Syllabus of 3rd Semester of Department of Information Technology for Batch 2014 Onwards
IT-14301 IT Methodologies

Internal Marks: 40
External Marks: 60
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, network devices and Internet troubleshooting commands, WWW and its applications.

2. Apply the knowledge of basic Internet Technologies and WWW like troubleshooting utilities, 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

**Reference Books:**

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IT-14302 Social and Professional Aspects of Information Technology

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

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**

**Text Books:**

**Reference Books:**


IT-14303 Data Structures and Programming Methodology

Internal marks: 40
External marks: 60
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.

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


Recursion: Recursive definition and examples of recursion, Tower of Hanoi Problem, tail recursion

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


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

Text Books:

Reference Books:
CS-14303 Digital Circuits and Logic Design

Internal Marks: 40  \hspace{1cm} \text{L \ T \ P} \\
External Marks: 60 \hspace{1cm} 3 \hspace{0.1cm} 1 \hspace{0.1cm} 0 \\
Total Marks: 100

\textit{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.

\textit{Detailed Contents:}

\textbf{Prerequisites:} Basic knowledge about capacitors, registers, inductors and semi-conductor devices.

\textbf{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.

\textbf{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.
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]


**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:**


Reference Books:
CS-14305 Object Oriented Programming using C++

Internal Marks: 40
External Marks: 60
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
Text Books:

Reference Books:
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 JavaScript 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 JavaScript 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.
IT-14305 Data Structures and Programming Methodology Laboratory

Internal marks: 30
External marks: 20
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.
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, counters, 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/Subtractor.

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.
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.
15. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
16. ADC Operations: Study of 8-bit ADC.
17. To conduct an experiment to store a set of data in RAM using IC2114.
CS-14308 Object Oriented Programming using C++ Laboratory

**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:

   $$ Y = \begin{cases} 
   2 & \text{for } x > 0, \\
   0 & \text{for } x = 0 
   \end{cases} $$

   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, authornname. 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.
IT-14401 Database Management Systems

Internal Marks: 40
External Marks: 60
Total Marks: 100

Course Outcomes:

After completing this course students will be able to

1. Apply knowledge of database system, NoSql 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


Relational Model


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:**

**Reference Books:**
2. SQL and PL/SQL - Sharad Maheswari Ruchin Jain - Firewall Media New Dehi First Edition 2010
8. Oracle for Professionals - Sharanam Shaw - Shroff Publishers and Disitributors - Third print Sep 2011
Course Outcomes:

After completing this course students will be able to


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]


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]


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

**Text Books:**

**Reference Books:**
IT-14403 Data Communication & Computer Networks

Internal Marks: 40  
External Marks: 60  
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 802 standards 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

Physical Layer

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:

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:

Reference Books:


IT-14404 Web Technologies

Internal Marks: 40
External Marks: 60
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

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:**


Reference Books:

IT-14405 Computer Architecture and Microprocessors

Internal Marks: 40  
External Marks: 60  
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.

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.

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

Reference Books:
IT-14406 Database Management Systems Laboratory

Internal Marks: 30
External Marks: 20
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.
CS-14406 Operating Systems Laboratory

Internal Marks: 30
External Marks: 20
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.
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.
7. Study and implementation of shell variables, shell keywords.
8. Implement conditional statements, looping statement and case statement in Shell programming.
9. Implement parameter passing and arguments in Shell programming.
10. Implement Shell programs for automate system tasks and report printing.
11. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.
IT-14407 Data Communication & Computer Networks Laboratory

Internal Marks: 30
External Marks: 20
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 topologies and their creation using network devices, cables and computers.
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
10. **Mini Project:** Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same.
IT-14408 Web Technologies Laboratory

Internal Marks: 30
External Marks: 20
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.
5. Creating web pages using PHP.
6. Setup of codeigniter framework and to study its different components.
7. Setup of wordpres 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

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. 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
IT-14501 Discrete Mathematics

Internal Marks: 40  
External Marks: 60  
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:**

**Reference Books:**
IT-14502 Programming in Java

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. 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


Reference Books

IT-14503 Theory of Computation

Internal Marks: 40
External Marks: 60
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 ε-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:**

**Reference Books:**
IT-14504  Human Computer Interaction

Internal Marks: 40
External Marks: 60
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]


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]


**Text Books:**


**Reference Books:**

IT-14505 Programming in Java Laboratory

Internal Marks: 30
External Marks: 20
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 ( )

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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

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**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).
DEIT-14508 Advanced Computer Networks (Elective-I)

Internal Marks: 40
External Marks: 60
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
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 .

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.

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.
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).


Text Books:

Reference Books:
DEIT-14509 Advanced Computer Networks Laboratory (Elective-I)

Internal Marks: 30
External Marks: 20
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.
10. Configuring Adhoc Network
DEIT-14510 Business Intelligence and its Applications (Elective-I)

Internal Marks: 40  
External Marks: 60  
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:**


**Reference Books:**


4. Data Mining Introductory and advanced Topics – Margaret H Dunham, Pearson Education, 2011
DEIT-14511 Business Intelligence and its Applications Laboratory (Elective-I)

**Internal Marks: 30**

**External Marks: 20**

**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)

Internal Marks: 40
External Marks: 60
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]


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

Reference Books:
DEIT-14513 Digital Image Processing Laboratory (Elective-I)

Internal Marks: 30  
External Marks: 20  
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).*
Guru Nanak Dev Engineering College, Ludhiana  
Department of Information Technology  
Scheme 2014

DEIT-14514 .NET Technologies (Elective-I)

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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


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, Typcasting, 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]


**Text Books:**


**Reference Books:**

1. NET Framework 2.0 Application Development Foundation by Tony Northup and Shawn Wildermuth, with Bill Ryan of Grand Masters, PHI. 2011

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

Internal Marks: 30  
External Marks: 20  
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 Framework 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).
DEIT-14516 Advanced Web Technologies (Elective-I)

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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.


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:

4. Git in Practice, Mike McQuaid, Manning Publication Co., 2015.

Reference Books:

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

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Course Outcomes:
After completing this course students will be able to

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

    **Note:** *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practical’s. Instructor may also frame additional Practical’s relevant to the course contents (if required).*
Syllabus of 6th Semester

of

B.Tech Information Technology

for

Batch 2014 onwards
IT-14601 Information Assurance and Security

Internal Marks: 40
External marks: 60
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


Text Books:

Reference Books:
IT-14602 Software Engineering and Testing

Internal Marks: 40
External marks: 60
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


[10]


**Text Books:**


**Reference Books:**

2. Ian Sommerville, Software Engineering, Addison Wesley, 2004
IT-14603 Probability and Statistics

Internal Marks: 40  

External marks: 60  

Total Marks: 100

**Course Outcomes:**

After completing this course students will be able to

1. Demonstrate 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.

**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.

**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:

Reference Books:
IT-14604 Software Engineering and Testing Laboratory

Internal Marks: 30
External Marks: 20
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

User Id: 
Password: 
OK Cancel

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
External Marks: 20
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).
DEIT-14607 Advanced Java (Elective-II)

Internal Marks : 40
External marks : 60
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 Concurrent 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]


Multithreading and Concurrency Utilities: Basics of Multithreading, The Concurrent API Packages, Using Synchronization Objects, Phaser, Using an Executor, The TimeUnit

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.

Exploring Swing: JLabel and ImageIcon, JTextField, The Swing Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTab...

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.


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.


Text Books

Reference Books
DEIT-14608 Advanced Java Laboratory (Elective-II)

Internal Marks: 30  
External Marks: 20  
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).
DEIT-14609 Big Data Analytics (Elective-II)

Internal Marks : 40
External marks : 60
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: What 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 (Namnode, Datanode, JobTracker, TaskTracker, etc.), Understanding Map Reduce, Working with files in HDFS, Basic HDFS commands, Introduction to Hive, Working with Hive. [10]

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]


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

Text Books:
3. Eric Siegel, Thomas H. Devanport, “Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die”, Willey 2016

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

Internal Marks: 30
External Marks: 20
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
   - HDFS file 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)

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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


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]


**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]

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

Text Books:


Reference Books:

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

Internal Marks: 30
External Marks: 20
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
4. **Mini Project:** By using various concepts of E-Commerce students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

**Note:** *It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*
IT-14613 Embedded Systems in C (Elective-II)

Internal Marks: 40
External Marks: 60
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
DEIT-14614 Embedded Systems in C Laboratory (Elective-II)

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

**Note:** *It is recommended that mini project allocation to students be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).*
DEIT-14615 Information Storage and Management (Elective-II)

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]


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

Text Books:
1. EMC Educational Services, “Information Storage and Management”, Wiley India, 2015.

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

Internal Marks: 30

External Marks: 20

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.
3. To configure OpenLDAP server in Linux
4. To configure the firewall using tools like OPNsense, pfSense, ipfire etc.
5. To illustrate the features of NAS using software like FreeNAS,
6. Mini Project: By using various concepts of syllabus, students are required to prepare a project in a group of two to three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate the project as well as have to give a presentation of the same.

Note: It is recommended that mini project allocation to students to be done within two-three weeks of the start of the semester. This is only the suggested list of Practicals. Instructor may also frame additional Practicals relevant to the course contents (if required).
OEIT-14601 IT Enabled Services

Internal Marks: 40
External Marks: 60
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


**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

**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.

**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.

**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 ITES, experience and Case studies of ITES- call centers, ERP, google.

**Text Books:**


**Reference Books:**

OEIT-14602 Management Information System

Internal Marks: 40
External Marks: 60
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]


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:

Reference Books:
Syllabus of 7th/8th Semester of B.Tech Information Technology for Batch 2014 onwards
IT-14701 Business Enterprise Application

Internal Marks: 40  
External Marks: 60  
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, Service 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:

Reference Books:
IT-14702 ICT in Agriculture and Rural Development

Internal Marks: 40
External Marks: 60
Total Marks: 100

Prerequisite: Fundamentals of Information Technology

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


Impact of Mobile 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]


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.

Reference Books

IT-14703 Engineering Entrepreneurship

Internal Marks: 40

External Marks: 60

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.

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.

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.

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.

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.

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.

Case Studies. Case studies related to successful entrepreneur

Text Books:

Reference Books:
IT-14704 Business Enterprise Application Laboratory

Internal Marks: 30
External Marks: 20
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 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 elicitation
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  
External Marks: 60  
Total Marks: 100

Prerequisite: Software Engineering


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]


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:**

**Reference Books:**
DEIT-14706 Agile Software Development Laboratory (Elective-III)

Internal Marks: 30

External Marks: 20

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).*
DEIT-14707 Bioinformatics (Elective-III)

Internal Marks: 40  
External Marks: 60  
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), BLOSUM (BLOck 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:


Reference Books:

DEIT-14708 Bioinformatics Laboratory (Elective-III)

Internal Marks: 30
External Marks: 20
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).
DEIT-14709 Simulation and Modeling (Elective-III)

Internal Marks: 40
External Marks: 60
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.

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


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.

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.

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.

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.
Text Books:


Reference Books:

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

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**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.
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)

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

Prerequisites: IT-14502


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:  

Reference Books:  
DEIT-14712 Mobile Application Development Laboratory (Elective-III)

Internal Marks: 30
External Marks: 20
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
External Marks: 60
Total Marks: 100

Prerequisites: Web Technologies.


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]


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:

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

Internal Marks: 30  
External Marks: 20  
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).
DEIT-14717 Compiler Design (Elective-IV)

Internal Marks: 40

External Marks: 60

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]


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:

Reference Books:
2. G. Sudha Sadasivam, “Compiler Design”, Scietech Publisher, 2009
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


Text Books:

Reference Books:
DEIT-14719 Optimization Techniques (Elective-IV)

Internal Marks: 40
External Marks: 60
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]


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]


Text Books:


Reference Books:
3. Luenberger and Ye, Linear and Nonlinear Programming (3rd Edition) Springer
DEIT-14720 Multimedia Systems (Elective-IV)

Internal Marks: 40  
External Marks: 60  
Total Marks: 100

Prerequisites: Computing and Technology


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


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


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...


Text Books:

**DEIT-14721 Corporate IT Management (Elective-IV)**

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**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:**

Reference Books:


DEIT-14722 Research Methodologies (Elective-IV)

Internal Marks: 40
External Marks: 60
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.

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


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.

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


**Text Books:**


**Reference Books:**