and cloud computing, Types of virtualization, and Load balancing. Hypervisors, Multitenancy, Scalability and elasticity, Billing and metering of services, Application programming interfaces (APIs), and Service level agreement (SLA).   [9]

Cloud Architecture and Services: Cloud computing reference model architecture, Common cloud management platform. Cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Cloud-based services and applications: Cloud computing for healthcare, Energy systems, Transportation systems, Manufacturing industry, Government, and Education. Cloud deployment models: Public, Private, Community, and Hybrid cloud.   [9]

Security in Clouds: Cloud security issues and challenges, Cloud security reference model, Encryption techniques: Symmetric key encryption and Asymmetric key encryption. Identity and key management, Digital signature, Secure socket layer (SSL).   [6]

Cloud Computing Platforms: Study and comparison of various open source and commercial

cloud platforms. Open source cloud platforms: Openstack, Eucalyptus, and Nebula etc. Commercial cloud platforms: Amazon Elastic compute cloud (EC2), Google App Engine, and MS Azure etc. [8]

Text Books:

1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, "Cloud Computing: Principles and paradigms", 2011

2. Barrie Sosinsky, "Cloud Computing Bible", Wiley India Pvt. Ltd., 2013

3. John Rittinghouse, James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press Taylor and Francis Group,2010

4. Anthony Velte, Toby Velte, Robert Elsenpeter, "Cloud Computing: A practical Approach", Tata McGrawHill,2009

5. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper," Cloud Computing for dummies", 2009.

Reference Books

1. Kai Hwang , Jack Dongarra , Geoffrey C. Fox Distributed and Cloud Computing: From Parallel Processing to the Internet of Things. Morgan Kauffman 2011.

2. Jim Smith, Ravi Nair. Virtual Machines: Versatile Platforms for Systems and Processes. Morgan Kaufmann. 2005

DEIT-145714 Cloud Infrastructure and Services Laboratory (Elective-III)

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

Total Marks: 50

Prerequisites:

I. Use CloudSim Toolkit and do the following:

1. To create a datacenter with one host and run one cloudlet on it.

2. To create two datacenters with one host each and two cloudlets on them.

3. To create two datacenters with one host each and run cloudlets of two users on them.

4. To create a datacenter with one host and a network topology and run one cloudlet on it.

5. To create two datacenters with one host each and run cloudlets of two users with network topology on them.

II. Use CloudAnalyst Simulation tool and do the following:

1. Set up a simulation with one datacenter and one userbase.

2. Set up a simulation with multiple datacenters and multiple userbases in various regions of the world.

3. Use closest data center service broker policy and throttled load balancing algorithm to set up a simulation.

4. Configure the simulation tool to analyse the performance of social networking App.

III. Installation and configuration of Green Cloud simulation tool.

IV.   Developing and deploying applications on Google Cloud using Google App Engine.

V. Create own scheduling policy for allocation of jobs to the cloudlets keeping in mind the available load and resources. Embed this algorithm in the Cloudsim.

VI. **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).

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DEIT-14717 Compiler Design (Elective-IV)

Internal Marks: 40	**L**	**T**	**P**

Internal Marks: 40   **L T   P**

External Marks: 60   **3 1   0**

Total Marks: 100

Prerequisite: Knowledge of Theory of Computation

Overview of compiler-The structure of a compiler and its applications, Phases of Compiler, cousins of compiler, The grouping of phases, Compiler construction tools   [2]

Lexical Analysis: The role of a lexical analyzer, Input Buffering, specification of tokens, recognition of tokens, LEX, examples of LEX programs.   [5]

Syntax Analysis: Role of a parser, use of context-free grammars (CFG) in the specification of the syntax of programming languages, techniques for writing grammars for programming languages (removal left recursion, Left Factoring), non-context-free constructs in programming languages, parse trees and ambiguity, examples of programming language grammars. Top -down parsing- FIRST & FOLLOW sets, LL(1) conditions, predictive parsing, recursive descent parsing, error recovery. LR-parsing -Handle pruning, shift-reduce parsing, LR-parsing algorithm, SLR Parsing, CLR Parsing and LALR Parsing. YACC Specifications.   [15]

Syntax Directed Translations: Syntax-directed definitions synthesized and inherited attributes, dependency graphs. S-attributed and L-attributed SDDs, Bottom-Up evaluation S-attributed definition, Top Down Translations, Bottom up evaluation of inherited attributes.   [4]

Type Checking: Type systems, specifications of simple type checker, Equivalence of type expressions, Type Conversions, Overloading of functions and operators, polymorphic functions.[4]

Run-time environments: Source language issues, storage organization, storage allocation techniques, storage allocation strategies, parameter passing, symbol tables. Language facilities for dynamic storage allocation, Dynamic storage allocation techniques   [4]

Intermediate code generation: Intermediate languages, Declarations, assignment statements, Boolean expressions, case statements, back patching, procedure calls case statements.   [4]

Code Generation: Issues in the design of code generator, run time storage management, basic blocks and flow graphs, Register allocation and assignment, The dag representation of basic blocks,peephole optimization, generating codes from dags.   [2]

Text Books:

1. Alfred V. Aho, Ravi Sethi, Monica S. , Jeffrey D. Ullman, "Compilers Principles, Techniques and tools" Pearson Education, Second Edition, 2013

2. Research and Development Wing , New Delhi," Principles of Compiler Design", ITL Education Solution Limited. 2012

3. Santanu Chattopadhyay, " Compiler Design", PHI, 2005

Reference Books:

1. Dr. M. Jeseph, "Elements of Compiler Design", Luxmi Publications Ebooks, 2011

2. G. Sudha Sadasivam, "Compiler Design", Scietech Publisher, 2009

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DEIT-14718 Computer Forensics (Elective-IV)

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

Prerequisites: Networking; Databases; Web Systems

Computer Forensics: Computer Forensics Fundamentals**-** Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/ Employment Proceedings Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists.   [4]

Computer Forensics Technologies: Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised, Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls, Biometric Security Systems.[6]

Computer Forensics   Systems: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Biometric Security Systems, Homeland Security Systems. [5]

Computer Forensics Capture: Data Recovery: Definition , Data Backup and Recovery, the Role of Backup in Data Recovery, the Data-Recovery Solution, Hiding and Recovering Hidden Data.**;** Evidence Collection and Data Seizure: Need to Collect Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack.   [7]

Computer Forensics Evidence: Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene, Computer Evidence Processing Steps, Legal Aspects of Collecting and Preserving Computer Forensic Evidence; Computer Image Verification and Authentication: Special Needs of Evidential Authentication, Practical Considerations and Implementation. [7]

Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery; Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices; Reconstructing Past Events: Useable File Formats, Unusable File Formats, Converting Files. [7]

Networks: Network Forensics Scenario, a Technical Approach, Destruction of Email, Damaging Computer Evidence, and Tools Needed for Intrusion Response to the Destruction of Data, System Testing. [4]

Text Books:

1. Juhn R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", 2nd Edition, Charles River Media, 2005

2. Ali Jahangiri, "Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & It Security Experts", 2009.

Reference Books:

1. George Mohay, "Computer and Intrusion Forensics", Artech House, 2003.

2. "Computer Forensics: Investigating Network intrusions and Cyber Crime" (EC-Council Press Series: Computer Forensics), 2010.

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DEIT-14719 Optimization Techniques (Elective-IV)

Internal Marks: 40   **L   T   P**

External Marks: 60   **3   1   0**

Total Marks: 100

Prerequisites: Data Structures and Algorithms

Introduction to Optimization: Type of problems, Examples, Engineering application of Optimization, Formulation of design problems as mathematical programming problems, classification of optimization problems.   [5]

Classical optimization techniques: Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method- Multivariable optimization with inequality constrains – Kuhn-Tucker conditions. Basic descent methods, Newton Raphson's method [10]

Linear Optimization: Examples, formulation and applications, Basic Properties: Basic solution and extreme point The Simplex Method: The primal simplex method, the Simplex method in matrix form, the transportation simplex method Linear Optimization Duality: Farkas' lemma and alternative theorem, Primal, dual, and duality theory, Interpretation of the dual, Sensitivity analysis, Duality applications, the interior-point method: central path, potential function, primal-dual method   [15]

Nonlinear Optimization: Linearly constrained optimization: Examples and Applications, Optimality conditions, Solution algorithms. Nonlinearly constrained optimization: Examples and Applications, Optimality conditions. Solution algorithms.   [10]

Text Books:

1. K. Deb "Multi-Objective Optimization using Evolutionary", Wiley,2014.

2. Laurent El Ghaoui and Giuseppe C. Calafiore, "Optimization Models", Cambridge University Press, 2014.

2. K. Deb, "Optimization for Engineering Design – Algorithms and Examples", Prentice Hall India, 2012.

3. W.Forst and D. Hoffmann, "Optimization—Theory and Practice", Springer Science and Business Media, 2010.

Reference Books:

1. B.Guinen and J. Konemann, "A gentle Introduction to optimization" Cambridge University Press, 2013.

2. D. Belegundu and T. R. Chandrupatla, "Optimization Concepts and Applications in Engineering", Cambridge University Press, 2011.

3. Luenberger and Ye, Linear and Nonlinear Programming (3rd Edition) Springer

4. A. Antoniou, W.S. Lu, Practical Optimization, Springer (2007)

5. Rao S.S., Engineering Optimization: Theory and Practice, 4th Edition 2009

DEIT-14720 Multimedia Systems (Elective-IV)

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

Total Marks: 100

Prerequisites: Computing and Technology

Introduction to Multimedia: Multimedia, Components of Multimedia, Multimedia Research Topics and Projects Processing, content-based retrieval Networking, QoS End-Systems, User Interfaces Interaction, ubiquity devices.   [3]

Review of Signals and Systems: Definition of signal, Discrete-time signals and systems, Sampling theorem Quantization, Transform domain analysis, FFT, STFT, Wavelet. [3]

Audio: Audio representations, Formats and standards, Frequency Masking vs. Temporal Masking Speech processing Synthesis, recognition, Audio Compression, DPCM, ADPCM, LPC, CELP. [6]

Entropy Coding: Data storage, Data redundancy, Lossy and lossless compression, Entropy encoder, Predictive coding, Huffman Coding, Lempel-Ziv-Welch, Arithmetic Coding.   [5]

Image, Acquisition and Representation: Color Depth Palette, Halftone Image Resolution, Histogram, Contrast High-Dynamic-Range (HDR) Bracketing, Image, Enhancement, Image Noise, Gaussian Smoothing, Mean and Median Filter, Sharpening, Edge Detection, Despeckle.   [6]

Compression: Encoder, Decoder, Color Space Transformation, Subsampling in color space, Discrete Cosine Transform (DCT), Quantization Matrix, Compression Ratio, Blocking Artifact.   [5]

Video: Video Display Progressive, Interlaced Analog Broadcast TV Systems NTSC, PAL Analog Color Video, Composite video, S-Video, Component video Digital Video (HDTV) DVI, HDMI, Display Port.[5]

Multimedia (Networking) Systems: Standalone vs. Networked, Live vs. Orchestrated, Multimedia system building blocks, Real-time multimedia, system architecture, Quality of

Service (QoS), Error concealment, Prioritized Encoding, Overlay networks. Packet-loss, Congestion, Unicasting and Multicasting Streaming protocols.   [6]

Multimedia Applications: DVB, Interactive TV, Internet-TV, IPTV E-Learning ,Human Computer Interface, Multimedia Home Platform (MHP), Multimedia Information Retrieval System, 3D Technologies.[6]

Text Books:

1. Z-N. Li, M.S. Drew, Fundamentals of Multimedia, Pearson Prentice Hall ,Upper Saddle River, NJ.

2. R. Steinmettz and K. Nahrstedt, Multimedia: Computing, Communications and Applications, Prentice Hall.

3. R. Steinmettz and K. Nahrstedt, Multimedia Fundamentals: Media Coding and Content Processing, Prentice Hall.

4. K. R. Rao, Z. S. Bojkovic and D. A. Milanovic, Multimedia Communication Systems

Guru Nanak Dev Engineering College, Ludhiana
Department of Information Technology
Scheme 2014

DEIT-14721 Corporate IT Management (Elective-IV)

Internal Marks: 40   **L   T   P**

External Marks: 60   **3   1   0**

Total Marks: 100

Prerequisite: Basics of Computers

Basic concepts :Understanding information systems - data and information, creating information, quality of information, categorization of corporate information systems.   [5]

IT management: Overview, IT infrastructure, IT management disciplines, IT managers, disadvantages of IT management.   [3]

Acquiring and developing BIS :Methods of software acquisition - initiating system development, BIS acquisition, rapid application development.   [5]

Corporate Project Management : project management process and methodology, System Analysis, System Design, Implementation and Maintenance. Case Study: Falling at the final hurdle. [4]

End user computing: End user IS services, managing network services, end user development, providing end user services, Case Study: Using network computers to reduce the total cost of ownership. [4]

Managing E-business: E-business strategy and analysis, strategic analysis, strategic objectives & strategic implementation, managing e-business infrastructure.   [5]

Managing Information Security: Need of control, control strategies, types of controls, techniques of controlling information systems, threats related to internet services. Case Study: Computer Viruses [4]

Ethical, legal and moral constraints on information systems: Management issues, Professionalism, ethics and morality, code of conduct, social issues, moral issues, legal issues, software piracy. [5]

Text Books:

1. S.S Dubey , "IT Strategy and Management" PHI Learning , Third edition,2016

2. George W.M Reynolds, Ralph M. Stair, Thomas Chisney, "Fundamentals of Business Information Systems" , Course Technology CENGAGE Learning, 2008

Reference Books:

1. Paul Bocij, Dave Chaffey, Andrew Greasley, Simon Hickie , "Business Information Systems" ,Prentice Hall Second edition,2003

2. Patrick Mc Keown, Mark W Huber, James Norrie , "Introduction to Business Information Systems", Wiley Publications ,2007

DEIT-14722 Research Methodologies (Elective-IV)

	L	T	P

Internal Marks: 40

External Marks: 60　　　　　　　　　　　　　　　　**3 1 0**

Total Marks: 100

Prerequisites: Introductory course

Introduction: Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research. [5]

Defining the Research Problem: Define Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem. [3]

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan. [4]

Sample Design and Concepts : Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size. [6]

Methods of Data Collection: Collection of Primary Data ,Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Guidelines for Constructing Questionnaire/Schedule, Guidelines for Successful Interviewing, Difference between Survey and Experiment. [3]

Processing and Analysis of Data: Processing Operations, Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression

Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes. [8]

Interpretation and Report Writing : Meaning of Interpretation, Need of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Literature Survey, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Ethical issues related to publishing, Plagiarism and Self-Plagiarism, Oral Presentation, Mechanics of Writing a Research Report, Reference Management using Software like Mendeley and MS Word, Precautions for Writing Research Reports.[7]

Text Books:

1. C.R. Kothari, "Research Methodology Methods and Techniques", 2/e, New Age International, 2004.

2. Donald R. Cooper, Pamela S. Schindler, "Business Research Methods", 8/e, Tata McGraw-Hill Co. Ltd., 2006.

3. N G Das, "Statistical Methods" Combined Edition(Volumes I & II), McGraw Hill Education (India) Private Limited, 2008

4. Ranjit Kumar, "Research Methodology: A Step-by-Step Guide for Beginners", SAGE Publications Ltd; Fourth Edition , 2014

Reference Books:

1. Levin, R.I. and Rubin, D.S., "Statistics for Management", 7th Edition, Pearson Education: New Delhi 2001.

2. Zikmund, W.G., "Business Research Methods", 7th Edition, Thomson South-Western 2003.

3. Krishnaswami, K.N., Sivakumar, A.I. and Mathirajan, M., "Management Research Methodology", Pearson Education: New Delhi 2006.